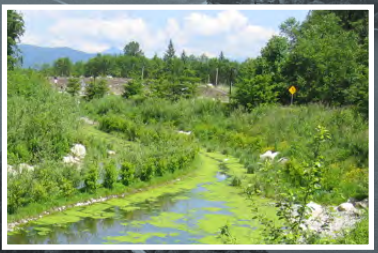
UniverCity
ON BURNABY MOUNTAIN

UNIVERCITY EAST NEIGHBOURHOOD PLAN

Development Guidelines and Requirements



A Sustainable Urban Community on Burnaby Mountain

March 21, 2014
Revision 2

UNIVERCITY EAST NEIGHBOURHOOD PLAN

Development Guidelines and Requirements

Phase 3:	Development Guidelines and Requirements Developed and administered by SFU Community Trust (The Trust)

A Sustainable Urban Community on Burnaby Mountain

March 21, 2014
Revision 2

Aerial view of Burnaby Mountain and the UniverCity East Neighbourhood Plan

SFU COMMUNITY TRUST

Gordon Harris
President & CEO

150 – 8960 University High Street
Burnaby, BC V5A 4Y6
info@univercity.ca

www.UniverCity.ca

Contents

A Vision for the Future

Over the next 25 years, the resident population of Burnaby Mountain will grow by approximately 10,000 to 11,000 people. As envisioned, all of these people will be citizens of a distinct, small community focused around the University. Schools, parks, gardens, residential infrastructure, transportation, retail facilities, office and workplaces, conference and meeting facilities, cultural amenities and other community resources will grow up within the Ring Road. Ownership of all land will remain with the university. The university will make properties available to developers through long-term leases controlled by design guidelines and zoning bylaws. An extremely user-friendly transportation infrastructure will encourage residents to live, work and play within the University Community. New transportation systems will facilitate the movement of people to and from the University to destinations throughout the Lower Mainland. Residents of the Simon Fraser University community will include students, faculty, scholars, staff, business people, families, retirees, and others who want to live in a community that is distinct from the rest of the Lower Mainland.

Excerpt from The University Community
- Vision Statement, SFU, 1998

Introduction

The new community at Simon Fraser University has been conceived as a complete community based on principles of sustainability. The land is subdivided into parcels that are leased to developers on a fully pre-paid basis for ninety-nine years. These parcels are leased for development as market, rental, mixed-use or low-income housing as negotiated by the Trust. This document is a compilation of development guidelines and requirements intended to set a direction for achieving sustainability as well as the desired design intent for the overall community. It includes general design criteria relating to all parcels, as well as more specific criteria for each development site and specific requirements that are conditions of the City of Burnaby zoning bylaw.

Guidelines are typically discretionary and a degree of flexibility is inherent in their interpretation. Requirements are mandatory to ensure that community objectives are being met.

This document is divided into nine sections:

Guidelines

1. The Guidelines for a Sustainable Community present a framework for the community.

2. The Design Guidelines provide general guidance applicable to all of the development parcels. They deal with use, building form, architectural expression and livability.

3. The Landscape Guidelines suggest an appropriate direction for the design of open spaces in terms of landscape character, private outdoor space, landscape design elements and sustainable design.

4. The Signage Guidelines suggest an appropriate direction for the signage of both residential and mixed-use developments.

Requirements

5. The Green Building Requirements set out mandatory sustainable building elements that must be met as a condition of zoning, as administered by the Trust.

6. The Green Building Bonus allows for an additional 10% density for green building features in excess of the requirements, as administered by the Trust.

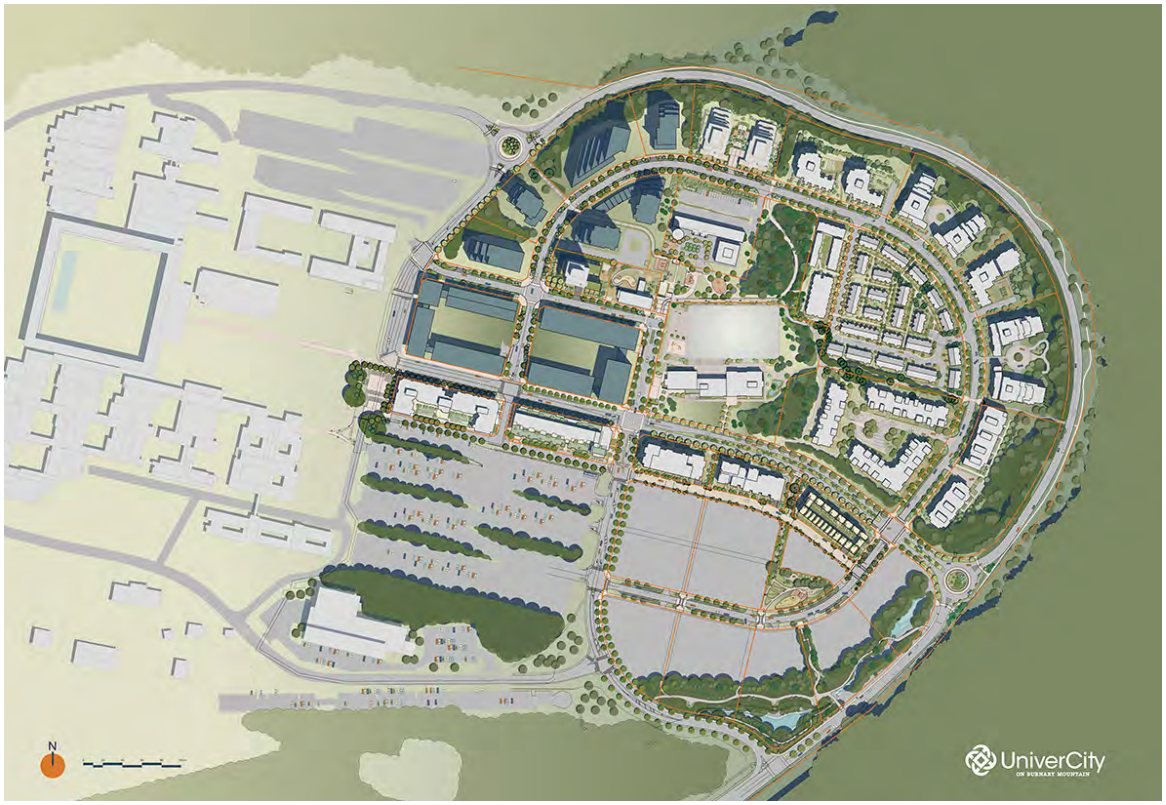
7. The Landscape Requirements set out specific specification criteria to ensure appropriate native and drought tolerant landscapes adapted to the Burnaby Mountain environment.

8. The Stormwater Management Requirements identify potential methods by which water detention requirements are to be calculated and accommodated on individual parcels.

The Approval Process

The SFU Community Trust will be responsible for vetting all development proposals prior to submission to the City of Burnaby for Preliminary Plan Approval (PPA) and at identified times throughout the approval and development process as specified in specific sections of this document. The Trust will retain a coordinating design architect and landscape architect to assist the Trust in achieving the goal of a comprehensively planned community designed to a high standard of both architectural and environmental achievement. The Trust will retain a green building consultant to verify and provide approvals for the green building requirements to provide advice on award of density bonus.

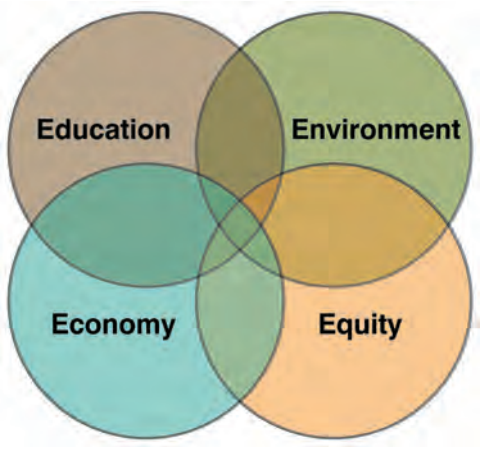
Submissions for the Trust review and approval for each parcel will be made prior to submission to the City for PPA and the Building Permit and as required within each section of this document. Drawing requirements will be consistent with those mandated by the City of Burnaby.



Towards a Sustainable Community 1.0

1.1 Principles

From the inception of the planning for UniverCity, the Trust and Simon Fraser University have been committed to the creation of a more sustainable form of community development on Burnaby Mountain. Ten working principles were developed as a framework for the planning, design, and development process. In no particular order, they fall under four themes: education, environment, economy, and equity. The plan for the new community strives to integrate and balance these four themes.



Education

- Enhance university life, academic structure and activities;
- Create a model sustainable community that educates and inspires.

Economy

- Maximize the long-term value of the Endowment Fund;
- Encourage opportunities for commercial and community economic development.

Equity

- Create a healthy, safe, livable and complete community;
- Provide an appropriate mix of housing types and tenures.

Environment

- Provide a full range of transportation choices;
- Preserve and improve the natural heritage of Burnaby Mountain;
- Design buildings and public spaces that respond to local context;
- Provide sustainable, cost and resource efficient infrastructure and buildings.

1.2 The Trust Initiatives

The SFU Community Trust is confident that a sustainable community will offer many benefits for new residents and for the developers creating new homes on Burnaby Mountain. This section of the Development Guidelines reviews those actions being initiated by the Trust in response to these principles. The remainder of Part 1 sets out the Design Guidelines in specific detail. Part 2 sets out specific Green Building, Landscape, and Stormwater Requirements to be undertaken by the developers of each of the parcels to further contribute to a more sustainable community.

Education

- Future residents will have access to a full array of educational facilities including two new elementary schools to be built within the community; a recently completed secondary school, Burnaby Mountain Secondary, at the bottom of the mountain; and the campus of Simon Fraser University;
- Revenues derived from the development will be placed into an endowment for research and teaching;
- The community development will be used as a research opportunity to “go tell it on the mountain” and educate not only students, but also residents, the development community, and the broader public.

Economy

- The Trust is investing in a high quality infrastructure to create a variety of attractive development parcels for long-term lease;
- The Trust will exercise a high degree of control over the High Street commercial space to create an attractive, viable town centre, along with community economic development opportunities;
- The plan creates opportunities for high tech, knowledge-based employment for both the university and new community residents.

Equity

- The Trust has developed an overall plan and development guidelines which will bring life to streets and public spaces;
- The plan incorporates CPTED (community protection through environmental design) principles in the design of the streets and open spaces;
- The overall design and variety of public spaces will maximize opportunities for social interaction;
- The plan incorporates a wide range of commercial spaces and services, along with community and recreational amenities, resulting in a complete community;

- The plan results in a broad choice of housing forms, including townhouses, stacked townhouses, low and mid-rise apartments and live-work units;
- The development criteria for the various parcels will result in a range of unit sizes and affordability, including secondary suites in up to 50% of the units in each parcel.

Environment

- The community will be served by a multi-modal transportation system, including bus routes throughout the region, a shuttle bus connecting to the Millennium SkyTrain line, and a network of bicycle and pedestrian pathways;
- Cooperative car and bicycle ownership arrangements along with car-pooling will be facilitated by the Trust;
- The plan protects and enhances environmentally sensitive areas, along with riparian corridors and urban wildlife habitat;
- A comprehensive tree preservation and management program has been implemented, resulting in “green fingers” through the development;
- The development guidelines result in forms of development which will respond to the form and micro-climate of the mountain;
- A comprehensive and innovative watercourse protection and stormwater management system has been designed and developed for the community;
- A comprehensive set of green building and landscape requirements have been developed to ensure that the building and site are respectful to the preservation of the environment and ensures sensitive development standards.

Part 1 - Guidelines

This part of the Design Guidelines identifies the development guidelines that will shape the design, form, and aesthetic of UniverCity and to ensure a consistency in development while still allowing for diversity and creativity. Guidelines are administered and reviewed by the Trust and may be amended from time to time. Guidelines are not a required component of the CD Bylaw developed by the City of Burnaby, but are evaluated against every development proposal by the Trust and/or the Trust’s consulting team.

The Guidelines consist of three components:

1. Design Guidelines
2. Landscape Guidelines
3. Signage Guidelines

Design Guidelines 2.0

2.1 Intent

The design guidelines contained in this section are to be used in conjunction with the City of Burnaby Official Community Plan and Zoning Bylaw. The CD comprehensive zoning will govern the development of the parcels. The guidelines will ensure that the design of individual development parcels is compatible with the overall design concept prepared for the UniverCity East Neighbourhood. They will be administered by the SFU Community Trust. However, they will also assist the City of Burnaby in the review and evaluation of plan applications for individual parcels.

The design guidelines strive to ensure that new development is also compatible with the design and character of the existing campus of Simon Fraser University, while providing an appropriate residential scale for the neighbourhoods. The new community has been planned to consist of a “family” of buildings that possess similarities in style, texture and colour rather than competing, or highly-stylized, architecture. At the same time, diversity is desirable and considered an important characteristic to add variety and to avoid monotony. **The new community should be contemporary and modern, and not be designed to reproduce another era or another place.** It is important that the final community not feel like just a big project. It should express individuality and allow its character to change over time but within a master-planned, design framework.

2.2 Planning and Design Principles

In planning the Burnaby Mountain Community several general principles formed the foundation for the work leading up to the development of the plan for the UniverCity East Neighbourhood.

In addition, there are key design principles that relate directly to the development of individual parcels. These ten principles aspire to ensure that new buildings relate to both the existing campus and to the natural surroundings.

2.2.1 Plan a complete community through the inclusion of a wide range of new land uses and sharing existing facilities of the university.

2.2.2 Create strong links with the nature of the site - its topography, watercourses, trees and magnificent views.

2.2.3 Pay careful attention to the mountain climate in the design of new buildings to acknowledge the higher levels of rain, snow and fog that can occur here.

2.2.4 Provide opportunities for housing choices for students and others wishing to live in the new community through a range of housing types and tenures.

2.2.5 Reduce auto dependency by integrating new developments with public transit and a network of bicycle and pedestrian routes through the community.

2.2.6 Foster a sense of community through development that animates public streets and places such as the High Street and Town Square at the "heart" of the campus/ community interface.

2.2.7 Ensure that new development relates to the linear, axial pattern of the SFU campus and its architecture.

2.2.8 Design with nature by retaining significant trees on sites, integrating "forest fingers" between developments and planting indigenous species.

2.2.9 Adopt sustainable strategies including on-site stormwater management and green building design in new construction.

2.2.10 Create a distinctive architecture that unites both urban and natural responses to the site and defines the new community by a "family of buildings".

View of Town Square

2.3 Use and Activity Guidelines

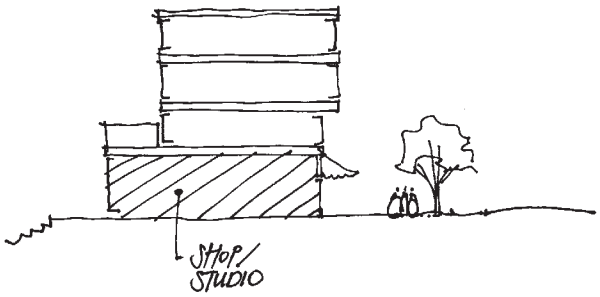
Several guidelines are included to achieve a broad range of uses and activities to ensure both a more vibrant community life and urban animation.

2.3.1 Mix of use

To insure vitality and diversity in the community, the CD comprehensive zoning identifies opportunities for a mix of uses in the new community including retail, office, restaurant and academic space in addition to residential. Integrating these uses into the same building adds vitality to the community.

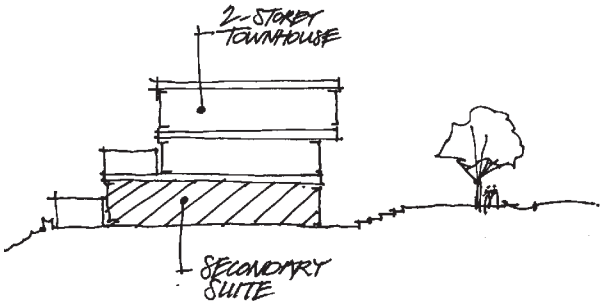
2.3.2 A central shopping area

A variety of retail stores will be provided in a central location, along High Street at UniverCity. The retail mix should include uses such as a food store sized to serve the East Neighbourhood, a pharmacy, restaurants, a video outlet, a bookstore, and a financial institution. Outdoor retailing is encouraged in the Town Centre area. These developments will be determined through independent CD zoning as the population grows and there is a market demand to support them.



2.3.3 Small-scale, commercial neighbourhood

Areas may be included in building designs to provide spaces to serve as home offices and studios under the “Home Occupation” provision of the zoning bylaw. In the case of townhouses, the ground floor, with a direct relationship to the street, may afford a separate, office address. The opportunity may also exist for the ground floor space of buildings to be used for small galleries, arts and crafts and retail shops at key locations compatible with a residential neighbourhood, subject to specific CD zoning. Commercial uses of this type would be limited to 50 square metres in area and located on the ground floor only. Bed and breakfast use may be considered as a home occupation subject to any required zoning amendment.

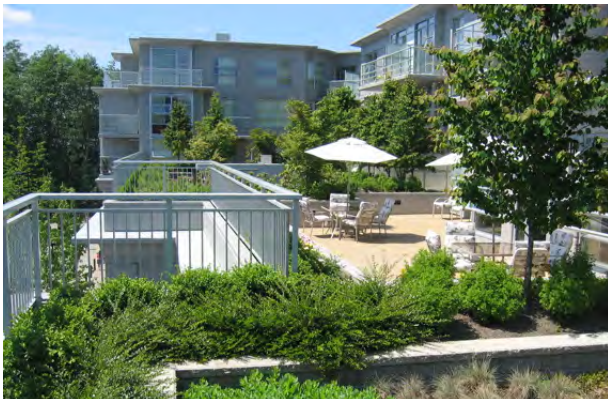


2.3.4 Housing for University community

P11e and CD zoning permits innovative approaches to the design of dwelling units to create rental suites for students, university staff, and faculty in up to 50% of the units in each development. For example, townhouses may be designed with lower levels with separate entries to allow for secondary suites. Self-contained suites in apartments may have an additional private entry from the corridor to create a “lock-off” suite.

2.3.5 Amenity Spaces

Individual projects should include amenity spaces for the residents. These areas should relate to a communal space for outdoor activity or offer an attractive view. Alternatively, amenity spaces could be related to a rooftop terrace. Amenity spaces will be excluded from the floor area calculation for a parcel.

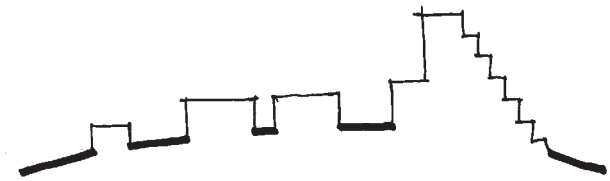


2.4 Building Form Guidelines

These guidelines define the elements that will lead to an appropriate overall scale and massing of development in the UniverCity East Neighbourhood. The primary objective is to produce an overall form compatible with the linear and the horizontal nature of the campus, allowing for individual expression in new projects, while ensuring that the overall development reads as a “family” of buildings.

2.4.1 Building height gradient

Buildings in the UniverCity East Neighbourhood will range from two storeys for some street-fronting townhomes to twenty storeys for important landmark sites. Buildings with a greater height along the street frontage are generally located along the northern edge of University Crescent and the southern edge of University High Street where views will be maximised for all development parcels. Building height does not include elevator and mechanical penthouses. Parking levels above existing grade will be counted as part of building height.

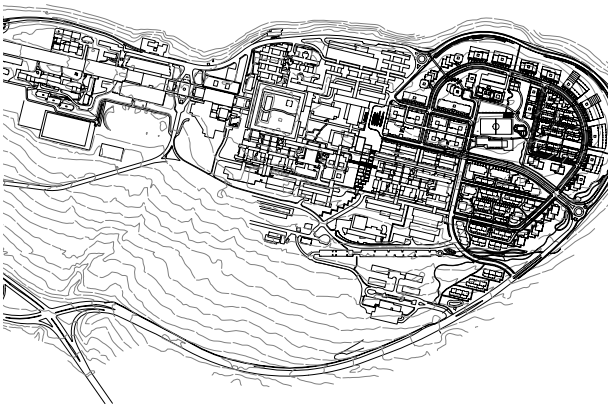


2.4.2 Terraced buildings

Terraced buildings are encouraged, given the predominance of this form within the campus and the topographic nature of Burnaby Mountain. Terracing will increase the sense of hill-town in the overall development. Building terraces can be either single floor or double floor increments.

Ground floor slabs should also terrace along sloping parcel frontages to ensure a better grade-oriented relationship of the building to the street, and to avoid high walls in the landscape.

Roofs and terraces in a stepped building should be used where practical, for private and communal outdoor patios, decks, and gardens. Green roofs are encouraged as a means of retaining stormwater from smaller storm events and to add visual interest.



2.4.3 Building orientation

Most buildings should generally align with the orthogonal grid of the University campus. The exception are the podium levels of those buildings forming the curve of University Crescent. The edge of this curve is to be defined either through curved buildings, or through a finely-stepped plan configuration.

All buildings should be oriented to reduce energy requirements for lighting, heating and cooling, and ventilation.

Building orientation should take into consideration the maximization of views for as many units as possible, as well as for the preservation of longer view corridors across the Slopes Neighbourhood to the south, east and west.

Orientation and views should be illustrated in plan.

2.4.4 Street relationship

All buildings should relate directly to the streets on which they front. This is assured through the specification of front yard setbacks in the Parcel Specific Guidelines. In all cases, the setback will not exceed 7.5m to insure a strong streetwall and pedestrian environment.

Ground floor dwellings should address the street through the use of front door entrances, gates and entry courtyards. Porches, patios or decks should be designed to establish a semi-private zone in support of a “porch culture” along the street. Windows and balconies at upper floor levels should face outward, adding to a sense of safety and security for the public realm.

Entrances should create identity and a sense of address for buildings, dwelling units, and stores, and should strive to have an elevated finished floor of no less than 0.50 metres above the sidewalk grade for comfort and livability.

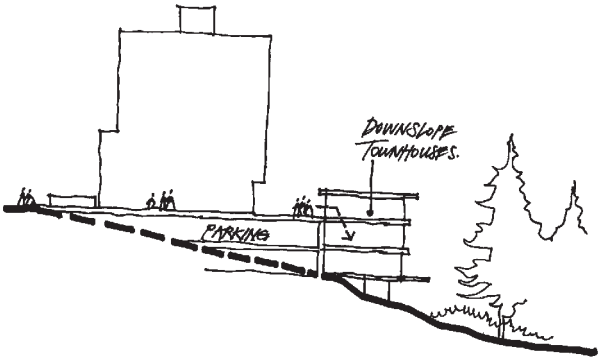
2.4.5 Building scale along the street

To create an appropriate scale along streets a two- or three-storey building base element is encouraged, unless otherwise specified in Parcel Specific Guidelines. Within this base, two- and three-storey “city-homes” are strongly encouraged with their primary entrance from the street. Floors above this base element should generally be set back a minimum of 2 metres.

The lower floors will form part of the streetscape, and are important to the public realm and pedestrian character of the street. Devices such as changes in material and fenestration scale and cornice lines should be used to achieve a comfortable pedestrian scale. Richer materials, more intensive decorative details, and lighting should be used to enhance the “close-up” view for pedestrians.

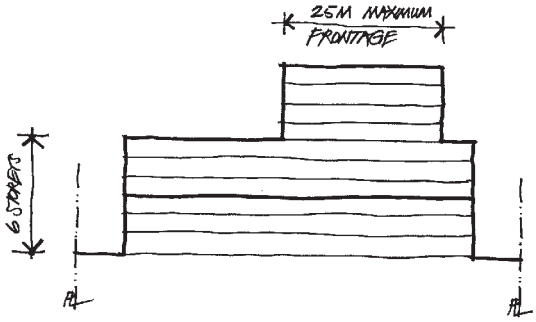
2.4.6 Downslope townhouses and apartments

The Neighbourhood Plan identifies opportunities for residential units to be placed “downslope” of higher building components. These may be either free-standing, or built against parking structures. These units should generally be accessed from the upland street through a residential courtyard. However, there may be the opportunity to address these units from the lower street on certain parcels.



2.4.7 Massing of taller buildings

Where building heights exceed 6 storeys, that portion above 6 storeys shall be limited to a frontage width of 25 metres. Where a single building is configured as a point block tower, up to 20 storeys in height, the floor plate shall not exceed 570 square metres in area, but these may be specified in the Parcel Design Guidelines.



2.4.8 Separation between higher buildings

Any portion of a building above 6 storeys in height should maintain a separation of 25 metres minimum from any existing or approved adjacent structure that is higher than 6 storeys.

Townhouses and ground-oriented units on separate development parcels that have facing front entrances shall have a minimum separation between building faces of 25 metres, or a minimum separation between property lines (front yards) of 10 metres if 25 metres is not available due to constraints of topography or for reasons of reduced front yard setbacks.

2.4.9 Stepped Corners

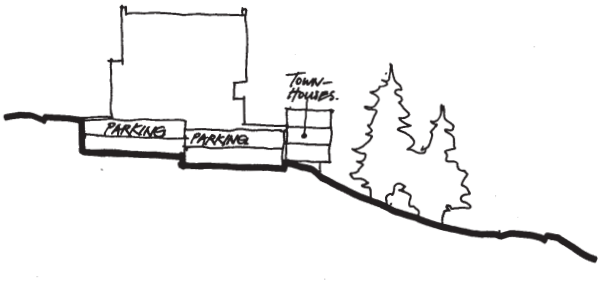
To reduce the bulk of larger buildings, a “softening” of corners in plan and elevation is encouraged and can be achieved by stepping the upper corners of buildings a minimum of 1.5 metres.

2.4.10 Usable outdoor space

A pattern of courtyards and enclosed spaces is inherent in the organization of the University campus. Residential projects should take advantage of this concept to form new spaces, particularly in townhouse developments. Courtyard spaces should be usable by building residents as communal outdoor spaces.

2.4.11 Rooftops for living

Roofs and terraces in a stepped building should be used, where practical, for private and communal outdoor patios, decks, and gardens. Green roofs are encouraged as a means of retaining stormwater from smaller storm events and to add visual interest.



2.4.12 Underground parking structures

All parking is to be located under new buildings, and generally meet side and rear yard setback requirements. In some situations it may be feasible for parking to extend to a side property line, subject to acceptable design coordination with the adjacent property. In the case of steeply sloping sites, some portions of the parking structure may project above the adjacent grades, subject to conformance with one or more of the following criteria:

- The maximum parkade height is 6.5 metres above existing, natural grades or 3.5 metres above new grades.
- New grades may be created through bermed land forms or structured, terraced planters.
- “Green walls” are encouraged utilizing evergreen planting on metal lattice structures.
- Down-slope townhouses built against parkade walls are encouraged, where practical.
- Quality wall materials, such as stone, should be used as architectural treatment on parkade walls.

2.4.13 Parking entrances

Ramps to underground parking should be perpendicular to the street that serves them, rather than parallel to the street frontage. Ramps should be concealed to the greatest extent possible within a building or through the use of overhead trellises and landscaping.

Full cut-off lights shall be used to avoid spill-out of lighting into public spaces and to mitigate concerns for night sky pollution, with a full consideration of CPTED principles.

No private garages in townhome developments shall be visible or directly accessed from the street that serves them. They shall be concealed by a streetwall building form with a single driveway access to entrance points at the rear of the units.

Where secured, visitor parking is provided in underground garages, access control shall be available at street level to avoid non-entering vehicles from having to back up ramps onto the street.

2.4.14 Definition of retail streets

The form of buildings along streets in the High Street area should strongly define the street space with a minimum scale of two storeys and a maximum height of five storeys. The upper three storeys should generally be set back a minimum of 2 metres from the two storey base element.

2.4.15 Narrow retail frontages

The individuality of retail stores should be expressed through many stores of narrow frontages, with high-quality storefront displays rather than wide, uninviting storefronts. Solid walls are to be minimized. Transparent storefronts and high-quality signage and illumination along the street frontage will result in a more active and inviting streetscape. Storefronts should generally be built to the frontage property line, except where small courtyards are included to add diversity and activity space to the streetscape, or where a setback is required to satisfy sidewalk widths.

2.4.16 Continuous weather protection

All retail or mixed-use frontages must provide continuous weather protection along sidewalks. This cover may take the form of fabric awnings or fixed, metal and glass canopies.

The minimum width of weather protection should be 2.0 metres with a ground clearance of 2.75 metres to underside of structure. (Refer to Signage Guidelines).

Any weather protection extending over a public street will require an encroachment agreement.

Weather protection extending towards the street shall be provided at all principal entries to apartment residential buildings.

2.5 Architectural Expression Guidelines

The following guidelines identify the important characteristics of building design to ensure compatibility with the Simon Fraser University campus and to establish an appropriate aesthetic for the East Neighbourhood. The goal is to achieve a balance between a consistency of design as well as individual expression in new developments. A more contemporary 'West Coast' design is encouraged for new developments rather than 'heritage reproduction' from another time and place.

2.5.1 Horizontal lines

The architectural expression of all new high-rise (greater than 4 storey) buildings should focus on the use of horizontal lines, contrasted with small vertical elements, similar to the approach taken on the University campus. Design elements should include projecting roofs and floor slabs, trellises, sun screens, extended wall planes and a horizontal expression in wall materials.

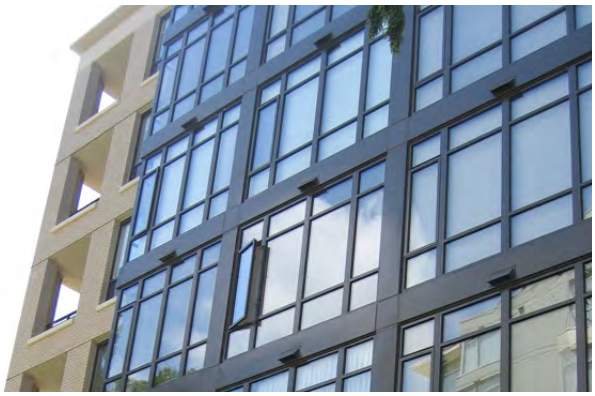
Low rise buildings (typically 4 storeys or less) should try to express horizontal lines, but this need not be a dominant design requirement in favour of other design elements.

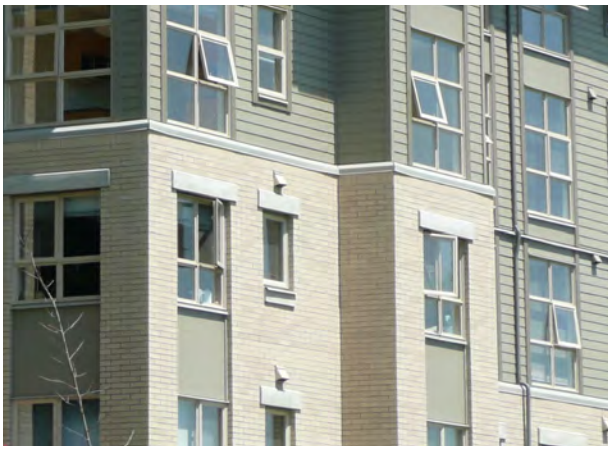
2.5.2 Design of windows

An emphasis should be placed on the use of glass to maximize natural illumination within buildings while taking advantage of the magnificent outward views from this setting. Windows should be operable to maximize natural ventilation as part of the energy design of new buildings.

The detailing of window elements is important to avoid a "tacked-on" appearance. The use of a rebate window, set into the façade, will create a more solid expression and increased shadow lines. Metal/aluminum and wood windows are encouraged, with vinyl windows not preferred.

Window walls shall not be used for vertical walls and should be limited in all buildings; spandrel panels are acceptable on apartment buildings.





2.5.3 Roof forms

Roofs on apartment buildings along University High Street and Tower Road shall be horizontal as an appropriate response to the expression established by the University campus.

Roofs on all other high rise buildings should generally be expressed in a horizontal fashion, contrasted with small vertical elements, similar to the approach taken on the University campus.

Roofs on townhouses, rowhouses, and smaller apartment buildings shall incorporate horizontal roofs and/or shallow sloped/pitched roofs to a maximum of 12 degrees to fit with the natural environment of the Slopes Neighbourhood and to accommodate green roofs whenever possible.

Curved or shallow sloped roofs (particularly within townhouses and rowhouses) can add variety and texture. Horizontal projections, including roof overhangs and trellis elements, should be used to contrast sloped roof forms.

2.5.4 Architectural appurtenances

Architectural appurtenances such as projecting roof lines or vertical elements may be added to provide visual interest, but shall be designed primarily to support green building initiatives, including light shelves, shading devices, solar panels, and ventilation fins.

Vents, mechanical equipment rooms and elevator penthouses shall be integrated with the architectural treatment of roofs and screened from view, preferably with planted or green roofs to blend more harmoniously with the Burnaby Mountain skyline.

Higher buildings should introduce articulation in the upper floors through the use of terracing and/or architectural appurtenances like projecting roof lines, trellises or vertical elements to create greater interest in the skyline.

2.5.5 Balconies

Balconies should be maximized in area to provide more usable outdoor space. They should be designed as an integral part of the building rather than appearing to be “tacked on”. Balconies may not be enclosed following construction. In the event that an enclosed “solarium” is preferred to an open balcony, it should be incorporated as part of the initial design of the building. Balustrades around balconies should be transparent either through the use of glass or fine metal detailing. Solid upstands are encouraged but should be limited to 300mm in height. Balconies shall have a minimum depth of 1.5 metres and a minimum area of 4 square metres to ensure livable space.

2.5.6 Building entrances

The sense of arrival to a building should be celebrated through the design and detailing of its entrance. Canopies extending towards the street providing weather protection should be provided at all principal entries to residential and commercial buildings.

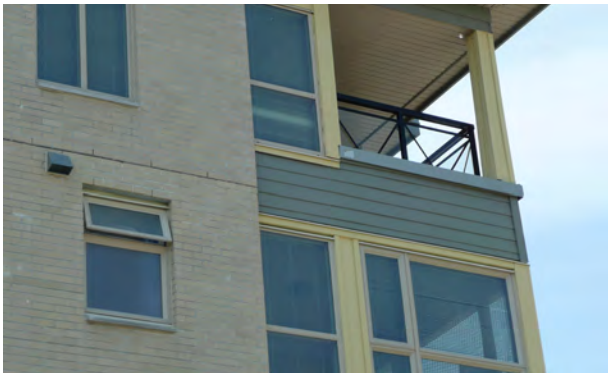
2.5.7 Structural Materials

The dominant structural material for all buildings over 4 storeys in height shall be concrete for reasons of durability, sound transmission, fire rating, and continuity with the campus design. Concrete should be of high fly-ash content whenever possible.

The dominant structural material for all buildings 4 storeys and under in height shall be wood, with a preference for cladding to be selected of sustainable materials.

2.5.8 Exterior materials

Cladding materials will vary by building type, and are expressly noted as mid/high rise (typically greater than 4 storeys) or low rise (typically 4 storeys and less).



Low Rise

Cladding materials may include brick, architectural wood products, metal panel, and hardiboard® (fibrous cement) with wood trim. Ground oriented units, townhouses, and rowhouses should be clad in either brick (in a varied palate of size and shape) architectural wood, or hardiboard®. Low rise apartment buildings may employ stucco as a primary cladding material for upper-storey units, as long as it is consistent with neighbouring developments. Window walls and high percentage of glazing should be limited, to ensure a better fit with the low-rise component.

Mid Rise/High Rise

Cladding materials may include in-situ concrete, pre-cast concrete, brick, stone, metal panel and wood. Ground-oriented and/or podium units shall endeavour to use brick in a varied palate of size and shape. Stucco should not be used as the principal wall material at lower levels of the building, but may be appropriate at upper levels. Vinyl siding, plastic, plywood, concrete block and metal utilizing exposed fasteners, are not permitted materials.

Following are more detailed criteria for individual materials:

In-situ concrete:

- Where used structurally, in-situ concrete should be expressed on the exterior of a building in the form of a grid, band, projecting slab or load-bearing wall.
- Concrete left exposed should have a sand blasted or bush-hammered finish.
- Concrete may be stained or painted, subject to colour selection.

Pre-cast concrete:

- Pre-cast concrete may be used as wall cladding or limited to details for window and door sills, base and fascia elements.

Brick:

- Brick is most appropriate especially when it is expressed as a load-bearing material.
- The use of precast concrete sills and other elements is encouraged in brick buildings to create a better visual connection to the university campus.

Stone:

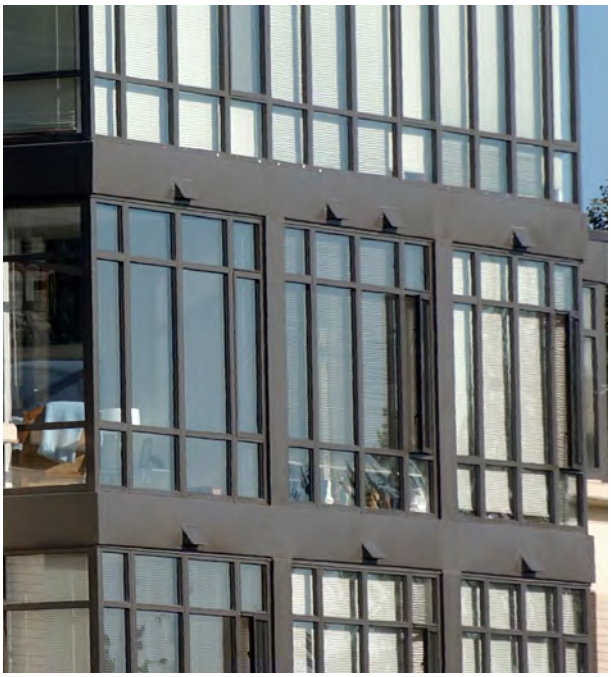
- The university is characterized by stone base elements in the lower walls of buildings. This material is encouraged in new developments for both building and landscaping walls.
- The type of stone selected may be split-face field stone, or split-face or smooth-cut squared or ashlar applications. Polished-face stone is generally not considered appropriate.

Wood:

- Siding should be of a re-sawn or smooth finish, not rough-sawn.
- Horizontal applications are preferable.
- Stain finish should be with a solid or semi-solid product.

Metal:

- High quality metal panel systems may be utilized as a wall and fascia material. Products are to be of an equal quality to Alucabond®.
- The finish of such panel systems can be anodized or factory-finish painted.



Steel and aluminum:

- Steel is an appropriate material for finishing details such as rails, grates, privacy screens, fascia and banding elements, trellises and canopies.
- Aluminum is most appropriately used for window construction, balcony railings and gates.

Stucco:

- Stucco is preferred as a secondary wall finish.
- Stucco should generally not be used at the lower levels of buildings, especially along streets and public rights of way.
- Construction detailing must prohibit water entry into the wall, roof and floor systems of dwelling units by adopting currently acceptable applications.

Hardi-Board®/Fiber Cement Siding:

- Can be a primary siding for townhouse and rowhouse projects.
- Styling should be limited to simple applications of smooth-faced lap-siding with no shapes or over-robust replicated wood grains.
- Can be used in vertical or horizontal applications, with horizontal applications typically the preferred choice.

2.5.9 Finishing techniques

Exterior materials should be finished in a manner that retains their colour and quality over time. For example, in-situ concrete left unpainted should be sealed to reduce water streaking. Staining and painting are acceptable subject to colour. Brick and stone finishes should also be sealed. Exterior wood requires a stain finish sufficiently solid to eliminate blackening over time. Scheduled maintenance is required to ensure that finishes last.

2.5.11 Signage

Residential building identification signage should be low-level and illuminated, indicating the street address in a discreet, graphic style. Signage should be closely related to the principal building entrance and generally placed in low wall elements. Commercial signage should add diversity and interest to retail streets (refer to Signage Guidelines).

2.6 Residential Livability Guidelines

Certain guidelines are of importance to ensure that the new community achieves a high standard of livability for residents.

2.6.1 Building setbacks

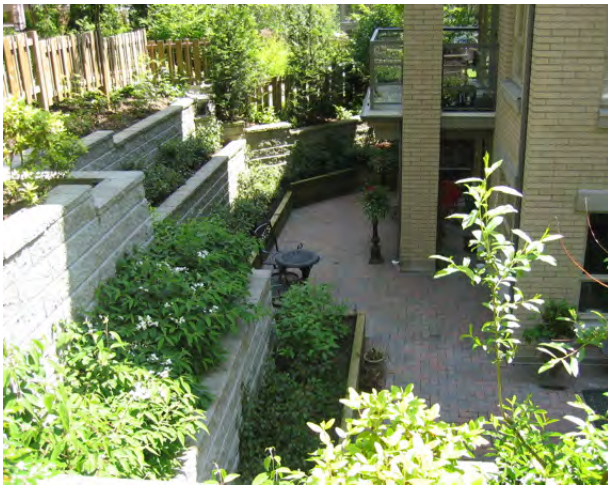
Privacy for grade level units should be enhanced through low walls, hedges and changes in elevation. Buildings should be separated by landscaping elements such as extensions of the natural forest along property lines, where feasible. Buildings should be designed to avoid overlook problems between units facing one another. Windows located in sideyards should take into account those located in existing or approved adjacent developments.

2.6.2 Children's play areas

Children of all ages shall have easy access to appropriately located, designed and landscaped outdoor play areas suited to their developmental and play needs.

Total outdoor play area shall be a minimum of 130 square metres in size and shall be visually accessible from amenity areas and residential units. Outdoor play areas shall be situated to maximize sunlight access. There should be a minimum of 2 hours of sunlight between the hours of 10:00 a.m. and 5:00 p.m. on December 21st. Adequate artificial lighting shall be provided.

These play areas may be exempted for user-specific projects as negotiated with and approved by the Trust.



2.6.3 Privacy of outdoor spaces

Each dwelling unit should generally have direct access to a private outdoor space in the form of a balcony, patio or roof deck with a minimum depth of 1.5 metres and a minimum area of 4 square metres. Adjoining balconies should be separated with a privacy screen. Where outdoor spaces are terraced, screening should be employed to minimise the extent of overlook from one patio to another.

A pattern of courtyards and enclosed spaces is inherent in the organization of the University campus. Residential projects should take advantage of this concept to form new spaces, particularly in townhouse developments. Courtyard spaces should be usable by building residents as communal outdoor spaces.

2.6.4 Identity

The ground floors of all buildings should be designed to express the individuality of units through architectural expression and the inclusion of entrance doors and windows addressing the street. Private outdoor spaces should be capable of being customized by residents through their choice of plant materials, potted plants, window boxes and furnishings.

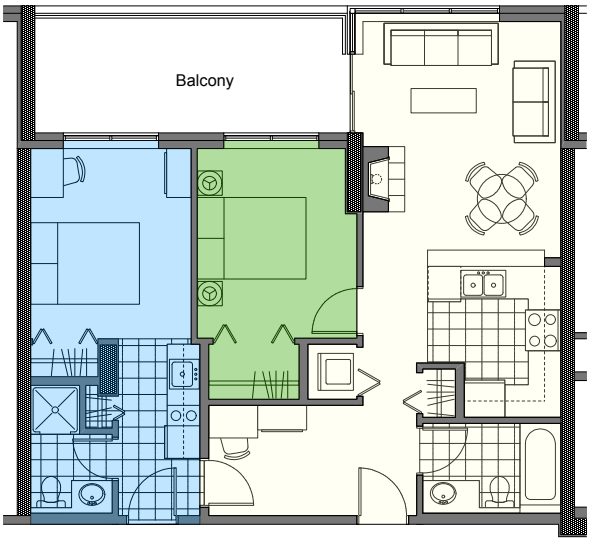
2.6.5 Safety and security

Residential developments and unit designs should be safe and secure from on-street access. Public and semi-private outdoor spaces should have some degree of overlook from residential units and good visibility from the street. Landscaping should be illuminated to enhance security. CPTED (Crime Prevention through Environmental Design) principles should be incorporated into building and site design.

2.6.6 Accessibility and Adaptability

Many older people prefer to remain in their home for as long as possible. To this end, housing units should be designed to be adaptable to the future needs of residents as they age. Particular consideration should be given to CMHC “Flex Housing” design guidelines.

Access to all residential common spaces and primary external circulation routes shall be designed to be accessible to those persons impaired by vision, hearing, or mobility. Street-oriented units elevated above the sidewalk grade may be excepted from this requirement, but shall provide opportunity for adaptability for accessibility requirements to not preclude aging in place and future user’s of these units.



Perkins & Company - Novo1

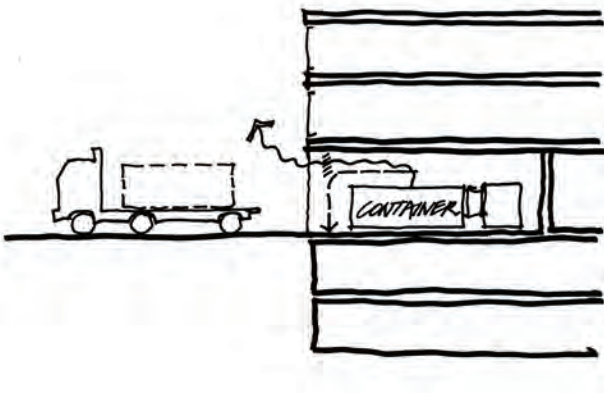
2.6.7 Solar orientation, Light, and Ventilation

80% of habitable rooms should have access to daylight and direct sunlight. Private and semi-private outdoor spaces should receive direct sunlight during most days of the year. Outdoor spaces related to north-facing units will require careful design for sun access.

Each external facing room shall have operable windows for increased natural ventilation.

2.6.8 Multi-level units

Inclusion of some two- or three-storey units, particularly at street level, will afford the opportunity for residents to have units that are more “house-like”. This unit type also lends itself to a choice-of-use for the ground floor such as a home office or studio space.



2.6.9 Recycling and garbage

Provision should be made within individual units, and in the main garbage holding area for each building, for a full recycling program for residential waste. Garbage holding areas should be contained within buildings either at grade or in underground parking areas. In no case should large garbage containers be left exposed to the street. These areas are to be properly ventilated, enclosed behind operable doors, and equipped for full sanitary management. Space in garbage holding areas should provide additional space for future compost collection.

2.6.10 Bicycle parking

The zoning has special requirements for bicycle parking. Provision should be made for secured bicycle parking for residential units and employees of businesses consistent with these by-law requirements. Visitor racks should be provided in all residential and commercial areas.

2.6.11 Comfort in underground parkades

To raise the sense of security and comfort within parking garages, they should be well illuminated, painted, have good view lines throughout, and make use of glazing in lobbies, stairwells and at entrances.

2.6.12 Telecommunications

The Trust is promoting Fibre to the Home (FTTH) technology for the new community. This will allow for maximum bandwidth type service for residents. An open-access utility consisting of a neutral exchange facility and a conduit system with a junction at each development parcel is proposed as part of the subdivision servicing. Although the Trust is promoting direct fibre optic cabling to each residential unit, service providers selected by the developer may opt for one or more cable types to support telephone, data and video services. These include fibre optic cable, high performance twisted pair copper cable, telephone-grade twisted pair copper cable or distribution coax cable.

Buildings are to be designed with a main communications room to be connected to the conduit in the street and designed so that any installed electronics have at least a 1 metre separation from a transformer. Additional communications rooms may be required in the building so that no cable run is greater than 90 metres. This limitation is a requirement of Category 5, Category 5e or better, twisted pair cable.

The main communications room is to be connected to the residential units by conduit of sufficient size to enable fibre optic cable to be installed from the communications room to each suite. The fibre optic pathways may require the protection of an inner-duct, if they are to share a conduit with other cable.

Landscape Guidelines 3.0

The overall landscape design intent of UniverCity is to respect and build on the indigenous character of the site atop Burnaby Mountain. To this end, significant tree stands at the edges of the neighbourhood are being protected by tree and riparian covenant areas. Other stands of trees have also been identified for protection and preservation both within development sites and public areas like parks and the school site.

Within individual development sites, easements and covenant areas are identified for tree retention and riparian protection along streams and public walkways traversing the community. Proponents are encouraged to retain trees in side and rear yard areas of sites, where practical. New landscape elements should complement the natural species of the mountain.

The following guidelines provide greater definition towards achieving this design intent and provide design information that supports implementation of the “Landscape Requirements” identified in Section 7.0 of this document.

3.1 Landscape Character

3.1.1 The landscape character throughout the UniverCity should fit with the overall native forest character of Burnaby Mountain.

- Existing stands of trees should be preserved to the greatest extent possible and protected during construction.
- Native plant species should be maximised.
- A mix of deciduous and coniferous species should be utilized.
- Large informal groupings of plants should predominate.
- Informal, naturalistic planting should be used adjacent to greenbelts, riparian corridors, and certain streetscapes with naturalized planting schemes.
- Flowering plants are appropriate to add colour.

3.1.2 The landscape of semi-private open spaces on residential parcels should consider landscape character and functional use issues.

- Shared outdoor areas should be programmed for use by residents and to promote social interaction among neighbours. Opportunities for small children’s play, seating, and outdoor eating should be considered.
- Sustainable landscape opportunities should be incorporated including communal gardening areas and composting.
- Both sunny and shaded areas should be provided for outdoor uses.
- Landscape elements should be designed to protect privacy of units and individual outdoor spaces.

- Views from windows of surrounding buildings should be provided into the semi-private open spaces, especially to areas designed for children's play.

3.2 Private Outdoor Spaces

3.2.1 Provision of ground floor private open space for all at-grade units is encouraged.

- Private outdoor patios for ground floor units should be large enough to permit patio gardening and use of table and chairs.
- Private patios and semi-private open space should be buffered through changes in elevation, hedges, low walls, or other measures.

3.2.2 Landscape elements should be used to provide visual buffers.

- Trees should be planted between closely located units for visual privacy.
- Plant material, berms, and hard landscape elements should be used to screen views to service areas, surface parking, parking structures, and utility boxes.

3.2.3 Landscape design should consider view management.

- Overlook from upper units should be screened with trees and other landscape elements.
- Plant material should be selected to achieve a mature scale that will limit future view impacts.
- Existing trees may be cut, trimmed and shaped in selected areas to allow views for residential units.
- Trees contained in protection and riparian covenant areas are subject to viewscape management according to procedures agreed to by the Trust and the City of Burnaby. This approach will permit selective pruning over time to preserve important view corridors from buildings.

3.3 Landscape Design Elements

3.3.1 Design of hard landscape elements should relate to the style, materials, and colours of adjacent architecture.

- Materials used in the landscape for walls, metalwork, and structures should share a similar design expression, range of colour, and style to the architecture on the same site.
- Landscaping walls should make use of stone or brick as a finish surface.
- Wall caps on stone walls should be stone, pre-cast or in-situ concrete and detailed to be flush with the wall below.

Pavers should generally be used in hard surface areas. Consideration should be given to the use of 'pervious pavers' which allow water to infiltrate through joints. The choice of paver should complement pavers being used for parking lanes and sidewalks within the road right of way.

3.3.2 Landscape features should mark entry points and special places.

- Flowering plants should be used for emphasis within the overall native landscape context.
- Landscape structures and public art should be used to provide focal points within the semi-private realm, especially adjacent to public spaces.
- Stormwater collection areas should be designed as landscape features and integrated into the open space program.

3.3.3 A landscape setback should be provided between public sidewalks and private developments. Within this area:

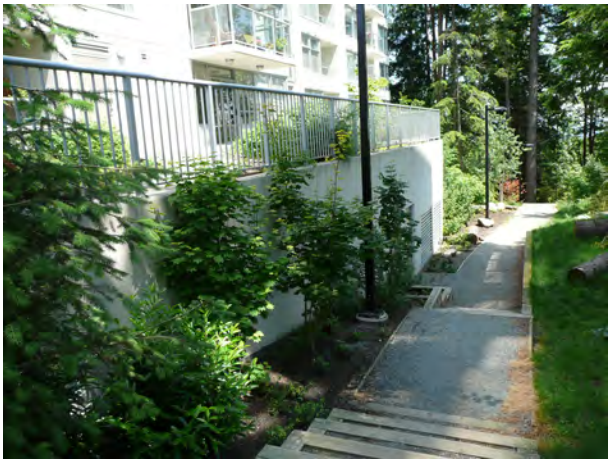
- Ground planting or grass should be planted adjacent to retaining/landscaping walls.
- Hedging should be used to screen private outdoor spaces.

3.3.4 Adequate but unobtrusive lighting should be provided throughout semi-private outdoor areas.

- Indirect lighting should be used wherever possible.
- Pedestrian-scale lights should be provided along walkways, especially between parking areas and unit entries.
- Warm coloured lighting should be used.
- Light spillage into private units should be avoided.
- Illumination shall be specified to ensure cut-off lighting for the preservation of night sky.

3.3.5 Site re-grading

In many locations re-grading of the site for street construction and underground parking structures will result in significant changes from the existing topography. These variations should be taken up with terraced landscaping, utilizing stone or concrete walls with planted areas, or through the use of planted berming.



3.3.6 Mitigating parking structures

Where underground parkades protrude above grade due to sloping topography, any exposed wall should generally be limited to 0.8 metres in height above grade, appropriately finished, and adjacent grade should be sloped and planted to soften the wall. The exception will be on steeply sloping sites.

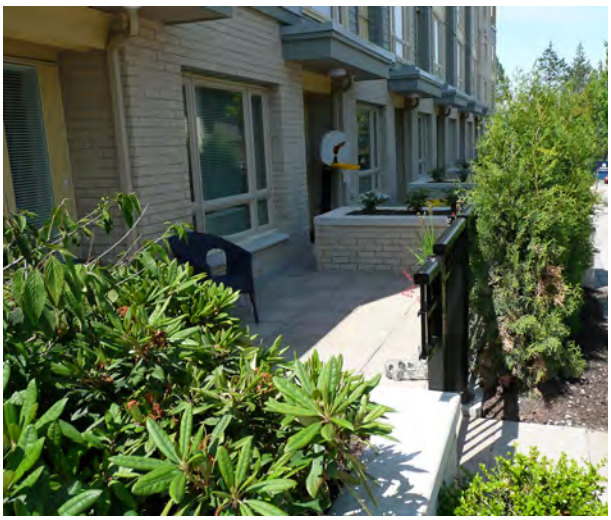
3.3.7 Sideyard privacy

Where developments have units with windows or outdoor patios facing a sideyard, privacy should be enhanced through the use of fences or hedges with a maximum height of 2 metres.

3.3.8 Walls and fences

Where walls, fences or hedges are installed adjacent to public roads and rights-of-ways, they should utilize stone, brick, concrete or planted hedges.

3.4 Sustainable Landscape Design



3.4.1 Sustainable landscape design is strongly encouraged.

- Landscape should be designed for low requirements for watering and energy used for maintenance purposes.
- Herbicide and pesticide use is not supportable.
- Ecological infrastructure should be revealed so that it is readily understood and becomes a part of everyday life.
- Plant selection should consider food for use by residents and to support wildlife.
- Integrated Pest Management (IPM) measures should be implemented for the maintenance of both public and private landscapes.
- Green roofs are encouraged to reduce impacts of first flush of storm water and reduce glare.

3.5 Tree Preservation Covenants

Tree preservation areas are defined by covenant on Development Parcels and are to protect groups of trees rather than individual trees that could be subjected to loss in wind conditions. The covenant prohibits disturbance during construction, except for the removal of dead, diseased, or hazard trees. The covenant permits the removal of trees every ten years to establish and preserve views from the development, subject to certain conditions as agreed between the Trust and the City of Burnaby.

3.6 Riparian Covenants

Riparian areas along headwater streams are defined by covenant on specific development parcels. While there are no fish in these streams, they support food, nutrient and filtration of surface flow and contribute to downstream fish habitat. To allow for flexibility in the design of the parcels, the covenant registered at the time of subdivision establishes a required riparian area, and minimum width. The final covenant boundary is to be defined and registered at the time of Preliminary Plan Approval (PPA). The covenant allows for the removal of hazard trees and the removal and pruning of other trees to establish views from a building on certain parcels. It also allows for the maintenance of views every ten years, subject to certain conditions, so as to not adversely affect the habitat function of the area.

Signage Guidelines 4.0

The purpose of these signage guidelines is to provide general direction to developers for the type and design of signs at UniverCity. The guidelines will be administered by the SFU Community Trust, as landlord of the overall project. The Burnaby Sign By-Law will also apply, and approval will be required by the City of Burnaby. Developers will submit a Comprehensive Sign Plan, consistent with City of Burnaby requirements, for landlord approval, prior to making application to the City.

4.1 Residential Signage

4.1.1 Location

Residential identification signage shall be placed close to the ground, in a horizontal format, either free-standing on supports or embedded in a building or landscaping wall.

4.1.2 Content

The graphic content of a residential sign shall be limited to one or more of the following elements:

- Building name
- Building logo
- Street address number

4.2 Commercial Signage Types

4.2.1 Fascia signs are permitted subject to the following:

- Individual letter type only.
- Three-dimensional structure to letters.
- Maximum letter size 300mm.
- Neon or halo-type rear illumination, or front illumination with billboard-type light fixtures.
- Back-lit, plastic fascia sign boxes are not permitted.

4.2.2 Signs on awning drops are permitted subject to the following:

- Maximum awning drop/skirt of 400mm in height.
- Painted or vinyl applied lettering, or incised lettering with applied backing.
- No rear lighting installed under awnings.
- No signage or graphic material on any sloped, curved or vertical portion of an awning other than on a drop or skirt as described above.

4.2.3 Hanging Signs are permitted subject to the following:

- Minimum clearance of 2.75 metres from grade.
- Maximum area of 0.5 square metres.
- Mounted in the middle one-third of the frontage of the premises under awnings and canopies.

4.2.4 Window Signs are permitted subject to the following:

- Maximum area 0.5 square metres.
- Paper, cardboard, plastic or fabrics are not permitted for window sign construction with the exception of cut-out vinyl, surface-applied to inside of glazing.
- No back-lit signs, displays, or product machines may be visible through store windows.
- Neon is acceptable for inside of glazing.

4.2.5 Building Directories are permitted subject to the following:

- Maximum area of 1.0 square metre.
- Located at the front entrance of building.

4.2.6 Commercial signage types that are not permitted include:

- Back-lit sign boxes.
- Billboards.
- Revolving signs.
- Banners, pennants, bunting, flags (other than national, provincial, municipal flags), balloons or other gas-filled inflatable devices.
- Roof signs.
- Changeable copy signs.
- Sandwich boards or any other temporary signs.

4.3 Storefront Transparency

Visibility into shops from the street shall be maintained and any solid signage, advertising or blackout panels placed against the inside surfaces of storefront glazing are prohibited. Clear glass shall be used for retail storefronts. Interior equipment, such as pop coolers that contain signage faces, shall not be directed towards storefronts and the street.

4.4 Number of Signs

A maximum of two signs are permitted per business street frontage. In the case of small-scale commercial uses located on residential streets, only one sign per business is permitted.

4.5 Materials

Exposed surfaces of signs may be constructed of any material with the exception of plastic, fibreglass, plywood and particle board, subject to approval.

4.6 Colour

Signage colour must be coordinated with the materials and colours of the building façade with which it is associated.

4.7 Lighting

Signs may incorporate front-lighting for their illumination and limited use of rear lighting provided it is restricted to:

- Individually-incised, plastic or glass letters or symbols. mounted in a solid, opaque sign face.
- Individual halo-lit lettering or symbols mounted on a solid, opaque background.
- Neon signs are permitted as a form of illuminated signage.

4.8 Height

Signs must be located no higher than the finished second floor level of a commercial building. Signs located over pedestrian areas or sidewalks shall have a minimum clearance of 2.75m from grade.

4.9 Lettering

The maximum permitted lettering size on any sign is 300mm. Symbols are encouraged, depicting the nature of the business occupation in the premises being signed.

4.10 Comprehensive Sign Plan

A comprehensive sign plan showing the size, type, location, and number of signs is required for each parcel which is zoned CD and not solely residential use. The design, placement and colour of the signs shall be coordinated with the architectural elements of the building and take into consideration the intent of the Design Guidelines. A Comprehensive Sign Plan is subject to the sign area and density requirements of the City of Burnaby Sign Bylaw and shall result in an improved relationship between various parts of the plan. All signs require City of Burnaby approval and the necessary municipal permits.

No permanent sign shall be placed on a parcel until a Comprehensive Sign Plan has been submitted and approved, in the first instance by the Trust and, ultimately, by the City of Burnaby.

Prior to approving a Comprehensive Sign Plan, the Trust shall consider:

- The conformance of the proposed sign(s) with the design guidelines.
- The consistency of the plan with signs on adjoining parcels.
- The recommendation of the Coordinating Architect for the new community.

Part 2 - Development Requirements

These Development Requirements have been established and are administered by the Trust as a supplement to the City of Burnaby's zoning requirements. The intent is to ensure that the design of individual development parcels is compatible with the overall design concepts for the Slopes and West Highlands Neighbourhoods. In addition to assisting applicants with their PPA, these Requirements will be used by the SFU Community Trust in the evaluation of each application. These required components must be met in order to successfully fulfill the conditions of development as set out in the CD zoning schedule. There are three required components:

1. Green Building Requirements (and Green Building Bonus)
2. Landscape Requirements
3. Stormwater Management Requirements

All building types are covered by these Requirements, unless otherwise specified within a specific requirement.

DEFINITIONS

Applicant: An individual, company, or developer who is undertaking the development approval process for building development at the local municipality.

Approved Green Building Consultant: Any professional consultant that has experience in green building design, construction, or commissioning and can provide evidence to this regard, including but not limited to: LEED® Certified, BuiltGreen® experience, written reference from development clients and/or direct proof.

ASHRAE 62-1999 (Ventilation for Acceptable Indoor Air Quality): A building standard for managing indoor air quality in commercial, mixed-use, and multi-unit residential buildings in North America.

ASHRAE/IESNA 90.1 2001: A building energy efficiency standard that provides minimum requirements for the energy-efficient design of buildings with common corridors. This standard ensures a minimum performance for buildings with corridors that is approximately 13% superior to MNECB (see definition).

Bioretention Areas: Vegetated basins and ponds that store and infiltrate runoff.

Building Permit: Issued for the construction of all structures including new buildings, additions, interior finishing, signs, building moving and building demolitions.

BuiltGreen: A program focused on local homebuilders associations design to encourage homebuilders to use technologies and practices that will provide greater energy efficiency, healthier indoor air, reduce water use, preserve natural resources, and improve durability and reduce maintenance.

Cistern: A tank used to collect rainwater runoff from the roof of a building, or impervious surfaces of a site.

Commissioning Agent: An individual responsible for coordinating and carrying out the commissioning process for a building. Responsibilities typically include design assistance for building systems, writing of commissioning specification, incorporating commissioning into construction specifications, carrying out of pre-functional and functional testing of equipment and systems, reviewing operation and maintenance documents, and developing operation and maintenance curricula and materials.

Compact Fluorescents: A compact fluorescent lamp (CFL), also known as an energy saving lightbulb, is a type of lamp (light bulb) designed to fit into roughly the same space as an incandescent lamp, but with the advantages of a fluorescent lamp. Many CFLs can directly replace an existing incandescent lamp. Compared to incandescent lamps of the same luminous flux, CFLs have a longer rated life and use less energy

Construction Indoor Air Quality Management Plan: A plan that requires the building construction contractor and/or project manager to adhere to the Air Conditioning National Contractors Association (SMACNA) “IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3”, and should include HVAC equipment protection, source control measures, pathway interruption strategies, site housekeeping, and sequencing and scheduling.

Construction Waste Management Plan: A plan developed to manage the separation of waste materials on the construction site, aimed at minimizing the quantity of waste going to the landfill and should include a waste diversion target, analysis of project waste, disposal methods and dump locations, and material handling procedures.

District Energy: Production of energy at a single central utility plant for distribution to other buildings through a network of pipes; typically more efficient than traditional building-scale systems.

Drought Tolerant Plant: A plant that withstands periods of time without water and will still flower and have a normal appearance; these plants are specified due to their tolerance for local climatic conditions.

Dual Flush and Low Flush Toilet: A manual flush toilet that minimizes the use of water for the flush cycle. Dual Flush operates with two different flushing volumes depending on the matter to be disposed of (6 litres/3 litres); Low Flush or High Efficiency toilets operate on a reduced average flush (4.3 litres).

EnerGuide for New Homes: A building energy efficiency standard with multiple performance levels, developed by Natural Resources Canada (NRCan), that provides minimum requirements for the energy-efficient design of low rise and woodframe buildings (buildings without common corridors). It is a standard based on reducing air leakage, heat loss, efficiency of building components, orientation, system efficiency/distribution, and air exchange.

Energy Modelling: A building energy simulation program for calculating building heating, cooling, lighting, ventilating, and other energy flows. Modelling is required to prove building design performance against building energy efficiency standards.

Energy Star: An international voluntary labeling program, supported by NRCan, that identifies energy efficient products that exceed minimum federal standards for energy consumption by a certain amount, or where no federal standards exist, have certain energy saving features.

Flyash: Finely divided mineral residue resulting from the combustion of powdered coal in electric generating plants, consisting of inorganic, incombustible matter present in the coal that is typically blended with concrete to reduce the amount of concrete necessary by volume in construction projects, thereby reducing green house gas emissions and reusing a waste product.

Free Draining Soil: Soil that has enough porous capacity and air space to allow water to permeate through the soil to expedite movement to the roots of the plant, while maintaining open air spaces between soil particles to retain the access of oxygen for plant processes.

FSC Certified Wood: Wood products that are endorsed and certified by the Forest Stewardship Council (a non-profit organization based in Bonn, Germany) verifying that it is grown and harvested in accordance with international standards for environmentally appropriate, socially beneficial, and economically viable forest management.

Fundamental Building Systems Commissioning: Quality assurance provided by a commissionable professional, intended to demonstrate the building and its building systems are con-

structed per specification and perform as designed.
Geoexchange: A space heating/cooling system which moves heat from and to the earth, as opposed to making heat using a fuel source. Geoexchange heat pumps take advantage of the almost constant temperature underground -- usually warmer than the air in winter and cooler than the air in summer.
Green Building: A building that, through careful design and construction, exhibits increased energy efficiency, reduced water consumption, employs innovative material selection, and improves overall air quality and health for occupants.

Green Building Checklist: A list of green building requirements as a condition of PPA, Building Permit, and Occupancy Permit approval.

Green Roofs: A green roof is an intensively or extensively planted/landscaped roof surface that consists of vegetation and soil, or a growing medium, planted over a waterproofing membrane and root barrier that is used pirmarily for stormwater management, energy savings, and aesthetic quality.

High Efficiency Irrigation: The controlled application of water to planted areas by use of specialty equipment that reduces quantity and/or increases quality of irrigation measures, thereby conserving water.

Hydronic Heating/Cooling: A ventilation and space heating system using heated or cooled water pumped through a building.

Infiltration Chambers: Typically clean gravel (or other approved material) installed in sub-surface soakaway trenches to act as storage.

Infiltration Facility: Structures, landscape solutions, ponds, swales, and naturalized areas that are designed specifically for the retention and/or detention of stormwater for a determined period of time or determined flow rate that increases ground-water recharge and supports the settlement of contaminants from the stormwater.

Letter of Compliance: A letter issued by the applicant and/or Approved Green Building Consultant to the City of Burnaby and the Trust verifying that the submitted design has met the Green Building Requirements or approved equivalencies and is required for verification prior to issuance of Occupancy Permit by the City of Burnaby.

LEED® (Leadership in Energy and Environmental Design): A third party green building verification program that sets standards for green building performance and reviews and awards certifications based on four levels, Certified, Silver, Gold, and Platinum.

Letter of Intent: A preliminary agreement between the applicant and/or Approved Green Building Consultant and the City of Burnaby and the Trust setting out the proposal for meeting the Green Building Requirements. This is a binding agreement to be referenced at the PPA, Building Permit, and Occupancy Permit phases of development.

Low E (low emissivity) Glass: Glass coated with a microscopic, virtually invisible, metallic oxide layer that improves thermal performance.

MNECB (Model National Energy Code of Canada for Buildings 1997): A building energy efficiency standard developed by NRCan, that applies to all new buildings (other than houses of three storey's or less) and provides minimum requirements for energy efficiency.

Native Plant Material: plants that occur naturally in an area and are thus better suited for survival under natural/naturalised conditions.

Occupancy Permit: Certification by the municipal building inspector, or approved alternative, that the property has been fully completed in accordance with the building code and local regulations.

Occupancy Sensors: A control device that senses the presence of a person in a given space and is commonly used to control lighting and HVAC systems.

Off-Site Stormwater Management: Stormwater measures that are located outside of the property and may include, but are not limited to, infiltration, storage, and naturalized drainage systems.

On-Site Stormwater Management: Stormwater measures that are located within the property and are designed to limit the frequency and magnitude of storm flows and improve water quality. Measures may include, but are not limited to, green roofs, cisterns, and permeable surfaces.

Optimum Value Engineering (OVE or Advanced Framing): Advanced wood framing techniques that minimize the number of board feet of lumber used to construct a building without compromising its structural integrity or energy efficiency.

Ornamental Plant Material: A plant primarily grown for its beauty, colour, or any other aesthetic reasons and may, or may not be, native or drought tolerant.

Part 3 Buildings: Buildings typically of steel or concrete construction that have a common corridor and are typically greater than 3 storey's in height.

Part 9 Buildings: Buildings typically of wood construction that have individual entrances and are typically less the 4 storey's in height.

Pervious Pavers: A pavement surface consisting of strong structural materials having regularly interspersed void areas which are filled with pervious materials, such as sod, gravel or sand, but not including traditional interlocking concrete pavers or pavers that are not specifically designed to increase infiltration.
Potable Water: Water that can be consumed by humans without ill effects. Government agencies have adopted standards of quality that specify limits of chemical constituents in water sources.

Preliminary Plan Approval (PPA): an approval granted by the Director Planning & Building Inspection indicating that a proposed development meets all the applicable requirements of the Zoning Bylaw.

R-2000: A building energy efficiency standard for buildings without a common corridor, developed and supported by the CHBA and NRCan, that generally equates to EnerGuide 80, and is based on an energy consumption target for a building and a series of technical requirements for ventilation, air tightness, insulation, choice of materials, water use and other factors.

Rainfall Capture and Runoff Control Facilities: Any combination of Retention Ponds, Bioretention Areas, Cisterns, Soakaway Pits or Trenches, and/or Infiltration Chambers.

Rapidly Renewable Material: A material that comes from a natural source that typically has a harvest cycle of 10 years or less.

Reclaimed Material: A used material that has been cleaned and/or refurbished for reuse.

Recycled Material: A material that has been separated from the waste stream and reprocessed into a new product (often taking the place of virgin material).

Renewable Energy: Energy obtained from sources that are essentially inexhaustible, including waste, geoexchange, wind, photovoltaic, and solar thermal energy.

Retention Ponds: A man made pond to which stormwater is directed and held, and allowed to seep into the ground.

Riparian Areas: Areas along headwater streams that typically support food, nutrient, and filtration of surface flow and contribute to downstream fish habitat; they may or may not contain fish.

Sediment and Erosion Control Plan: A plan designed to minimise the extent of disturbance on a construction site and the surrounding environment by focusing on erosion control measures (minimizing disturbed areas, seeding, mulching, matting) that mitigate the amount of soil that can run off exposed soil. Sediment control measures also prevent sediment from entering natural or municipal storm run off systems

Soakaway Pits or Trenches: Trenches typically filled with drain rock that allow stored water to exfiltrate into surrounding soil.

Solar Hot Water: A method of pre-heating domestic hot water with a collector that is typically placed on or forms the roof of a building, or on a wall facing the sun, or may be free-standing. The working fluid is either pumped or driven by convection through it. Active control or simple physics ensures it only moves when a net gain in heat occurs.

Stormwater: Rainwater from ground surfaces, roads, roofs, paved areas etc. and usually carried away by drains. It is further defined as storm runoff, snowmelt runoff, or surface runoff and drainage that can transport a variety of chemicals (eg fertilizers and pesticides), biological contaminants, and litter to the stormwater system.

Stormwater Management: Stormwater management is the mechanism for controlling stormwater runoff rate and quantity for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Three Stream Waste Disposal: Provision for space and facilities to allow for the separation and independent disposal of recyclables, traditional garbage, and organic material.

Ultra-High Efficiency: Energy provision/distribution systems that may or may not be renewable or may be a combination of renewable and fossil fuel-based, but does not include electric resistance heating. These systems typically operate at levels of efficiency higher than 87% and may be, but are not limited to

condensing boilers, co-generation, and bio-mass can provide energy with very high levels of efficiency.

Urea Formaldehyde: A transparent thermosetting resin or plastic, made from urea and formaldehyde heated in the presence of a mild base such as ammonia or pyridine. These resins are used in adhesives, finishes, and molded objects. Urea-formaldehyde resin's are noted as an environmental toxin that persists in the atmosphere for long periods of time.

Volatile Organic Compounds (VOC's): Any organic compound that evaporates readily into the atmosphere. VOCs contribute significantly to photochemical smog production and certain health problems. These are typically the compounds within paints, tints and materials, which off-gas toxic gases out of the material or finish over a duration of time.

Water Balance Model: The Water Balance Model promotes a watershed-based approach that manages the natural environment and the built environment as integrated components of the same watershed by balancing impacts of development on the watershed and developing strategies to mitigate this impact.

Water-Based Finishes: Water-based products are marketed under different names, and are often called "water-based varnish" or "water-based polyurethane." Water-based products have excellent wear and scuff resistance and are healthier to use, since they're primarily thinned with water, not a strong solvent.

Green Building Requirements 5.0

This section identifies mandatory requirements to meet the sustainability principles of UniverCity. It also identifies optional green building strategies to encourage innovation and excellence. Implementation of these options will result in additional density awarded to the applicant, as per Section 6.0 of these Requirements.

Verification:

In order to meet the base requirements, the applicant shall have an Approved Green Building Consultant or an alternate with LEED® or other green building experience approved by the Trust, submit a green building checklist and supporting documents as required to the Trust, at the following stages of their approval process:

a. PPA: submission of Letter of Intent outlining strategy for achievement of green building requirements, and PPA Green Building Checklist including identified submittals for this phase.

b. Building Permit: submission of finalized strategy reflecting design changes/modifications since PPA, and Development Permit Green Building Checklist including identified submittals for this phase.

c. Occupancy Permit: submission of Letter of Compliance for all green building requirements and Occupancy Permit Green Building Checklist including all outstanding submittals.

Green building review and verification Checklists will be used internally by SFU Community Trust and “letters of compliance” will be issued from the Trust to the City at PPA, Building Permit, and Occupancy Permit stages, verifying compliance with requirements, and advising whether or not the project qualifies for the FAR bonus.

The strategy relates to six priority areas:

5.1. Site Strategies
5.2. Water Conservation and Efficiency
5.3. Energy and Atmospheric Impacts
5.4. Resource Efficient Materials
5.5. Waste Reduction
5.6. Healthy Buildings, Indoor Air Quality

In addition, Section 6.0 sets out those optional green building features that are available for additional density, and the associate verification procedure.

5.1 Site Strategies

Intent: To reduce the negative impacts of development on the natural environment, and to generally maintain the natural landscape, vegetation and environmental attributes of each development site. To develop projects that reflect the character of the natural landscape on Burnaby Mountain.

Required Practices

5.1.1 A site plan shall be submitted to the Trust indicating all protected portions of the site during construction, including protection zones for natural vegetation and habitat.
5.1.2 Compliance to site Stormwater Management Design Requirements shall be required as identified in Section 8.0.
5.1.3 Pervious Paving shall be specified for a minimum of 50% of all hard surfaces, including driving surfaces, decks, and patios for all surfaces that reside over soils (not over parkade slab). Impervious surfaces that are clearly drained to a pervious area of landscaping shall be included in the 50% calculation.

5.2. Water Conservation and Efficiency

Intent: To reduce the consumption of Potable Water and reduce the impact on the water supply and consolidated storm sewer and treatment system of the GVRD/Metro Vancouver.

Required Practices

5.2.1 A spool shall be installed in the incoming water main of each building to allow for future installation of water meters.
5.2.2 All toilets shall be either minimum 6L/3L Dual Flush toilets or Low Flush/High Efficiency toilets (max. 4.2litres per flush).
5.2.3 All fixtures shall be ultra low-flow for water efficiency – kitchen faucets (maximum 1.75 gpm), bathroom faucets (maximum 1.2 gpm) and showerheads (maximum 1.75 gpm).
5.2.4 Drought Tolerant Plants shall be used in landscaping as per the Landscape Requirements and planting beds shall be mulched to a 50mm depth to reduce loss of water by evaporation.
5.2.5 Grass coverage shall not exceed a maximum of 50% of the total soft and/or vegetated landscaped area within the property line.
5.2.6 Irrigation systems for all non-grass planted surfaces shall only be high efficiency (trickle or drip feed) systems, or no irrigation.

5.3. Energy and Atmospheric Impacts

Intent: Reduce the use of non-renewable fossil fuel resources and decrease the impacts of greenhouse gas emissions.

Required Practices

5.3.1 All buildings shall be designed to meet the BC Building Code (December 20, 2013), as demonstrated by successfully meeting ASHRAE 90.1-2010 or the National Energy Code of Canada for Buildings 2011 (NECB 2011). Buildings designed without a common corridor shall endeavor to meet or exceed EnerGuide for New Homes 80.

5.3.2 All buildings shall be connected to the existing District Energy System (DES) as per the specifications provided by the SFU Community Trust and the operating utility partner.

5.3.3 Hydronic Heating and domestic hot water, and make-up air units specified in the building shall be designed for and connected to the existing DES.

5.3.4 A Commissioning Agent shall perform Fundamental Building Systems Commissioning for all mechanical and heating systems and a request for commissioning documentation in all contract documents shall be required.

5.3.5 Wall performance in Part 3 buildings of predominantly concrete construction shall improve wall performance to R-15 overall, accounting for all thermal bridging.

5.3.6 All windows shall be specified with argon and warm edge spacers.

5.3.7 Roof insulation in buildings with wood-frame roof joists (typically wood frame construction), shall be a minimum R-37 to minimize losses and increase performance.

5.3.8 Only Energy Star rated dishwashers and refrigerators shall be installed, and Energy Star rated front-loading horizontal axis washing machines shall be installed if included as part of a base appliance package or as an optional appliance package.

5.3.9 Compact Fluorescents shall be specified for all exterior lighting affixed to the building and pedestrian scale site lighting, and common area interior lighting (hallways, lobbies, parkades, exit stairs).

5.3.10 Compact Fluorescents shall be specified for 100% of all fixtures in suites.

5.3.11 No gas fireplaces shall be specified. Should electric fireplaces be specified at the developer's discretion, they shall be heat source rated fireplaces connected to a room thermostat with automatic ignition and shall replace any other heat source within the specified heating area capacity of the fireplace (usually the room of installation).

5.3.12 No air conditioning shall be specified in residential units unless provided through a high energy efficiency space heating/cooling mechanical system or alternate, approved by the Trust, with examples of approved systems being geoexchange, water

loop heat pump with condensing boiler, and radiant hydronic.
5.3.13 Rough-in for solar hot water shall be provided for all buildings with centralised hot water distribution.
5.3.14 All building design concepts shall be subject to a pre-design energy utilization consultation with BC Hydro and Terasen Gas, or their approved agents (if available at time of preliminary conceptual design).

5.4. Resource Efficient Materials

Intent: To reduce the amount of natural resources consumed in the construction process. The objective is to adopt the practices outlined below and then measure results to create tangible targets for future phases.

Required Practices

5.4.1 All projects shall meet any four (4) of the following ten (10) items:
a. Rental forms or re-use of existing forms shall be specified for foundation forms or wood shall be re-used from waste forms for non-structural elements in building construction.
b. Concrete with flyash content greater than 20% shall be specified for large footings and vertical concrete that does not require finishing
c. Fibreglass batt insulation shall be specified, with a minimum recycled content of 40%.
d. Cabinetry material with a minimum 50% recycled content (total combined content of cabinet boxes and doors) shall be specified.
e. All carpets shall meet the Carpet and Rug Institute's Green label program.
f. Rapidly Renewable or Reclaimed/Recycled flooring material shall be specified for all hard surfaces – examples such as cork, natural linoleum, reclaimed wood, bamboo, or FSC certified wood.
g. FSC Certified plywood shall be used for all forms and sheathing.
h. In woodframe structures, engineered wood products shall be used for beams, joists and headers (e.g. TJI's, finger-jointed studs for non load-bearing walls).
i. Steel studs with aluminum content shall have high aluminum content and have approximately 30% recycled content.
j. Drywall with a minimum recycled content of 15%.

5.5. Waste Reduction

Intent: To reduce the waste materials produced in the construction process and during long-term occupancy by a total volume by weight of 75% as verified through a Construction Waste Management Plan.

Required Practices

5.5.1 A Construction Waste Management Plan shall be provided to ensure a minimum of 75% diversion by weight from the landfill, including provision for waste separation.

5.5.2 A recycling area shall be provided in all units with separate bins/drawers for paper, metals, and plastics (e.g. - under-sink stacking units) with provision for an additional bin for compost when available.

5.5.3 A central collection point for Three Stream Waste Disposal shall be provided within buildings, including additional space (approximately 5'x8') for compost when/if available

5.6. Healthy Buildings, Indoor Air Quality

Intent: To design and construct buildings and homes with improved indoor air quality. This can be achieved by reducing the source of potentially harmful contaminants, through material selection and the provision of adequate ventilation.

Required Practices

5.6.1 The requirements of ASHRAE 62-1999, "Ventilation for Acceptable Indoor Air Quality" shall be required for Part 9 Buildings.

5.6.2 A Construction Indoor Air Quality Management Plan shall be specified and includes:

- Cleaning interiors, building cavities, ventilation systems and components prior to occupancy;
- Replacing filtration media prior to occupancy;
- Protecting absorptive construction materials from moisture damage on site.

5.6.3 Water-Based Finishes shall be used for all cabinetry, paneling, moulding and flooring that is finished on site.

5.6.4 In-suite carpets shall be tacked rather than glued. Carpet in public/common areas shall be tacked or adhered using non-toxic glues that meet the VOC content limits of SCAQMD (St. of California S. Coast Air Quality Management District) Rule #1168, October 2003, or approved alternative.

5.6.5 Operable openings shall be provided in all external rooms.

5.6.6 Carbon monoxide detectors shall be installed in all units with direct connection to private garages and/or those units with gas appliances.

5.6.7 All paints shall be low in Volatile Organic Compounds (VOC), and shall meet or exceed Green Seal Standard GS11, January 1997, or as amended.

Landscape Requirements 6.0

In keeping with the landscape design intent for UniverCity, landscapes within the UniverCity development shall include a significant proportion of Native Plant Materials in their design. This will support the intent to reflect the indigenous character of the site and to support ecologically responsible development. It is acknowledged that native plants do not fulfill all landscape needs; however, such materials shall be included and used in preference to ornamental species as per these requirements.

A representative list of useful native plant materials is included in Appendix A.

Requirements:

6.1. Top Soil

Native top soils are often poor in organics and on the slopes of Burnaby Mountain the soils can be expected to be principally free draining soils of course texture.

Required Practices

6.1.1 The use of native top soils or free draining soils with low organic content (typically fast draining and more porous) be specified in areas that contain significant percentages (50% or greater) of native plant materials.

Texture	- Sand 75% - Silt/Clay 15% - Organic 10% Matter
Saturated Hydraulic Conductivity	13.1 mm/hr
Winter Water Storage (% volume)	23% water
Winter Water Storage in 300mm depth of soil	69mm

6.1.2 The following are the required minimum depths of growing medium for all planting areas on the development parcel:

Trees pits:	900 mm (3'-0")
Shrub beds:	450 mm (1'-6")
Ground cover areas:	300 mm (1'-0")
Lawn areas:	300 mm (1'-0")

6.1.3 All planter areas on the development parcel are required to have a 50 mm (2") layer of 9 mm (3/8") composted bark mulch black/brown in colour.

6.2. Water Management Requirements

Landscape design shall comply with the the Trust's Green Building Requirements Stormwater Management Requirements, and the GVRD Absorbent Landscape Initiative Guidelines.

Required Practices

6.2.1 Wherever possible, water shall be dealt with through on site infiltration or absorption by plant material.

6.2.2 Native wetland plant material shall be specifically selected and used in areas intended for accumulation of run-off water.

6.3. Native Plant Requirements

In order to appropriately balance native and ornamental species within the site property line, required minimum percentages are specified for different situations. All percentages are expressed on the gross number of plants to be installed, not on the relative percentages of species. A schematic site diagram identifies the general application areas with respect to other typical site features. The application areas are generally defined by public visibility, utility, ecological continuity and proximity to woodlands.

For example, a plant list on which 75% of the species names are native but only 40% of the gross number of plants installed are native, would not be acceptable. A plant list on which 40% of the species names are native but 75% of the gross number of plants are native would be acceptable.

Note that there are separate required percentages for different types of plants and that these percentages are targets that must be met separately. For example, including large quantities of native ground covers in the plant list does not reduce the requirement for the use of native shrubs. All landscape requirements are specified for areas only within the property lines, as the Trust has the responsibility for planting outside of the property line, unless otherwise specified.

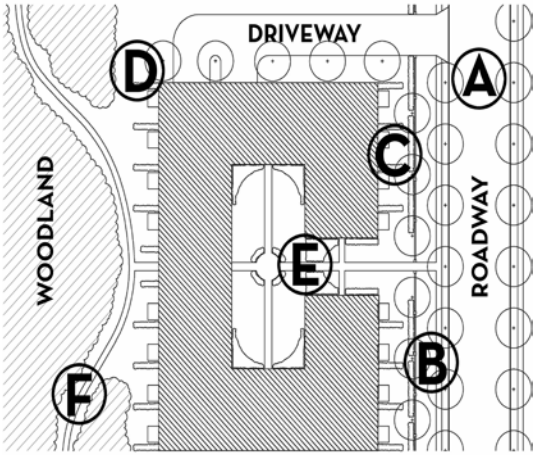


Figure 1: Schematic Lot Diagram

Required Practices

Refer to Figure 1: Schematic Lot Diagram

A. Street Trees (if within property line)	No requirement for native trees

B. Boulevard Landscapes

1. Trees	No requirement for native trees
2. Conifers	75% native
3. Shrubs	75% native
4. Ground Covers	75% native

C. Building Entries / Road Frontage Landscapes

1. Trees	25% native
2. Conifers	50% native (hedging exempt)
3. Shrubs	75% native
4. Ground Covers	75% native

D. Building Rear / Side Landscapes

1. Trees	60% native
2. Conifers	75% native (hedging exempt)
3. Shrubs	75% native
4. Ground Covers	75% native

E. Courtyard Landscapes

1. Trees	25% native
2. Conifers	50% native (hedging exempt)
3. Shrubs	75% native
4. Ground Covers	75% native

F. Woodland Pathway Verges

1. Trees	100% native
2. Conifers	100% native
3. Shrubs	100% native
4. Ground Covers	100% native

G. Drainage Channels / Wetland Areas

1. Trees	100% native
2. Conifers	100% native
3. Shrubs	100% native
4. Ground Covers	100% native

6.3.1 Woodland Planting

a. Plantings adjacent to the forest edge shall use plants of substantial scale, providing a typical wall of vegetation composed of large shrubs and tree species.
b. Within the woodland, remediation plants shall be of small scale, acting principally as ground covers or low under storey.

6.3.2 Ornamental Planting

a. Ornamental plants with a tropical character (e.g. Fatsia or bamboos) shall not be specified.
b. Foliage colours shall be predominantly green. Plants with red, yellow and blue foliage should be used only as accents.
c. Ornamental species shall be mixed with native plantings, not separated into separate blocks.

6.3.3 Native Species

a. Native species shall be specified that are appropriate to the Burnaby Mountain environment. A recommended list of species is provided in Appendix A, but is not an exhaustive list.

6.4. Landscape Plan Requirements

6.4.1 Landscape Materials Plan

Plan and or plans at a minimum scale of 1:200 / 1/16” = 1’-0”. Notes all hard landscape materials, paving types, stairs, fences, gates, hand rails / guard rails, grade changes, wall types, special features

6.4.2 Landscape Planting Plan and Plant List

Plan and or plans at a minimum scale of 1:200 / 1/16” = 1’-0”.

6.4.3 Landscape Grading Plan

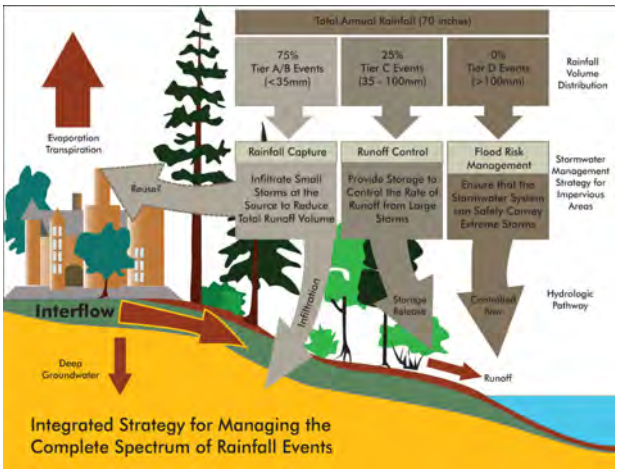
Plan and or plans at a minimum scale of 1:200 / 1/16” = 1’-0”. Preliminary grading plan identifying grading of hard and soft landscape areas. Note top and bottom of wall elevations, top and bottom of stairs, slope of ramps. Plan should note approach to hard landscape drainage. This information can be shown on the Landscape Materials Plan if it does not conflict with materials information.

6.4.3 Landscape Sections

Sections of landscape development are required to demonstrate the relationship of landscape planting and elements with building slab and building.

Stormwater Management Requirements

7.0



On-Site Stormwater Management

This chapter describes the required performance criteria and design procedure for on-site stormwater management, as originally defined in the Burnaby Mountain Watercourse and Stormwater Management Report, dated February 2002 and modified to implement adaptive management actions based on experiences gained through the development of Phase I of UniverCity. On-site measures for stormwater are to be distinguished from community, or off-site facilities, but they must operate in concert, one complementing the performance of the other.

Off-site facilities include all infiltration, storm drain collection and conveyance facilities and community detention ponds which are located in streets and other common areas outside of the individual development lots. They are constructed as part of the subdivision servicing and provide approximately 2/3 of the storage requirements of the development.

On-site measures include stormwater management systems that serve the individual development site. These stormwater management systems will be designed by the Developers consultant team in order to meet the conditions for the Preliminary Plan Approval (PPA) with the City of Burnaby. The on-site stormwater management facilities implemented by the developers shall be designed to integrate with the community facilities. Their purpose is to manage rainwater runoff from the developed site to resemble runoff from the same site when it was in its pre-developed, natural state, thereby contribute to the protection of the health of salmon-bearing streams downstream.

Stormwater Management Covenant

Each development has a registered covenant requiring the developer, and lease holder to implement and maintain a storm water management system that captures and infiltrates the runoff from 35mm/day rainfall and provide safe conveyance to community facilities when the rainfall event exceeds the 35mm/day threshold. The performance criteria are based on the extent of impervious surfaces on the development site and may be satisfied by installing a basic detention and infiltration system, or a combination of alternative practices, such as absorbent landscaping, green roofs, permeable pavers, cisterns, conservation and other technologies that may surface in the future. The covenant for the development site must include the selected set of stormwater management practices that satisfy the capturing and infiltrating the runoff from a 35mm/day rainfall.

Required Elements

1. The design of on-site detention and infiltration facilities shall be based on the size of the Effective Impervious Areas (EIA) of the development site (lot).

EIA's are defined as fully impervious areas with direct hydraulic connection to the storm drainage system of the site. Fully impervious areas include building roofs and impermeable pavements. Fully pervious areas are those with a permeable soil structure that is capable of absorbing the rainfall of a 5-year return period storm (100mm/24hr) without surface runoff.

2. Design and construct a stormwater storage system for a minimum of 35m3 of storage per 1000 square meter of impervious area.

3. Design and Construct the storage facility to include an infiltration facility that would release a minimum of 4l/s/h of EIA to the natural soil.

4. The rate of discharge is controlled at outlet of the storage tank into the infiltration facility. The control device must be a "passive" control, where the rate of release could not be adjusted by the operators.

5. Design and construct an overflow system to convey stormwater originating on the site to the City storm drainage system from rainfall events exceeding capacity of the on-site detention and infiltration system.

6. Provide a stormwater management facility maintenance manual to be implemented by the strata corporation.

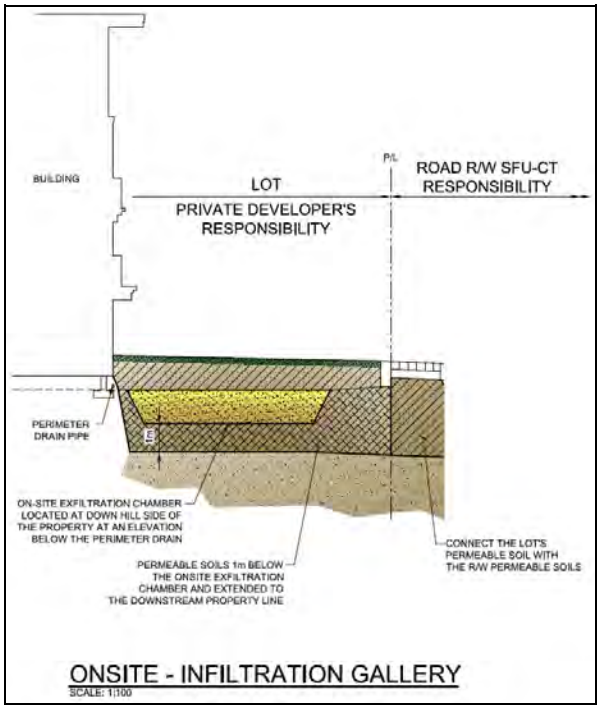
7. Design and implement a detailed erosion and sediment control system during construction to meet a maximum discharge of 25mg/l of suspended sediment above background levels under dry weather conditions. (75mg/l under wet conditions).

8. Install flow monitoring devices to confirm the performance of the on-site storm water management systems. Flow monitoring should be kept for a minimum of two years, including one year after the monitoring has proved that the system operates according to design criteria.

Required Practices for the Design of Infiltration Facilities.

• To facilitate the dispersal of the infiltrated stormwater, the infiltration facilities should be located on the lowest section of the property, and at least 10m away from nearby buildings in a downstream direction.

• The infiltration facilities should be installed at an elevation below the building's perimeter drain. If the infiltration facility is located above the perimeter drain, an impermeable layer needs to be placed between the infiltration facility and the perimeter drain to prevent short-circuiting the infiltrated water into the storm drain.



• Infiltration facilities (surface and sub-surface) are to be placed over a minimum of 1-meter deep permeable soil layer with a minimum of 12mm/hr infiltration capacity to maximize infiltration. The permeable sub-soil layer must be extended to the downstream property line to create an interflow path by connecting to permeable soils within the street right-of-way.

• The infiltration facilities should utilize multiple measures of stormwater control systems, including, but not limited to, green roofs, interflow zones, detention trenches, deep soil planters, cisterns, etc. Two or more of these systems must be visually accessible and provide education and visual amenity to building occupants, resulting in less reliance on below-grade systems. Alternatively, solely traditional below-grade measures can be undertaken, provided that these systems must exceed the minimum UniverCity Stormwater Requirements for both storage and flow rates by a minimum of 10% as shown through water balance model calculations.

• Compaction and sedimentation of infiltration areas must be avoided. Sediment ponds and infiltration basins should never be combined in the same facility.

• To ensure the long term operation of the infiltration facility, a safety factor of two will be used to size infiltration areas. The safety factor is applied by using fifty percent of the percolation rate defined by field tests as the design value up to a maximum of 25 mm/hr .

Encouraged Practices for Design of Storm Water Facilities

The design of the on-site stormwater detention and infiltration facilities is based on the Effective Impervious Area (EIA) draining to the facilities. The EIA of the site may be reduced by applying permeable surface cover, such as absorbent landscape soil over impervious surfaces, or over excavating and backfilling typical sandstone bedrock found at the UniverCity site.

The effectiveness of these practices is dependent on the porosity, infiltration capacity and the depth of the soil layer, as well as the physical properties of the underlying subsoil. Ten percent permeable credit may be obtained for each 100mm depth of soil with a minimum of 12 mm/hr infiltration capacity placed over bedrock or other impervious surfaces.

Examples:

• An extensive green roof with 100mm absorbent soil layer would receive 10% permeable credit for an EIA=90% design value.
• An intensive green roof with 300mm absorbent soil layer would

receive 30% permeable credit for an EIA=70% design value.
• A landscape area with 300mm absorbent soil over a minimum of 700mm subsoil with a minimum of 12 mm/hr infiltration capacity would receive100% permeable credit for an EIA=0% design value.

Further permeable credit may be received by discharging stormwater runoff from impervious surfaces onto permeable areas based on the following criteria:

• Permeable areas may receive stormwater runoff from impervious areas of equal size
• Impervious areas that are directly connected to the storm drainage system will receive no permeable credit, EIA=100%
• Impervious areas that discharge to fully permeable areas of at least equal size will receive fifty percent permeable credit for an EIA=50% design value.
• If impervious areas discharge to less than fully permeable areas of at least equal size will receive a portion of the fifty percent permeable credit that is applicable to the receiving permeable area.

Example:

Impervious area discharging to a green roof with 300mm absorbent soil layer, which receives 30% permeable credit, will receive 30% of the 50% re-direction credit, or 15% permeable credit for the impervious area.

Effective Impervious Area Calculation Examples

The following set of examples demonstrates the processes of reducing the EIA on the development site by applying various alternative surface treatments for stormwater management benefits. The project site in these examples is 1ha (10,000m2) in size, of which 7,000m2 is covered by buildings and pavements, and the rest (3,000m2) is landscaped area. As a result of site grading, the nearly impermeable sandstone bedrock is located near to the finished surface. The tested infiltration capacity of the soils under the infiltration facility is 36mm/hr, fifty percent of this value (18mm/hr that equates to 0.005 L/s/m2 discharge rate) may be used in the design of the infiltration facility.

Example 1:

Basic site development when runoff from the impervious areas are directly connected to storm drainage system, and the landscape areas are developed by placing 300mm absorbent landscape soil over the bedrock.

EFFECTIVE IMPERVIOUS AREA CALCULATIONS

Surface Type	Area (m2)	IMP (%)	EIA (m2)
Impervious Areas			
Directly connected to storm drains	7,000	100	7,000
Landscape Areas			
300mm absorbent landscape soil over sandstone bedrock	3,000	70	2,100
TOTAL	**10,000**	**91**	**9,100**

DRAINAGE FACILITY SIZING			
Detention storage capacity required	35	m3/1000m2	319m3
Discharge rate to infiltration facility	0.4	L/2/1000m2	3.64L/s
Required surface of infiltration facility	0.005	L/s/m2	728m2

Example 2:

The same as Example 1, except the sandstone bedrock in the landscape areas is over excavated to a depth of 1 meter and backfilled with the excavated material to create a permeable soil body under the landscape areas.

EFFECTIVE IMPERVIOUS AREA CALCULATIONS

Surface Type	**Area (m2)**	**IMP (%)**	**EIA (m2)**
Impervious Areas			
Directly connected to storm drains	7,000	100	7,000
Landscape Areas			
300mm absorbent landscape soil over 700mm permeable soil layer	3,000	0	0
TOTAL	**10,000**	**70**	**7,000**
DRAINAGE FACILITY SIZING			
Detention storage capacity required	35	m3/1000m2	245m3
Discharge rate to infiltration facility	0.4	L/2/1000m2	2.80L/s
Required surface of infiltration facility	0.005	L/s/m2	560m2

Example 3:

The same as Example 2, except 4,000 m2 of the roof areas are covered by extensive green roof with 100mm absorbent soil layer.

EFFECTIVE IMPERVIOUS AREA CALCULATIONS

Surface Type	**Area (m2)**	**IMP (%)**	**EIA (m2)**
Impervious Areas			
Directly connected to storm drains	3,000	100	3,000
Covered by extensive green roof with 100mm absorbent soil layer	4,000	90	3,600
Landscape Areas			
300mm absorbent landscape soil over 700mm permeable soil layer	3,000	0	0
TOTAL	**10,000**	**66**	**6,600**
DRAINAGE FACILITY SIZING			
Detention storage capacity required	35	m3/1000m2	231m3
Discharge rate to infiltration facility	0.4	L/2/1000m2	2.64 L/s

Required surface of infiltration facility	0.005	L/s/m2	528m2

Example 4:

The same as Example 3, except the green roof is intensive with 300mm absorbent soil layer.

EFFECTIVE IMPERVIOUS AREA CALCULATIONS

Surface Type	**Area (m2)**	**IMP (%)**	**EIA (m2)**
Impervious Areas			
Directly connected to storm drains	3,000	100	3,000
Covered by intensive green roof with 300mm absorbent soil layer	4,000	70	2,800
Landscape Areas			
300mm absorbent landscape soil over 700mm permeable soil layer	3,000	0	0
TOTAL	**10,000**	**58**	**5800**
DRAINAGE FACILITY SIZING			
Detention storage capacity required	35	m3/1000m2	203m3
Discharge rate to infiltration facility	0.4	L/2/1000m2	2.32 L/s
Required surface of infiltration facility	0.005	L/s/m2	464m2

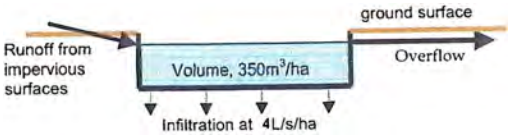
Example 5:

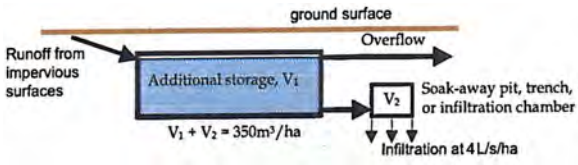
The same as Example 4, except the stormwater runoff from the remaining impervious areas are discharged to fully permeable landscape areas.

EFFECTIVE IMPERVIOUS AREA CALCULATIONS

Surface Type	**Area (m2)**	**IMP (%)**	**EIA (m2)**
Impervious Areas			
Discharged directly to fully permeable landscape areas	3,000	50	1,500
Covered by intensive green roof with 300mm absorbent soil layer	4,000	70	2,800
Landscape Areas			
300mm absorbent landscape soil over 700mm permeable soil layer	3,000	0	0
TOTAL	**10,000**	**43**	**4,300**
DRAINAGE FACILITY SIZING			
Detention storage capacity required	35	m3/1000m2	151m3
Discharge rate to infiltration facility	0.4	L/2/1000m2	1.72 L/s
Required surface of infiltration facility	0.005	L/s/m2	344m2

Percolation tests are to be performed on each development parcel, at the proposed location and at the depth of the bottom of the infiltration facilities, to





characterize the "hydraulic conductivity" of the soil. At the time of the test confirm that the depth of the permeable soil underneath the infiltration facility is at least one meter.

Other alternative practices include, but not limited to the following:

Surface Facilities, such as
- Retention ponds, which are storage basins that allow water to seep into de ground;
- Bio-retention Areas, which are vegetated basins that store and infiltrate runoff

Sub-surface facilities such as
- Soak-away Pits or Trenches, which are typically filled with drain rock and allow stored water to exfiltrate into surrounding soil
- Infiltrator Chambers, which are inverted plastic half-pipes that can be installed in sub-surface soak away trenches and act as storage
- When there is no street between adjacent lots, the infiltration and detention facilities will be shared and located in the downstream lot. The upstream lot could include additional stormwater credit by implementing other storage strategies such as green roofs or absorbent landscape

Required Practices for Sediment and Erosion Control

Sediment and Erosion Control during the construction period is an important aspect of the environmental performance of the development. Developers are required to design and implement source control measurements to control transport of sediment and soil during construction. This will involve the developers contractor to attend a seminar on sediment and erosion control practices that will be held the Trust prior to the commencement of the on-site works. Representatives of Burnaby Mountain Community Corporation will share knowledge and experience. Developers as part of the approval process with Burnaby will be required to design and implement a sediment and erosion control plan as part of the PPA and Building Permit process.

Where infiltration facilities are to be located, it is critical to maintain the natural hydraulic conductivity of the native soils. This requires:

- Sediment and erosion control during construction to prevent clogging of rainfall capture facilities and their underlying soils;
- Management of construction sites to prevent disturbance and compaction of infiltration area (i.e. maintain underlying soils in their natural undisturbed state).

Required Practices for Landscaping

The objective of landscaping in the stormwater management point of view is to create fully permeable surfaces in development areas that would resemble the hydrologic functions of natural areas. Since rainfall capture and runoff control facilities are designed to manage the runoff from impervious areas, pervious areas must be 'self-

mitigating' from a storm water management perspective (i.e. achieve both rainfall capture and runoff control targets). The following design criteria must be met to ensure that pervious areas are self-mitigating;

- Provide a layer of controlled-texture landscape soil (growing medium) to the depths specified in Section 7.1.2 of these Requirements;
- Ensure that the growing media is underlain by a minimum of 700mm deep permeable soil with a minimum of 12mm/hr saturated conductivity, to create a total of one meter permeable soil body to manage stormwater.

Design Soil Specifications
Growing medium to be in accordance with the BC Landscape Standard Current Edition.

Growing medium to have the following properties:

Saturated Hydraulic Conductivity	13.1 mm/hr
Winter Water Storage (%volume)	23% water
Winter Water Storage in 300 mm of soil	69mm

Provide test results indicating conductivity, storage capacities and conformance with the BCLA Standard from a recognized soil analysis lab at the request of the SFUCT for review and records.

Chum salmon spawning in Stoney Creek

Appendix A - Native Species Reference Table

	Botanical Name	Common Name	Height Width	Sun Shade	Description
DECIDUOUS TREES					
1	***Acer circinatum***	Vine Maple	8.0 m 3.0 m	Sun Shade	Prefers moist areas with drainage; shade tolerant; low to mid elevations; excellent autumn colour; understorey tree in coniferous forests; predominantly south coastal British Columbia
1	***Betula papyrifera***	Paper Birch	25.0 m 4.0 m	Sun	Prefers moist to wet sites; valleys and low mountain slopes; ornamental peeling white bark; south-western British Columbia.
1	***Cornus nuttallii***	Pacific Flowering Dogwood	12.0 m 8.0 m	Sun Partial Shade	Prefers moist soil conditions; showy flowers; coastal southern British Columbia to California.
1	***Crataegus douglasii***	Black Hawthorn	9.0 m 3.0 m	Sun	Prefers moist sites; showy white flowers and black fruit; British Columbia to California.
1	***Oemleria cerasiformis***	Indian Plum	4.0 m 3.0 m	Sun Shade	Grows in dry to moist sites, open areas; pendant white flowers in early spring; British Columbia to California.
1	***Sorbus sitchensis***	Sitka Ash	7.5 m 3.0 m	Sun	Prefers moist soils; red/orange fruit in the autumn; common from Alaska to California
CONIFERS					
2	***Abies grandis***	Grand Fir	5.5 m 5.0 m	Sun to Shade	Moist soils in valleys or mountain slopes; BC and California.
2	***Pinus contorta contorta***	Shore pine	6.0 m 3.0 m	Sun	Grows in dry to moist soils from British Columbia to California. Tolerant of poor, sandy soils.
2	***Pseudotsuga menziesii***	Douglas Fir	100.0 m 10.0 m	Sun	One of the most common forest trees in the Pacific Northwest. Prefers moist, acidic soils. Ranges from Southern British Columbia Arizona to California and east to Montana.
2	***Thuja plicata***	Western Red Cedar	50.0 m 5.0 m	Sun	Moist to wet sites; low to mid elevations; common west of Cascades and Interior cedar/hemlock ecosystem
2	***Tsuga heterophylla***	Western Hemlock	60.0 m 5.0 m	Sun	One of the most common forest trees in the Pacific Northwest. Prefers moist, acid soils. Ranges from Alaska to California.
SHRUBS					
3	***Amelanchier alnifolia***	Saskatoon Serviceberry	3.0 m 2.0 m	Sun	Ranges from dry to moist sites; prefers well drained soils and open areas; showy white flowers and good autumn colour; low to mid elevations
3	***Cornus sericea***	Red-osier Dogwood	3.0 m 2.0 m	Sun Shade	Prefers moist soils, stream banks; ornamental bark exposed in winter; throughout western North America
3	***Gaultheria shallon***	Salal	1.2 m 1.0 m	Sun Shade	Prefers well drained soil with good moisture; broadleaf evergreen.
3	***Holodiscus discolor***	Oceanspray	2.5 m 1.7 m	Sun	Prefers dry to moist sites, well drained; sprays of creamy flowers mid-summer; low to mid elevations, widespread in British Columbia and east to Montana.
3	***Mahonia aquifolium***	Tall Oregon Grape	2.0 m 2.0 m	Sun Shade	Dry to moist sites, open to closed forest, low to mid elevations; broadleaf evergreen; purple fruit in autumn; across southern British Columbia.
3	***Mahonia nervosa***	Longleaf Mahonia	0.6 m 0.7 m	Sun Shade	Ranges from dry to moist, open/closed forest; broadleaf evergreen; low to mid elevations; coastal forest and interior.
3	***Mahonia repens***	Creeping Oregon Grape	2.0 m 0.7 m	Sun Shade	Prefers dry, well drained sites; up to 1800 m; broadleaf evergreen; in southern BC and on east side of Vancouver Island

3	***Pachystima myrsinites***	False Box	0.9 m 0.7 m	Full to Partial Shade	Common in coniferous forests, esp. near streams; broadleaf evergreen; British Columbia to California
3	***Philadelphus lewisii***	Mock Orange	2.5 m 1.5 m	Sun Partial Shade	Drought tolerant; showy white flowers; pacific northwest native
3	***Physocarpus capitatus***	Pacific ninebark	1.5 m 1.5 m	Sun Shade	Prefers moist to wet locations, well drained; low to mid elevations; coastal and cedar/hemlock ecosystems
3	***Ribes sanguineum***	Red-flowering Currant	3.0 m 1.5 m	Sun Partial Shade	Prefers well drained sites; low to mid elevations; pendulous masses of red flowers in spring; Ranges through south coast, Gulf Islands, Fraser Canyon, sporadic Interior
3	***Rosa gymnocarpa***	Baldhip Rose	0.6 m 0.6 m	Sun	Ranges from dry to moist sites; low to mid elevation, south of Quesnel
3	***Rosa nutkana***	Nootka rose	1.5 m 1.0 m	Sun	Prefers open habitats, low to mid elevations, widespread
3	***Rosa pisocarpa***	Clustered Wild Rose	2.5 m 1.5 m	Sun Shade	Prefers damp places at low elevations, mainly Lower Mainland and southern Vancouver Island
3	***Rosa woodsii***	Woods' Rose	1.2 m 1.0 m	Sun	Lives in variable habitat, damp places at low elevations, drier at higher elevations, mainly east of Cascades
3	***Salix discolor***	Pussy Willow	10.0 m 2.5 m	Sun	Moist sites; lower elevations, southern two-thirds of British Columbia
3	***Salix hookeriana***	Hooker Willow	7.0 m 3.0 m	Sun	Wet places; low elevations; south Vancouver Island, south coastal
3	***Salix lasiandra***	Pacific Willow	3.0 m 3.0 m	Sun	Moist sites close to water; low to mid elevations; widespread in British Columbia
3	***Salix scouleriana***	Scouler Willow	10.0 m 7.0 m	Sun Shade	Upland moist areas; low to mid elevations; widespread
3	***Salix sitchensis***	Sitka Willow	6.0 m 4.0 m	Sun	Wet sites; low to mid elevations; coastal British Columbia
3	***Sambucus racemosa***	Red-berry Elder	5.0 m 3.0 m	Partial Shade	Prefers moist clearings and open forest; sea-level to mid elevations; masses of red fruit in autumn; coastal and Gulf Islands.
3	***Spiraea douglasii***	Pacific Hardhack	1.5 m 1.0 m	Sun	Tolerant of dry to moist sites, prefers margins of water bodies and damp areas; low to mid elevations; pale pink slower spikes in summer; Burns Lake south in British Columbia.
3	***Symphoricarpos albus***	Common Snowberry	1.5 m 1.0 m	Sun Partial Shade	Ranges from dry to moist sites; low to mid elevations; white berries in autumn; widespread habitat in Pacific Northwest.
3	***Vaccinium ovatum***	Evergreen Huckleberry	1.0 m 1.0m	Sun	Found at forest edge at low elevations; broadleaf evergreen; black fruit in autumn; south coastal British Columbia
GROUND COVERS including ferns (4a), herbs (4b) and wetland species (4c)					
4a	***Blechnum spicant***	Deer Fern	0.3 m 0.3 m	Shade	Prefers moist to wet forests; all elevations
4a	***Polystichum munitum***	Sword Fern	0.9 m 0.9 m	Shade	Prefers moist forest floor; low to mid elevations; abundant on Vancouver Island and Lower Mainland
4b	***Aquilegia formosa***	Red Columbine	0.6 m 0.1 m	Sun Partial Shade	Prefers meadows to stream verges; red summer flowering perennial herb; British Columbia to California
4b	***Dicentra formosa***	Pacific Bleeding Heart	0.45 m 0.60 m	Sun Shade	Best in moist, rich soils; perennial herb with red blooms; British Columbia to California
4b	***Lillium columbiana***	Tiger Lily	1.0 m 0.20 m	Sun	Best in moist soils; perennial; orange blooms in summer; southern British Columbia to California

4b	***Lupinus littoralis***	Seashore Lupine	0.5 m 0.5 m	Sun	Nitrogen fixing; moist soils; purple blooms in summer; coastal British Columbia
4b	***Lupinus polyphyllus***	Blue Lupine	1.0 m 0.7 m	Sun	Nitrogen fixing; moist soils; Alaska to California
4	***Arctostaphylos uva-ursi***	Kinnikinnick	0.1 m 0.6 m	Sun	Prefers exposed, well drained soils; sea-level to timberline; throughout British Columbia
4	***Cornus canadensis***	Canada Bunchberry	0.1 m 0.1 m	Shade	Prefers moist forest floors, prefers shelter; sea-level to sub-alpine; throughout British Columbia
4	***Fragaria virginiana***	Wild Strawberry	0.1 m 0.1 m	Sun	Found on roadside or open places, well drained; to mid-elevations, throughout British Columbia
4c	***Carex rostrata***	Beaked Sedge	0.9 m 0.4 m	Sun	Prefers perennially wet areas; low to mid elevations; south half of British Columbia
4c	***Juncus effusus***	Common Rush	0.9 m 0.4 m	Sun	Prefers moist to wet open areas, disturbed sites; low to mid elevations; south coast
4c	***Sagittaria latifolia***	Arrowhead	0.9 m 0.6 m	Sun	Found in wet to submerged soils across North America