

A TRANSIT- FRIENDLY COMMUNITY:  
INTEGRATING A SKYTRAIN STATION INTO THE NEIGHBORHOOD

by

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## **Abstract**

Urban growth and the need to meet mobility, environmental, and energy objectives place demands on public transit systems. Focusing development around transit facilities has become a significant way to improve accessibility, support community and regional goals of enhancing quality of life, and of supporting the financial success of transit investment. Today, many transit systems and communities are participating in Transit Oriented Development programs to attract interest as a tool for promoting smart growth and catering to shifting market demands and lifestyle preferences. The SkyTrain system has been adopted by Vancouver as a way of solving traffic congestion, preserving the natural environment, and approaching a more sustainable future. This study is to explore the potential of SkyTrain stations to be centers of community life and to have positive impact on the surrounding area. Based on a combination of a literature review, case studies and a review of existing policies in Vancouver, this study proposes a transit-friendly community at the Gilmore station, one of the stations on the Millennium line. With proper design, Gilmore station can attract a variety of activities and uses.

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# Chapter 1- Introduction

## 1.1 Background

As populations and communities grow, many communities have identified a demand for fast, efficient and clean transportation systems to encourage people to transfer from using cars to public transit in order to protect the natural environment. Consequently, the communities around transit stations should be developed in a transit-friendly manner to encourage the use of public transit systems.

SkyTrain, an advanced light rapid transit system, has been adopted by the Greater Vancouver Region to connect Vancouver, Burnaby and other suburbs. Since 1986, Vancouver has been attempting to achieve an increase in density focused on transit and a less car-dependent future. Successful growth of the city will mean greater use of the transit system. An effective transit system requires land-use patterns which are transit-friendly (City of Vancouver, 2003).

Gilmore SkyTrain station, a transit station along the Millennium line in Burnaby, will be analyzed for this study. A large and presently undeveloped area around the station structure is currently being designed. Although this study focuses on one station, it is expected that what is learned about potential functions of the surrounding area will be able to be generalized to improve our overall understanding of the factors involved in building a successful public transit center that serves both community and transit related needs.

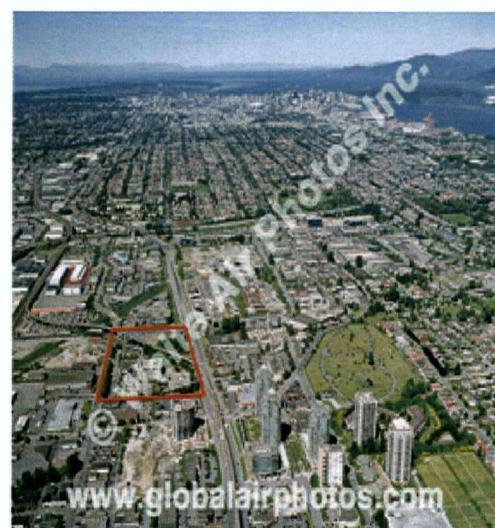


Figure 1 Gilmore station air photo<sup>1</sup>

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<sup>1</sup> Source: <http://www.globalairphotos.com/gallery/BC/Burnaby/Central/2004/11>

## **1.2 Purpose of the Study**

Project goals: The goal of this project is to explore the direct relationship between SkyTrain stations and their communities' contents. The focus is not only on the station, but also on how this facility connects to the surrounding neighborhood and public space, making the area a more safe, convenient and sustainable place to live.

Transit stations, an important part in the SkyTrain system, not only act as important places in the daily life of commuters, but also as significant landmarks which reflect the characteristics of the neighborhoods. Stations are places that create a first impression of the communities in which they are situated. A good station should add to the richness of the community that it serves. How, through a creative environmental design, can a station best be integrated into the neighborhood in which it is located?

The aim of this project is to design a friendly area around the Gilmore station through well-conceived site planning with positive landscape treatments that ensures that future neighborhood development will be focused around the station. It is crucial to analyze the existing issues and opportunities around the transit station area. It is also important to consider the concept of Transit Oriented Development, derive experience and understanding from precedents, and to understand how these concepts might be applied to make the station more attractive and inviting.

## **1.3 Problem Definition**

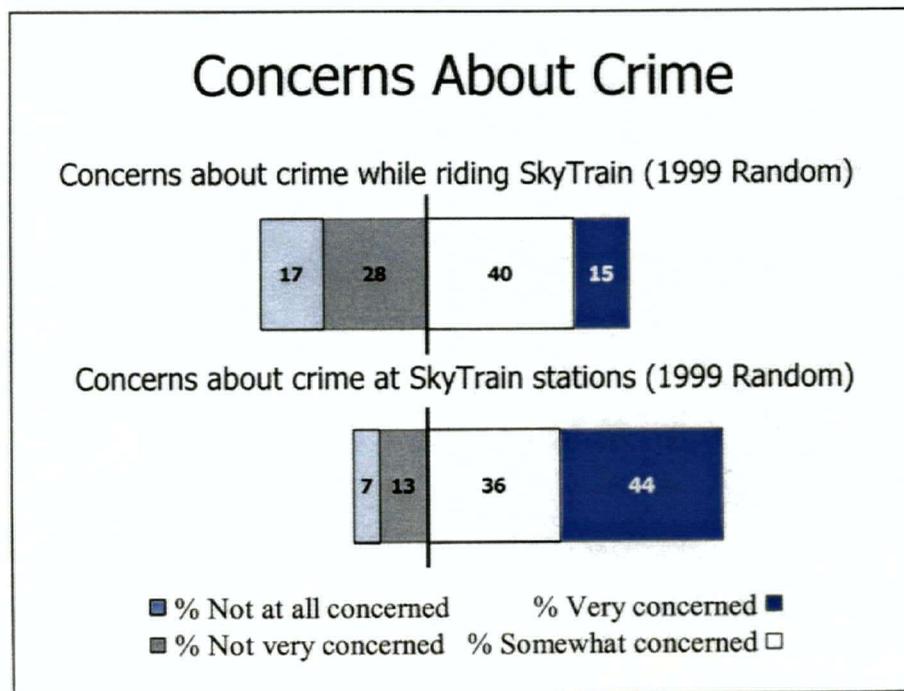
SkyTrain has been in operation in Vancouver's lower Mainland for 18 years and has performed well because it has integrated land use planning and transportation investment (Rapid Transit Project 2000Ltd, 2000). Although the public has displayed a positive attitude to the speed, reliability and convenience of SkyTrain, a number of negative impacts have been identified.

When SkyTrain began operating in 1986, the Provincial Ombudsman's office received numerous complaints about the negative impacts of SkyTrain on privacy, views, shadowing, noise and property values (BC Office of Ombudsman, 1987). For example, many local residents complained that the elevated rail system, with its concrete columns interfered with their panoramic views and blocked sunlight. Especially in winter, when the sun sits low in the sky, the over-shadowing guideways have an especially depressing effect on nearby residents (BC Office of Ombudsman, 1987). In addition, due to the positioning of the SkyTrain rails, passengers were able to see through living room windows and into many yards and patios (BC Office of Ombudsman, 1987). Loss of privacy results in reduced livability and possibly reduced property values for those residents living in close proximity to the SkyTrain lines.

In addition to the above mentioned problems, there are growing concerns about the safety of the SkyTrain stations and the connectivity between communities (Rapid Transit Project Office, 1999). Years of research and consultation have revealed that the greatest focus of public concern centers around the criminal elements that operate around the SkyTrain and its surrounding neighborhoods. Berkley, in her research entitled "Public Transit and Crime" has discovered that "crime does not generally occur at random, but instead occurs with predictable regularity in space, time and place" (Buckley, 1996). Joanne Proft, a project planner and designer with BC Translink told me that a large number of crimes around stations are attributable to the fact that the stations provide an easy escape for criminals. In addition, SkyTrain stations have predictability of time and usage. There are predictable peak usage times as well as times when stations are virtually empty. This type of environment can affect both the public's perception and fear of crime as well as the true level of crime that takes place.

According to the "All criminal code report at station" from SkyTrain security office, over the last 4 years, a large number of the crimes have occurred at busy nodes, such as Broadway and Metrotown stations. Twenty incidents of crime have been documented at

the Gilmore station from 2001 to 2004. However, future high density development at the Gilmore station might have an effect in altering the uses and activities that take place at the station. The potential exists for a rise in the crime rate with the new development. The potential of criminal activity can not be ignored.



**Figure 2** *SkyTrain regional issues survey regard to crime*<sup>2</sup>

### 1.4 Theoretical Orientation

The negative impacts of a SkyTrain station can be somewhat mitigated through the positive design of outdoor space that effectively connects the station with the surrounding neighborhood. A well designed station will promote the interest of the public for using the station area throughout the day. This project proposes that this can be achieved through Transit Oriented Development (TOD).

TOD “is compact, mixed-use development near new or existing public transportation infrastructure that serves housing, transportation and neighborhood goals” (American

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<sup>2</sup> Source: [www.rapidtransit.bc.ca/reports/Market%20Research/pdf/STRIS%20-%20final.pdf](http://www.rapidtransit.bc.ca/reports/Market%20Research/pdf/STRIS%20-%20final.pdf)

Public Transportation Association, 2004). "Once that idea takes hold in a community, it becomes a powerful motivator for changing the built environment" (King County Webpage). TOD represents an integrated approach to transportation and land use planning, and makes stations notable public places. According to this study, the design of the Gilmore SkyTrain station area should anchor the relationship between the SkyTrain system and its surrounding community. The development of the station attempts to maximize passenger safety and makes it convenient for pedestrians to reach neighborhoods and major activity centers.

Since the goal of this project is to design the landscape of Gilmore SkyTrain station area, this study will emphasize the social design of streets and open spaces. Establishing a transit friendly community node at the Gilmore SkyTrain station aims to encourage more social activity and promote the desire to stay and enjoy the station as a high quality outdoor room rather than a monotonous transit stop. "The extent and character of outdoor activities are greatly influenced by physical planning" (Gehl, 1987). Therefore, more attention needs to be given to the design of streets and open spaces for the realization of a transit friendly community because a positive outdoor environment has a significant effect on the extent of social activities. In addition, because, according to newspapers and public surveys, the crime rate is considered to be the most important issue regarding SkyTrain station areas, this project will apply some of the principles from the Crime Prevention through Environmental Design (CPTED) in order to create a safe and welcoming place for people to live, work and play (RTPO, 1999).

A good SkyTrain station in Vancouver could be used as leverage for Transit Oriented Development seeking to "use transit investments to spur a new wave of development that revitalizes suburban neighborhoods" (Reconnecting America, 2003).

## **1.5 Project Objectives**

### 1. Create Connectivity

There are several existing developments around the Gilmore SkyTrain station. In addition, the Brentwood Town Centre Development Plan has facilitated numerous rezoning applications near the station. Therefore, this study will create a range of overall site maps to demonstrate the access and connection between the Gilmore SkyTrain station and its surrounding neighborhoods, both existing and future, including commercial, residential and other transportation modes. As well, a number of proposed programs could be implemented at the undeveloped station site, on which this study will focus.

## **2. Minimize negative impacts**

The Millennium line's elevated guideway bears physical impacts, such as shadowing and loss of privacy to the surrounding buildings, and public open space. If a community plan is badly conceived, people will lose interest in using the area. As a result, the station will become isolated from the surrounding community. For this reason, this study will suggest a range of specific ways (from literature reviews and case studies) to change these impacts and mitigate the concerns related to SkyTrain and its surrounding environment. As a result, the study will show the proposed development options to city officials, residents and others through the use of written material and diagrams.

## **3. Reduce crime**

Due to public concerns that the level of crime around the SkyTrain stations might be increased with the new development, this study is going to apply, test and evaluate a number of Crime Prevention through Environment Design (CPTED) principles in the Station area design in order to reduce both future potential crime and the fear of crime.

## **4. Proposed design guideline for SkyTrain station**

Through a literature review and case studies, this research paper will analyze and summarize key aspects for the implementation of a successful development around transit stations. In addition, it will draw on existing policies and situations in order to

develop a design guideline for Vancouver SkyTrain station area design.

### **5. Develop design**

This study will apply design guidelines to make a proposal on a design option for the existing undeveloped area. The design will take the proposed programs and site plan by the developer into consideration and optimize them. The focus will be on the outdoor open space design, adjacent streetscapes, and building forms. The design will plan a pedestrian oriented and well connected system to create a transit-friendly station.

### **6. Policy review**

The concept of Transit Oriented Development (TOD) has been applied to transit station areas in other cities. This study will apply the concept of TOD to a review of the planned developments and policies around the Gilmore SkyTrain station area. The study will also examine the implementation of new land use and design policies at the undeveloped area around this SkyTrain station.

## **Chapter 2- Transit Oriented Development**

### **2.1 An Overview**

Many cities have recognized that substantial increases in ridership call for greater availability, reliability, speed and comfort in a transit service and that this can be achieved by a rapid transit system. Because this kind of transit system is so tied to our daily lives, it provides a perfect opportunity to create strong nodes around station areas. Over the past two decades, research in and the practice of Transit-Oriented Development (TOD) has spread to numerous metropolitan areas worldwide. Through its vibrant, accessible, mixed-use communities surrounding transit stations have been created. Since the mid-1990's, North American cities such as Vancouver, Portland and San Francisco have had success in the planning and implementation of TOD to further promote the concept of integrating land use and transportation (Dale and Ginn, 2001). TOD has been one of the important strategies for the development of a sustainable city.

Currently, more and more cities in North America, Europe and Australia are building light rail systems in metropolitan areas in order to connect communities and foster healthy community development. Subsequently, a number of policies which embrace the concept of TOD and which attempt to create a desirable and efficient urban form have emerged in the areas around the transit stations.

As a means of promoting compact urban form, expanding lifestyle choices and curbing urban sprawl, TOD continues to attract interest as a tool for promoting smart growth, leveraging economic development and catering to shifting market demands and lifestyle preferences (Cervero, 2004).

## **2.2 Why Transit-Oriented Development?**

As the 1980's approached, a rapid population growth created increasing levels of congestion from auto traffic and resulted in greenhouse gas emissions for Vancouver. Public concerns about sprawl and the loss of open space continue to grow. In advance of the 1986 World Expo, Vancouver constructed the first segment of its SkyTrain system. Since then, Vancouver has learned from the experience of other cities' light rail systems and is exploiting its SkyTrain system to create a transit-friendly urban form. At the same time, interest in station area development is centered around the SkyTrain stations. The following explains why transit is important to a healthy sense of community:

"Historically, transit helped foster community, just as the automobile helps undermine it. The reason is that when most people took transit, they normally walked from their homes to the bus or streetcar stop. Other people from the neighborhood were doing the same, and as they walked and at the tramcar stop they met face to face. Since commuters tend to be creatures of habit they saw many of the same people each day. They met, talked, and got to know each other. They found a shared interest in the well being of the neighborhood. Transit itself was part of that well being; people had a common interest in seeing that it offered good service. Often shops and maybe a bar or cafe opened near the stop, and a mini-community developed around it. All these influences helped a neighborhood become a community."(Weyrich and Lind 1996, page18)

Transportation plays a role in almost everyone's daily life. When the transit facilities provide attractive surroundings, they become important places in their communities that people can enjoy (National Research Council, 1997). Focusing on locating new construction and redevelopment in and around the transit nodes through TOD is expected to create a desirable, affordable and prosperous community. It is also expected to create a vibrant, diverse neighborhood by optimizing the use of public transportation infrastructure, and to breathe new life and vitality into the SkyTrain station areas.

## **2.3 Definitions of TOD**

According to Gwen Chisholm," Various terms have surfaced over the years to convey

the idea of TOD, such as ‘transit villages’, ‘transit-supportive development’, and ‘transit-friendly design’. TOD is the most widely used term” (Chisholm, 2002). However, there is no universally accepted definition of TOD. The reason is that the development outcomes may vary due to local contexts and urban forms. Nonetheless, most definitions of TOD share common aspects such as mixed-use development, development close to the stations and promotion of transit ridership. Some definitions include a pedestrian and cycle-friendly environment, as well as public and civic spaces near stations. All these facilities are within a 5 minutes walk to the stations, creating community hubs around these stations.

According to Niles and Nelson, “In essence, TOD means the creation of denser, mixed-use activity nodes connected by high quality public transportation” (Niles and Nelson, 1999). For each category, the appropriate design should be informed by the local context. Calthorpe’s guideline has identified two development patterns: An Urban TOD may be developed at “high commercial and residential densities and can consist of offices, large-scale shopping centers, and moderate-to high-density housing” (Dale and Ginn, 2001). These TODs are located near light rail and bus stops to allow users to get to many locations using transit. In contrast, the Neighborhood TODs are those located along bus lines that “have a residential or shopping focus” (Dale and Ginn, 2001, page14) with a mix of services, entertainment, and recreation uses. In addition, these TODs promote active streetscapes and central public spaces, encourage walking, provide densities adequate to support a transit system, and create distinct, identifiable neighborhoods.

## **2.4 Benefits of the TOD**

According to Cervero, “TOD has attracted the interest of politicians, environmentalist, real-estate developers, and other groups in recent times because it yields benefits” (Cervero 2004, page119). These benefits include an antidote to traffic congestion, a connection between isolated suburban communities, and the implementation of

desirable neighborhoods. Some of the benefits associated with TOD can be derived from the literature, they include:

### **1. The reduction of greenhouse gas emission and energy consumption**

TOD improves the efficiency of using the public transit systems by increasing the density of people and amenities near the station. The rates of transit ridership can be increased while car use can be decreased. For instance, in Vancouver, 47% of the households located near a station ride the SkyTrain frequently while only 18% of those households remote to SkyTrains ride frequently (Bunt ,1998). The transit ridership rates at mixed-use suburban centers of employment are on average 5% to 10% higher than those at single-use centers of employment (Cervero, 2004). Vancouver SkyTrain has made substantial gains in the delivery of service to the public. Since its inception, ridership has climbed by over 80%, reflecting increases in capacity and frequency. RTP2000 commissioned a series of ridership estimates based on the updated population statistics and employment figures, and predicted that annual ridership will reach 65-70 million by 2006 (RTP2000,1999). Creating transit-oriented, mixed use sub-centers around Vancouver SkyTrain stations offer good provisions for pedestrians and cyclists. Safe pedestrian access to the transit station and other amenities allows households to lower the rate of air pollution and energy consumption by decreasing the number of auto-based trips that they make.

### **2. Conservation of open space and the decrease of local infrastructure cost**

By encouraging high density development around the station and infilling undeveloped parcels, TOD also contributes to optimizing the use of land and reducing the conversion of open space into development. Contiguous and compact development could relieve growth pressure on rural land, leaving open space at the urban fringe and protecting agriculture. This benefit meets the Greater Vancouver Regional District's smart growth plan of reducing urban sprawl. More open spaces, including environmentally sensitive areas and natural habitats, can be preserved.

### 3. Higher quality of life.

Some public open spaces such as plazas or parks serve as gathering places for events, including parades, performances, concerts and farmer's markets. When these activities are accommodated at transit stations, the stations become focal points for social interaction. The pedestrian-friendly scale and design features create 'defensible spaces' that instill a sense of safety and well-being for the people and provide mobility choices so that those who prefer not to drive can get around by walking and cycling. In addition, a mix of residents, workers and shopkeepers within compact areas creates a continual security presence throughout the day and night, providing 'eyes on the street'. A review of transit stations in New York City found that street life, when combined with lighting improvement, street art and retail kiosks, can contribute to a healthier lifestyle for people by reducing both perceived and actual crime rates (Cervero, 2004).

### 4. Providing a catalyst for economic development

TOD encourages new development on vacant lands as well as in existing communities. The easy access by transit not only encourages people to live there, but also attracts new investments and businesses into to the neighborhoods, creating new and better economic development. The thriving businesses thereby stimulate local economic development by creating new and better-paying jobs. For example, Union Station in Washington, D.C., a bustling facility for 50,000 daily train and bus riders, has spurred an urban renaissance. Retail sales have increased at an annual rate of 5% at the station (Cervero, 2004). In Vancouver, the UBC geography department has conducted a GIS analysis with regard to SkyTrain and its effect on property values. They used a visual investigation that was conducted by visiting each station and examining new condominium complexes and apartment buildings in the areas. The investigation revealed that an increase in property values around the stations is a rising trend. For example, the property values around the Nanaimo station have seen an increase of 4.49 % between 1981 and 1996 (Spencer).

## 5. Benefits to housing availability and affordability

TOD increases the supply of affordable housing by creating opportunities for more diverse housing options. In new development areas, housing costs for land and structures can be significantly reduced through more compact growth patterns (California Department of Transportation, 2002). Therefore, people will have more opportunities to buy or rent medium to low-priced housing which will increase in value in the long term. In addition, reduced spending on transportation can result in reducing expenses for households. Using fewer automobiles frees up income for housing purchases. In addition, thriving businesses offer local residents more employment and service opportunities within the communities. TOD provides workers and residents with commercial, public and recreational services close to where they live and work, also reducing transportation expenses. As Cervero states, "by reducing driving costs by \$3,000 to \$5,000 per year, TODs make it easier for low income renters to afford the higher rents found in many rail-served cities" (Cervero, 2004, page125).

## **Chapter 3- Research Methodology**

### **3.1 Problem Definition**

The goal of SkyTrain for a transit-friendly community is to design a safe, functional, and aesthetic place for transit users and local residents and at the same time to eliminate or mitigate the potential risks that it could bring. According to the 1987 SkyTrain Report, the Special Commission SkyTrain Review in 1999 and other surveys, major concerns raised by the people living near SkyTrain included noise, reduced property values, a lack of integration between stations and neighborhoods, and crime. How do these concerns affect the integration between stations and their neighborhood community? The first stage in understanding this is to explore how the issues arose and show that perhaps not all stations would experience these problems if it weren't for certain environmental conditions around the stations. By examining some of the literature and research reports about the Vancouver SkyTrain system, one sees that the surrounding land use and physical environment have a direct effect upon these potential impacts. For example, according to a property value investigation on four SkyTrain stations, the surrounding land use patterns had significant impacts on increasing or decreasing the property values of the lands. As another example, the crime ratio and patterns, as well as the levels of people's fear of crime are quite different between the areas at which the stations are located.

### **3.2 Developing the Project Program**

How can the aforementioned negative impacts be reduced, and what kind of station area design would allow for the station to best integrate into its surroundings? Case studies will serve as a valuable supplement in order to demonstrate how to respond to the need for a transit-friendly community. Some key research has examined and summarized current thinking about the development of transit station areas worldwide. A review of the current literature on the topic will help to deepen our understanding about how to

make the best use the theory of Transit Oriented Development in order to create a design with the best possible outcome under the varying conditions that need to be considered.

Westside Light Rail in Portland has been a pioneer in applying the concept of a Transit Oriented Development to plan local station areas. Beaverton Central and Orenco stations are two other examples. Learning from their successes and failures can provide direction on how to best implement the concept of TOD. The Expo Line in Vancouver has also been a success in the area of SkyTrain station development. For example, Joyce and Edmonds stations, two clear successes, both have new high density development around the stations with integrated landscaping. Broadway station, on the other hand, is a hot spot for crime and is surrounded by a large range of commercial uses. In addition, a literature review will be useful in helping us to gain clarity on the best way to design a station area with outdoor living spaces that are both aesthetically pleasing and functional.

When a clearer understanding has been gained about design and planning, the next step will be to review specific conditions for Vancouver SkyTrain, as well as city planning policies for the entire Greater Vancouver Region. The goal is to investigate how these plans could encourage the development of transit-friendly communities around the stations. From the examination of the case studies, the literature review and the evaluation of existing conditions in Vancouver, specific guidelines, including some proposed plans for specific station areas for Vancouver SkyTrain will be proposed.

### **3.3 Revised Program**

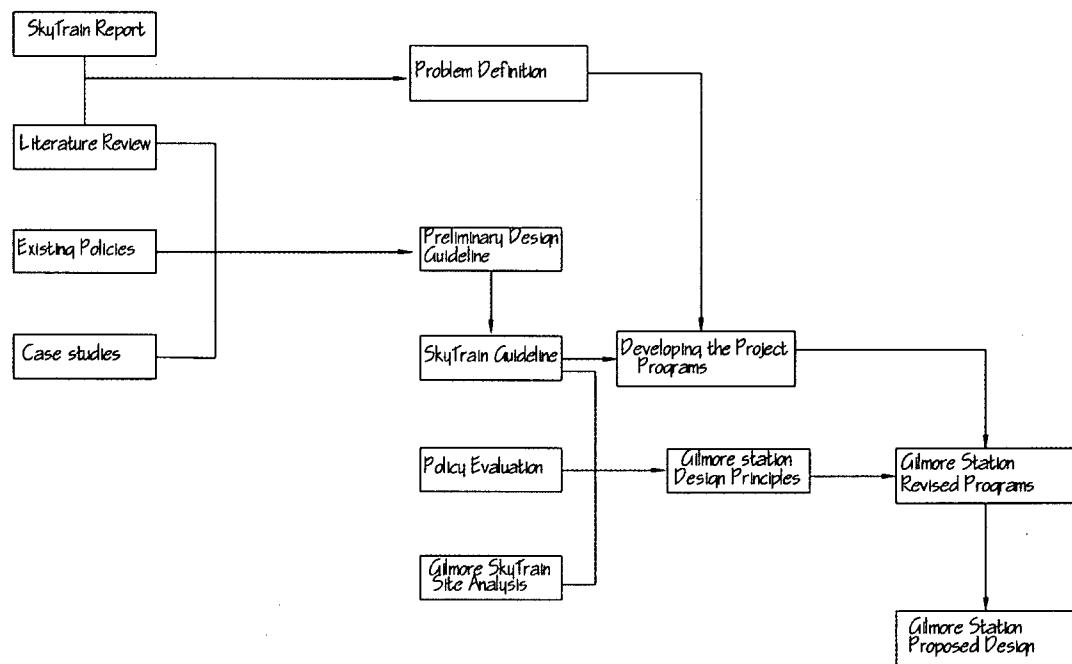
Although generalities can be made about how to best approach a design, development planning must also be site specific. In the case of the Gilmore SkyTrain Station, the study should not only analyze the opportunities and constraints of the station area, but

also evaluate the physical conditions and urban planning policies. The goal is to distill the most suitable programs for the Gilmore SkyTrain Station. At this point, the analysis of Gilmore station should be approached on a large scale for neighborhood contexts, history, circulation and open spaces, and on a small scale for subject site grading, noise, shadowing, etc. After such an analysis, it could be found that some predicted negative impacts would not be problematic, and also that some special concerns would need to be paid more attention to. These revised programs would have the effect of improving the station area and further integrating the station into the community. At the same time, existing policies of the Greater Vancouver Region, the Burnaby Official Community Plan, the Brentwood Town Centre Development Plan, and nearby rezoning proposal can be examined to see which aspects and recommendations would be suitable for improving the design plans. Based on the information gathered, the design principles for the Gilmore station could be revised, and the general plans could be updated with consideration for the new information about the conditions present at the subject site.

### **3.4 Proposed Design**

Once the revisions are finalized, the study will try to adjust the plans in order to consider the existing undeveloped areas. The layout plan will use the existing development plan as a reference guide and make sure that there remains flexibility for potential changes and improvements in the plan. Subsequently, the study will pay more attention to the outdoor landscape design of this area. The design should take all guidelines that would minimize negative impacts into consideration. It is expected that a positive outdoor landscape design will reinforce the Gilmore SkyTrain station area as a popular space that encourages social activity and aims to create a gateway for a vibrant future neighborhood. It is also expected to enhance the comfort and convenience of transit users and increase the sense of security for the community.

### 3.5 Methodology Diagram



**Figure 3 Research Methodology diagram**

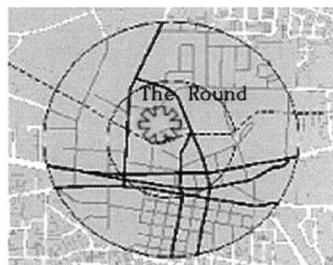
## Chapter 4- Case Studies

### 4.1 Portland, Oregon

Portland is a leader in applying Transit-Oriented Development. The Westside MAX connecting several outlying suburbs with downtown Portland is often used as a model for other cities when they develop their transit system planning. Its biggest success is rezoning areas around Westside MAX stations. These stations are located in some relatively undeveloped areas. For this reason, the communities create station-area plans that involve dense, pedestrian-focused development to balance local needs and regional objectives. This coordination of transportation and land-use planning is essential in promoting both social and economic benefits around station areas. A 1998 case study in Portland showed how that the region's almost fanatical devotion to transit-oriented development was paying off (NAR, 2002). For instance, it was found that TOD increases the light rail ridership as well as local property values.

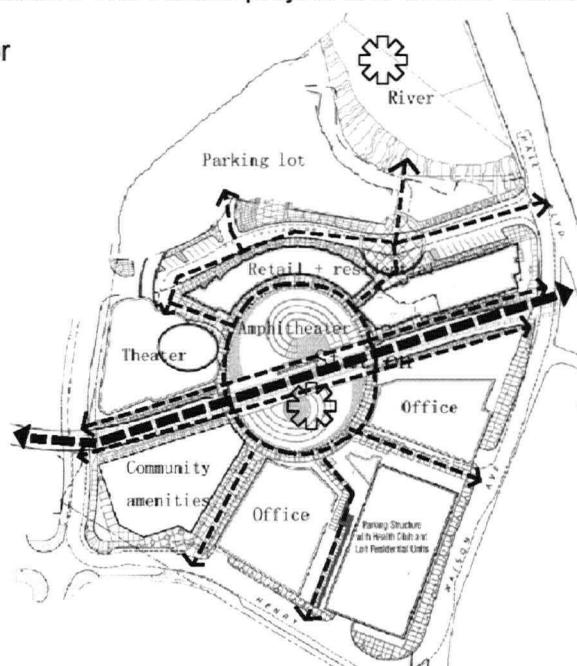
The following section presents and analyzes 2 case studies of TOD developments in the Portland area; Beaverton Central Station's The Round project and Orenco Station, located in the Portland suburb of Hillsbor

#### 4.1.1Beaverton Central Station



**Figure 4 Beaverton central road network**

Site area: 8.5 acres
Housing units: 260
Parking space: 1.8space/units
Retail/Commercial: 470,000sqft



**Figure 5 Beaverton Central Station Diagram<sup>3</sup>**

<sup>3</sup> Source: [www.ci.beaverton.or.us/.../econdev\\_downtown.html](http://www.ci.beaverton.or.us/.../econdev_downtown.html)

TriMet (Tri-County Metropolitan Transportation District of Oregon), the company responsible for the Portland transit system, has created a new development project known as The Round at Beaverton Central Station. The project includes a civic plaza with an amphitheater, market housing, offices, retail/office flex space, a garden, a hotel, a movie theater, and an 810-space parking garage, covering about 8.5 acres in the area that surrounds Beaverton Central Station. As a model of approaching Transit-Oriented Development, "The Round" will be the 'jewel' of Westside Light Rail and the centerpiece of Beaverton's downtown revitalization plan" (Henry, 2004, webpage).

Notable features of The Round include its variety of building structures which form a large circle around the light-rail platform, and that a train passes within a few feet of the lofts. The crescent-shaped buildings bracket an impressive public plaza adjacent to the MAX station platform and create a focal point for the Round. The sunken public plaza is framed by lines of decorated lights, benches and significant trees. Together with a waterfall cascade, this amphitheatre forms a center focus for the ground floor commercial spaces. The Round creates a new heart for downtown Beaverton and sets the stage for revitalization in a pedestrian-friendly, transit-oriented fashion.



Beaverton Central station



The Round at Beaverton



Art work at Beaverton



The round retail buildings

**Figure 6 Beaverton station photos<sup>4</sup>**

<sup>4</sup> Source: [https://.../economicdev/econdev\\_project5.html](https://.../economicdev/econdev_project5.html)

<http://www.trimet.org/max/blueline/stationart/beavcentralart.htm>

The art work at Beaverton Central station area is also unique. The platform is paved with bricks representing the phases of the moon, which is used as a visual way to symbolize Beaverton's dramatic changes through the past fifty years. At the westbound platform, a photograph of the surrounding landscape circa 1994 portrays a dramatic change of the station grounds: As the landscape changes over the years, a passenger can look through this 'time window' and see the present landscape contrasted against the former" (TriMet).

However, The Round ran into difficulties during the process of development. Construction on The Round began in 1998, but was delayed due to financial problems. One reason was that the plans for The Round attempted to encourage walking or transit use by creating mixed-use development along the transit route. Although in theory this sounds like a good plan for the reduction of vehicle use and the need for parking spaces, in practice it did not prove to be realistic as the focus on retail attracted drivers who then found adequate parking space to be lacking (American Dream Coalition).

Other factors that led to the failure of TOD at The Round were lack of access and connectivity. To begin with, Beaverton's high concentration of arterials so close to the transit stop went counter to the theory of walkable urban forms close to TOD stops. The transit stop was isolated in an auto-centric street system. Also, the circular pattern of Beaverton's arterials cut off the areas beyond a quarter mile, thus making pedestrian travel difficult. Access to any of the surrounding areas was nearly impossible by foot without traversing a series of large, high volume, high speed auto-oriented roads (Schlossberg, 2003).

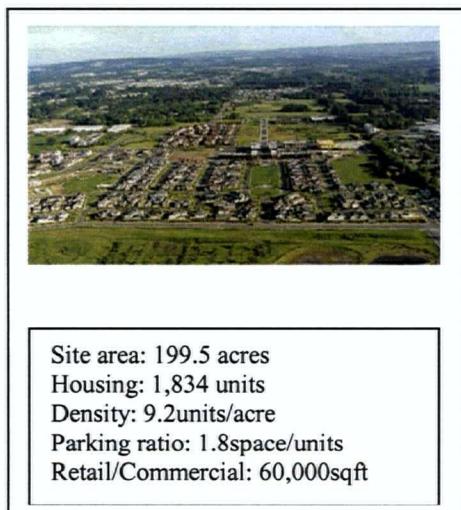
#### **Lessons learned**

- + *Creating a focal point at the station can encourage a central community focus*
- + *Mix-used development helps to create a complete community*
- + *Artwork can add aesthetic quality to the stations and reflect local character*
- *Total Parking spaces should be carefully controlled*
- *Pedestrian-friendly routes should extend outside of station areas to create connectivity and easy access to the stations*

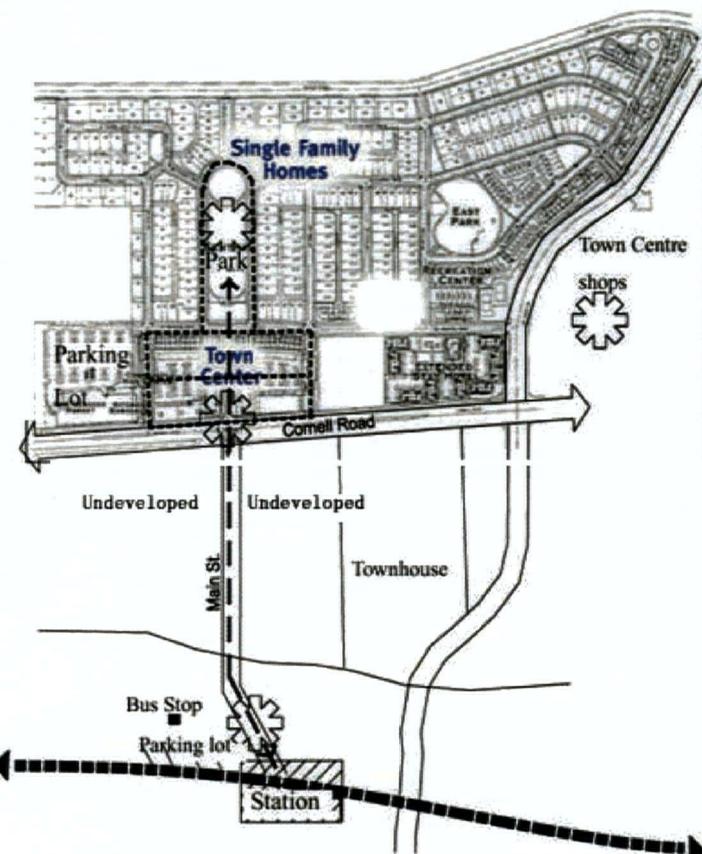
Fortunately, the City of Beaverton stepped in and designed a new plan for land redevelopment in 2001. They modified the design project to create more intensity around the station area and the new developer convinced the city to allow it to include hundreds of additional parking spaces. In addition to its diligent efforts to realize the vision for The Round, the revised project included off-site improvements that embarked on a streetscape project to improve pedestrian connections.

Although The Round at Beaverton Station is often used as an example of a problematic project in Transit Oriented Development, the lessons that have been gleaned from the difficulties in the original design of The Round -- the conceptual layout, hierarchical road systems and parking, are all valuable teachings in how to create a successful TOD.

#### 4.1.2 Orenco Station



*Figure 7 Orenco station air photo<sup>5</sup>*



*Figure 8 Orenco station diagram<sup>6</sup>*

<sup>5</sup> Source: <http://www.planetizen.com/oped/item.php?id=95plot>

<sup>6</sup> Source: <http://www.orencostation.com/sitemap.htm>

Orenco Station in the Portland suburb of Hillsboro is the largest master-planned community on the MAX system. It is a new 199-acre pedestrian-oriented community featuring traditional architecture adjacent to the Orenco Westside light rail station. The community combines a connected network of local streets and a variety of amenities, including a commercial and retail center and community parks.

Orenco Station, once an agricultural area, continues to grow from its origins as a planned community, conducive to walking and riding Max light rail. Transit Oriented Development is generally considered a success for Orenco station. It is just what most suburban communities strive for -- it is green, quiet, and safe. However, Orenco station is anything but a typical suburban development. Most prominently, the community is anchored by a light-rail stop, linking residents to the regional transit system. Another notable feature of Orenco Station is that it is at the heart of a neighborhood known as "Main Street". Main Street consists of a community shopping area and gathering place that is connected to a series of residential neighborhoods via tree-lined streets with wide sidewalks, parks and open spaces. The design attempts to capture the essence of a small town business district that combines living and working environments.



Ground oriented retail shops



Station area sitting



"Main Street"

**Figure 9 Orenco station photos<sup>7</sup>**

The Orenco light rail station itself introduces distinguished works of art. It incorporates

<sup>7</sup> Source: <http://www.nrdc.org/cities/smartGrowth/solve/orenco.asp>

<http://www.trimet.org/max/blueline/stationart/orencoart.htm>

nature and plants into its design theme. When designing this station's artwork, the artist professed awe at the natural beauty of the surrounding forest. The design uses elements from the area's nursery heritage. The station's decorative benches are made of bronze casts of the sticks found around the station site (TriMet). This not only creates an interesting detail, but also helps incorporate the station into the community, for the art surpasses the limits of the station and improves the local area (TriMet).

However, in some aspects, Orenco Station does not implement all the goals of Transit Oriented Development. Since light rail is an essential feature of the community, the residents living near the station are presumed to use light rail regularly and walk to the station. The data shows just the opposite (Charles and Barton, 2003). The expensive, pedestrian-oriented parkway that connects Orenco Station to the transit station is most often empty despite wide sidewalks, park benches and decorative street lighting. The majority of residents using Orenco Station live too far away from the transit station to walk on a regular basis and they arrive at the station primarily by driving about 600m to 2000m from their homes. Approximately, 18% of Orenco Station residents regularly commute by transit (Girling and Kellett, 2005)

Although Orenco Station is named as an outstanding example of Transit Oriented Development and has won the Governor's Livability Award, it is not only intended to connect previously isolated communities to downtown and to each other by light-rail, but also the station serves as a focal point for creating walkable, vibrant, mixed-use pockets in the suburbs. Unfortunately, the existing unfinished development has not yet reached the design

#### **Lessons learned**

- + Mix-used “Main Street” provides for community activities near the station
- + Human scale pedestrian oriented streets create a pedestrian friendly environment
- + Transitional architecture creates local identity
- + Ground level retail reduces the fear of crime by ‘eyes on the street’
- + Parking lot integrates with pedestrian routes creating pedestrian connectivity
- In order to be used by residents, it must have pedestrian access to the transit station of no more than 500 meters
- Mixed use neighborhood centre should be at a vary near to the transit station

goals in large part due to the gap between the station and the neighborhood center.

## 4.2 Vancouver City

Greater Vancouver, one of the largest urban centres in Canada, has a long history of integrated land-use planning and transportation investment. SkyTrain stations have been catalysts for development in Vancouver (BC Transit, 1989). BC Transit has worked closely with city councils with varying degrees of success in the Greater Vancouver area to take advantage of the SkyTrain in order to stimulate economic and social development around station areas. It encourages commercial and residential development as well as business centres within the SkyTrain station areas. Additional public amenities such as new green lands and neighborhood parks are also created for community cohesion.

Stations facing complex concerns such as Broadway/Commercial station and smaller developments such as Joyce-Collingwood and Edmonds are typical examples of using the concept of Transit Oriented Development in the station areas. In some sense, they provide a living laboratory for understanding how to reshape the transit station areas into more transit oriented neighborhoods.

### 4.2.1 Collingwood/Joyce Station

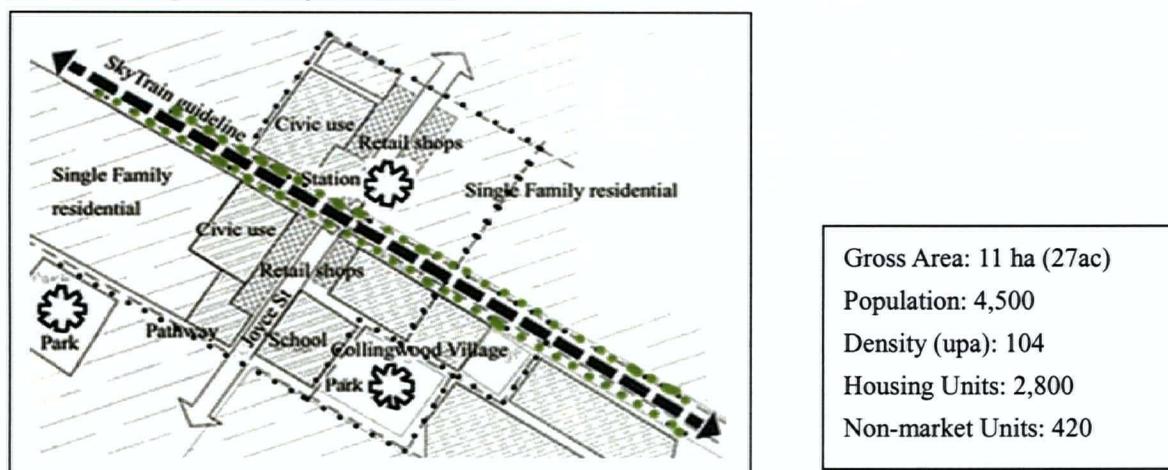


Figure 10 Collingwood/Joyce station diagram

It has been noted that “Collingwood Village is a prime example of how the opportunity created by a new rapid transit system can be the impetus for coordinating land use planning with a large scale development” (City of Vancouver, 2003, Page1 ). As a result of the construction of the Joyce SkyTrain station in 1986, this area has been transformed from an outdated industrial pocket surrounded by single family housing into a new high density neighborhood. A range of high density residential and commercial uses with public amenities have sprung up around the station.

A significant factor for the success of Collingwood village is the well-conceived community plan which is anchored by Joyce station. Development parcels are arranged along a central spine, the SkyTrain guideway, with short cross streets connecting with it, creating a fine-grained block system. Several north-south mid-block roads with enhanced pedestrian environments provide natural connections to the greenway under the SkyTrain guideway and surrounding communities. Sensitively sited buildings define an urban street grid that is also helpful in reinforcing the connectivity, providing convenient access for many adjacent residents to the SkyTrain station.

A significant proportion of the housing units are ground oriented with aesthetic building frontage in order to encourage safety through ‘eyes on the street’. Another factor influencing the success of this development is that the functional landscaping has been blended into the station area design, effectively eliminating the negative impacts brought by the SkyTrain guideway. The new housing is buffered from the elevated SkyTrain system that runs



Access at Joyce station



Ground level commercial



Parking lot



Graffiti on the retaining wall

**Figure 11 Joyce station photos**

along the northern edge of the site with landscape setbacks. The high-rises are located toward the northern edge of the site to minimize overshadowing and overlooking of the existing single-family houses to the south. Buildings have generally been oriented to the adjacent street grid and reinforce the street and public open space pattern. As a result, a pleasant pedestrian environment has been created with natural connections to the surrounding neighborhoods. The regional greenway system is linked to provide cycling and walking connections to recreation and the SkyTrain station.

However, northeast of the SkyTrain station, the original single family area is not considered to be a successful

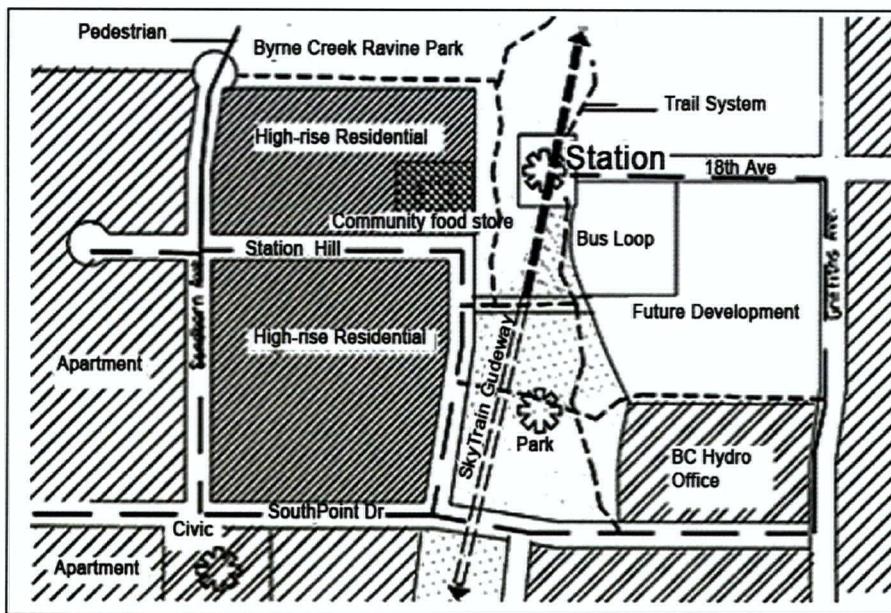
part of the SkyTrain development plan. There is graffiti on the retaining walls that raises concerns of criminal activity. As a result, the trail on the north side is left largely unused because of the poor walking environment. Although a row of conifer trees is used for screening the guideway, it does nothing to improve noise levels.

Despite the above mentioned concerns, Collingwood Village provides a "textbook example" of transit-oriented development (GVRD Policy and Planning Department, 2002). Its outstanding development won the GVRD Livable Region Strategic Plan Award for the 2002 UDI Awards of Excellence.

#### **Lessons learned**

- + *Building high density development near the station increases ridership*
- + *Landscaping is designed as a guideway buffer for curbing negative impacts*
- + *Green spaces are connected by pedestrian friendly routes*
- + *Parking lot and bus loop integrate with the station*
- + *Ground oriented residential creates 'eyes on the street'*
- *Noise issues still on the north because vegetation buffer is no use for sound insulation*
- *Graffiti at retailing wall creates unsightly conditions*

#### 4.2.2 Edmonds Station



**Figure 12** *Edmonds station diagram*

Edmonds SkyTrain Station is the easternmost station in Burnaby and sits at ground-level. The remaining tracks of the old BC Electric Interurban Railway can be seen when approaching this station. Four bus routes converge at the Edmonds bus interchange near the station to provide passengers with local service. Pedestrian and cycle routes include the BC Parkway, a trail system through Byrne Creek Ravine Park and a number of street improvements that are planned for the core area to enhance the pedestrian experience. City-in-the-Park community, southwest of the Edmonds Skytrain station, is a high-rise development with extensive garden areas as well as a medium-sized grocery store. These large complexes of high-rise apartments are built as a "lid" over the tracks directly east of the station (NW Virtual Transit Center).



**City in the park**



**Community food store**



**Neighborhood Park**



**Pedestrian**

**Figure 13** *Edmonds station photos*

The development plans for the Edmond station area focused on SkyTrain to encourage non-vehicular modes of transportation. The plans focused on the density of the site, its proximity to public transit, the pedestrian network, and the greenway. A high level of development density was allowed on the site in exchange for the protection and maintenance of public open space. Community food stores not only stock gourmet items, fresh produce and basic staples, but also serve light meals. They are located in a red brick building with a clock tower designed to symbolize a railway station one might have seen long ago.

City-in-the-Park and Edmonds SkyTrain station are separated by SkyTrain guideline buffers but connected via trail systems and pathways. On the north, a natural heritage park with creeks has been preserved to provide refuge and habitat for wildlife. On the south is a green area designed as a sloped neighborhood park above the tunnel. The pathways are well planned to provide direct access to every entrance, such as those to the office building the station and City-in-the-Park. The green space not only provides a recreational place for the staff of the BC hydro offices and the residents of City-in-the-Park, but also supports a focal center in proximity to the Edmonds SkyTrain station.

A number of street improvements such as scaled lighting and street trees have also been planned for the core area to enhance the pedestrian experience. A double row of significant street trees and good quality pedestrian pavers provide durability and attractive detail, enriching the public realm and walking environment and providing pedestrians with an interesting, vibrant, fun and exciting community.

#### **Lessons learned**

- + *High density around the stations can increase the ridership*
- + *Integration between buses and parking help commuters reduce auto-use*
- + *Natural resources integrated with developed green lands around stations enrich residents' lifestyle*
- + *Pedestrian oriented street networks create a friendly environment for walking*
- + *High quality of streetscapes help to create a friendly walking environment*

City-in-the-park offers residents an ideal location, nestled in a tranquil park-like environment that is adjacent to the Edmonds SkyTrain station for speedy connections to Metrotown, downtown Vancouver and other areas of the Lower Mainland. (Rennie Marketing System) "Vancouver city counselor Gordon Price said: "City-in-the-Park makes living in a transit-oriented community extremely attractive and it does so in a suburban context" (Rennie Marketing System).

#### 4.2.3 Broadway/Commercial Station

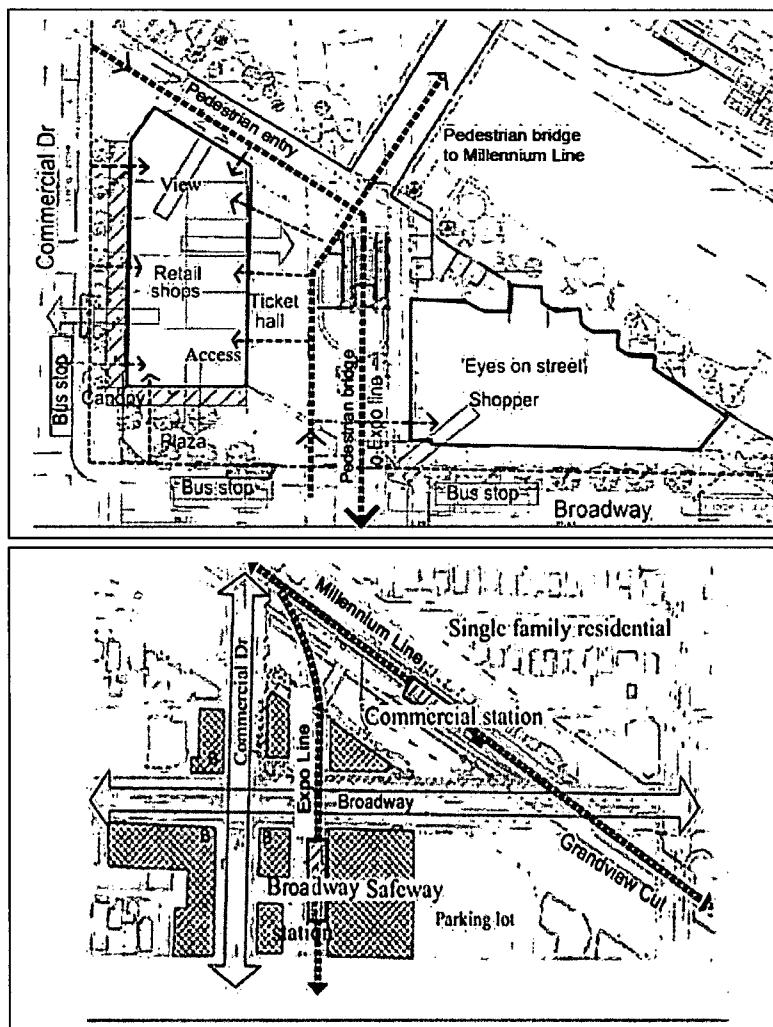


Figure 14 Broadway/Commercial station diagram<sup>8</sup>

<sup>8</sup> Source: [www.city.vancouver.bc.ca/.../000725/tt4.htm](http://www.city.vancouver.bc.ca/.../000725/tt4.htm)

Broadway/Commercial Drive are two separate stations that are joined together to connect the Expo and Millennium SkyTrain lines and to allow transfers between the two, creating a major transit hub. Broadway station is the original station with an elevated platform that opened in 1986 as part of the first SkyTrain line. Commercial Drive is the terminus of the new Millennium Line loop. It is located below grade in the Grandview Cut, and was opened in 2002. A green design and impact mitigation approach has been adopted with respect to the retaining wall design, re-vegetation and maintenance.

Also significant is the fact that “the two stations serve as a point for transferring to the trolleys and regular buses service on Broadway” (NW Virtual Transit Center). The stations provide a catalyst for transit related and pedestrian-friendly development in the station area. They reinforce Broadway and Commercial Drive as shopping streets for local and district shopping, which has been the dominant activity in the station area, providing the continuity of retail development and encouraging pedestrian access to surrounding residential developments.



Ticket hall



Grandview cut



Retail shops



Poor streetscape

**Figure 1 Broadway/Commercial station photos**

In order to achieve a unique sense of place for the shopping street with attractive, pedestrian-friendly, livable and neighborly mixed-use developments, the City of Vancouver made an attempt to redevelop the station area in 2000. The intent was to build a high quality, safe and vibrant stations with a transit interchange with mixed-use

development at the northeast corner of Broadway and Commercial Drive (City Council, 2000). Subsequently, a significant improvement of the northeast corner has become a focal point for the community and a major activity node.

Uniform awnings designed across the length of the development not only provide weather protection, but also create a sense of small scale storefronts. The corner plaza, with significant trees and pavers improves the waiting environment and serves as a landmark in this public open space. In addition, the grade level entries are oriented to both the Broadway and Commercial Drive fronting sidewalks, providing both convenient pedestrian access and a sense of ownership of the adjacent public space.

Despite the commercial infrastructure and high population base surrounding this SkyTrain development, the public streetscape is not an admirable example of urban design. The Broadway SkyTrain station displays a lack of planning for the streetscape that has led to horrible street conditions and an appalling public space. As a result, the station attracts 'crime hot spots'. Statistics indicate that the number of criminal reports at Broadway station have been far higher than the number at other stations in the several past years. Vagrants and vendors can be seen against some buildings' exterior walls, raising public fears for safety and security. Moreover, residents still express concerns about the poor appearance of buildings and sidewalks, the generally low maintenance, and the changing nature of shops and services in this area (Ducote, 2001). Some residential developments adjacent to the Grandview Cut are exposed to noise impacts from the transit system.

#### **Lessons learned**

- + *Busy transit hub can associate with high commercial level*
- + *Integrating with bus loop into the station encourages the use of public transit*
- + *Ground level retail shops with corner plaza create a space for outdoor activity*
- + *Canopies along the building can protect people from poor weather*
- *Noise issues and poor streetscape have negative impact on resident lifestyle.*
- *Hot spot can attract criminal activities*

### **4.3 Conclusion**

These Vancouver and Portland case studies illustrate a variety of developments for

public transit that have been based on the philosophy of TOD. These sites were chosen partly to reflect different environments within which the TOD concept is being implemented and partly to reflect on the reliability of the measures across different environments. Beaverton and Broadway / Commercial represent in-fill TODs located within auto-centric, commercial shopping districts. Orenco Station and Edmonds are Greenfield TOD areas, master planned and implemented through the conversion of open space to high density mixed land uses. Joyce station consists of a redeveloped TOD through the transfer of an old industry parcel into a newly built community. By studying the successes and limitations of these developments, we can learn to develop more successful and efficient transit designs.

As Peter Newman has stated, "plans call for further rail development in the form of a surface light rail system and commuter rail to improve transit and to provide more opportunities for compact development" (Newman, 2002). A critical analysis of these recent case studies can help us derive knowledge from both their successes and failures and help us to offer well thought out and educated options for further TOD station area design in Vancouver.

## **Chapter 5- Design Guidelines**

### **5.1 Existing Conditions at Vancouver SkyTrain Stations**

"The pace of redevelopment around many SkyTrain stations has been extraordinary and the process is continuing" (Newman, 2000). As a result, urban villages have sprung up around SkyTrain stations. According to a GIS analysis on the property value investigation on existing four SkyTrain stations, in areas that were historically considered to be residential, the introduction of the SkyTrain has had a small impact on overall property values. Meanwhile, the construction of new condominium complexes and apartment buildings near the SkyTrain has had the effect of creating a trend towards increasing property values. Areas that were historically considered to be commercial or industrial show little or no change in the prices of property values (Spencer).

However, there is a widely held perception that travel on the system poses a real threat to personal safety and that the SkyTrain lines encourage criminal activity (Rapid Transit Project 2000 Ltd, 2000). This issue of personal safety and security has many facets and touches on the physical design in and around stations. When one examines statistical analyses on SkyTrain crime, one finds that crime ratios and crime patterns are quite different between stations located in commercial and residential areas (Buckley, 1996). Physical cues such as litter and vacant lots, and social cues such as public drunkenness and street prostitution tend to give rise to increase in levels of fear of crime (Poyner, 1983). Therefore, the principle of Crime Prevention through Environmental Design (CPTED) should be included in the concept of TOD for Vancouver SkyTrain stations.

### **5.2 Crime Prevention through Environmental Design (CPTED) at SkyTrain Stations**

Crime Prevention through Environmental Design (CPTED), as defined by the U.S National Crime Prevention Institute, consists of the "proper design and effective use of the built environment that can lead to a reduction in the fear of and incidence of crime

and to the improvement in the quality of life". Oscar Newman, in his book *Defensible space*, aimed to find ways of changing the underlying structure of the environment so that it would not attract criminal behavior (Poyner, 1983).

Because of the strong relationship between crime and the SkyTrain, the SRG Security Resource Group Inc was hired in 1999 to explore the issue in detail. According to studies gathered, "the public is most fearful of nuisance behaviors, such as loitering, unsavory people and "street people" (SRG Security Resource Group Inc, 1999, Page1). In addition, fear of crime can lead to the perception of a community as being unsafe. This personal feeling is largely influenced by the social activities and physical design in an area. Based on these research results, Rapid Transit Project 2000 Ltd has identified a few CPTED principles that can be incorporated into SkyTrain station area design.

**Table 1 CPTED principles**

<b>principles</b>	<b>Description</b>
<b>1. Surveillance</b>	Visually permeable stations encourage a feeling of safety and increase the likelihood that the potential offender will be observed. Design features should be chosen carefully and planned well to avoid areas of concealment
<b>2. Territoriality</b>	A variety of paving materials used in a way to distinguish different spaces can serve as symbolic barriers to make people aware of the transition from each space and should be accessible for disable people
<b>3. Pathways and Movement Predictors</b>	It is important to have specific pathways which act as movement predictors for the people approaching the stations.
<b>4. Access and Security Control</b>	Entry and exit points should be limited through careful design and provide acceptable security devices without creating an unfriendly environment.
<b>5. Target Hardening.</b>	The materials of design features should be selected to limit damage from vandalism and surfaces should be designed to reduce graffiti.

### **5.3 Guidelines for Station Area Design**

The concepts of new urbanism and Transit Oriented Development have emerged in the last 10-15 years as a platform for the development of transit station areas. The following

are five key findings distilled from the literature reviews (Puget Sound Regional Council (PSRC), Calgary citywide planning and Economics (CPE), RTD in Denver and others) are of relevance to Vancouver SkyTrain. They describe ways of optimizing the leveraging of transit to build stronger and friendlier communities, as well as ways to implement the success of Transit Oriented Development. The Matrix bellow shows how these resources support the SkyTrain station area design guideline.

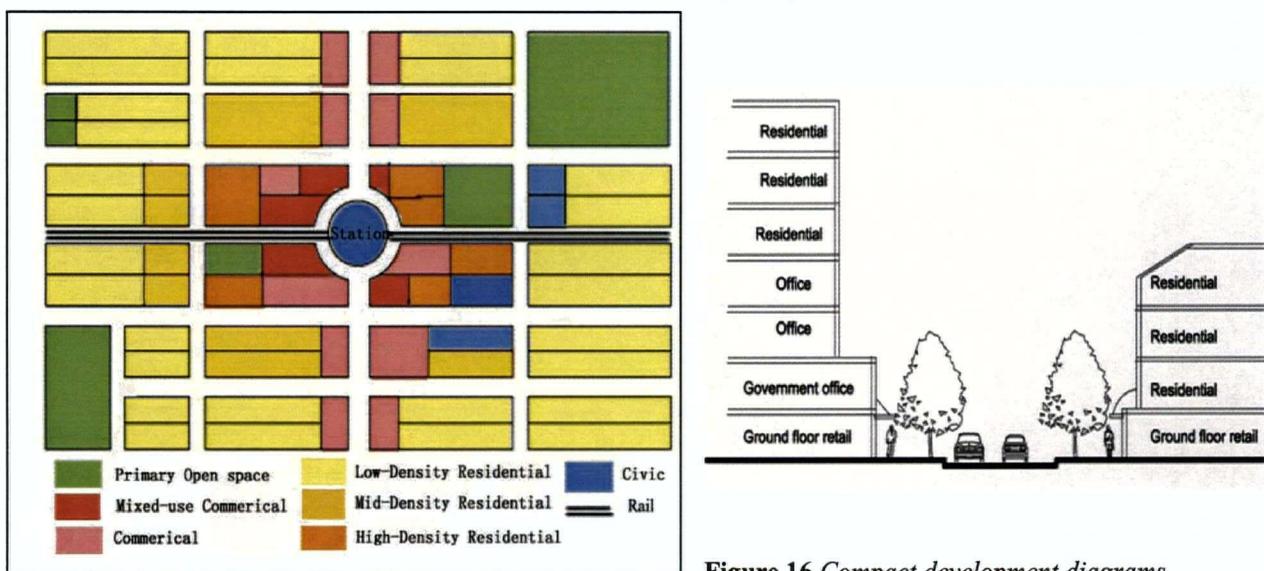
**Table 2 Design Guideline Matrix**

Guidelines		PSRC	CPE	RTD
<b>1. Compact Mixed-use development</b>	a. High density development adjacent to the stations	*	*	*
	b. Concentration of commercial retail close to the stations	*	*	*
	c. Establishing an employment base close to station facilities	*	*	*
	d. Providing mixed use development	*		*
	e. Protection and preservation of natural features and historic characters	*		*
	f. encouragement of infill and/or redevelopment of underdeveloped lands	*		
<b>2. Pedestrian-oriented design within a 500m radius</b>	a. Enhancing "pedestrian streets" within the station areas	*		*
	b. Establishing pleasant walking and cycling paths		*	*
	c. Creating streets with a high level of connectivity		*	*
	d. Providing continuous and uninterrupted walking routes	*	*	*
	e. Providing pedestrian amenities within the station areas	*		*
	f. Locating pedestrian-oriented use at ground level		*	*
<b>3. Making each station area "a place"</b>	a. Using open space creativity		*	
	b. Creating focuses for local communities		*	*
	c. Encouraging extended hours of activity		*	*
	d. Emphasizing community identity			*
	e. High quality of design		*	*
<b>4. Balancing parking with community needs</b>	a. Parking and pedestrian needs must be planned together	*	*	
	b. Carefully controlling the total supply of parking.	*	*	*
	c. Placing parking in appropriate locations	*	*	
	d. Keeping the size of surface lots small	*		*
	e. Ensuring convenient access for transit vehicles	*	*	
	f. Shared parking facilities			*

<b>5. Creating public safety and security</b>	a. Providing attractive, safe, and convenient transit nodes	*	*	*
	b. Establishing a range of uses for the station areas	*		
	c. Controlling the access			*
	d. Encouraging watching		*	*
	e. Creating a sense of ownership	*	*	*
	f. Clear and clean visibility		*	*

### 5.3.1 Compact Mixed-use Development

The development of complementary uses makes an area more wealthy, interesting and convenient. Compact mixed-use development generates human-scale public activity throughout the day, increasing options for both consumers and transit users. This type of development entails the following:



**Figure 16** Compact development diagrams

a. High density development adjacent to the stations. The plan should concentrate on high density (minimum 40 units per acre), high-quality developments (high to medium rise buildings) within a 500m radius of the transit stations. In addition, the plan should form a gradually decreasing development (from townhouses to single detached houses) away from the core, creating the sense of a town center.

b. Concentration of commercial retail units close to the stations. Commercial development should be most intense within the station core, creating an economic center.

Conveniently located retail services reduce the need for making other trips on the way to and from the stations, and also function to make using transit more convenient.

c. Establishing an employment base close to the station facilities. An employment base (min. 50 employees per acre) in a station area is an excellent way to attract transit riders. Job sites provide a regular daily destination at specific periods each day where frequent transit service can be concentrated.

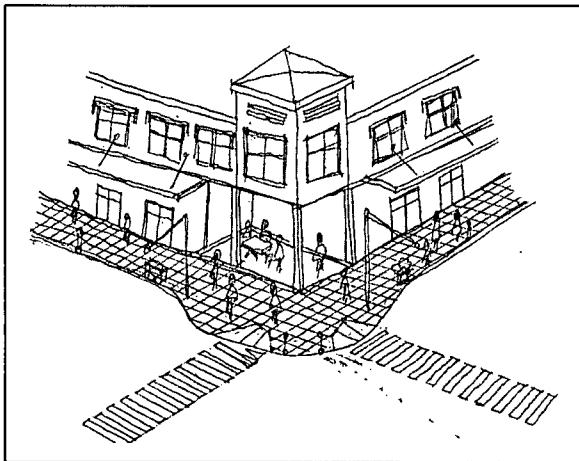
d. Providing a mix of uses. Providing an exciting mix of housing, employment, entertainment, education, retail and amenities can support a vibrant station area within communities. A mix of uses is encouraged both within buildings and on adjacent sites.

e. Protection and preservation of natural features and historic character. Natural features provide visual relief, establish a unique character for a community and ensure resource protection and public access. It is also essential to ensure that new buildings incorporate some of the distinctive historic character elements and qualities common in the local context.

f. Encouragement of infilling and/or redevelopment of underdeveloped lands. Underdeveloped or underutilized parcels should be identified within a station area as potential opportunities for new development.

### 5.3.2 Pedestrian Oriented Design within a 500m Radius

In pedestrian-friendly areas, land-use activities and streets are designed in a way that emphasizes pedestrian travel. Here are some of the considerations of pedestrian-oriented design.



**Figure 17 Pedestrian oriented design diagram**

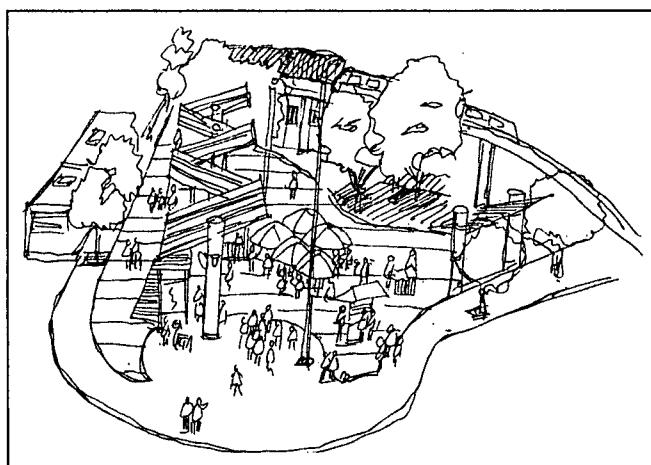
- a. Encouraging development of “pedestrian streets” within station areas. Creating a thoughtful pedestrian system that includes sidewalks and safe crosswalks to accommodate large groups of people can make walking more efficient, comfortable and safe.
- b. Establishing pleasant walking and cycling paths. Using planting strips, street trees, public art and on-street parking can create a buffer between cars and pedestrians. As well, cycling paths should be separated from automobile use lanes. The paths should be framed by human scale architecture.
- c. Creating streets with a high level of connectivity. Road layout and street networks are encouraged to be on a grid (200-400 feet long) that provides direct and regularly-spaced transit space routes serving all directions. This also provides more route options for cars, alleviating congestion.
- d. Providing continuous and uninterrupted walking routes. A continuous sidewalk system should be established within station areas. Pedestrian routes should be located along, and should be visible from all streets and should provide clear, comfortable, and direct access to the core commercial area and transit stop.
- e. Providing pedestrian amenities within the station areas. Incorporating landscaping,

weather protection, public art, street furniture, street lighting, and other pedestrian amenities in the station areas will help establish a more comfortable and visually interesting place for pedestrians.

f. Locating pedestrian-oriented use at ground level. Building entrances should be along the sidewalk to create better access for pedestrians and to establish an interesting walking environment connected to other land-use activities. Windows on the ground level should have a clear view so they can serve as 'eyes on the street'.

### 5.3.3 Making Each Station Area "A Place"

A station is where people have traditionally come together for commuting purposes. Using the concept of TOD however, a transit station can transform a utilitarian transit node into a focal point for community gathering and a variety of community activities. There are numerous ways to make stations multi-use places.



**Figure 19** *Station a 'place'*

a. Using open space creativity. Parks and greenbelts should be incorporated into the station area development as open space amenities. These open spaces can provide access to urban nature. As well, they offer recreation options and provide vibrant, active, and safe environments for area residents and transit riders to gather and play.

b. Creating focuses for local communities. Civic spaces such as plazas or squares near stations can help to create centers of community gathering spots. They provide friendly places where people can enjoy a cup of coffee from nearby shops; meet each other in a relaxed environment. Such plazas can also be used as the setting for weekend market places or other community oriented activities.

c. Encouraging extended hours of activity. A well designed open and public space can encourage people to use it day and night. The efficient use of these spaces near the stations can accommodate station area activities at off-peak times, thereby maintaining viability and safety in the neighborhoods.

d. Emphasizing community identity. Unique architectural styles, material and design, as well as the use of open space, can reflect a neighborhood's character and give a feeling of being welcoming to people. Such elements in the station area can create a better sensory experience, thereby creating increased community identity.

#### 5.3.4 Balancing Parking with Community Needs

Although TOD incorporates considerations of improved pedestrian and bicycle access, in order to achieve a successful development, both automobile circulation and parking needs must also be addressed.

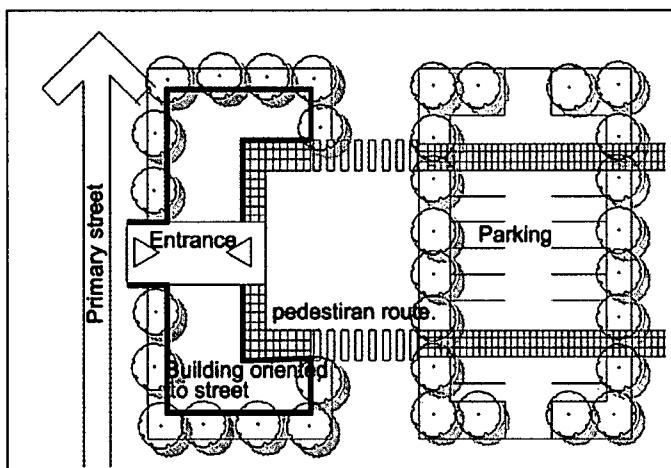


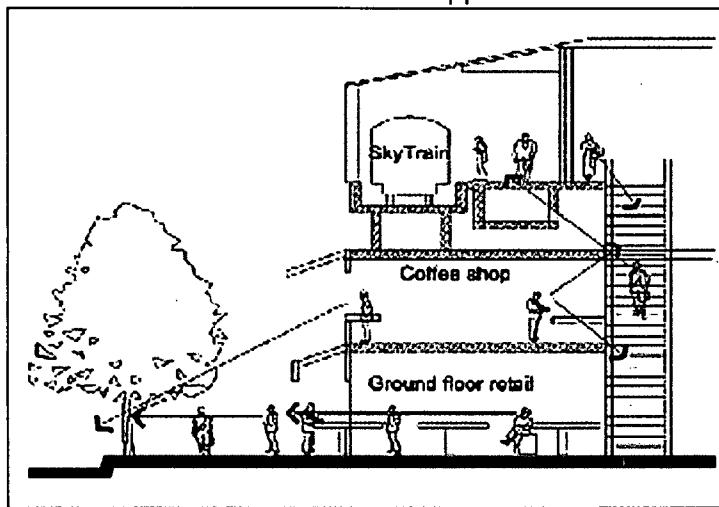
Figure 20 *Parking space diagram*

- a. Parking and pedestrian needs must be planned together. All automobile drivers become pedestrians after they park. Pedestrian walkways should be clearly delineated and located within parking lots at all building entrances and out to the street.
- b. Carefully controlling the total supply of parking. Too much parking in a station discourages transit-oriented development by consuming land, disrupting pedestrian walkways, and making distances between amenities greatly inconvenient. Reducing regulated parking areas and establishing parking maximums is needed. City of Vancouver has since allowed parking reductions ranging from 14% to 28% for new projects in other multifamily zones near major transit stations (Bunt, 1998).
- c. Placing parking in appropriate locations. TOD discourages large surface parking lots and encourages underground parking and on-street parking. Surface parking should be located behind buildings or in the interior of a block so that pedestrian access to building entrances is not impeded.
- d. Keeping the size of surface lots small. Where large surface parking lots exist, they should be visually and functionally segmented into several smaller lots (max. 0.4 acre). This can be accomplished through planting trees (1 tree/ 6 parking spaces) and screened from streets with buildings or landscaped treatments.
- e. Ensuring convenient access for transit vehicles. The location and design of parking lots should not cause conflicts with transit-vehicle circulation. Where transit riders must cross parking lots to board buses, safe travel routes should be provided.
- f. Shared parking facilities. TOD should encourage shared-parking for complimentary uses where users alternate throughout the day. For example, a library by day and movie theatre by night would be considered complementary users. On the streets, parking could be used by commuters during the day and by shoppers on evenings and

weekends.

### **5.3.5 Public Safety and Security**

Achieving a safe and vibrant environment throughout the station area can be realized through the creation of high levels of pedestrian activity and community interaction, as well as increased economic and recreational opportunities.



**Figure 21***Public safety diagram*

- a. Providing attractive, safe, and convenient transit nodes. Ground level retail shops in the station areas should be designed for year-round weather conditions. Overhangs, awnings and canopies are all desirable for the retail frontages, and should have sufficient depth and height to protect pedestrians from wind-driven rain.
- b. Establishing a range of uses for the station areas. A mixture of residential and commercial uses in the station area can generate human traffic and activity throughout the day, making the area safer, and increasing options for consumers and transit users.
- c. Controlling access. Pathways and buildings by the pathways should be carefully inspected to ensure that their design reduces opportunities for crime and nuisance activity in both public and private areas by creating a sense of ownership and avoiding

hidden places.

d) Encouraging watching. Commercial uses should be located at street grade or at the fronting property line with large glass display window areas. Where possible, outdoor seating and outdoor display of goods should be set up to encourage watching.

e) Creating a sense of ownership. The design of buildings and their grade level uses have an important impact on the activity that takes place on adjacent public streets, lanes and open spaces, and helps to create a sense of ownership and public interaction in the area. Social areas facing streets and open spaces have a positive effect on reducing crime and nuisance.

f) Visibility. The absence of nooks, alcoves, and backwater areas in a location that experiences high mischief and is poorly watched can reduce the mischief activity by making it easily visible.

#### **5.4 Guidelines for the design of the open space**

Open spaces provide benefits to the community through providing opportunities to improve health and well being, either through specific activities or through simply providing access to green spaces from which to enjoy and appreciate the environment.

##### **1. Enough space**

The size of open space should relate to the population. City of Burnaby have average neighborhood park standard which is 2.25 acres per 1000 persons (City of Burnaby).

##### **2. Connection with other open spaces**

Open spaces that are near to or connected to other open spaces offer the advantage of providing shared facilities and facilitating maintenance. Connected open spaces can form networks of spaces and corridors that knit the city together.

### 3. Public access

Recreational facilities should be accessible to the public which they are meant to serve.

Access to station areas should be available to local pedestrian circulation as well as the local mass transit system.

### 4. Aesthetic views and vistas

Significant and especially unique and beautiful views and vistas should be maintained. A scenic overview of a natural, social, historical or expansive landscape is valuable. In addition, open space should be well located for receiving natural sunlight.

### 5. The integration with buildings

Open spaces should not be seen as isolated units. They should be integrated with surrounding buildings to enhance living and working areas. Higher density housing should be organized around usable common open space for recreational purposes.

Outdoor seating must be provided for retail shops.

### 6. Preserving the natural environment

People should be encouraged to take responsibility for and value open spaces, which are also designed to promote a sense of local identity. Therefore, the design of open spaces should provide for an increased level of preservation of the natural environment by conserving natural resources and following the natural landforms.

### 7. Defensible space

Open space could be used to reduce criminal activity by increasing the field of observation and ownership. When space is used in such a way that makes people feel safe and secure in the community, it fosters the likelihood for increased social interactions. Techniques, such as lighting, fencing, and landscaping, can define spaces in a manner that promotes community safety by decreasing criminal activity.

## **5.5 Guidelines for the design of residential areas**

### **1. Views**

The quality of landscaping within yard setbacks should be increased and improved in order to enhance the visual quality and friendly appearance of the property and streetscape. Aesthetic views for the residents should not be blocked.

### **2. Access**

Sidewalks in all residential areas should be provided with a minimum width of 1.5 meters on both sides of the street. Each residential building should have easy access to neighborhood open spaces and other amenities.

### **3. Safety**

Adequate lighting for sidewalks and at intersections should be provided to let pedestrians feel safe at night. Outdoor noise levels should be controlled to under 55 decibels as the maximum to ensure a quiet environment for the residents.

### **4. Privacy**

Landscaping buffers and privacy fences are designed to provide additional privacy for the yard. In addition, residential buildings should have enough setbacks from the SkyTrain guideway in order to avoid the possibility of being overlooked by passengers.

# Chapter 6- Gilmore SkyTrain Station Design

## 6.1 Existing Policy Frameworks

### 6.1.1 GVRD Livable Region Strategic Plan

Since the Greater Vancouver Region is a whole unto itself, the Livable Region Strategic Plan (LRSP) has been adopted as a framework for local land use and transportation decisions. All levels of development should be under the LRSP plan. Land use and transit are key elements in this Plan. "Successful growth of the city will mean greater dependence on transit, but an effective transit system requires land use patterns which are transit-friendly" (City of Vancouver, 2003). Brentwood was designated by this Plan as a local Municipal Town Centre to complement eight interconnected Regional Town Centres. These centres provide a concentration of jobs and housings, a variety of shopping, services and community facilities, and are a focus for transit connection to the rest of the region.

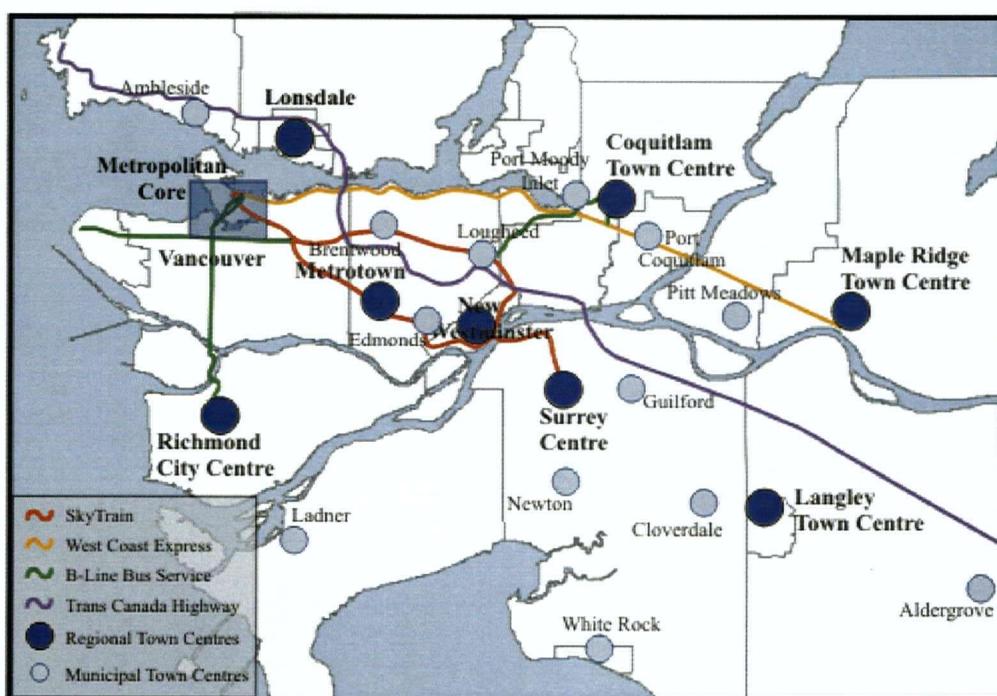
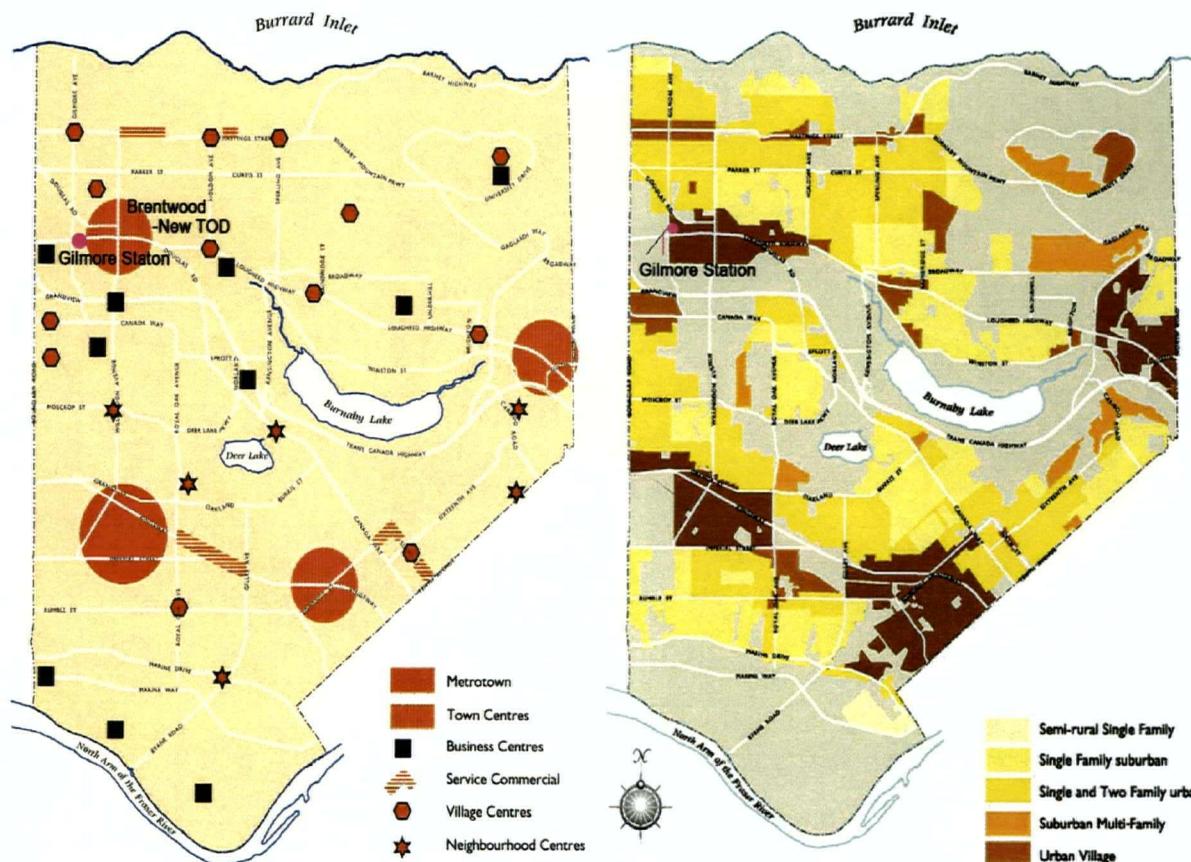


Figure 22 GVRD Livable Region Strategic Plan Livable Centres profiles<sup>9</sup>

<sup>9</sup> Source: <http://www.gvrd.bc.ca/livablecentres/>

### 6.1.2 Burnaby Official Community Plan

The City of Burnaby's Official Community Plan provides strategic direction for the development of four town centres located near Burnaby SkyTrain stations. These plans were created to take advantage of the benefits, such as new residential developments and employment opportunities, which a SkyTrain development encourages. The OCP proposes significant new transit oriented development along the Lougheed corridor in order to support the SkyTrain (Brentwood on GVRD Plan). This new housing will replace present industrial uses.



**Figure 23** Official Community Plan commercial policy framework<sup>10</sup>

**Figure 24** Residential policy framework

<sup>10</sup> Source: [http://www.city.burnaby.bc.ca/cityhall/departments\\_planning/plnnng\\_plans\\_offclc.html#maps](http://www.city.burnaby.bc.ca/cityhall/departments_planning/plnnng_plans_offclc.html#maps)

### 6.1.3 Development Policies for the Gilmore SkyTrain Station Area

The Brentwood Town Centre Policy Framework was adopted by Burnaby City Council in 1996 and the proposed rezoning bylaw was created by the Burnaby Planning and Building Department for establishing community plan guidelines to the subject site. The following policies are summarized in four categories from the Brentwood Town Centre Development Plan and Rezoning Reference for the subject site.

**Table 3 Existing polices**

<b>policies</b>	<b>Descriptions</b>
<b>Policy 1. High-density, commercial and mixed-use development</b>	<ul style="list-style-type: none"><li>• Build high-rise employment centre in the Lands</li><li>• Increase floor area density (net floor area ratio from 3.0 to 4.0 including bonus floor area ratio )</li><li>• Redevelop existing low and mid-rise buildings</li><li>• Align "Village Street" at Dawson Street</li><li>• Revitalize the traditional commercial uses of the Lands</li></ul>
<b>Policy 2. Parking management</b>	<ul style="list-style-type: none"><li>• Provide underground parking wherever possible</li><li>• Encourage making use of existing SkyTrain columns for building underground parking.</li><li>• Retain on-street parking</li><li>• Provide bicycle parking and end-of-trip facilities on the subject site</li></ul>
<b>Policy 3. Pedestrian and cycling network</b>	<ul style="list-style-type: none"><li>• Minimize interruptions of vehicle access to developments</li><li>• Maintain a special bicycle corridor south of Lougheed Highway</li><li>• Create a pedestrian-oriented village along Dawson street with a minimum 2m building setback</li></ul>
<b>Policy 4. Open space improvement</b>	<ul style="list-style-type: none"><li>• Enhance the Still Creek drainage and parkway system as a major public greenway</li><li>• Create structures to protect the public engaging in outdoor activity during rainy periods</li><li>• Ensure sufficient natural light for outdoor spaces through building</li><li>• Emphasize native trees and shrubs in landscape buffer strips</li></ul>

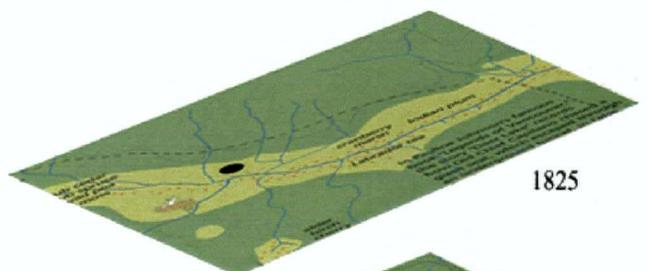
## 6.2 Gilmore SkyTrain Station Area Profile

### 6.2.1 History

Before the arrival of settlers in the late 1800's, this area was a land of tall trees and wilderness. The early pioneers were primarily employed in agriculture or logging. Presently, the opening of Millennium line has stimulated new development around the station area. Some industrial parcels have been rezoned for high density commercial and residential uses.

#### 1. Native Burnaby 1825

- Natural wilderness
- Cranberry marsh along Still Creek



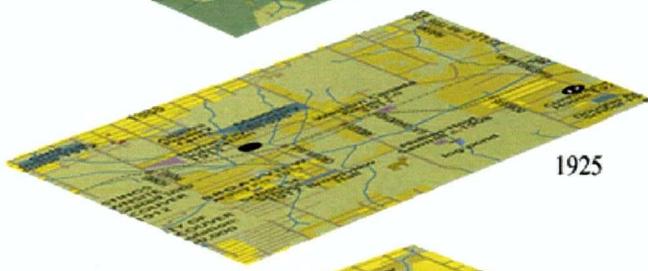
#### 2. Pioneer Burnaby 1905

- Logging camp and residential area on east side of Boundary Road abutting the railway
- Shrubs and small trees along Still Creek



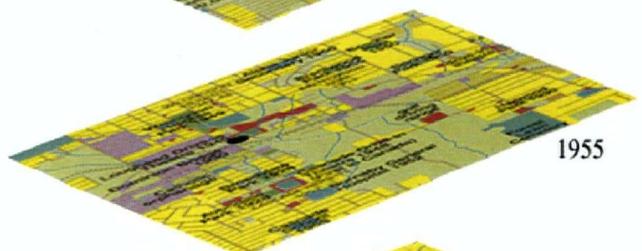
#### 3. Young Burnaby 1925

- large areas still undeveloped
- Masonic Cemetery opens in 1925
- A number of farms and industrial uses emerged
- Willingdon Heights Park opens in 1949



#### 4. Burnaby Boom 1955

- Industry dominates
- Commercial developments emerged along the Lougheed highway



#### 5. Modern Burnaby 2001

- Brentwood Town Centre Plan Development adopted
- Millennium Line SkyTrain opens
- More commercial use develops

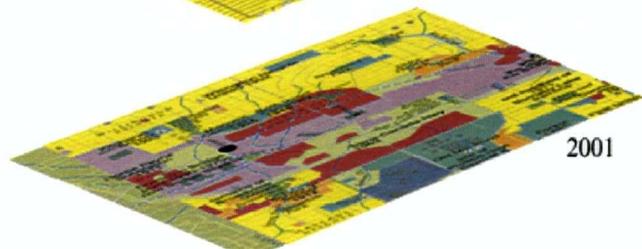


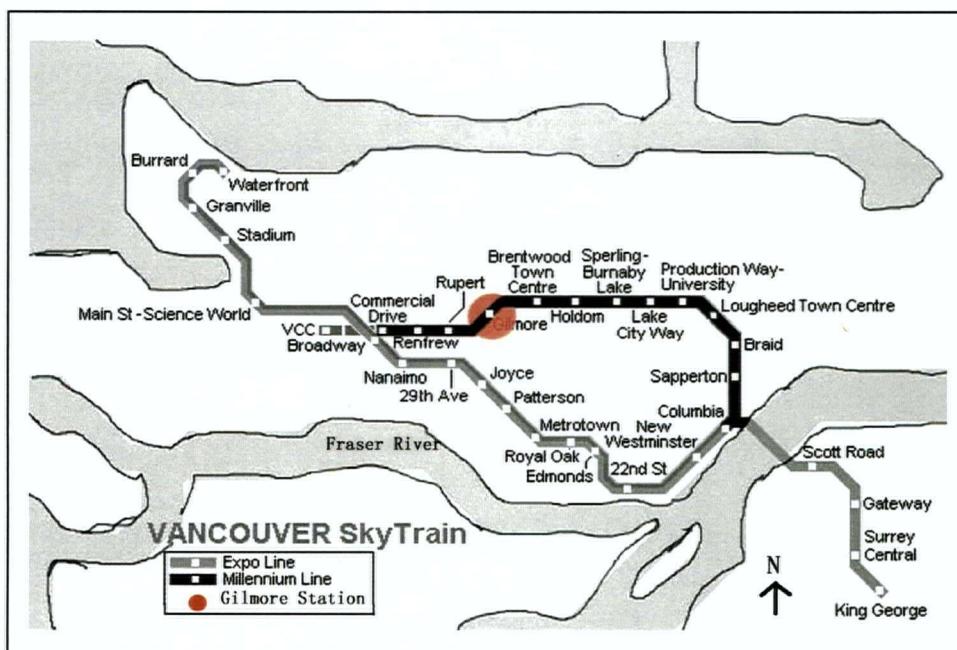
Figure 25 Historical evolution maps<sup>11</sup>

<sup>11</sup> Source: [http://www.city.burnaby.bc.ca/residents/about/hstryh\\_chrtch.html](http://www.city.burnaby.bc.ca/residents/about/hstryh_chrtch.html)

## 6.2.2 Location

According to the concept of Transit Oriented Development, the Gilmore station catchment area covers about 78.5 hectares within a radius of 5 minutes walking distance (500m) from the Gilmore station platform (Niles and Nelson, 1999). The station is the most westerly station in Burnaby and is located at southwest corner of the intersection of Gilmore Avenue and Dawson Street. The subject site of this study is bounded by Lougheed highway, Gilmore Street and Dawson Street, and is close to Madison Street.

The Gilmore station is located in the Brentwood Town Centre plan and is the gateway to the town centre. The SkyTrain system is the primary route that people use every day on their trips to and from work. Because of its panoramic views of the north Shore Mountains, proximity to the Still Creek and the Chubb Creek corridors, and closeness to the Brentwood town centre, the station plays an important role in forming an image of the city that will draw future residents.



**Figure 26 Location of Gilmore station<sup>12</sup>**

<sup>12</sup> Source: <http://www.urbanrail.net/am/vanc/vancouver.htm>

### 6.2.3 Topography

The Millennium line lies within the Fraser Lowland physiographic region, a subdivision of the Georgia Lowland physiographic region. This region is characterized by gently rolling and flat-topped uplands ranging in elevation from 15 to 300 meters and is separated by wide, flat-bottomed valleys (RTPO, 1999).

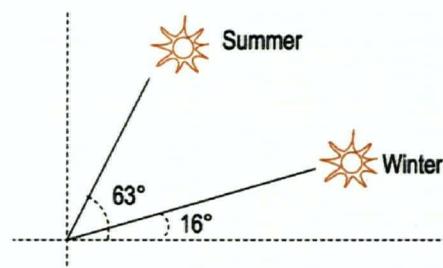
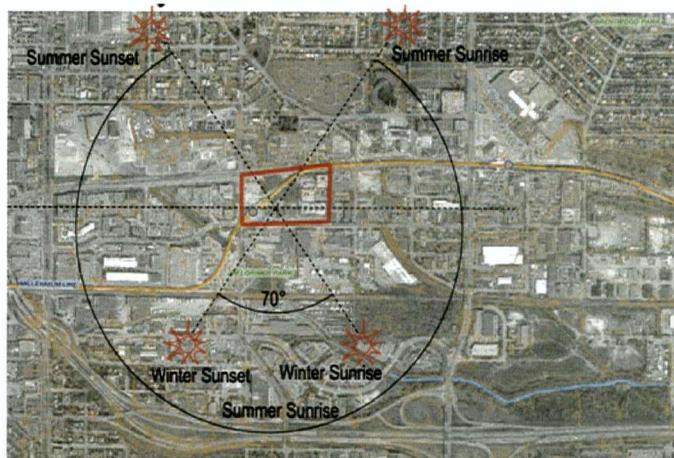
Gilmore station is located within the flat-bottom Central Valley and Still Creek subwatershed in Burnaby. There is a steep slope up to the north across the Lougheed highway, and another steep slope up to the south from the Trans Canada highway. The station area has a gentle slope down from north to south between Lougheed and Gilmore, with an elevation ranging from 17m to 27m. This topography allows for excellent panoramic views to the North Shore Mountains and also gives emphasis to the Still Creek trail system.



**Figure 27 Topography<sup>13</sup>**

<sup>13</sup> Source: <http://webmap.city.burnaby.bc.ca/burnabymap/viewer.htm>

#### 6.2.4 Sun Analysis



**Figure 28** Sun analysis diagram

#### 6.2.5 Wind Analysis



**Figure 29** Wind analysis diagram

#### 6.2.6 View analysis

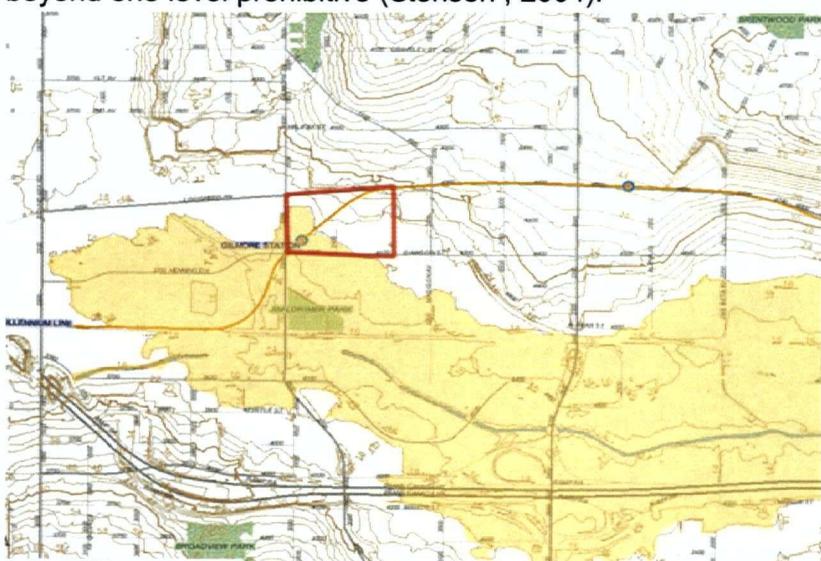


**Figure 30** View analysis diagram

### 6.2.7 Soil Analysis

Still Creek's shallow gradient produces a naturally slow-moving, meandering stream. These characteristics affect its ability to absorb urban runoff and to flush out contaminants. Still Creek has been significantly degraded by dense industrial, commercial and residential land development, with further densification expected in the next 10 years (City of Burnaby, 2002). Still Creek has suffered significantly from poor water quality (low oxygen and high temperatures) and high contaminant loading, and is largely culverted and channelized above Boundary Road (GVRD, 2001).

This low lying area requires special construction consideration due to poor drainage and underlying peat deposits. The soil of the Southside of the subject site is especially poor, consisting largely of unstable peat silt and clay soils, compounded by a high water table and having possible artesian action. According to the survey of the surrounding area, the extraordinarily poor soil conditions make the development of underground parking beyond one level prohibitive (Stenson , 2004).



**Figure 31** Soil analysis diagram

### 6.2.8 Transportation

The area in question is bounded by Lougheed Highway to the north, Dawson Street to the south and Gilmore Avenue to the west. Lougheed Highway is a primary arterial with huge traffic volume. The newly developed Gilmore Avenue is a primary collector.

Together with Lougheed Highway, these two roads are defined as pedestrian routes and have sidewalks on both sides of the street. Currently, Dawson Street is under development. The plan is to transform it into an urban pedestrian street that has wide sidewalks associated with the ground level retail shop frontages. There are two major arterials leading out of the station catchment area: Boundary Road to the west and the Trans Canada Highway to the south. Both of these roads, as well as Lougheed Highway, serve as major truck routes. The BC Railway is parallel with Dawson Street to the south serves for industrial and passenger use.

In addition to SkyTrain, there are several bus routes running through the neighborhood and bus stops near the station entries. Bus129 goes to Metrotown and Bus 28 serves Joyce Station.

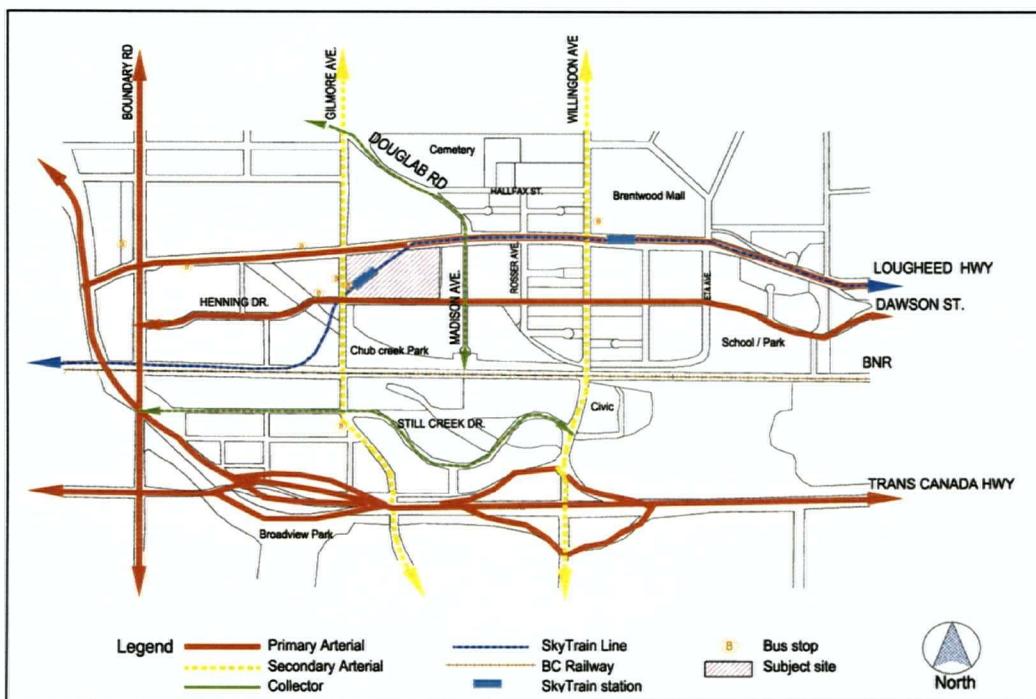


Figure 32 Existing transportation network

### 6.2.9 Aquatic Ecosystems and Resources

Gilmore SkyTrain station is located at Still Creek watershed. Today, Still Creek is one of the only two remaining visible streams in Greater Vancouver and forms an important part of the Brunette River system (Canada Department of Fisheries and Oceans, Habitat and

Enhancement Branch, 1999). Chubb Creek is a tributary of Still Creek and is classified as a relatively high-value salmon-bearing stream. The creek is also designated as an Environmentally Sensitive Area by the City of Burnaby Official Community Plan. A narrow strip of riparian vegetation, approximately 3 meters in height, exists in the vicinity of Gilmore SkyTrain station. The SkyTrain guideway crosses Chubb Creek at a point where the existing riparian vegetation is confined to a narrow strip spanning 35 meters. Support columns are located approximately 12 meters away from the edge of the creek.

#### 6.2.10 Land Use and Zoning

The stated area has been dominated by industrial since it was first settled by Europeans, a range of industrial and retail activities still remain. To the north of the subject site, across the Lougheed Highway, there are a number of restaurants, a cabinet manufacturer and a hotel. In addition, there are other commercial outlets on the east side of Gilmore Avenue. The area on the west side of Gilmore Avenue is zoned as industrial.

To the south of the subject site, across Dawson Street, there are office and industrial buildings and a courier dispatch centre. The property at the southeast corner of Dawson and Gilmore is proposed to house the development of two to three story commercial and residential buildings fronting Dawson Street, as well as high-rise apartment towers in the interior of the site. The Chubb Creek corridor runs southwest of the subject site and across the BC national railway. The area south of the railway is dominated by industrial use. Willingdon Business Park, centrally located between Willingdon and the Trans Canada Highway, is now largely occupied by a mix of business offices and high-tech uses.

West of the subject site is Bridge Business Park, a large new business park developed with a mix of film studios, offices and other businesses on the other side of Gilmore

Street. Home Depot, a big-box retail store, is located to the southwest, below the SkyTrain guideway and near B.C. Hydro.

There are a number of existing open green spaces in this area. A cemetery is located about 500 meters to the north, and there is Chubb creek corridor, with a purposed neighborhood park to the south. Brentwood Park, a large natural corridor along Still Creek and Broadview Park are close by. In addition, some small green pockets exist within residential complexes, schools and other institutions in the area.

The subject site comprises of 5.1 hectares of land between Lougheed Highway, Gilmore Street and Dawson Street. The station is located at northeast corner of Gilmore Avenue and Dawson Street. Presently, the subject site consists of traditional commercial uses, some underdeveloped land, and the Gilmore SkyTrain station structure with its guideway.

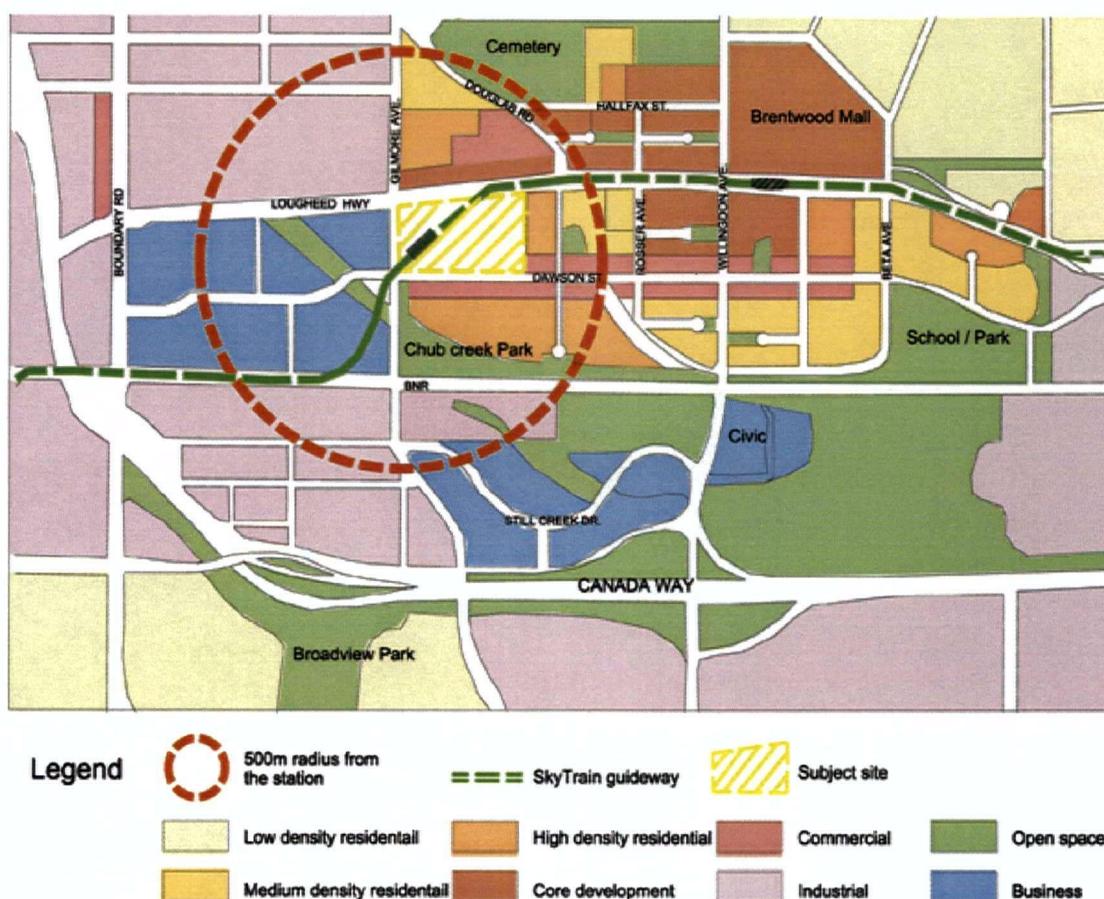
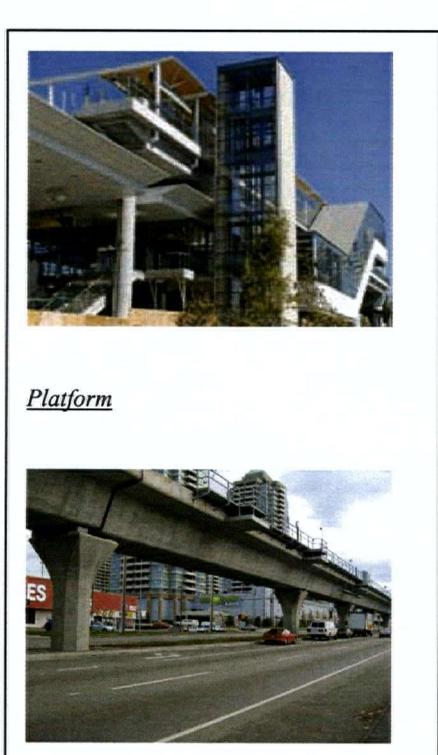


Figure 33 Land use map

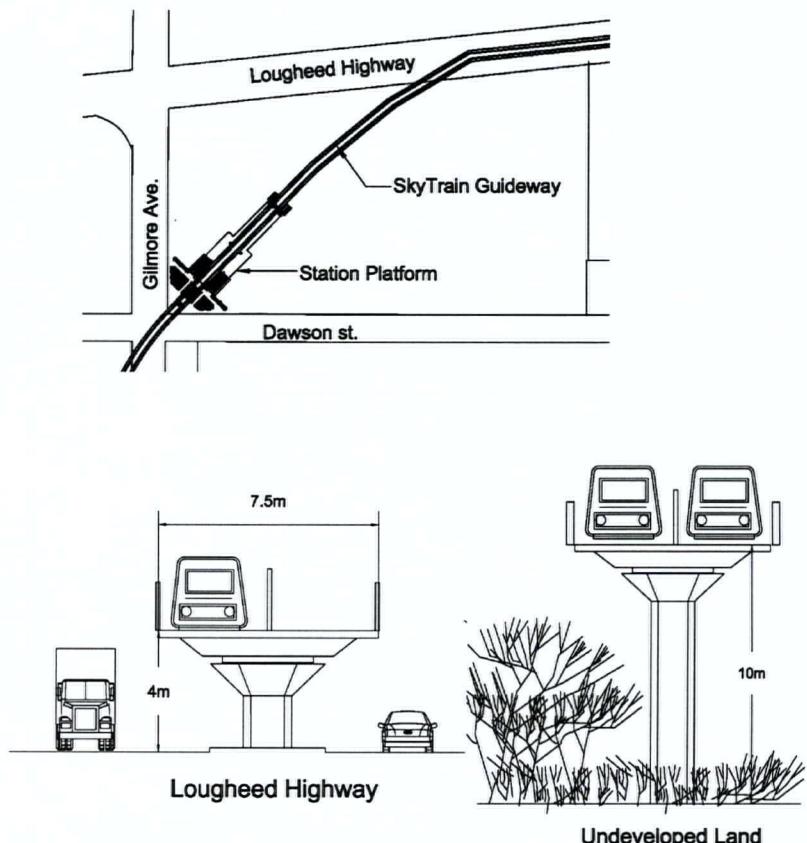
### 6.2.11 Station Platform and Guideway

The Gilmore station platform is a large, high structure, approximately 17m high, 24 m wide and 100m long. It is situated on the southwest corner of the lands at Gilmore and Dawson and is diagonally oriented to the streets. The platform was designed by Busby and Associates. It uses BC-made composite wood and steel materials in a modular style, allowing partial deconstruction or reconfiguration as required in order to be incorporated into a new development on the site. This is done with the intention of maintaining the artistic integrity of the station and accommodating any future alterations to the SkyTrain line or development around it.

The Millennium Guideway is 7.6m wide and its underside is 10m above the Gilmore/Dawson intersection. The natural grade of the land slopes up to Lougheed and the underside of the guideway is 4m above grade at Lougheed Highway. The guideway is comprised of large, bold, simple components such as concrete columns and beams.



Platform

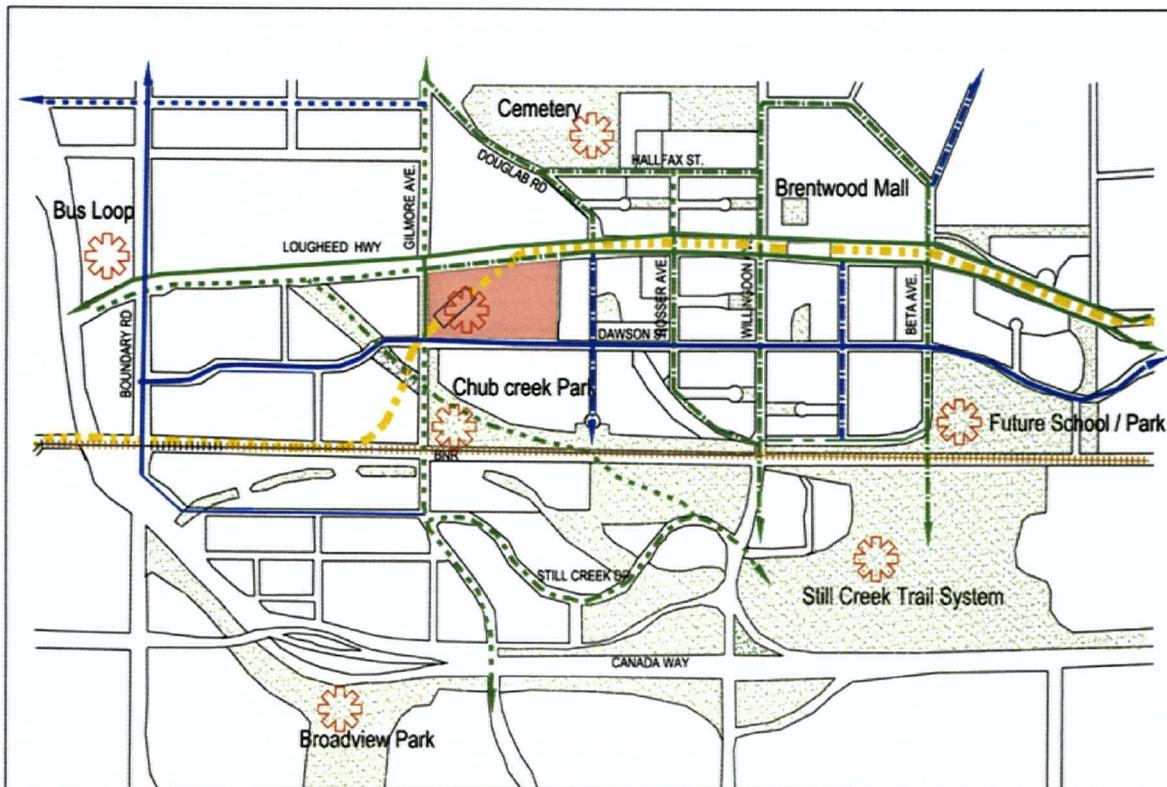


**Figure 34** SkyTrain station profile

## 6.3 Gilmore Station Site Analysis

### 6.3.1 Open Space, Pedestrian and Cycling Network

There are a number of green spaces, bus loops and a commercial mall near the Gilmore Station. Pedestrian and cycling routes are needed to link these key attractions. The proposed pedestrian and cycling facilities should be located within a green corridor, desirably off-road where possible, and are outlined in following sketch.



#### Legend

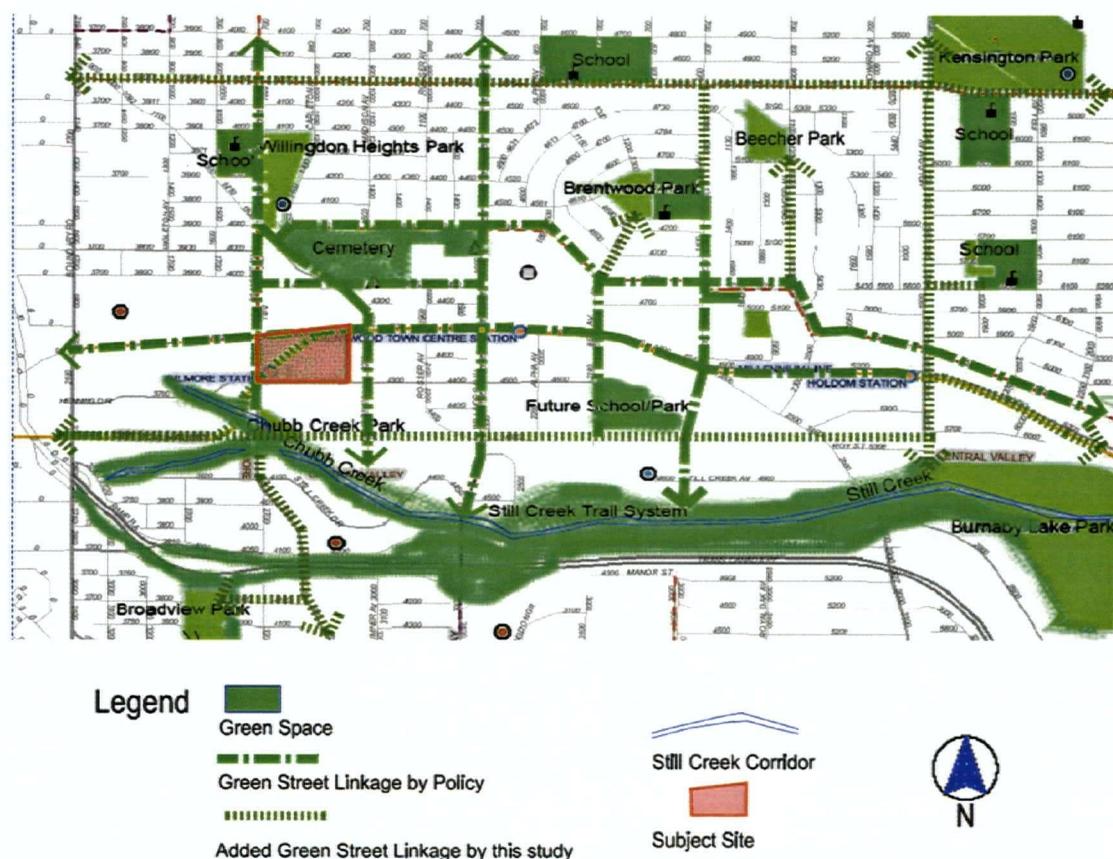
	key Attraction
	Open Space
	Subject site
	SkyTrain Line
	BC Railway
	Existing Specific Bicycle Corridor (Including Pedestrian Path)
	Purposed Bicycle Corridor by Policy (Including Pedestrian Path)
	Purposed Bicycle Corridor by This Study (Including Pedestrian Path)
	Pedestrian Route
	Purposed Pedestrian Route by Policy
	Added Purposed Pedestrian Route by This Study



Figure 35 Open spaces, pedestrian and cycling network concept

### 6.3.2 Green Space Linkage

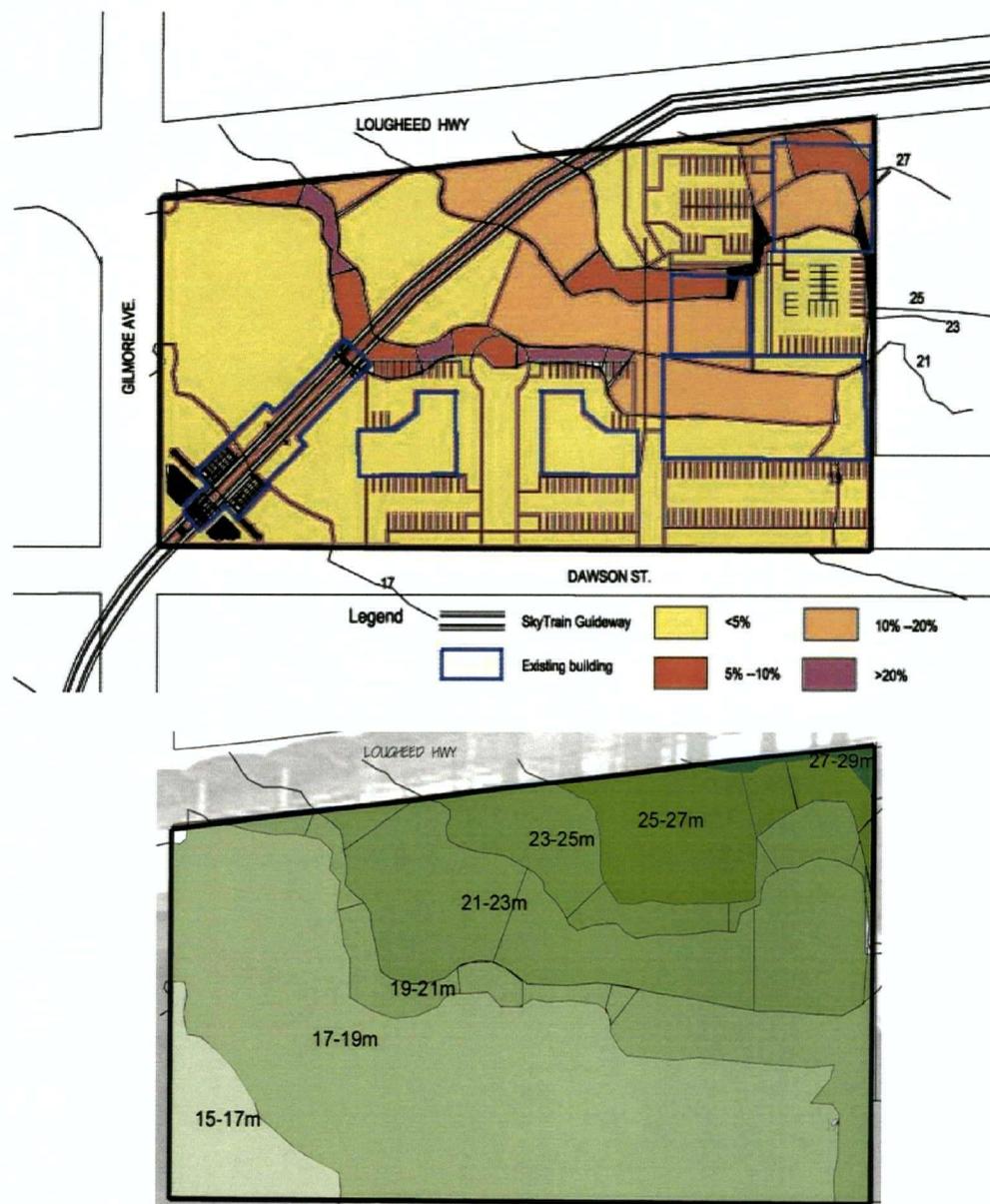
The green space system is illustrated in the sketch below. The image of the station area is linked from the north to major parks and open space ravine areas and from the south to the primary Still Creek drainage and park trail system by Green Streets. The creation of this linkage of green spaces is a deliberate attempt to form a green street network between each green space, as well as to link the station to the various green spaces.



**Figure 36** *Green space linkage concepts*

### 6.3.3 Natural Grade

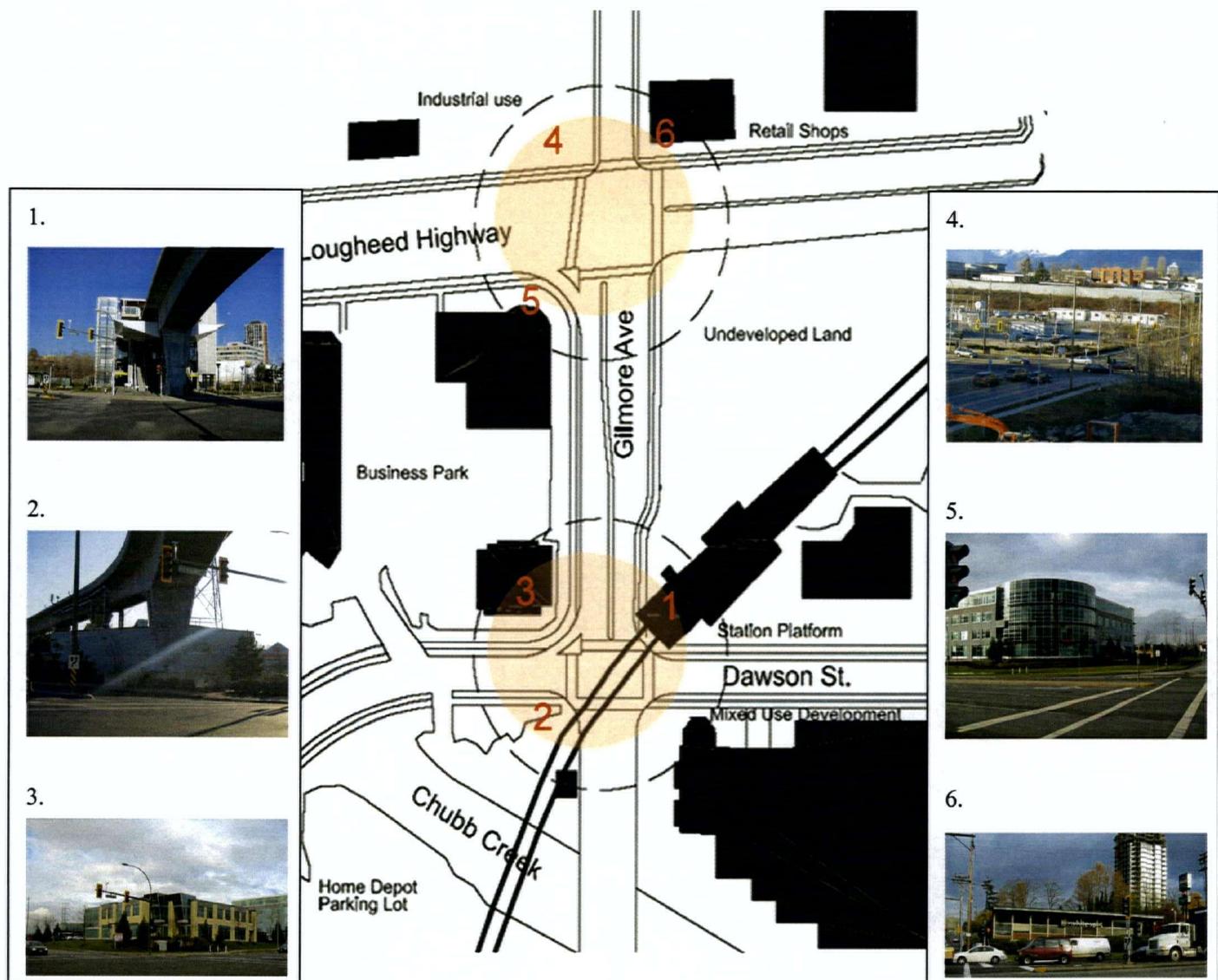
Northeast down to 17m on the southwest, along Gilmore, this downward slope is 4.5m and along the eastern boundary of the land, the slope is approximately 9m. The southwest side of the subject site is gentle and flat with a slope of lower than 5% up to the northeast side. With a steep line tranversing the SkyTrain Guideway at the bottom of the station platform, the northeast part of the subject site has a 5-20% slope. Details relating to these slopes are ranked and illustrated in the sketch below.



**Figure 37** Natural grade analyses

#### 6.3.4 Key Intersections

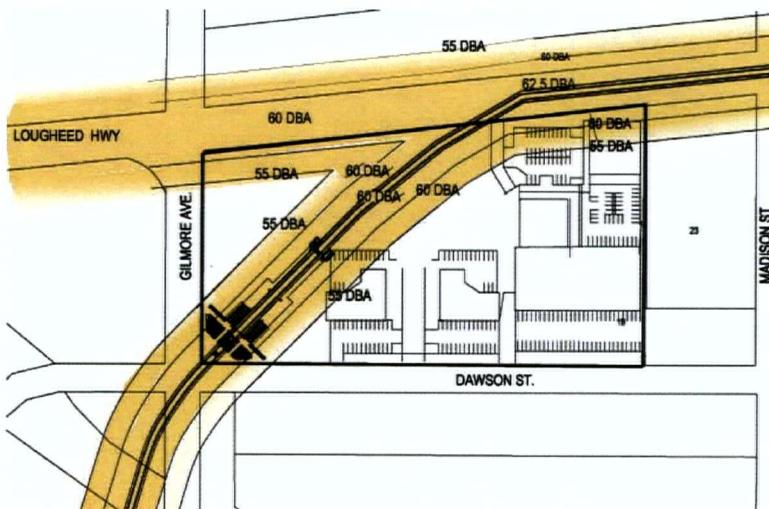
There are two key intersections which act as gateways to Gilmore station. One intersection is at Gilmore Avenue and Dawson Street, which is bounded the corners by a two story office building, the Gilmore SkyTrain platform, Home Depot parking lot and a village plaza that is still being planned. Another intersection is at Gilmore Avenue and Lougheed Highway and the developments on the corners include a four story office building, industrial land, a restaurant, and a vacant corner.



**Figure 38** Key intersection profiles

### 6.3.5 Noise Control

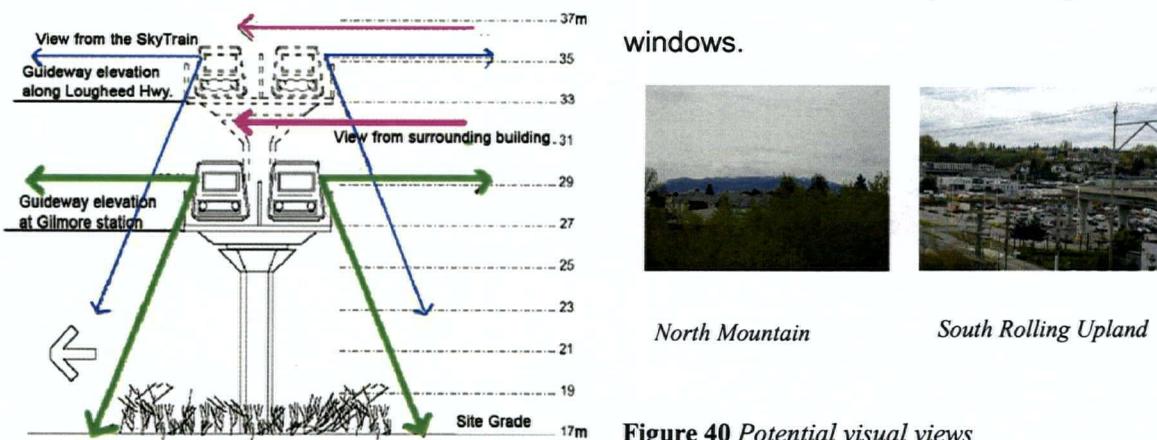
Canada Mortgage and Housing Corporation (CMHC) have adopted 55 decibels as the maximum outdoor noise level for its residential projects (BKL Consultants Ltd, 1998). The minimal setback distances from the SkyTrain alignment to the nearest residences are 30 to 40m (RTPO, 1999). According to Lougheed Highway's Collateral Noise Effects, the noise level from the road is higher than that from a single SkyTrain guideway.



**Figure 39** Noise level analyses

### 6.3.6 Visual Impact

Along the SkyTrain guideway one finds breathtaking views of the north shore mountains, and a clear view to the future Brentwood Town Centre. The dull, heavy, concrete elevated guideway however, adversely affects the view to the south. Furthermore, there are private areas that have potential to be overlooked by the passengers through train



**Figure 40** Potential visual views

# **Chapter 7-Station Area Design**

## **7.1 General Concept**

The design of the Gilmore SkyTrain Station area will derive from information gained through a review of the literature on the subject and though examining the successes and failures of precedent Transit Oriented Development (TOD) projects. Furthermore, it will follow the design guidelines and the existing policies that relate to the design area. The plan begins as an existing policy to transform the Lands into a landscaped, high density centre of employment with both commercial and residential uses. This policy matches the concept of Transit Oriented Development (TOD). Thus, the design programs will be comprised of mixed-use and high rise residential apartments, office buildings, public spaces and streetscapes etc.

The key concept in the Development Plan consists of a range of high-rise buildings that surround a large open space with existing grades that allow easy access to each building. This plan exemplifies the guidelines of increased floor area density that is encouraged for development at public transit stations within a pedestrian-oriented and largely landscaped site. In addition, the streets around the site will be improved to meet transit-friendly development. The main entrances located beside the SkyTrain platform and on Dawson Street, will frame a center around the SkyTrain station.

This chapter will give design principles under design guidelines and site analysis on the Gilmore station. As well as create design concept diagram to match these principles.

*Guideline 1. Compact mixed-use development*

## **7.2 Principle 1. Increasing Density to Support Transit**

Increasing the density of local residential areas and centers of employment is an effective strategy to increase transit ridership (Hendricks, 2004). At the same time, the plan should provide a gradual transition from the high density transit center to the

surrounding medium to low density neighborhood areas.

#### Actions

- Build high density development in the central core of the Lands (50 or more employees per gross acre, 60-300 residential units per acre).
- Construct medium rise, mixed-use apartments (30-60 units per acre) along the Dawson Street to support the village street.
- Balance the densities on four corners of the two important intersections.
- Redevelop existing low and mid-rise buildings.

### **7.3 Principle 2. Encouraging Mixed-use development**

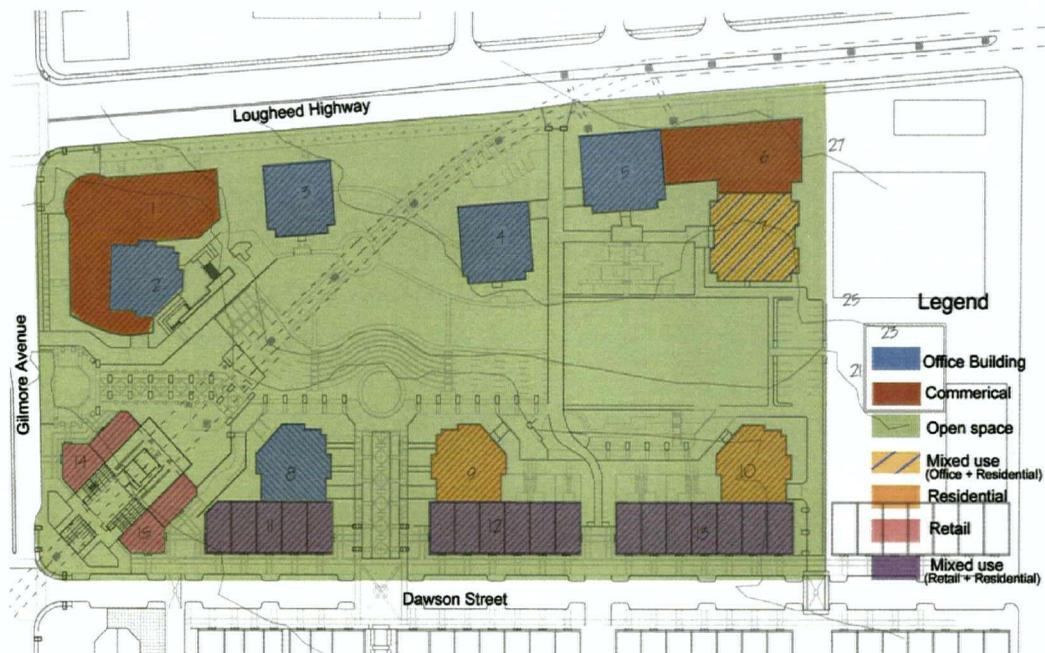
Mixed-use development is used to create communities in which daily activities are integrated rather than separated. When a variety of land uses are located near one another, walking and bicycling become a practical means of travel (Henry, 2001).

#### Actions

- Ensure compatible numbers of residents and employees to support transit and public space usage throughout the day.
- Build small retail shops beside the SkyTrain platform to provide convenient service for both commuters and neighborhood residents.
- Create flexible open space for weekend market.

Gilmore Station Design Response. The plan includes a high density development for both commercial and residential uses in order to increase the SkyTrain ridership. As well, Moderate site coverage provides enough open space to benefit all site users. The mid-rise building along Dawson St. and the buildings situated at the corners will link the Street frontages with the surrounding area. The residential towers are located at a distance from the SkyTrain guideway in order to reduce the impacts of noise, privacy and shadowing. Each tower will be designed in order to protect views and to avoiding the shadowing of public spaces. The buildings will require a high ratio of perimeter windows

to floor area and contiguous landscaped areas in order to attract and retain tenants (Stenson, 2004).



**Figure 41** Land use map



**Figure 42** Mixed use example

**Figure 43** Design site 3D model

**Table 4 Site Statistics**

Air Parcel	Stories	Usage	Area(m2)	Comments
Parcel1	4	Commercial	8464	Urban design relationship to existing 4 storey office building on the west side of Gilmore Avenue
Parcel2/8	18	Office	23868	Office town as a gateway to town centre
Parcel3	18	Office	12880	
Parcel4	20	Office	16400	
Parcel5	16	Office	15200	
Parcel6	5	Commercial	8110	
Parcel7	20	Mixed –use	22640	5 story office plus 15 story residential use
Parcel9/10	18/15	Residential	23456	residential tower
Parcel11/12/13	3	Mixed-use	10860	1 story commercial use with 2 story residential
Parcel14/15	2	Retail	1620	Station Retail shops

- Total floor area: 145328m<sup>2</sup> (residential: 48396m<sup>2</sup>, commercial: 90582m<sup>2</sup>, Retail:4520m<sup>2</sup>)
- FAR: 2.81 (residential: 2.6 commercial: 3.08)
- Commercial—1175 employees (50 employee per gross acre or more)
- Residential: —360units (~78.26 residential units per acre.)

#### *Guideline 2. Pedestrian Oriented design*

#### **7.4 Principle 3. Enhancing Continuous, Direct and Convenient Linkage**

Transit, bicycle, and pedestrian routes and facilities must offer an acceptable level of convenience and provide a realistic travel alternative to the automobile (Belzer and Autler, 2002).

#### **Actions**

- Create direct pedestrian pathways to the streets, primary entrances of buildings and other popular destinations (shopping, centers of employment, transit stops etc.).
- Create a network of pedestrian ‘rights-of-ways’ supporting continuous pathways.
- Design greenways linking public open spaces and offsite parks and enhance greenways related to the watercourse flowing into Still Creek.
- Build a trail system under the SkyTrain guideway to connect with other green spaces.
- Design a bicycle corridor south of Lougheed Highway, continuing from the west to form a regional bicycle corridor.

Gilmore Station Design Response. The road system at the Gilmore Station presently allows for four vehicle and three pedestrian accesses to the design site. The access at Dawson Street will connect to a future access on the south side. Pedestrian paths will link all open spaces, buildings, trail systems and other amenities, as well as the future Chubb Creek Park. Fire lanes will ensure access to each of the building entries in case of emergency.

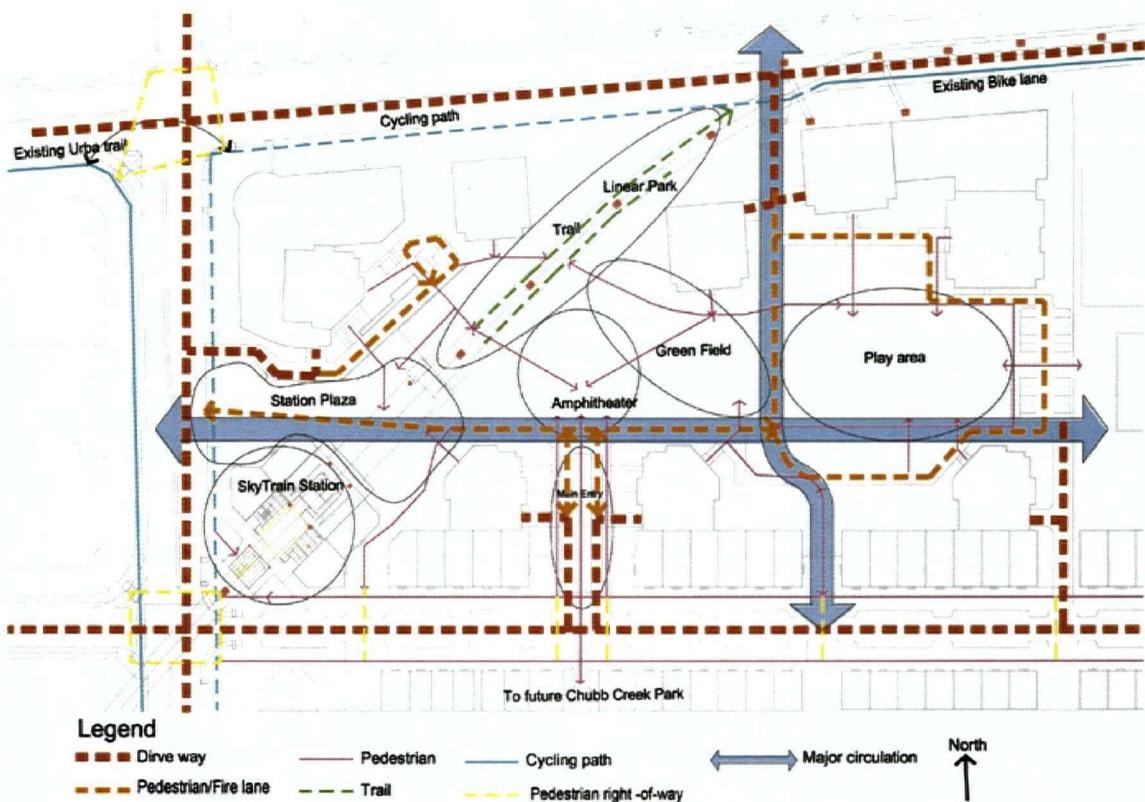


Figure 44 Circulation diagram

## 7.5 Principle 4. Improving the Pedestrian Oriented Design

Creating a pleasant environment for walking or bicycling can greatly influence the number of people willing to walk. They feel comfortable and secure when the streetscape offers attractive features (Chisholm, 2002).

### Actions

- Ensure adequate space for both pedestrians and cyclists: sidewalks and bike paths or lanes must be wide enough to accommodate the existing and projected volume of

pedestrian and bicycle activity.

- Install adequate illumination for pedestrian pathways with increased illumination around building entrances and transit stops.
- Design access and walkways to be physically separated from driveways by landscaping, grade separation and attractive paving materials.
- Design buildings to provide for weather and wind protection at the ground level by way of awnings or overhangs that are a minimum of 48 inches in depth.

Gilmore Station Design Response. Dawson street will be a pedestrian-oriented village street designed as a narrow street with two traffic lanes and two parking/tree lanes. Three meter setback is created in order to leave wide pedestrian and outdoor seating area. Gilmore Avenue will be a pedestrian, bicycle and transit oriented boulevard that connects off-site parks. Street trees provide an opportunity for pedestrian buffering and a decorative streetscape element. Lougheed Highway will be a quality urban boulevard treatment with separated sidewalks and street trees. An office frontage continues the Bridge Business Park west of Gilmore Avenue. All Street-oriented buildings with canopies, pedestrian lighting and other street furniture will be designed to integrate the street more closely with the adjacent buildings and provide a pleasant walking environment.

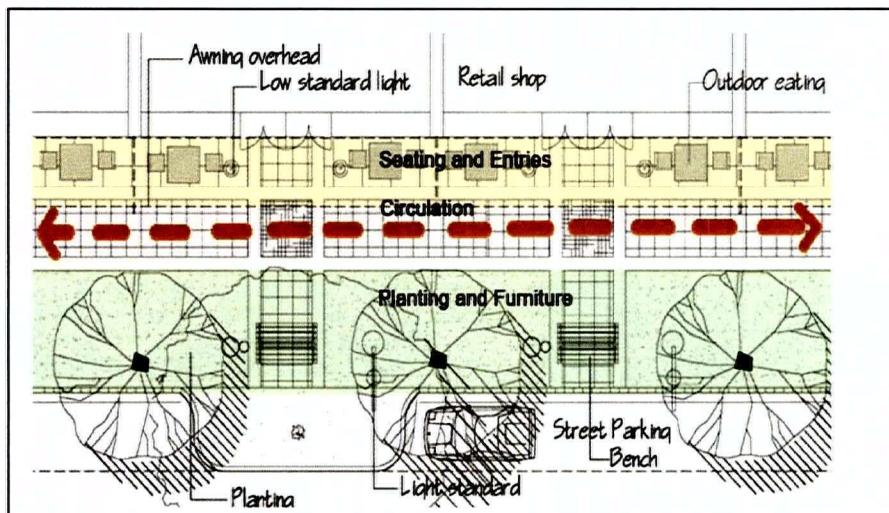
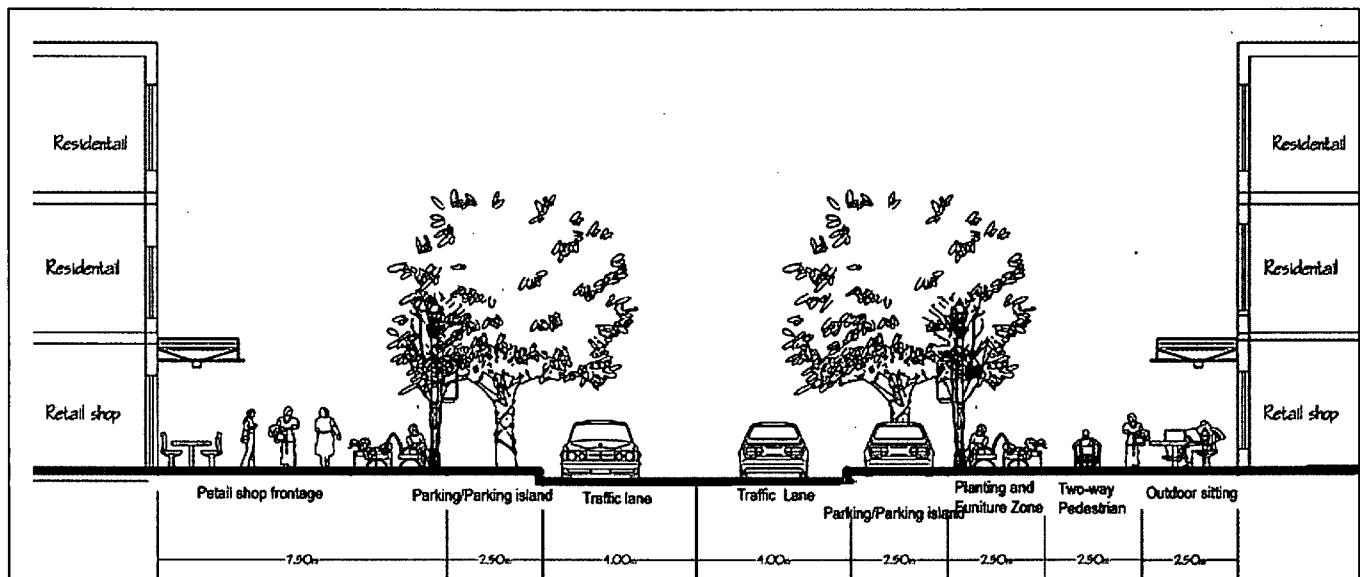
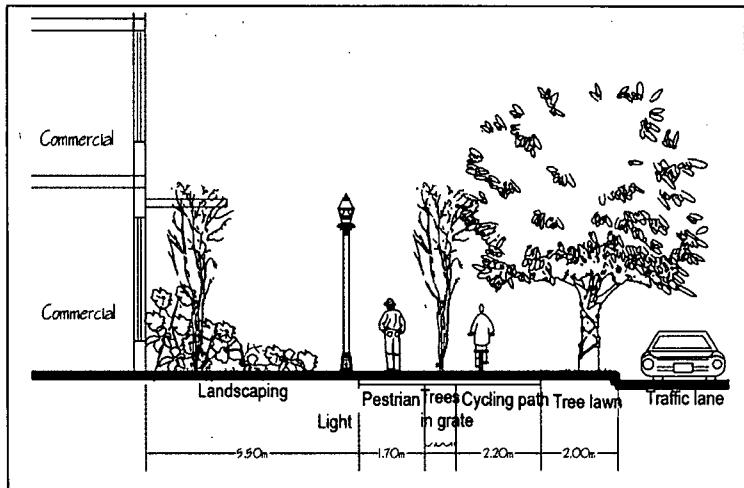


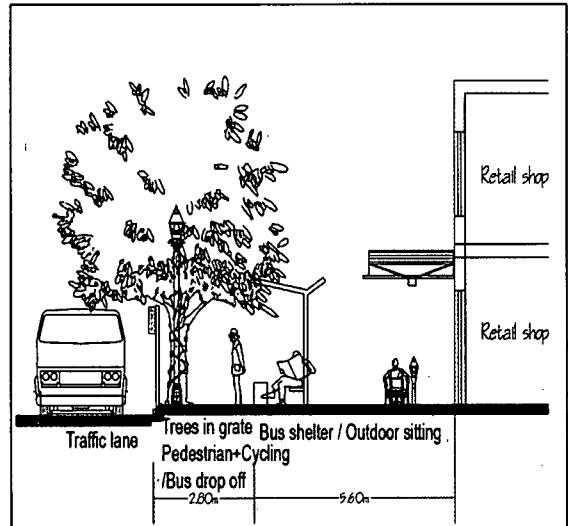
Figure 45 Dawson Street retail shop frontage



**Figure 46 Dawson Street section**



**Figure 46 Gilmore Avenue section**



**Figure 48 Longheath Highway section**

*Guideline 3. Making each station area “a place”*

### 7.6 Principle 5. Providing landscaped Public Open Space

Public open spaces, such as pedestrian plazas and landscaped areas provide pedestrians with additional points of interest along the way and offer people a place with amenities and opportunities for socializing (NRC, 1997).

#### Actions

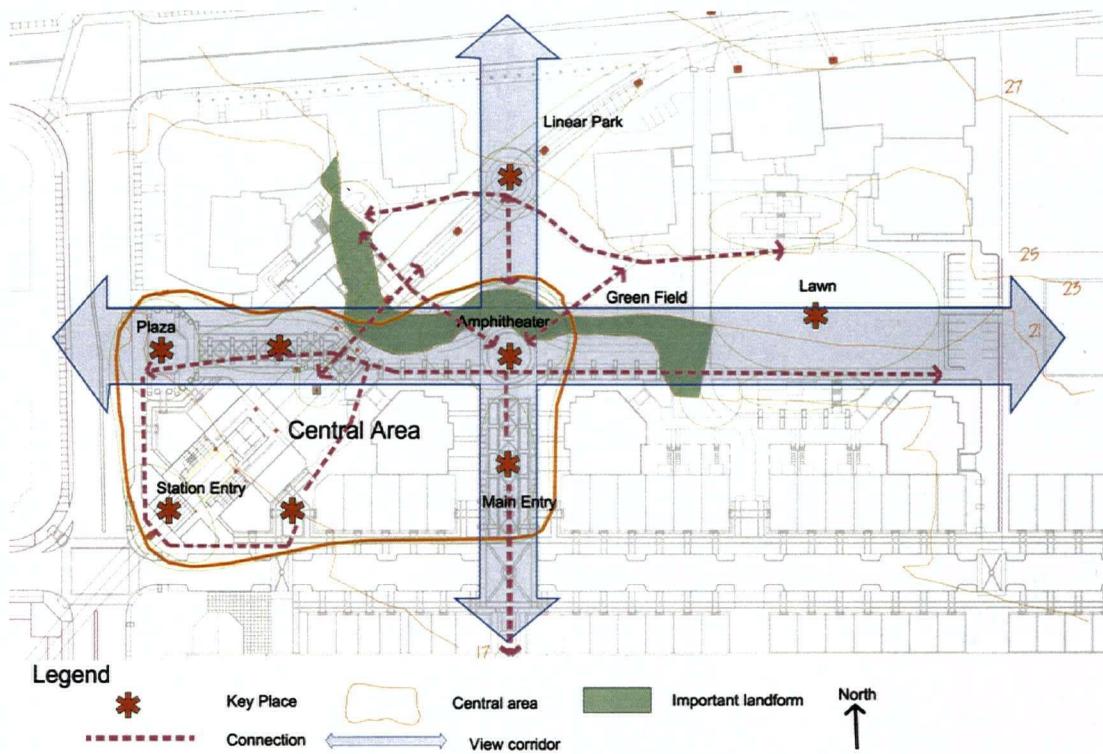
- Create a neighborhood park in the interior space of the subject site to meet community needs for recreation and leisure activities.

- Design a large public open space with numerous pedestrian amenities including features such as seating, lighting, special paving, planting, artwork and special recreational features.
- Create flexible spaces that can be designed for mixed uses such as public gathering and a weekend market.
- Create a connection between each space and link to off-site open space. This can form networks of spaces that knit the city together.
- Maintain significant and unique views with regard to the natural, social, historical or expansive landscape and provide adequate levels of natural sunlight.
- Use wetland plants and detention ponds to reflect the historical character of the site and its context.

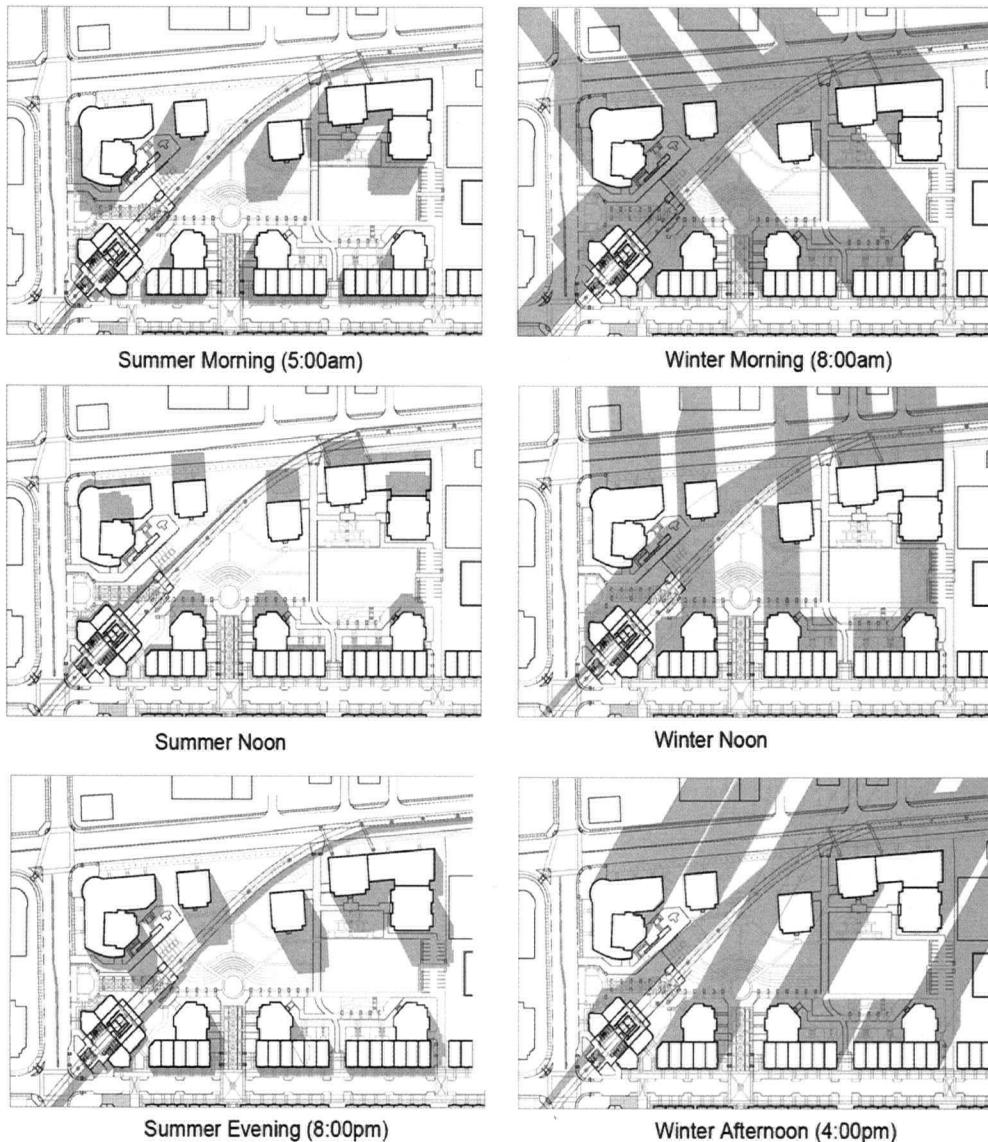
Gilmore Station Design Response. The interior open space is comprised of a number of rooms set in a hierarchical form and which connect each to the other. The existing landform will be preserved through the use of creative design solutions and primarily native plant material will be used for creating a sense of local identity. Each sitting area is positioned in such a way as to give the user a fine view towards open spaces. The whole of the open space will be designed for use by both residents and the local workforce and thus will encourage safety through use of the grounds throughout the day.

The central area close to the SkyTrain platform will be the focus for the neighborhood. Its presence will encourage people to get together to hold Saturday markets and other community activities. The whole space includes a hierarchy of big and small rooms and allows access to and linkage between these rooms. The design creates a variety of options for people to get from one place to another. The neighborhood parks are green spaces, providing people with options for conducting healthy outdoor activities. A broad variety of landscape specimens, such as Shore pine (*Pinus contorta*), Paper birch (*Betula papyrifera*), Labrador tea (*Ledum groenlandicum*), Bog rosemary (*Andromeda*

polifolia), etc. and design features will provide for a tranquil and health open space, which also supports amenities for recreation and exercise. A linear park underneath the guideway will exploit the elegance of the transit line and integrate it with the surrounding land uses.



**Figure 49** Open Space concept diagram



**Figure 50** Shadow diagram

*Guideline 4. Balancing parking with community needs*

### **7.7 Principle 6. Carefully Controlling the Supply of Parking Spaces**

Properly controlling the number and location of available parking spaces in the area close to the station is quite important for land preservation and the construction budget (Charles, 2003).

#### Actions

- Control the total supply of parking according to the City of Burnaby Parking Standards
- Provide underground parking wherever possible

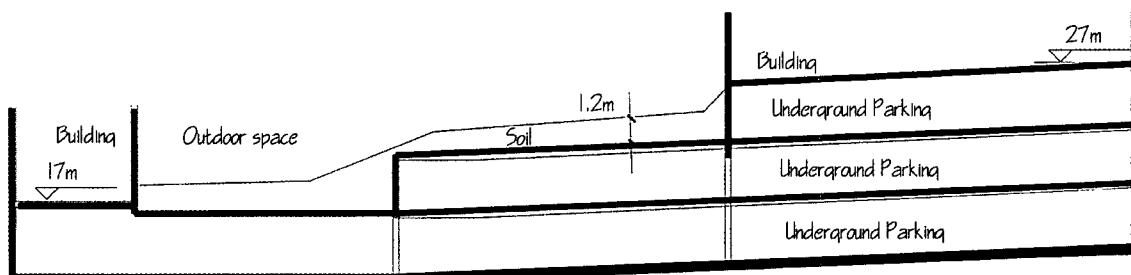
- Merge the surface parking to the landscaping design
- Retain on-street parking
- Provide bicycle parking

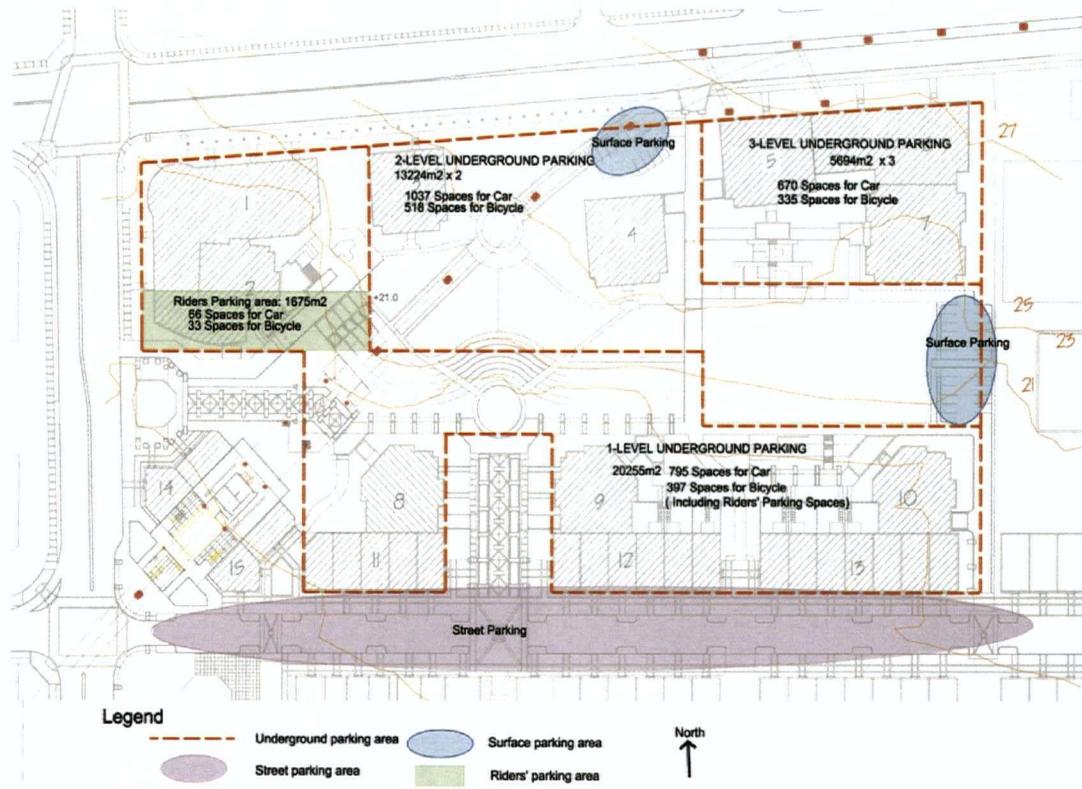
Gilmore Station Design Response. Total parking space will be in accordance to the city of Burnaby Parking Standards and will decrease available parking by 10% near the station. In consideration of on-site soil and topographical conditions, underground parking will be limited to one level on the south and two to three levels on the northeast. The soil above the underground parking will be limited from 0.6m to 1.2m, which will not only provide enough soil for the growth of plants but also control the load on the parking structure. Dawson Street will provide some parking and a few surface parking sites for visitors. Bicycle parking and end-of-trip facilities will also be required in proximity with each of the buildings and the SkyTrain station.

#### Vehicle Parking:

- Commercial: 1772 spaces (1 space/ 46 m<sup>2</sup> X 90%)
- Residential: 518 spaces (1.6 spaces/unit X 90% including visit parking)
- Retail: 145 spaces (1 space/ 28m<sup>2</sup> X 90%)
- Transit riders: 66 spaces
- Others: 92spaces (Street parking: ~60spaces, surface parking: ~32spaces)

Bicycle Parking: 1283 spaces (1 spaces/unit)





**Figure 51** Underground parking concept

#### *Guideline 5. Public safety and security*

#### **7.7 Principle 7. Reducing Crime and Fear**

The volume of crime tends to rise in more active areas of the city although this can be reduced by improving the urban physical environment (Poyner, 1983).

##### **Actions**

- Create a direct and convenient walking distance to each building and open space.
- Establish ground oriented retail shops along Dawson Street to create a vibrant pedestrian-friendly environment.
- Ensure all accesses between different land uses are visible.
- Design perimeter pathways along the edges of buildings and large green spaces.
- Ensure a high ratio of perimeter windows to floor area to encourage watching.

**Gilmore Station Design Response.** The design will establish a mixture of residential,

commercial and retail shops in the station area, and incorporate a well-organized circulation system to encourage pedestrian activity throughout the day in order to encourage safety for the public using the site. All the buildings will have clear views to the public space and all public spaces will have visual access to each other in order to encourage watching and create a sense of ownership. Pedestrian lighting and building canopies are also included to support safety during the evenings and bad weather conditions. In addition, residential yards are buffered by planting for privacy. All these elements are designed in order to create of a safe and enjoyable place for the neighborhood around the station.

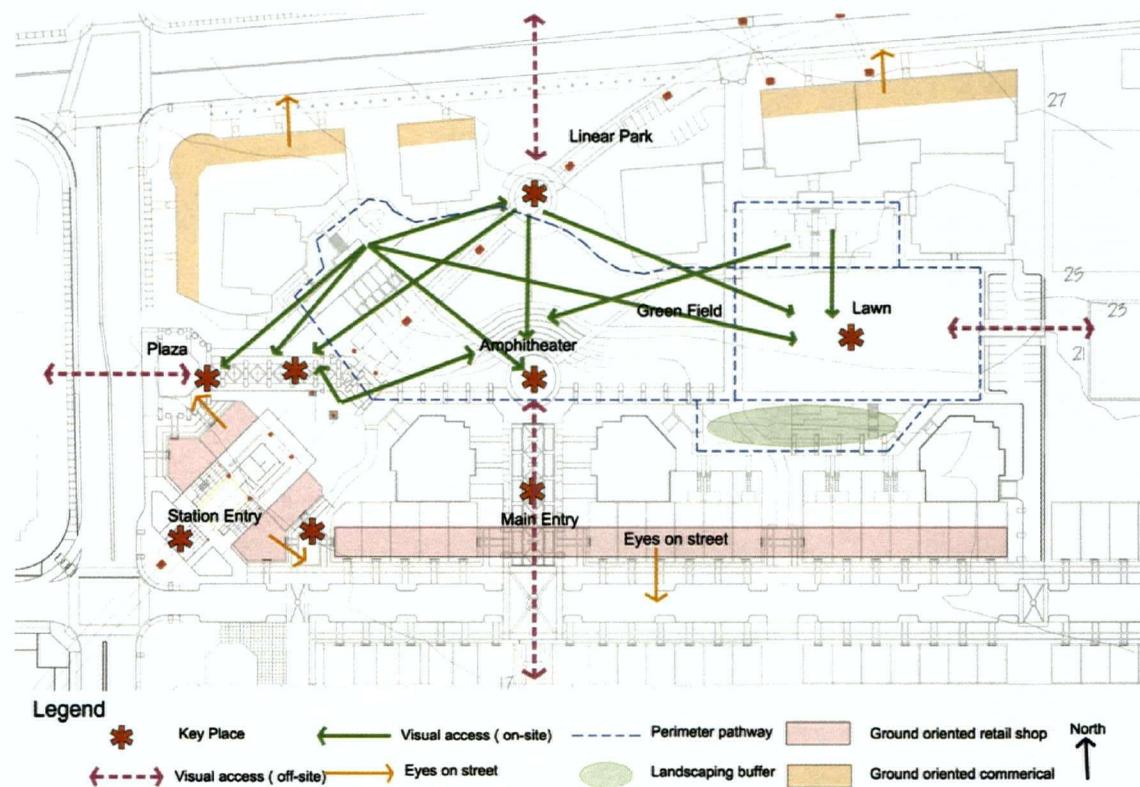


Figure 52 Public safety diagram

**Figure 53** Site plan



## **Chapter 8 - Conclusion**

### **8.1 Evaluation**

The proposed design of the Gilmore SkyTrain station area has attempted to follow the design principles under the guidelines that have been outlined in this study. Under the existing policies and site conditions, the design took into account the experience of preceding developments and selected a best option for the Gilmore station area development.

The Brentwood Town Central Development Plan has encouraged the model of Transit Oriented Development (TOD) to be put into place at Gilmore Station. As mentioned, this would involve building high density, mixed use developments with street networks. The design that this study proposes has taken advantage of these favorable policies, which match the design guidelines. Under the rezoning bylaw, the design has attempted to achieve a high level of density while keeping negative impacts on the open space to a minimum. As well, it has attempted to design the space so that it is used at varying times of the day by local business employees and residents in order to ensure maximal use of the open space throughout the day. In addition, the residential towers have been located at a distance from the SkyTrain guideway. This arrangement will mitigate the issues of noise, shadowing, view and privacy for the residences. The residential yards are buffered by natural grade to achieve a quiet and private environment. The ground level retail use has been purposefully designed to create 'eyes on street' which reduce the potential for crime. All these design elements will contribute to the success of Gilmore SkyTrain station in creating a transit-friendly community.

The use of open space plays an important role in shaping a transit-friendly community. The SkyTrain station is a place to which people come in their daily commute. It is also a place where they have the opportunity to come together and get to know each other. The

design followed the design of open space guidelines listed in this study and matched the general concept of TOD. The station plaza, with retail shops and the main entry on Dawson Street are connected in order to serve as a neighborhood focus around the SkyTrain platform. This design encourages the station to take a central focus in the community and contributes to the station's potential to become a center of community life, a welcoming gateway and a spot where a variety of activities can take place. This central focus is connected with other open spaces both visually and physically in the design area. It is also linked to off-site open spaces through the proposed Green Street. In addition, the design incorporates the existing topography and uses wetland planting to add a sense of local identity. Adequate lighting and clear access are incorporated into the design for the purpose of safety and the creation of a feeling of ownership for the people who live or work in the area. The design, furthermore, is pedestrian oriented. From a larger perspective, this study has capitalized on the successes of other compatible projects in order to create the best possible design with a high likelihood of success. The study assumes that, with proper design, the station can attract a variety of activities and become the community's 'living room'.

There is also some unknown information for this design. Although the study area is located within Brentwood Town Centre Plan which supposes to reach a commercial centre, the market ability is still unpredictable. For the bog soil, what is the relationship between the construction costs and soil structures needs to be carefully considered. As well, soil depth needs have a detailed on-site survey for allocating underground parking structures accurately. In addition, the entire design elements should be corresponded with architectural, engineering and other design work.

However, there are some aspects might require a more in depth study. A concern over the total supply of parking has always been an issue for the fulfillment of a successful Transit Oriented Development (American Dream Coalition, 2004). The City of Burnaby's

parking standards requires a maximum of 10 percent below the normal standard with regard to transit centers. However, as we have seen through the case studies and literature reviews, it looks as though less than the professed standard is needed in order to have a controlled amount of parking in the case of a successful Transit Oriented Development (TOD) station. Furthermore, it must be noted that it is difficult to assess the guidelines on parking space that is shared between different types of users, such as in this case, commuters, residents, a workforce, recreational users and shoppers etc. This design abides by the City of Burnaby parking standards but it is not yet clear if it would allow for a lower level of parking for the site. Further study and data collection are still needed in order for us to gain an understanding of the optimal amount of parking spaces that would be required for this development.

## **8.2 Conclusion**

In the post-war period, an increased emphasis on automobile travel has led to urban sprawl and other environment issues. Worldwide encouragement of public transit has been promoted in order to work towards a more sustainable future. SkyTrain has played a crucial role in advancing the livability of growing communities in the Vancouver area. It is a potent force in spurring the development of communities and in shaping community life. Furthermore, it functions to provide connections between communities that bring people together in a hospitable and livable environment.

However, communities located near transit stations face their own challenges with regard to station design, addressing local needs, transit improvements and community livability. Case studies and the literature reviews discussed in this paper offer some suggestions for potential ways of enhancing different facets of community life within station design. They illustrate the powerful role that transit can play in the creation of livable communities by creating, within the design of the stations, places for a rich and vibrant community life (NRC, 1997).

In general, the types of land use and activities that are incorporated into a design can help to determine what makes a place in a community special or unique because they provide the reasons why people come to the area. Transit facilities are themselves a key focal point for commuters. Sometimes they are located in isolated areas and serve no other function than providing access to transit. In this situation, where there is little or no other activity taking place, it is less likely that transit would be a factor in enhancing livability for any other reason than providing mobility. However, if the station is more centrally located and options exist for buying a newspaper, getting a snack or window shopping, then transit use will contribute to the overall activity and livability of that area. The station itself can provide a place for people to socialize and come together, reinforcing a sense of common purpose and establishing a center for public life.

Gilmore SkyTrain station offers the potential for a successful experiment in how a station can become the public center of a community, where socializing can take place naturally. The planning department of the City of Burnaby has created a number of policies and rezoning bylaws with regard to the redevelopment of the Gilmore station area. The new high density residential area, business centre and village streets around the station will offer the opportunity to transform the station into a social hub. The new open space around the station platform is intended to support places for community life to thrive. As well, the interconnected pathways provided allow people to circulate within that space and to access its different uses. Improved streets allow access to linkages between the station and the surrounding neighborhood. In addition, the physical design and focus on safety is intended to encourage people to feel comfortable in using the space. All these factors are equally important for the creation of a livable place around Gilmore station and have been implemented in my proposed design.

### **8.3 Future Study**

The Greater Vancouver region has realized the benefits of coordinating land use and transportation planning. The City of Burnaby has outlined a plan for defining new development opportunities along the Lougheed LRT Corridor and seeking a close integration of land use with the delivery of improved transit. This plan supports the concept of Transit Oriented Development for both existing and future SkyTrain stations. Under these policies, transit-friendly development will be put in place throughout the Greater Vancouver region as further development occurs.

This study presents a proposal for the development of a transit friendly community around the Gilmore SkyTrain station. Case studies and literature reviews were also presented in order to provide evidence supporting the feasibility of using Transit Oriented Development for the Gilmore SkyTrain station area. The examples provided will hopefully support Gilmore station in undertaking innovative transit programs to address its own particular livability needs. Learning from the successes and failures of other similar projects should help with the successful development of Gilmore station, while reducing potential risks for failure. Furthermore, the success of transit's role in enhancing community life at Gilmore station will stimulate other transit communities in Vancouver.

Although the design for Gilmore SkyTrain station is derived from the experience of previous projects that have had varying degrees of success, obstacles will still likely be encountered. The hope is to achieve increased ridership along with the development of a transit-friendly community. In order to achieve these goals, the design has incorporated high density residential and commercial enterprises, in hopes of attracting a high level of population and thus potential ridership. But it is hard to predict how many people will shift from auto or bus travel to SkyTrain. It will also be difficult to judge what other factors, such as the U-Pass program at SFU and UBC, may be responsible for a shift in usership.

Evaluation of such a development cannot be a rushed or done sloppily. Rather, it must be preplanned so that all survey data can be properly compiled. Future studies must address the level of success of the Transit Oriented Development in terms of what it gives to the community and to the transit system. From the literature review, there is still some uncertainty about how much success TOD has brought to communities. Questions have arisen about the ability of the design of land uses to influence travel nodes. Also, due to the focus on building for population density, many small sized units will be developed and will likely be inhabited by small households or poorer levels of the populace who can not afford the larger spaces available in nearby suburban communities. Consequently, these households may undertake fewer car trips, and this situation would prevail wherever these communities are situated. Several recent research sources have indicated that TOD is not delivering on promises to shift travelers from using the car to transit (Hendricks, 2004). No matter how good the quality of the transit service, commuters are very reluctant to give up their cars (Belzer and Autler, 2002). More attention at next step must be given to how much the Transit-Oriented Development can change people's behaviors.

The concept of building transit-friendly communities is in its infancy (Dale and Ginn, 2001). Lots of work is being undertaken in order to better understand this concept. The precedents that have been discussed offer a good resource in this work. The previously discussed situation of the Gilmore SkyTrain station could also be helpful for the planning of any subsequent development.

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