

**Bridging The Gap:
A Healthier City Through Green Belts, Parks and Recreation**

by

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ABSTRACT

This thesis investigates the architectural role of green belts and recreational zones as one solution to urban sprawl, ultimately creating healthier, more livable cities. A list of concepts and guidelines will be derived from both historical and modern green belt efforts, for the development of a more livable city in the 21st century. These concepts will then be tested as a tool on the city of Halifax. The concepts and guidelines will be used in the development of a green belt master plan. The plan will connect Halifax through existing and proposed parks and recreation. Secondly, it will develop a series of networks and connections enhancing the ability for alternate methods of transportation into and out of the urban core, facilitated by the design of a pedestrian bridge. Finally, a second design will support the existing program of mountain biking and create a unique architectural cycling experience for both the user and the observer.

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CHAPTER 1: INTRODUCTION

Urban sprawl is defined as the unplanned urban growth into surrounding rural areas. This thesis will investigate urban sprawl issues surrounding transportation and recreation in order to develop a greenbelt plan for a healthier, more livable city in the 21st century.

Some of the issues surrounding urban sprawl and investigated in this thesis include: a loss of green space for recreation due to continuing development, and an increase in low density and low proximity resulting in extreme auto dependency.

Modern transportation has become reliant on the personal automobile. Our cities have been molded over decades to accommodate and celebrate the use of the automobile. The increased focus and reliance on the car has negative effect on the population's level of physical activity.

Physical activity and the definition of recreation have changed over time, however the development of parks has not adapted to these changes. As traditional sports participation has declined, the participation in modern outdoors and lifestyle sports like mountain biking has increased. Unfortunately today's urban parks do not accommodate such activity.

Green belts have the ability to protect large areas of wilderness that would accommodate these modern activities. Green belts were originally designed as a planning tool for urban growth control and containment. In many cases they were also used to provide open public spaces and recreational areas.

Chapter 1 will devise a conceptual model with two basic components: a recreational green belt and an agricultural green belt. The focus of this thesis will be on the recreational greenbelt. The developed model can be applied onto a city in order to define a unique green belt master plan. Secondly, a list of guidelines will be developed for further design and implementation of the green belt and design characteristics. The concepts will focus on encompassing the urban sprawl issues of transportation, physical activity and the controlled growth of urban cities, while arriving at the end goal of a healthier, more livable city.

In Chapter 2, the concepts developed in chapter 1 will be applied to the city of Halifax at a master plan scale. Halifax has recently recognized urban sprawl as an issue, and a recently published and currently developing solutions plan for Halifax titled “Our Seven Solutions,” is a guide that proposes several solutions including a green belt to be implemented in order to create a healthier, more livable city. This thesis will investigate the possibilities and potentials in the implementation of modern 21st century green belt for the city of Halifax. It will use the developed tools and guidelines to propose a unique master plan defining both the recreational and agricultural green belts. The recreational green belt will then be broken into sectors and one will sector will become the focus of the architectural investigation. The “Backlands,” a popular mountain biking and outdoor enthusiast retreat, lies within the defined sector and will become the main driving force of chapter 3’s design response.

In Chapter 3 the architectural responses of the green belt implementation will be presented. These designs are a direct translation from the applied concepts and guidelines at a building and contextual scale. The need for two pedestrian bridges crossing the Northwest Arm became apparent in order to complete the connection of both existing and proposed parks and recreational zones. Secondly, the development of a facility that enhanced and provoked the existing mountain biking program of the “Backlands” created a unique architectural opportunity and added to the diversity of the recreational belt.

The development of these two designs and the execution of the plan address the issues and concepts presented in this thesis. They are a direct response to the implementation of the green belt concepts applied to the city of Halifax.

Question

What is the architectural and planning role in the development of a 21st century green belt, providing a healthier and more livable Halifax?

CHAPTER 2: TOWARDS HEALTHIER GROWTH

Urban Sprawl

Urban sprawl is happening all around the world. It is uneconomical, bad aesthetics and auto dependent. Since 1956 the federal highway act set out to “Disperse our factories, our stores, our people, in short, to create a revolution in living habitats.”¹ Within a year, writer and social critic William H. Whyte was already disturbed by what he saw.² He witnessed the development of new highways, bridges, and overpasses that allowed cities to expand rapidly into surrounding rural areas. These cities continue to expand and consume the natural habitats surrounding them and the division between one city and the next became blurred by this irregular and disconnected growth pattern.

Sprawl is defined as “dispersed, auto dependent development outside of compact urban and village centers, along highways, and in rural countryside.”³ Today environmentalists, small business owners, architects and planners see sprawl as unhealthy growth and are looking for ways to change the way we grow. In the twenty first century we now understand the effects of sprawl on a city, the environment and our health. The effects of sprawl are broad, critic William H. Whyte said, “Sprawl is bad aesthetics; it is bad economics. Five acres is being made to do the work of one, and do it poorly. This is bad for the farmers, it is bad for communities, it is bad for industry, it is bad for utilities, it is bad for railroads, it is bad for recreation groups, it is bad even for the developers.”⁴ It has taken some time for us to realize the effects of sprawl but critics like William H. Whyte had predicted that sprawl would be bad development in the future. When architect Joel Schwartz in the early 1990’s challenged his lecture audience to “name a New Jersey community built in the past 50 years that is a really good place, . . . nobody could name a single location.”⁵ “Rarely

1 Howard Frumkin, Lawrence D. Frank, and Richard Jackson, *Urban Sprawl and Public Health: Designing, Planning, and Building for Healthy Communities* (Washington, DC: Island Press, 2004), 1.

2 Ibid.

3 Ibid.

4 Ibid., 2.

5 Dom Nozzi, *Road To Ruin: An Introduction to Sprawl and How To Cure It* (Westport, Conn.: Praeger, 2003), 8.

does anyone have a good word to say for sprawl.”⁶ So why do we continue to develop these suburban communities? And what are the real advantages and disadvantages of urban sprawl?

Urban sprawl is appealing to a majority of the population because of the associated affordable cost of living. Housing and property value is significantly lower in suburban and rural areas compared to that of the urban center. However the advantages of affordability come at an even larger hidden cost.

These affordable communities contribute to the conversion of 1.2 to 1.5 million acres of rural land to auto-oriented, unpleasing, horrifying, sprawling development in the United States every year.⁷ “In many states, natural forests and other wildlife habitats have given way to suburban sprawl, contributing to the total 60,000 square miles of land paved in the united states, a total of 2 percent of all arable land.⁸ In Florida for example, sprawl development and the streets needed to support it are the most serious threat to biological diversity and several endangered animals, is motor vehicle collisions. Not only is urban sprawl uneconomical costing 40 to 400 percent more to serve than more centrally located areas, and 8 to 44 percent more energy consumption than higher density urban development.⁹ It also is the leading cause of wildlife fatalities and the consumption of land supporting their habitats.¹⁰ Secondly the land being consumed for auto infrastructure and suburban communities creates low density, low proximity development patterns leaving any natural land that remains fragmented and disconnected. Natural environmental processes like water filtration are not able to exist within the growing city. For example in the 1990s, New York City had developed a fresh drinking water problem due to up state urban sprawl development. They were faced with the decision of whether to build a filtration system for \$6 billion with the additional \$300 million of annual operating cost, or develop a master plan for the protection of the Catskill-Delaware watersheds costing only \$1.4 billion.¹¹ Luckily they choose the protection of the watershed.

6 Ibid.

7 Ibid., 9.

8 Ibid., 4.

9 Ibid., 9.

10 Ibid.

11 Frumkin, Frank, and Jackson, *Urban Sprawl and Public Health*, 135.

Most of these effects of urban sprawl are not immediately apparent to the investors or inhabitants of these suburban communities, but what is more directly related to their choice of affordable living, is the associated cost of travel, and for some the loss of land for recreation, especially for the ever rising popularity in outdoor recreation sports and activities. These two topics will be discussed further in the following sections.

Ultimately urban sprawl has a large impact on our cities, the built environment, and the way we live. In order to create healthier more livable cities we must address the issues surrounding urban sprawl that directly relate to the way we live and our activity levels. Frank, Engelke, and Schmid, describe these as the three dimensions of the built environment: Land use patterns, design characteristics, and transportation systems.¹² These three dimensions have the greatest control over the way we live in our cities, therefore they will have the largest amount of leverage when designing a healthier more livable city. These three dimensions will be the focal point in the development of green belt concepts for a healthier more livable city in this chapter.

The Driving Forces of Urban Sprawl

Until about 1945 American community development was focused on pedestrians, bicyclist, and children. “Streets” as they were in 1945 were places for social interaction, children were playing and riding their bicycles and neighbors were conversing on porches.¹³ Over the past 60 years American streets have transformed drastically, they are wider and filled with vehicles, streets are no longer a place for play or socializing, the blocks are longer, sidewalks are narrow and absent of trees, benches and porches or any other human scaled objects.¹⁴ No longer are the streets safe for people, they no longer invite people to come together to walk or bicycle.¹⁵

As well as the development of urban streets, highways became a major development in the late 50’s. These highways were allowing cities to expand rapidly into surrounding rural areas,¹⁶ and at an alarming rate. As the cities expanded there was no structure or land

12 Ibid., 99.

13 Dom Nozzi, *Road To Ruin*, Introduction xvii - xx.

14 Ibid.

15 Ibid.

16 Frumkin, Frank, and Jackson, *Urban Sprawl and Public Health*, 1.

use planned for such rapid development. The vehicle had taken priority and the birth of urban sprawl as we know it today had begun.

Today the car is the most used form of transportation, and they are costly in more ways than one. Of course there is the obvious cost of driving, the purchase of a vehicle or two, which is common for most families, the cost of insurance, fuel, maintenance and repairs. But what about the hidden costs that are not so apparent to the owner and the user. The vehicles that provide us with such luxury and convenience are also the vehicles that pollute our air and water, create noise pollution, take lives and injure people; as well they also create social and emotional isolation.¹⁷ Finally as we become more and more auto-dependent we become less physically active. Commutes are no longer made by bike or by foot but by the car. Even the concept of the street has changed from an open public space to an artery for motor vehicles.¹⁸ Our streets no longer invite people to come together to walk or bicycle, we have designed our streets not for kids or bikes or walkers but for high-speed, high volume car travel.¹⁹ No longer do our streets feel safe for alternate modes of transportation, the car owns the street.

It is clear that the automobile has been a driving force in the development of urban sprawl. Without the vehicle, or the road systems, we would not have traveled further from the urban center, but the vehicle alone did not create urban sprawl the entire system and the way it was planned for the vehicle did.

The reality is transportation planning has played the biggest role in, land use, urban sprawl and the automobile.²⁰ Therefore land use and transportation are intrinsic to each other and urban sprawl.²¹ This finding is key in the process of developing a healthier more livable city because any changes to one will affect the other.

The heavy reliance on the automobile over the last 60 years has shaped our cities and the way we live. The land use patterns associated with urban sprawl are driven by the automobile. This scattered irregular growth and segregated land use mix has resulted in a

17 Dom Nozzi, *Road To Ruin*, 2.

18 Frumkin, Frank, and Jackson, *Urban Sprawl and Public Health*, 35.

19 Nozzi, *Road To Ruin*, xvii.

20 Frumkin, Frank, Jackson, *Urban Sprawl and Public Health*, 27.

21 *Ibid.*, 5.

development defined by its low density and low proximity.

The density and proximity associated with urban sprawl is what has lead us to become so automobile dependent. Density can be used to study travel behavior, “higher density is associated with shorter trips and an increase in transportation options, and reduced vehicle ownership, compared to lower density.”²² Therefore in order for us to rely less on the automobile we must increase density which in turn increases proximity.

An alternate solution to the automobile would be public transportation but more often then not public transportation systems are uneconomical in sprawling communities. They are often not put in place or when they are they fail or are poorly serviced because of the low density. There are not enough people using these systems for them to be sustainable and economical.

Secondly the automobile dependency associated with urban sprawl has reduced our level of physical activity. Physical activity was once woven into the fabric of our lives, from the jobs we worked to the ways we moved from place to place. It is obvious the car has become the main source of transportation and has drastically reduced our level of physical fitness. We spend more time working and commuting then ever before leaving less time for leisurely physical activity.

Finally the parks and recreational zones provided for recreation and physically activity have suffered because of the unplanned irregular growth that is urban sprawl. The un planned and rapid growth development or urban sprawl has left fragmented pieces of land being defined as parks. These open spaces or “Bread and Butter” parks as Jane Jacobs calls them are nothing but small grassy patches of land with no programmatic intention. The issue of physical activity and parks that are suppose to facilitate physical activity will be discussed further in the following sections.

Parks and Recreation for The 21st Century

“The primary purpose of parks, since their 19th century beginnings, has been to provide places of recreation and leisure. While these will always remain as an essential ingredient

²² Ibid., 6.

of civic life, the recreational needs, values and make-up of urban people are changing.”²³ Our parks will need to adapt to the changing recreational needs, including the recent growth in the outdoor recreation sector.

The continuing expansion of cities since the nineteenth century lead to decline in park priorities, and have created new conditions.²⁴ These new conditions which are evident in Jane Jacobs critique of neighborhood parks are not positive. Jane Jacobs describes the majority of these parks as volatile places and says they tend to run to extremes of popularity and unpopularity.²⁵ She also notes that most of the time parks often end up becoming vacant and then eventually crime ridden, placing strain and liability upon surrounding communities. Once a park becomes crime ridden it is nearly impossible to rid it of crime. People are unwilling to take back their park because of fear intrinsic to the park. Additionally these parks which she describes as “bread and butter parks.”²⁶ Are often unprogrammed patches of grassy field, they do not offer many opportunities for recreation and therefore lead to the failure of the park.

The reasons for failure of these generalized “bread and butter” parks are obvious when we look at what Jane Jacobs has described as making successful parks and cities.²⁷ Her factors for a successful park are as follows based on a combination of her writings. 1) High densities of population and activities; 2) mixtures of primary uses; 3) constant flow of people through the park; 4) Demand goods – pools, concerts, sports fields, etc.; 5) accessibility and connectedness. These five simple guidelines will help to ensure the successfulness of a park or parks. In short her definitions for a successful park are similar to her concepts on what makes a city vibrant and diverse. The success of a park, much like a city is driven by functional physical diversity among adjacent uses. In turn producing a constant flow of users due to the diversity in their schedules.

In reality there is a contradiction between the need for landscape in the city and what is

23 Donna L. Erickson, *Metrogreen: Connecting Open Space In North American Cities* (Washington: Island Press, 2006), 122.

24 Michael Hough, *Cities and Natural Process* (London: Routledge, 1995), 14.

25 Jane Jacobs, *The Death and Life of Great American Cities* (New York: Random House, 1961), 89.

26 Ibid., 91-102.

27 Ibid., 176.

being offered as parks and landscape. People are no longer looking for just grassy open spaces; they are looking for an escape, a sense of wilderness. There is greater wealth and personal transportation among the majority of populations. There is also an increased desire to escape the city in search of rural and natural settings, engaging nature in ways the urban park is not capable of. Every weekend city dwellers flee to the countryside and beyond, they access its lakes, mountains, and forest for recreation, leisure and pleasure. Work and play have come to be perceived as separate and distinct activities.²⁸ This results in a disconnection between physical activity and daily life. Physical activity and recreation are now segregated from daily work life and reserved for the weekends when people have free time to escape to the areas needed for such activity. The role of the park is to provide recreation but recreation has changed over the past century. No longer is walking through the park or city square enough to satisfy the needs of most recreationists. And no longer are our parks providing opportunities for today's recreationist.

Traditional sports and recreation are changing and a new generation of outdoor enthusiasts and environmental stewards are on the rise. "In short, outdoor recreation is a growing and diverse economic super sector that is a vital cornerstone of successful communities that cannot be ignored. Most importantly, outdoors recreation is no longer a "nice to have," its now a "must have" as leaders across the country recognize the importance of outdoor recreation."²⁹

In the last 30 years mountain biking among other outdoor activities have become increasingly popular. In 2005 there were nearly 40 million mountain biking participants.³⁰ They contributed to, "more than 140 million Americans making outdoor recreation a priority in their daily lives, and proving it with their wallets by putting \$646 billion of their hard-earned dollars right back into the economy."³¹

There has been a remarkable rise in environmentalism and global ecological awareness, as well as a growth in tourism and the associated need in retaining a sense of unique

28 Hough, *Cities and Natural Process*, 12-13.

29 The Outdoor Industry Association, *The Outdoor Recreation Economy*, 2012.

30 International Mountain Biking Association, "Demographics of Mountain Biking," June 24, 2013.

31 The Outdoor Industry Association. *The Outdoor Recreation Economy*. 2012.

identity due to massive urban growth.³² As the shift towards outdoors and lifestyle sports continues more people are looking for large natural areas disconnected from the urban environment, offering diversity in landscape, minimal human intervention, and a unique identity. The addition of large urban parks may be just what the modern city and recreationist are both looking for in creating healthier more livable cities.

In “Large Parks,” large parks are defined as being over 500 acres. Large parks offer a dramatic exposure to the elements, weather, geology and vegetation.³³ These huge experiential reserves of land become the great outdoor theaters of the city and stages for natural processes like water filtration.³⁴ Large parks are priceless, and those cities that do not have an effectively designed one will always be poorer.”³⁵ The authors also define large parks as being a valuable ecological system, helping to store and process storm water, to channel and cool air temperature in the urban core, and provide habitat for rich ecology of plant, animal, bird, aquatic, and microbial life.³⁶

The functions and systems offered by large parks are precisely what today's outdoors recreationists' are looking for. Their scale and natural state can provide prime locations for outdoor sports and recreation like mountain biking while allowing for beneficial ecological cycles to exist.

The Bicycle for Transportation and Recreation

The bicycle is one of the most efficient modes of travel existing; it runs on purely the energy of the rider. However the distance traveled on a bicycle is limited for the average human. The equal amount of power generated by the act of walking can propel a human on a bicycle at 16-24km/h on average. This is a minimal amount of energy exerted by an average person. Let's assume a typical human can propel himself or herself at an average speed of 24km/h with minimal exertion. That translates into 8km distance over

32 Charles Waldheim, *The Landscape Urbanism Reader* (New York: Princeton Architectural Press, 2006), 23.

33 Julia Czerniak and George Hargreaves, *Large Parks* (New York: Princeton Architectural Press; 2007), 22-24.

34 *Ibid.*, 11.

35 *Ibid.*

36 *Ibid.*

20 minutes, the time recommended for daily activity. With a little more energy exerted that same person could travel 10km in 20 minutes. Therefore we can set up a general rule about travel distance by bicycle and safely assume that 10km and under is a acceptable distance to travel by bicycle for a destination purpose.

The disincentives of cycle transportation range from weather and safety to lack of bicycle or greenway routes.³⁷ Weather is not something we can control to a certain extent but having safe routes for cycling either on-street or through greenways or parks is one step forward in creating a vibrant commuter friendly cycling system. There are successful examples of both on-street and greenway developments all over the world.

Amsterdam is one of the most bicycle friendly cities in the world.³⁸ They seem to be born onto their bicycles, riders of all ages take advantage of the 400 kilometres of bike trails and routes all over the city. Their narrow 17th streets are not suitable for vehicular traffic therefore cycling has remained as the primary form of travel. The network and transformation of the city and the streets has taken place over the last 50-60 years. When automobile ownership began to increase the city turned its focus towards creating an extensive network of segregated cycling facilities and bicycle friendly policies which essentially turned most of Amsterdam's city center roads into a bicycle network.³⁹

Although Amsterdam remains at the forefront of cycling transportation, cities like Calgary, Alberta and Denver, Colorado have seen more recent transformations they have transformed into very successful cycling friendly cities as well. Their approach is that of open space planning, combining transportation, recreation, and park planning.⁴⁰ Both Calgary and Denver are transportation hubs to their neighboring Rocky Mountains and both cities are situated at the base of the mountains in endless open plains. You would expect both of these cities to be heavily dependent on the automobile but with more than 500 miles of pathways and 160 miles of on-street bikeways, The city of Calgary boast one of the most extensive urban pathway and bikeway networks in North America.⁴¹

37 Nozzi, *Road To Ruin*, 100.

38 I Amsterdam, "Cycling City."

39 Joe Peach. "How Amsterdam's Urban Form Created the Ideal Cycling City."

40 Donna L. Erickson, *MetroGreen: Connecting Open Space In North American Cities* (Washington: Island Press, 2006), 151.

41 *Ibid.*, 140.

In the United States, Denver is a national leader for greenway planning, Its 400 miles of greenways, parkways, and trails, supplemented by a superb park system illustrate a great example of how to implement a greenway system into existing city fabric.⁴² Through the use of open space planning they have created an expansive network using only the fragmented green spaces around the city.

The key to successful alternate forms of travel is to make it more convenient, accessible and inexpensive than that of automobile travel. A well-connected network of trails, paths, and in-street bike lanes, can reduce proximity and make travel by bicycle much more appealing. But still today only about 5 percent of Americans commute by bicycle.⁴³ The cities with higher levels of commuting are the cities with 70 percent more bikeways per roadway mile and six times more bike lanes per arterial mile than cities with lower levels of bicycle commuting.⁴⁴

Focus on bicycle transportation is and will continue to become an important role in future city development, therefore it is a main focus in this thesis. As we move away from the unsustainable and unhealthy automobile, the bicycle is an efficient and sustainable mode of transportation worth the investment. It is apparent that there are several methods in which to incorporate and develop proper cycling transportation systems. This thesis will focus on the use of the bicycle as a primary mode of transportation, it will explore the possibilities of connectivity through the use of open space and parks much like Calgary and Denver have done successfully. In addition it will explore how this open space connection can be combined and integrated into the use of a green belt system.

In addition to bicycles being used for transportation they are also a great form of recreation. The bicycle has many different disciplines of recreation. This thesis will focus on mountain biking as an important part of recreation. As mentioned in the previous section large parks offer the ability to provide a recreational zone suitable for mountain biking. Secondly these large parks increase the ability for open space planning as mentioned above. I Believe large parks are therefore necessary for the development of a healthier more livable city.

42 Ibid.

43 Nozzi, *Road To Ruin*, 101.

44 U.S. Department of Transportation. "*Reasons Why Bicycling.*"

However large parks sometimes have a price to pay. The parks can become costly to run and maintain. As these large parks become less maintained, they become less used by the public, and can develop into areas for the homeless, infested with crime and drug abuse. All across North America drug havens, crime zones, and parks filled with homeless and garbage, are being transformed into community areas centered around mountain bikes.⁴⁵ The following success stories are from an article published in *Bike* magazine and written by Peter Frick-Wright.

In 2008 Santa Cruz, California had a heroin problem leading to crime issues surrounding the Pogonip Park appropriately named Heroin Hill. The 640 acres of forest had become a breeding ground for drug dealers and users. In 2011 a mountain bike trail system was proposed as a solution the heron hill problem, and on March 2012 the proposal was passed. The non profit group who proposed the trail raised 11,000 dollars in order to cover the cost of the trail building and by late June they had cut over 5,000 feet of trail and had over 1,146 volunteer hours. The success of this park is somewhat unknown because of its recent development, but in years prior similar projects have been tackled with great success. In New York two mountain bike parks, one in Highbridge Park and the second larger one in Cunningham Park were constructed by volunteers. The Project has been very successful and has one numerous awards including 'Most Innovative Project' from Green Apple Corps and an achievement award from American Trails in the Environment and Mountain Biking.

The success of the parks above show that large parks can be treated as recreation parks through the adaptation of well designed trail systems, specifically those for mountain biking. Mountain bikers are willing and able to come together as groups to maintain and build trails. "Today, Mountain bikers are responsible for the vast majority of new trail construction as well as old trail maintenance."⁴⁶ Through the use of local bike shops, community groups and social media mountain bikers are the users and protectors of vast landscapes just like many of these large parks, making mountain bike parks a successful, safe, economical, and sustainable choice for large park recreation.

45 Peter Frick-Wright, "Uncommon Alliance," *Bike Magazine*, (December 2012): 59.

46 Aryeh Copa, "Spoke Talk: The Joy Of Mountain Biking," *Steamboat Today*, (2012) <http://www.steamboattoday.com/news/2012/may/26/spoke-talk-joy-mountain-biking/>.

In addition to mountain bike parks located within large urban parks, there has been amazing success in transforming ski hills into summer bike parks. British Columbia, Canada has become a world leader in mountain biking and mountain bike related tourism. Whistler Bike parks is home to the Crankworx mountain bike festival, a nine day spectator oriented event. As a result of visitor spending in the resort, mountain biking in Whistler generates considerable economic activity over the summer months.”⁴⁷

In 2006 just two years after the first ever Crankworx festival, total visitor spending attributable to mountain biking exceeded \$34.3 million over the period June 4th to September 17th, supporting an estimated 39.1 million in new economic activity.⁴⁸ Additionally the Whistler Bike Park and Whistler Valley Trails are a considerable source of revenue for both whistler and the province of British Columbia. The events and facilities bring in non-residents from around the world, and in the summer of 2006 non-residents visiting whistler for biking related activities spent an estimated 16.2 million.

The Crankworx festival attracted over 55,000 unique visitors in 2006. It is clear that the sport is becoming an international attraction, and as the sport continues to grow, with its recent addition to the x-games and international competitions all around the world, mountain biking and its needed resources will become an urban necessity much like skateboarding or BMX has.

The addition of mountain biking to the urban center has already begun with the success stories of New York and California transforming crime ridden parks into a mountain biking oasis. There is also another trend occurring in the world of mountain biking.

The indoorization of outdoor sports has been growing since the 1980’s,⁴⁹ typical outdoor sports like climbing, skiing, surfing, rowing and skydiving have all been developed as indoor sports now. These facilities have been created in order to provide increased access to sports that may require great travel distances in order to practice them. The facilities created enable enthusiast to practice their sport more often, and in most cases develop

47 Mountain Bike Tourism Association, “Sea to Sky Mountain Biking Economic Impact Study,” (accessed March 24, 2013).

48 Ibid.

49 Maarten and Salome Van Bottenburg, “The Indoorization Of Outdoor Sports: An Exploration Of The Rise Of Lifestyle Sports In Artificial Settings,” *Leisure Studies* 29, no.2 (2010):143-160.



Whistler Crankworx event 2012; from Bike Channel, *Mountainbike Chronicles*

skills which may not have been developed because of insufficient training and practice.⁵⁰

Mountain Biking is no exception, Since the peak of mountain biking participation in 2001 and the creation of festivals like the Crankworx festival, a new form of mountain biking has been born. This type of riding can be described as more spectator based riding, this type of riding includes mountain bike sub-categories such as; Slopestyle, Dirt Jumping, Freeriding, and Park Riding. This new spectator friendly form of riding requires facilities for developing new skills and talented riders who will compete in these spectator sport competitions.

In 2004 Rays Mountain Bike Park opened its doors in the middle of Cleveland Ohio, Far from any mountain or old growth forest. It became the first indoor mountain bike park in the world, opening its doors with just over 66,000 sq'. Today Ray's has expanded to over 130,000 sq' and has opened a second location in Milwaukee, WI with 93,000 sq' of indoor mountain bike park to explore and progress you riding skills.

⁵⁰ Ibid.



An example of Ray's Indoor MTB Park; from *Freehub Magazine*, Rays MTB Milwaukee has something for everyone!

The progression of mountain biking and its ever-expanding industry is following the same footsteps as its other similar outdoor and lifestyle sports have. Within the last decade mountain biking has broken off into subcategories of riding styles, many of which require the similar types of training facilities and resources as skateboarding and snowboarding do. We have seen that these facilities and resources are found in both remote environments like the Whistler ski resort and in urban environments like Ray's Indoors mountain bike park or the trail systems found in New York and California. I believe that these resources and facilities can be incorporated into parks and park planning strategies like green belts for the development of recreational zones for the 21st century as well as helping to create a healthier more livable city.

Green Belts and Garden Cities

A green belt is an area of contiguous open land close to a city or village. A green belt may be a narrow stretch of land or a broad swath of countryside. Similarly, the purpose of a green belt may include one or more objectives, such as providing recreation, protecting

agricultural land, protecting air and water quality, separating urban areas, and containing urban sprawl. The land uses typically found within a green belt include: farming, forestry, parkland, greenways, recreational trails, and some rural residences.⁵¹

The first example of a green belt in America was the 440-hectare network of public parks, known as the Emerald Necklace, which landscape architect Frederick Law Olmsted, Sr, designed around Boston in 1878.⁵² The park consist of nine separate parks connected by greenways. Olmsted had created the first green belt by connecting both new and old parks together, creating a network for travel and recreation.



Boston's Emerald Necklace; from Rubiella Evilio, "Boston's Emerald Necklace"

Ottawa the National capital of Canada has also become a very successful green belt and park system in which to study. Its success does not lie in its ability to contain urban growth, much like the Emerald Necklace it was intended as a place for recreation. All the major parks were connected by a system of eleven new parkways,⁵³ and the overall plan focused on active recreation.⁵⁴ The intention of the green belt to restrict urban growth was not something that seems to have been considered. The 1950 plan of Jacques Grebers was at a time when the 1944 Greater London Plan and its green belt were dominating planning

51 Thomas L. Daniels, "The Use of Green Belts To Control Sprawl in the United States," *Planning Practice and Research*, 25 (2010) : 258.

52 Ibid.

53 Marco Amati, *Urban Green Belts in The Twenty-first Century* (Aldershot, England: Ashgate, 2008), 130.

54 Ibid., 134.

ideas.⁵⁵ The 1944 Greater London Plan was emerging as an international influential planning model designed by Sir Patrick Abercrombie, it followed Ebenezer Howard's 1898 prescription for a green belt to encircle the built-up area, and new towns in the periphery to accommodate growth.⁵⁶ The 1950 plan for Ottawa and the most thoroughly implemented plan was designed by Jacques Greber and was most certainly influenced by the 1944 Greater London Plan "since he visited England during several of his Atlantic crossings for the commission to plan Canada's capital."⁵⁷ Therefore it was also heavily influenced by the Garden City model and was never intended to contain urban growth past its intended population size. Greber's plan called for "Growth beyond 500,000 to 600,000 people to take place in satellite towns in the rural area, although the locations of these towns were not designated."⁵⁸

Even though it is obvious the green belt was never intended to contain urban growth, in 1996 the National Capital Commission repositioned the Greenbelt from an urban containment feature to an essential part of the ecosystem. This could be seen as a failure of urban sprawl containment or as an inevitable part of development and settlement based on the average distance people are willing to travel with today's transportation methods.

I believe this is more likely the case as the green belt tightly wraps the urban core of Ottawa at roughly a 12km radius from the urban center. 12km is not far enough away for residents outside the belt to be deterred away from driving to the urban core on a daily basis. Previously we defined average distances willing to be travelled daily by different modes of transportation. 12km is just shy of the defined travel distance by bicycle; therefore it is not far enough to work as an automobile use deterrent. However then, the success of the green belt can be defined by its distance from the urban core. The green belt has become very successful as a recreational area and ecological and environmental system important to every city.

The Greater Toronto Area has recently implemented a green belt in order to halt the urban sprawl development surrounding the city of Toronto. However they have the complete

55 Ibid., 132.

56 Ibid.

57 Ibid.

58 Ibid., 135.



Diagram depicting the distance from the urban center of Ottawa to the edge of the green belt.

opposite condition as Ottawas does. The green belt stretches around the GTA in a semi circular path with an average radius of 30km to the urban core of Toronto. The Golden Horseshoe Green Belt as it is known consist of 1.8 million acres of land. Established in 2005 The Greenbelt was created for primarily for the protection of key environmentally sensitive land and farmlands from the urban development and sprawl surrounding the GTA. The green belt is to far for daily access or use as a recreational zone, this is evident on the official website where they state that it is “close enough for an easy day trip”.

Unlike the green belt that surrounds Ottawa or the Emerald necklace park system woven into Bostons urban fabric. The success of the Golden Horseshoe Green belt lies in its ability to provide protection for farming and other ecosystems necessary for a sustainable city. The green belt has also been successful so far in containing urban sprawl but that has a direct relationship to its distance from the urban center. As defined previously transportation and its infrastructure have been the driving force behind urban sprawl. We cannot contain urban sprawl within boundaries insignificant to the abilities of personal travel. The limits of urban sprawl are defined primarily by the methods of transportation and the relationship to travel time.

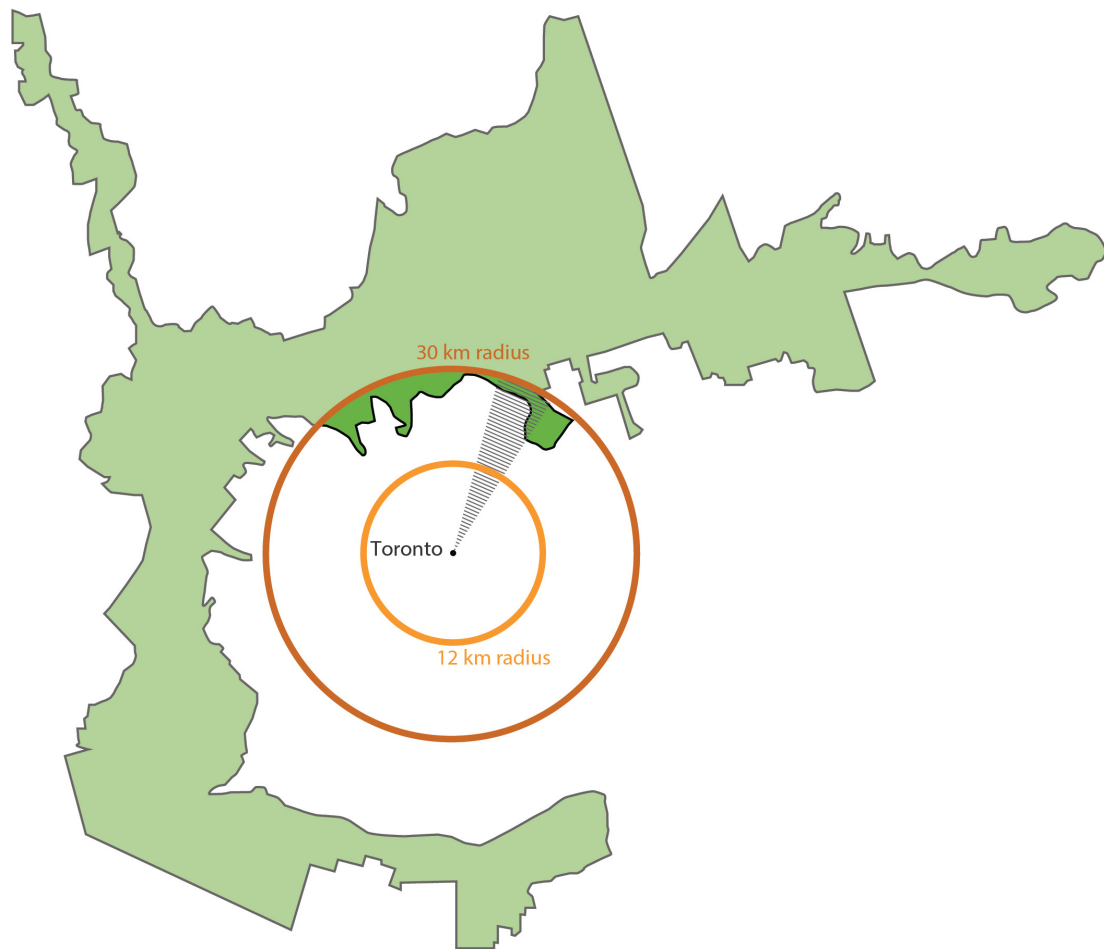


Diagram depicting the distance from the urban center of Toronto to the edge of the green belt.

This being said it is reasonable to say that green belts themselves do not contain urban sprawl but they can be used to increase density and define settlement patterns, protecting the necessary green spaces needed for a cities sustainable ecosystem, recreational space, and the protection of resources including farming and forestry.

Chapter Summary

Throughout this chapter issues surrounding urban sprawl have been presented. Of these issues the automobile and land-use were two that became primary points of interest. The rise and dependence upon the automobile have been driven by both the advancements in the automobile itself and the transportation planning and development in the last 60 years.

These advancements have allowed for aggressive city expansion, now known as urban sprawl. Both urban sprawl and the automobile have been defined here as unsustainable growth that has a chain reaction of negative effects on a city and the public. It has been noted that a decrease physical activity has been linked to auto dependence and the creation of auto oriented streets and transportation infrastructure.

It is apparent that in order to rely less on the automobile two major problems must be addressed. 1; Density, through the use of land-use planning 2; Shifting transportation development away from the vehicle and back towards alternate transportation forms like cycling and public transit. With the development of these two major aspects addressed we can move towards more sustainable and healthier cities.

Urban sprawl driven by the automobile and land-use have also been the source of negative impacts on urban parks and recreation. Urban sprawl and the associated unplanned scattered growth have created small fragmented parks. These parks are not fit for today's recreational activities, nor are they of any environmental or ecological benefit. The issues surrounding parks and recreation must be addressed in order to create a healthier more livable city.

The sections following urban sprawl dug further into the issues surrounding auto dependency, land-use, and recreation, in search of solutions to these problems that would aid in the development of a healthier more livable city.

It was found that a park is defined primarily as a place for recreation, but many parks are no longer meeting that requirement. As the definition of recreation expands and changes our parks must change with it. Sadly many urban parks are left over pieces of land defined as "bread and butter" parks, having no real purpose or program. We must plan for our future parks and the recreation of the 21st century.

The success of a park has been defined by the following five factors, 1) High densities of population and activities; 2) mixtures of primary uses; 3) constant flow of people through the park; 4) Demand goods – pools, concerts, sports fields, etc; 5) accessibility and connectedness.

Also notable is the concept of connecting or linking several parks together creating a parkway, this is known as open-space planning. This not only increases accessibility, but it increases flow and acts as a transportation corridor for alternate modes of transportation like cycling.

The large park was found to be a more sustainable park plan if it can be maintained and programmed properly. Mountain bike trail systems and parks are becoming popular around the world. They have been proven to be sustainable and economically beneficial when designed and constructed professionally following standards produced by the International Mountain Biking Association (IMBA). Secondly they offer access to the land for all others to enjoy, activities like swimming, hiking, bird watching, rock climbing, and trail running all require trail networks in order to facilitate the activity. This increased access and use has also been proven to help and in some cases eliminate unwanted users, crime and drug use.

Mountain bike trail systems require sufficient amounts of space putting them into the “large Park” category, and allowing for natural ecological and environmental systems to play a beneficial role in an urban environment. They also are at risk of becoming costly to maintain, but as we have seen mountain bikers and associated trail builders are willing to put in the needed volunteer work in order to have accessible and professional trail system that will be available for generations to come.

Green belts often used as a urban growth containment tool, but originally designed for the preservation of recreational land may be the solution to all of the issues and findings presented above. As we saw in Ottawa green belts have the ability to provide recreation and transportation close to the urban center while increasing density until a point where the density gets to high and satellite cities begin to form outside of the green belt. In Ontario it was found that the Golden Horseshoe green belt was successful in defining a cities edge and preserving land for agriculture and forestry.

In conclusion green belts as a land-use planning tool have the ability to provide solutions to many of the issues surrounding urban sprawl.

1. Green belts reduce auto dependency by providing alternate forms of transportation

like cycling, through the use of open-space planning and greenways within a green belt. Therefore increasing accessibility to forms of physically active travel avoiding the negative health effects of car travel. And finally a well connected system of networks and trails increases proximity increasing the potential of alternate forms of travel.

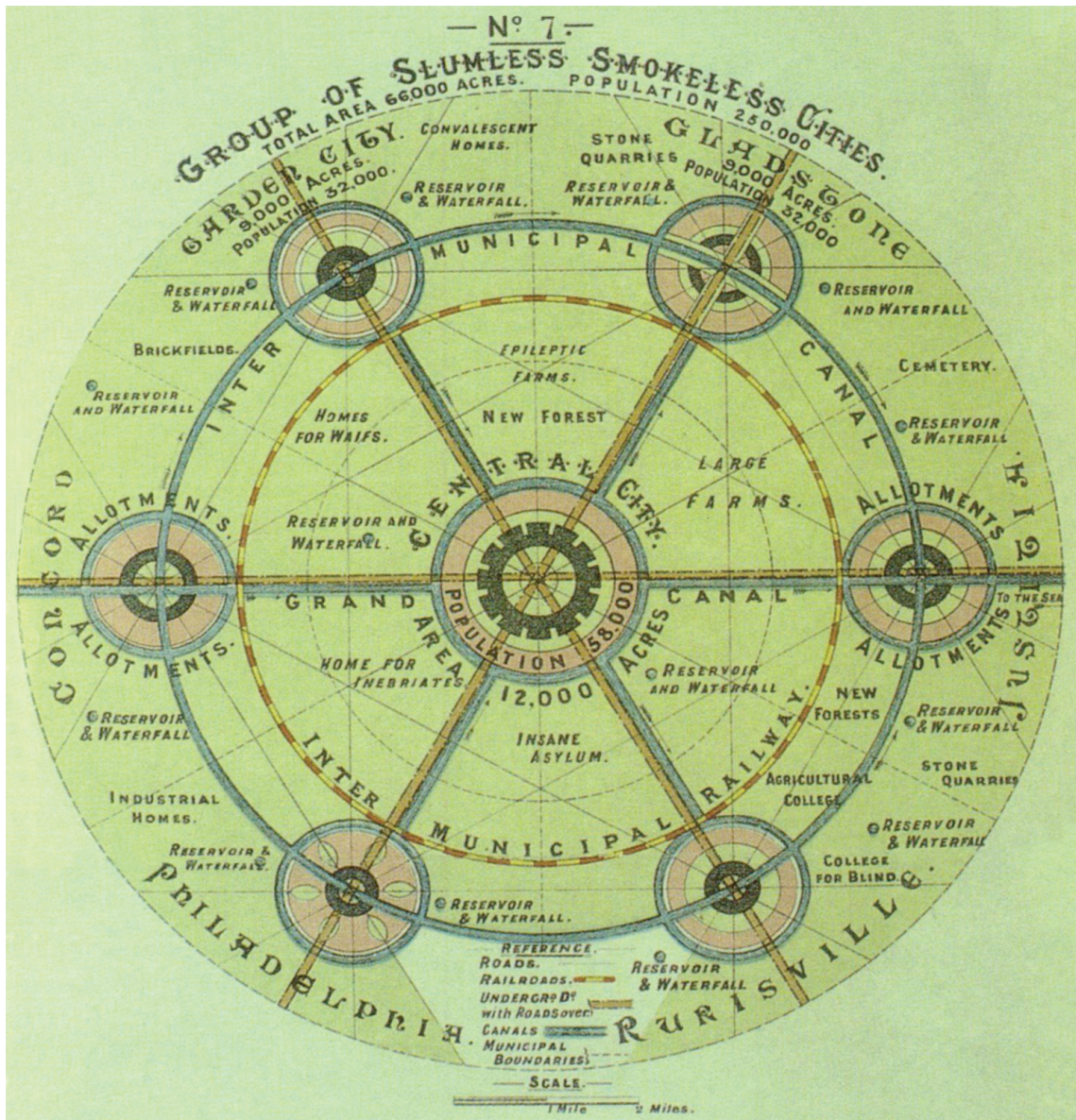
2. Green belts can protect land from urban sprawl growth. Creating protected areas for recreation, transportation, parks of varying sizes, agriculture, and forestry. They will be able to preserve land area large enough to accommodate recreation of the 21st century including mountain biking and many other sports and activities included in the growing sector of outdoor recreation.

3. Finally I believe there is a way to combine all of the successes of each green belt studied in this chapter in order to develop a stronger concept of what a green belt is and what it can do in the process of creating a healthier more livable city in the 21st century.

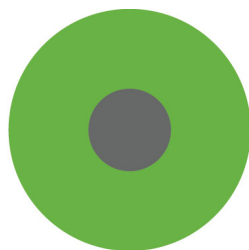
In the following section the information provided in this chapter thus far will be used to develop a 21st century green belt concept and a list of guidelines for further development of the concept.

Green Belt Concepts for The 21st Century

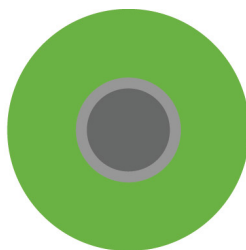
I believe there is opportunity to combine all of the successes and failures of the green belt plans mention in this thesis into one concept. If we combine the successes of the Golden Horseshoe Green Belt with the Ottawa Green belt we get a diagram that looks much like the Garden City diagram Of Ebenezer Howard. This is not surprising considering many green belts are derived from such concepts. The results are similar in their concentric layering of green belts and satellite cities centered on a nucleus or urban core, however the major differences in the combined diagram and the garden City diagram are found in the numbers. The scale of the garden city is much smaller then the combined Golden Horseshoe and Ottawa Green Belt. This difference in scale is in part due to the advancements in personal transportation while the difference in population reflects an increase in urban density. I believe there is still relevance in the garden city concept, but it is an old concept and needs to be updated. The following diagram is the result of combining the green belts and describes the different stages.



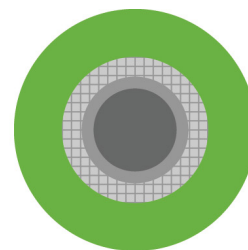
Ebenezer Howard's original conception of the Garden City (1902); from E. Howard, *To-morrow*.



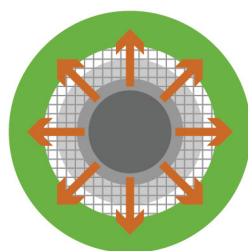
INITIAL URBAN SETTLEMENT



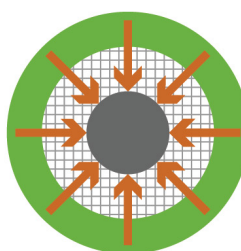
URBAN GROWTH ONE



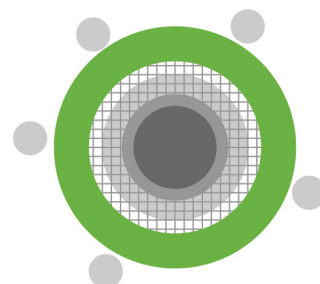
GROWTH TWO
INTRODUCTION OF
MAJOR ROADS



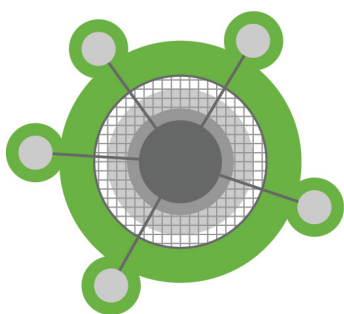
GROWTH THREE
SUBURBAN NETWORK
SPRAWLING



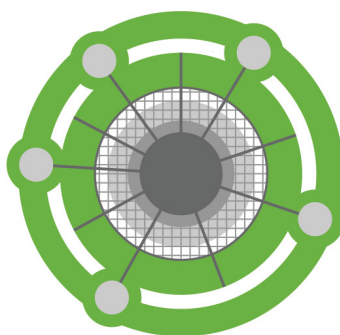
SECURE GREEN BELT
AREA TO PROTECT
ACCESIBLE RECREATIONAL
LAND



ALLOW INDEPENDENT
CITY GROWTH OUTSIDE
OF BELT AS URBAN CENTER
BECOMES TO DENSE
(SATELLITE CITIES)



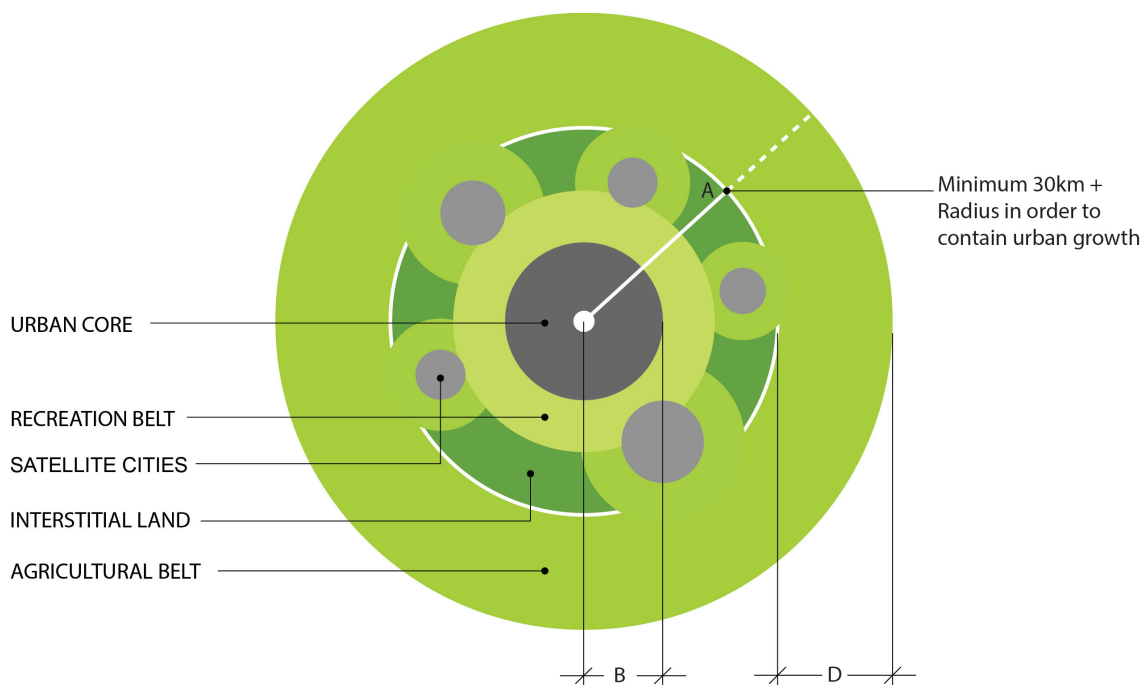
INTRODUCE LARGE
SCALE PUBLIC TRANSIT
SYSTEMS AND SATELLITE
CITY GREEN BELTS



INTRODUCE SECONDARY
GREEN BELT DEALING WITH
LARGE SCALE FARMING ETC.
SPACE FOR ADDITIONAL GROWTH
BETWEEN GREEN BELTS

Diagram depicting green belt growth and implementation derived in this thesis

I believe there are three types of green belts that should be used together as one system. The final diagram for this concept is pictured below.



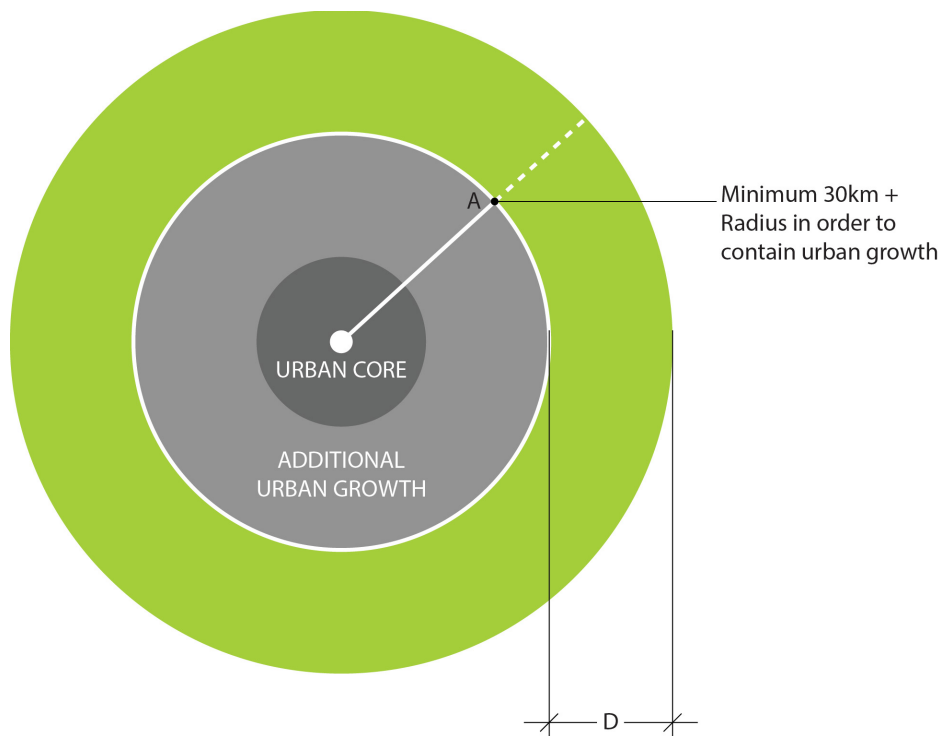
B = Distance from the urban center to the recreational green belt must be within a 5-10km radius.
 D = Depth of green belt: This land is preserved for the protection of agriculture and the preservation of sensitive ecosystems.

Diagram depicting the components of the developed green belt concept

The breakdown of these components are as follows:

1. The Agricultural Belt: Defined by a distance of 30km or greater from the city and is reserved for the protection of agricultural and sensitive land. Secondly it acts as a container for urban growth and defines the cities boundaries. The distance is derived from the 1.1 hour return commute time.⁵⁹ Lets assume we can travel at an average speed of 70km/h factoring in city driving at typically 50km/h and highway driving at typically 100km/h. Therefore we can travel 35km in the average time willing to be spent commuting in one direction. The thickness of the agricultural green belt is based on the agricultural needs of the city and the amount of pressure they wish to apply onto the urban sprawl. A thicker agricultural belt means more commuting time and less of a chance the development will leapfrog the belt.

⁵⁹ Dom Nozzi, Road To Ruin, 16.



C = Applied pressure from green belt: Any distance less than 30km from the urban center, while still retaining the necessary land for agriculture beyond the 30km mark.

D = Depth of green belt: This land is preserved for the protection of agriculture and the preservation of sensitive ecosystems.

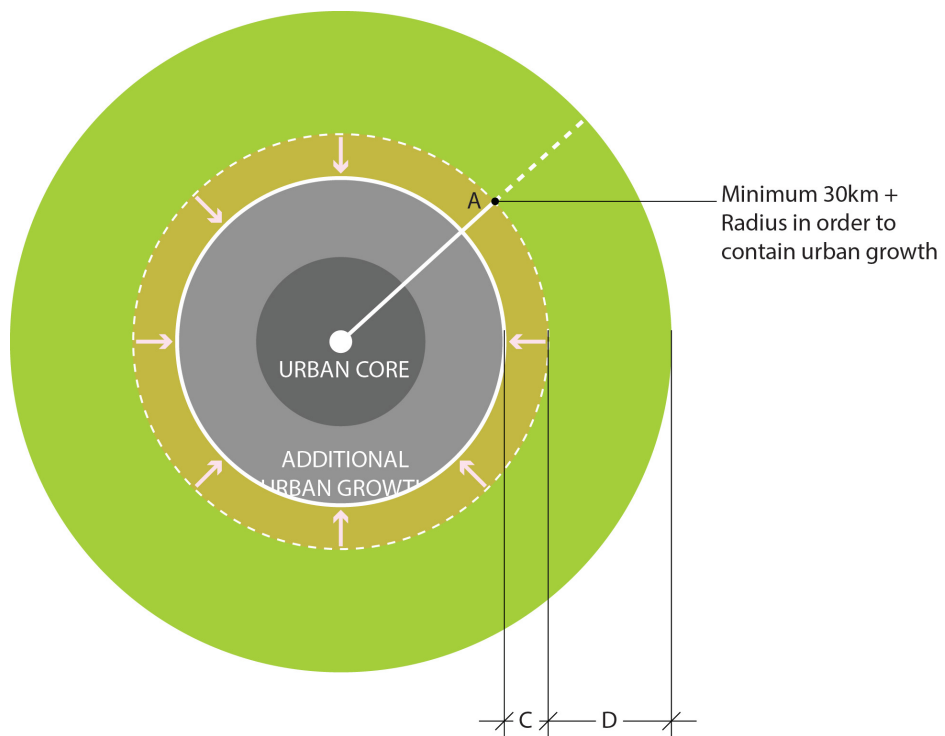
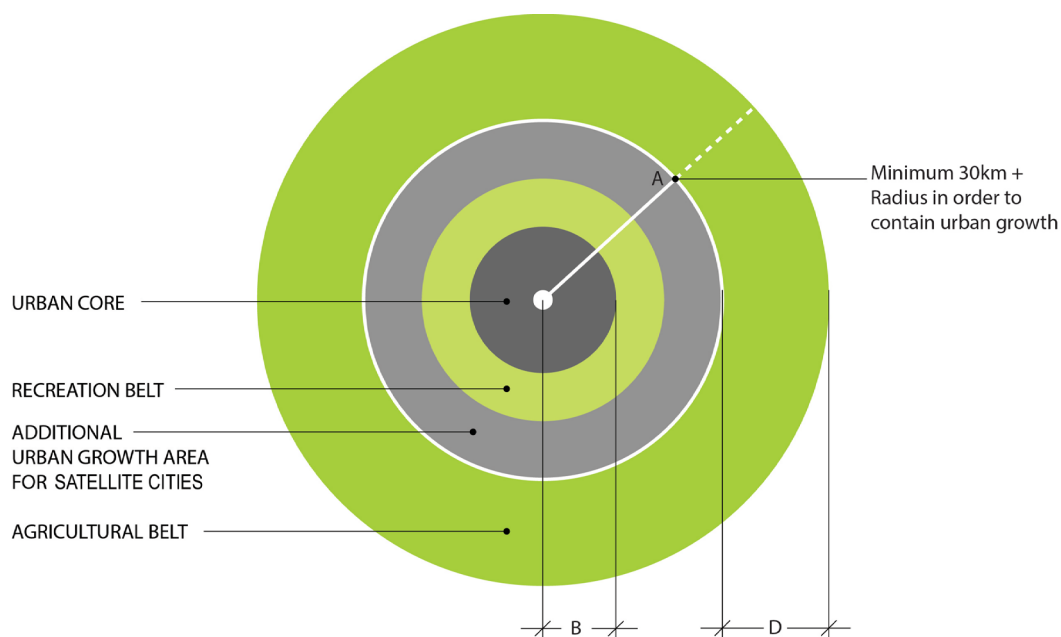


Diagram depicting the agricultural belt and its concept

2. The transitional belt: Satellite cities in this green belt concept are encouraged and lie between the defined recreation belt and the agricultural belt. They are however developed within their own green belts much like the Garden City concept. Satellite cities like those that have leapfrogged the Ottawa green belt evolved naturally. As these cities start to evolve a green belt plan for that satellite city must be designed and implemented. In the application of this concept onto an existing city, the satellite cities will be defined by areas of higher density. They will then have green belts implemented around them to prevent further development and increase density.

The following and third part of this concept is the recreation belt. Moving forward it will be the main focus of this thesis.



B = Distance from the urban center to the recreational green belt must be within a 5-10km radius.
 D = Depth of green belt: This land is preserved for the protection of agriculture and the preservation of sensitive ecosystems.

Diagram depicting the recreational belt and surrounding components

3. The recreational belt: This green belt is closer to the city providing daily access for the majority of the population. This means that the green belt must be within close proximity to the urban core, much like we have seen with the success of the Emerald Necklace in Boston and the Ottawa Green belt. Both have been successful as recreational zones and as transportation corridors for cycling and walking

The recreational green belt should be accessible by both bike and public transit within an acceptable time and distance. Twenty minutes is the daily-recommended time to spend being physically active. As presented earlier, an average person on a bike can travel 8-10km with minimal exertion within a twenty-minute time frame. The Ottawa Green belt on average lies at about 12km from the urban center and is still very successful as a recreational zone. However it must be noted that increased proximity to the green belt would increase the use of such a device. Public transit varies in time to distance ratios depending on the routes and schedules supplied by the city so it is much harder to understand how far one can travel by public transit within the 1.1 hour return commute rule.

Walking is another form of transportation that should be considered when implementing a recreational green belt. However the average distance willing to commute by foot is .4km - .8km.⁶⁰ This distance is too small to consider walking a viable means of transportation to the recreational belt. Additionally cycling is the main transportation method focused on in this thesis. Therefore the distance to the Green Belt from the urban center should be within a 5-12km radius. 5km is the average distance planners have set up for cycling destinations within a walkable city.⁶¹ The thickness of the green belt is a factor of the parks and programs found or developed within this zone, as well as the desired pressure exerted onto the urban core to increase density. A thicker recreation belt results in a decrease in the amount of people retreating to satellite cities outside of the recreational belt

This zone combines together green belts and parks into one recreational zone close to the urban center; this can create a more sustainable solution to providing parks for the 21st century. These parks can be designed as large parks allowing large uninterrupted swaths of land that can retain natural eco system processes. Secondly these parks due to their size and natural state can provide place for Outdoor recreation and sport. As described earlier these outdoor sports like mountain biking are becoming popular and the recreational needs, values and make-up of urban people are changing.”⁶² In the process of creating a healthier more livable city we must provide the needed facilities and spaces

60 Transportation Research Board, *Does the Built Environment Influence Physical Activity?, Examining the Evidence* (Washington, D.C.: Transportation Research Board, 2005), 103.

61 Ibid.

62 Erickson, *Metro Green*, 122.

required to provide a healthier more active lifestyle and a recreation belt is able to fulfill these needs.

The Recreational belt concept is the main focus on this thesis because it has a direct link to creating a healthier more livable city that can be experienced and enjoyed by the cities inhabitants. Therefore I have developed a set of guidelines for the implementation of such a device.

Guidelines for The Recreational Belt

To further the concept of the recreational belt these guidelines have been derived from the previous chapter and are influenced by the readings on Jane Jacobs and Parks. Because The proposal of this green belt concept marries both the idea of parks and recreation with the concept of green belts and large parks there must be a set of guidelines that defines how these spaces are to be used and designed, the following key factors help to define what this typology would consist of.

1. Proximity is essential; this means that the distance from any given point to an accessible connection into the recreational belt or network must be high. The higher the proximity the more likely the belt is to be successful.
2. Accessibility must be high. Accessibility is similar to proximity but it is based on the distance from one desirable destination or facility to the next.
3. Networks are an essential part in creating both proximity and accessibility. A well-designed system of paths, trails, paved sections and on-road routes are an essential part of a well-designed park, greenway, green belt, and city.
4. Connectedness is the way in which the networks flow. If a trail stops or does not have a clear transition to the next the network is not well connected. This is important in making the user feel safe and comfortable while using the system. Having a well connected system throughout the city and the greenbelt will allow users to take advantage of alternate forms of transportation like cycling that would shorten their commute and make it more accessible and desirable than that of the car.

5. Diversity is essential in creating life within the recreational belt. Much like a successful park the recreational belt must have a mixture of primary uses and demand goods. These uses or demand goods can vary from a simple basketball court to swimming pools and concert stages. Secondly the diversity and juxtaposition of programs will inevitably create vibrancy. Placing two programs or uses within close proximity to each other will draw different types of users with different schedules, this concept helps to produce prolonged activity within the park drawing in users at all different times of day.

6. Density is something that is not found around many of the parks developed today because of urban sprawl. The implementation of a recreational green belt would not only create density within the urban core. It would then in turn be surrounding the core. Density near parks helps to increase the diversity among users and ultimately increases the use of the park or recreation belt in this case.

7. Disconnectedness is something that all outdoor enthusiasts are looking for as well as many citizens looking to escape the city. Having a recreational belt that is thick enough and undeveloped enough to give a sense of disconnect from the urban environment is essential to its success as an outdoor sports recreation destination.

8. Wilderness is an important factor in the creation of a recreational belt. There must be areas in which have minimal human interventions. They must be in a natural state unlike the groomed and manicured parks found in urban city centers.

This conceptual model and set of guideline for the creation of a 21st century green belt for the development of a healthier more livable city could be used during the planning process of a new city, or it could be implemented into the existing fabric of a city.

These guidelines and green belt concepts will be put to test in the next chapter where they are applied to the city of Halifax. They will aid in the development of a green belt master plan and will define one specific site within the recreational belt for further architectural investigation.

CHAPTER 3: HEALTHIER GROWTH FOR HALIFAX

Intro to Halifax

Halifax is the capitol city of the peninsular province Nova Scotia, Halifax is also a peninsula, a 2km isthmus joins the downtown peninsula to the mainland of Halifax. Halifax has become a city of undesirable urban sprawl conditions because of its geographic conditions, transportation and poor urban planning. There is hidden potential in the geographic conditions of Halifax and I believe the green belt concepts developed in the previous chapter will aid in releasing that potential, and ultimately create a healthier more livable city.

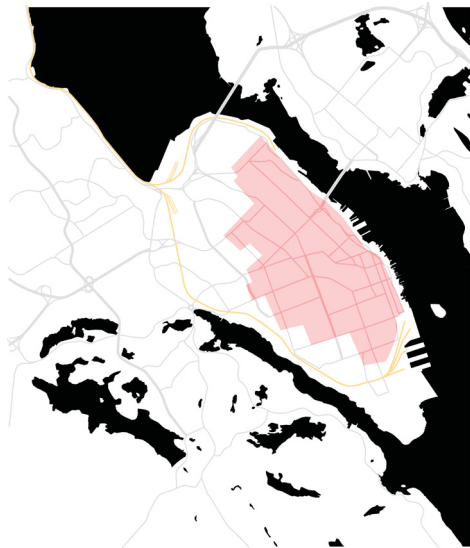
The population of Halifax is 390,096, however The population on the Halifax peninsula is just over 74,000, on an area of 59.22 square kilometres, resulting in a extremely low density of 944.2 persons per kilometre squared. These numbers in comparison to Vancouver, the densest city in Canada, and you can see how extremely low the density of the Halifax peninsula is. Vancouver peninsula consisting of the west end and the downtown area, combined they equal an area of 5.7 kilometres squared, with a population of just over 99,000 resulting in a density of 17,138 persons per kilometre squared. The density of Halifax is just 5.5% the density of Vancouver.

It is obvious that Halifax has a density problem, with only 19.17% of the metropolitan population living on a extremely undensified peninsula. This results in wide spread urban sprawl conditions with the remaining population living off of the downtown peninsula where the majority of the jobs reside. This living condition is a recipe for the negative urban sprawl conditions found in the previous chapter. Halifax is already seeing many of these effects like increased automobile dependency, and the loss of important land for both recreation and ecosystem needs.

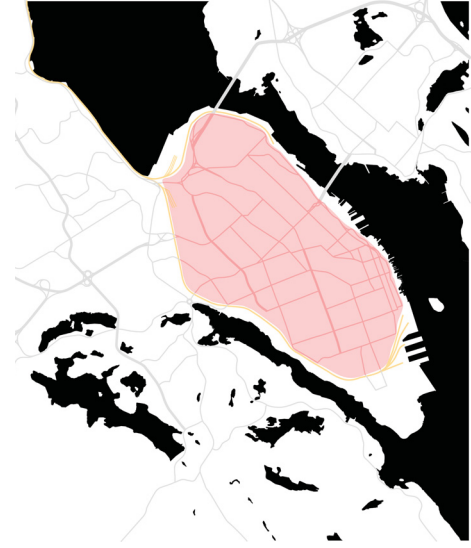


Image depicting the existing geographic and transportation conditions of Halifax

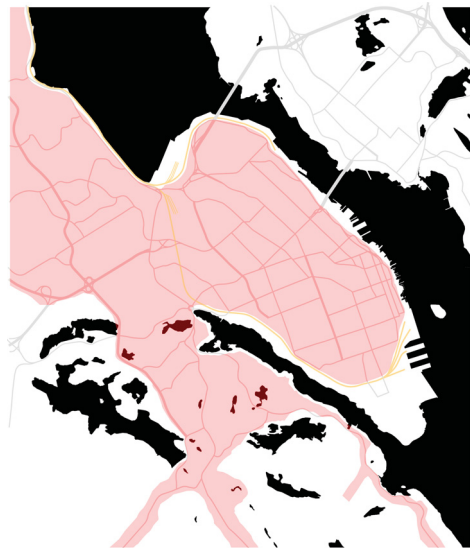
55 years after William H. Whyte defined sprawl as being a terrible form of development, Halifax has recognized their urban sprawl as a problem. David Donnelly an environmental lawyer who visited Halifax in January 2012, Voiced his opinion on Halifax's growth saying "Halifax has a "world class" urban sprawl problem and its downtown may be falling into the type of unsalvageable urban death seen in Detroit " He suggested Halifax creating a green belt in order to stop urban sprawl from devouring our surrounding natural landscape and put pressure back on the peninsula in order to increase density.



1914



1941



2000

Images depicting the urban growth off the peninsula; from Jordan Rice, "Personal Rapid Transit for Halifax, Nova Scotia"

Just six months later in June 2012, the HRM Alliance group published a guide known as "Our Seven Solutions". This guide proposes seven solutions to work towards in order to create a healthier and more livable city of Halifax. One of the guide's major solutions to the urban sprawl issue is development of a green belt.



Our HRM Alliance, "Our Seven Solutions," Halifax 2012.

It is clear that Halifax is looking for solutions to urban sprawl and a green belt is one of those solutions. These findings confirm Halifax is a perfect testing ground for the concepts and guidelines developed in chapter one.

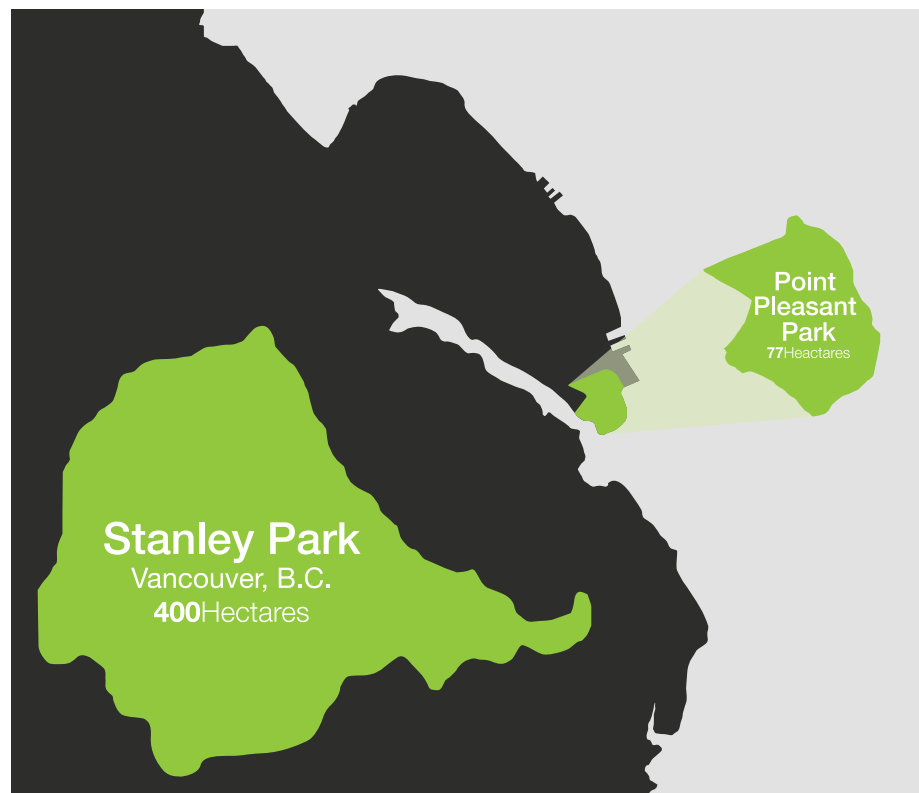
Specific Urban Sprawl Issues of Halifax

It is clear that Halifax is suffering from a multitude of urban sprawl issues from low density and auto dependency, to rapid growth off of the peninsula creating a dying urban center. The following will present some specific issues that will need to be addressed during the development of the green belt plan based on the finding in chapter one

Parks

Halifax is a prime example of a city that is not meeting today's recreational needs. Halifax is home to several small provincial parks and a lot of neighbourhood or "bread and

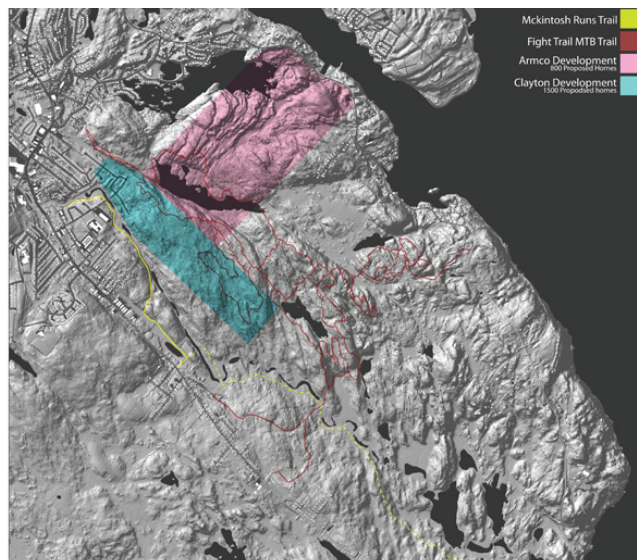
butter” parks. Most notable is the 77 hectare provincial park located at the south end of the Halifax peninsula. Point Pleasant Park is very generalized park, it is not a park for recreation but more of a park for walking your dog. Bicycles are even prohibited on the weekends. During the weekdays you can ride your bicycle on the main gravel paths but not in the forests of the park. This is not an ideal place to ride a mountain bike or participate in a wider variety of outdoor sports or activities. In comparison Vancouver is home to Stanley Park, it is much larger in size at 404 hectares and is programmed with many activities including beaches, tennis courts, water parks, a vast networks of biking trails and even the Vancouver aquarium resides in Stanley Park. If Halifax wants to become a healthier more livable city, it will need to reassess its parks and recreation strategies.



Comparing the size of Stanley Park to Point Pleasant Park

Backlands

There is one area that has become popular amongst outdoor recreationist, including mountain bikers. This area is known as the “Backlands”. However this area is being threatened by urban sprawl development.



Images depicting the areas of Proposed Developments Within The "Backlands." Base maps from Google maps and Geographical Information Sciences Centre Dalhousie University

The “Backlands” site is a site of pure beauty. Its unique high granite outcrops, low lakes and wetlands create a rugged beauty not found anywhere else in the Halifax area. This island of wilderness contained by the Herring Cove and Purcell’s Cove road is roughly 1500 hectares making it significantly larger than both Stanley Park and Central Park. However the recent and proposed development within the backlands will drastically reduce the overall size of the Backlands.



Photo of the Backlands

Two developments are threatening the Backlands the first; Governors Brook began construction shortly after a fire that affected the land in 2009. The community will assemble some 800 homes in the next few years. Secondly the Clayton Developments, projected to start construction in the next couple of years will contain around 1500 homes. This development will drastically reduce the size of the “Backlands”. The development will also destroy kilometres of trails used by mountain bikers and other outdoor recreationist. A local group “The McIntosh Runs Watershed Association” (MRWA) is currently in the process of preserving much of the “Backlands” as mountain bike trails. They understand the benefits previously mentioned of a large watershed like the “Backlands” being transformed into a mountain bike park.



Photo of the Backlands during development

Transportation and Networks

Halifax has struggled with transportation on and off of the peninsula since the installment of the first ferry service in 1752 running between Halifax and its sister city Dartmouth. “As a defensible location for a naval base in the eighteenth century, the peninsular site of Halifax was well chosen. As the nucleus of rapidly growing regional metropolis 200 years later, the site severely constrained urban development, and necessitated the building of new links to the mainland.”⁶³ The limitations of the peninsula in theory should have restricted growth off of the peninsula.

However the addition of vehicular transportation off the peninsula allowed for rapid urban sprawl. Since the first ferry to Dartmouth in 1752, Dartmouth had become a necessary commercial lifeline to the farming and industries across the harbor.⁶⁴ In 1955 the ferry services running from Dartmouth to Halifax were not enough to keep up with demands

⁶³ Hugh Millward and Eric Keuper, “Access to the Halifax Peninsula: Locational Decisions in the Context of The metropolitan Planning,” in D. Day (ed.) *Geographical Perspectives on the Maritime Provinces* (Halifax: Saint Mary’s University, 1988), 114.

⁶⁴ *Ibid.*, 116.

and the first major automotive connection was made to Dartmouth. The Macdonald Bridge completed in 1955 relived the stress on the ferry services, but simultaneously led to rapid suburbanization following its opening. By 1965 the two-lane Macdonald Bridge was often clogged with intercity traffic.⁶⁵ Since the early 60's the bridge had been unable to handle the traffic conditions, and proposals for a second bridge were being considered. In 1965 the second bridge proposal was passed and finished construction in 1970. The development of these two bridges exacerbated suburban sprawl and is apparent even in today's settlement patterns.

There have been similar bridge proposals for the connection from the peninsula to the mainland of Halifax across the Northwest Arm. Luckily these bridge proposals never came to life. If they had been built the communities of Purcell's Cove and Herring Cove would have seen rapid development much like Dartmouth had seen. Secondly if this would have happened the "Backland" area may not have existed in its natural state as it does today. Halifax would have lost a unique and important piece of land that also provides recreation.

It is fortunate that the bridge proposals over the North West Arm had not been constructed, however there is still a need for increased connectivity to the peninsula over the North West Arm. With more people than ever before living off of the peninsula increasing access through pedestrian networks and connections could relieve some of the pressure put on the vehicular transportation systems of Halifax.

These three topics will become the main focus of the master plan development in the following sections.

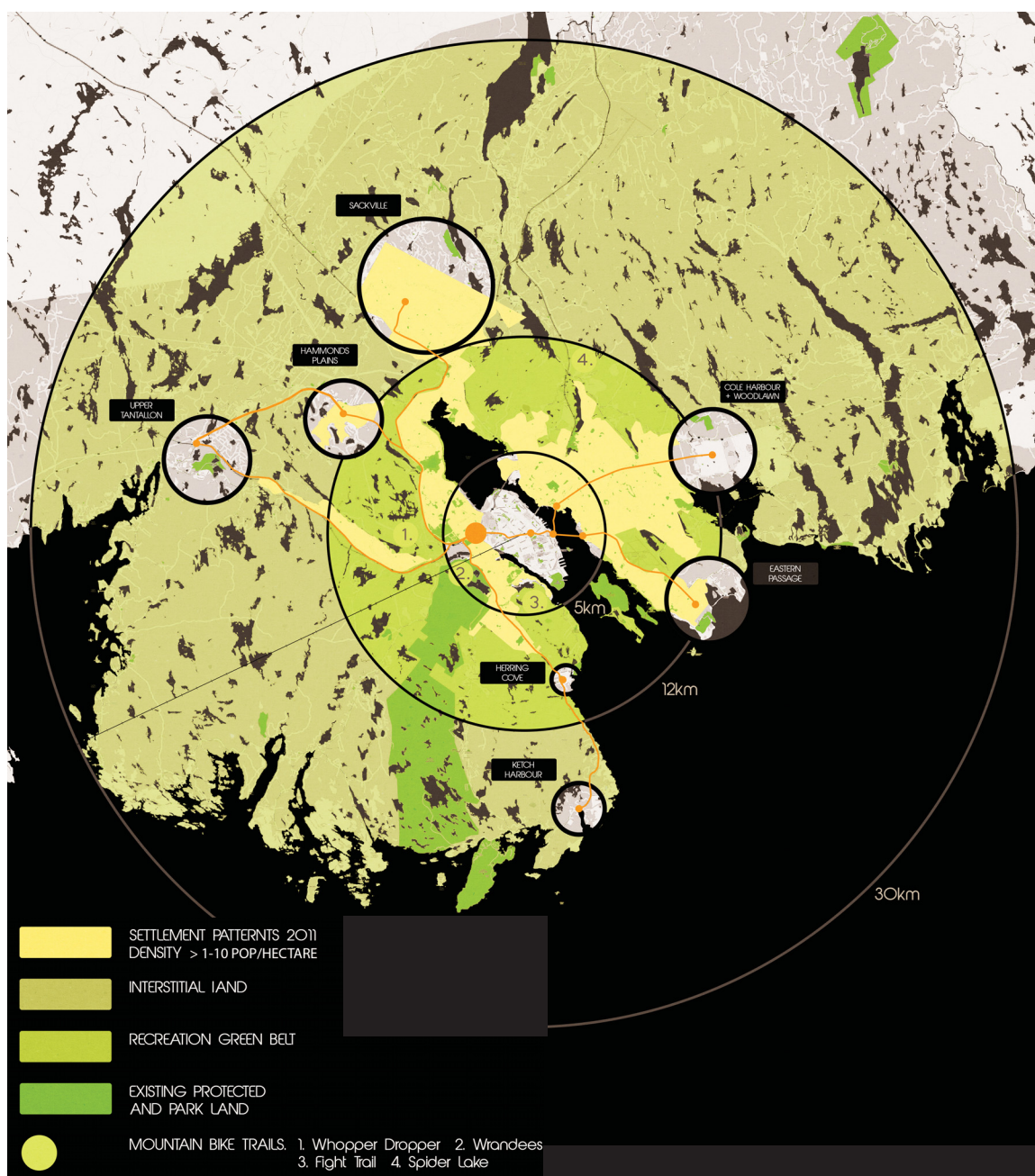
Master Plan Development

The first step is to apply the green belt concept components, being the recreational belt, the agricultural belt and the transitional belt. By applying these components certain observations become clear. The following image shows the three components overlaid onto the city map up to a 30km radius. What becomes very apparent is that the development outside of the core (shown in yellow) is occurring mainly inside the defined recreational belt. This is especially apparent on the Dartmouth side where urban sprawl exploded after

⁶⁵ Ibid., 118.

the addition of the Macdonald and Mckay bridges.

Another thing to observe at this scale is that there are pockets of development occurring outside of the recreational belt and in the transitional zone. These would be the location of satellite cities and would require their own dedicated green belts surrounding them. As the focus of this thesis will narrow in on the recreational belt for further architectural investigation we must continue to zoom in closer to the urban center and the recreational belt.



Map depicting the 30km radius and the zones within

Zooming in to another scale and we can observe more information about the recreational belt and the city. The following image picks up on the green spaces within the focused area.



Map depicting areas of interest within the recreational zone. Base map from Google Maps

These green spaces are both defined parks and undeveloped land both private and public. It is now possible to see the amount of small scattered green spaces around the city. Secondly there are a few large swaths of green space that are just outside of the urban center, two of these actually penetrate into the defined urban core, at a radius of 5km. At this scale we can start to select areas of interest for the development of a recreational belt. For this these I will focus on one of these areas in particular. The area to the far bottom right shown in (light green) is the “Backlands,” an area mention previously. At this scale it is clear that the “Backlands” has the most immediate proximity to the urban center.

Therefore it is of interest to this thesis as a gateway or entrance to the recreational belt. For the purpose of the architectural exploration of this thesis, the “Backlands” will become the site for this exploration.

Zooming in yet again it becomes possible to start applying some of the guidelines developed in chapter one. The image on the following page shows a proposal for the initial stages of this green belt master plan.

Master Plan Summary

The master plan shown above is the direct result of the green belt concepts and the guidelines developed in chapter one. As the concepts were applied the “Backlands” area become an important area for the initial development stages of a green belt plan for Halifax.

The “Backlands” site could not however be developed without its surrounding context. Therefore the Master Plan includes more than just the “Backlands” site itself. The guidelines developed in chapter one presented the importance of: proximity, accessibility, networking, connectedness, diversity, density, disconnectedness, wilderness, large parks, open-space planning, recreation, and demand goods. All of these guidelines have been integrated into this master plan.

Some of these will become more apparent in the following design chapter, but what is notable at this scale is the use of networks and connections through open-space planning, and the introduction of a large park known as the “Backlands”



Map depicting the proposal of a network of existing and proposed green spaces.
Base map from Google Maps

The master plan uses both existing and proposed parks like the “Backlands” in order to develop a continuous loop of green space. The loop is connected at two points by pedestrian bridges that cross the Northwest Arm. These bridges will be presented in the following chapter. This loop is approximately 10 kilometres long and provides a variety of recreational needs and diversity in landscape. The “Backlands” site is able to provide

an adequate amount of land for the preservation and development of mountain bike trails while simultaneously allowing for a multitude of outdoor activities and sports to take place. The scale of the backlands is large enough to be defined as a large park, therefore natural processes like water filtration will be able to continue and provide clean water for its surrounding communities. Secondly the size of this site enables the disconnectedness that many recreationist and urban dwellers are looking for. It provides a sense of escape.

In the following chapter the architectural responses to this master plan will be presented. The designs are heavily influenced by the developed guidelines and their surrounding context.

CHAPTER 4: DESIGN

Pedestrian Bridge Design

In the master plan shown previously there is an obvious need for two pedestrian bridge crossings over the Northwest Arm inlet. These bridges would complete the loop of this initial stage in a larger green belt strategy, allowing access onto the peninsula from the surrounding communities on the mainland side, while also allowing residents of the peninsula to escape the urban core into a network of wilderness, parks and trail systems for both recreation and pleasure. The following design and its process is for the bridge crossing from Point Pleasant Park to Purcells Landing (shown below).

The Architectural design of both bridges are the same, however the anchoring public spaces and programs would be different. A site study would have to be done in order to determine the best programs for the second bridge connecting from Flemming Park to Conrose Park, shown previously in the master plan.

This thesis concentrates on the first bridge shown on the map below. The bridge is intended to provide a seamless transition from one park to the next. As one crosses the bridge they find themselves traveling on the same surface treatments they came from.

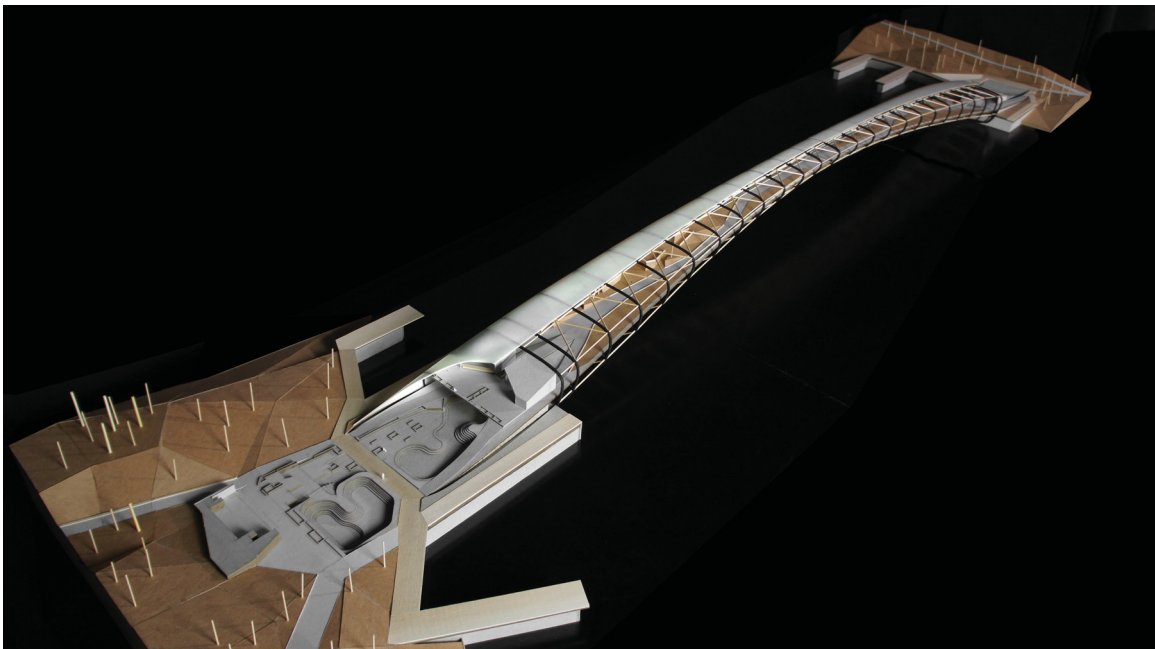
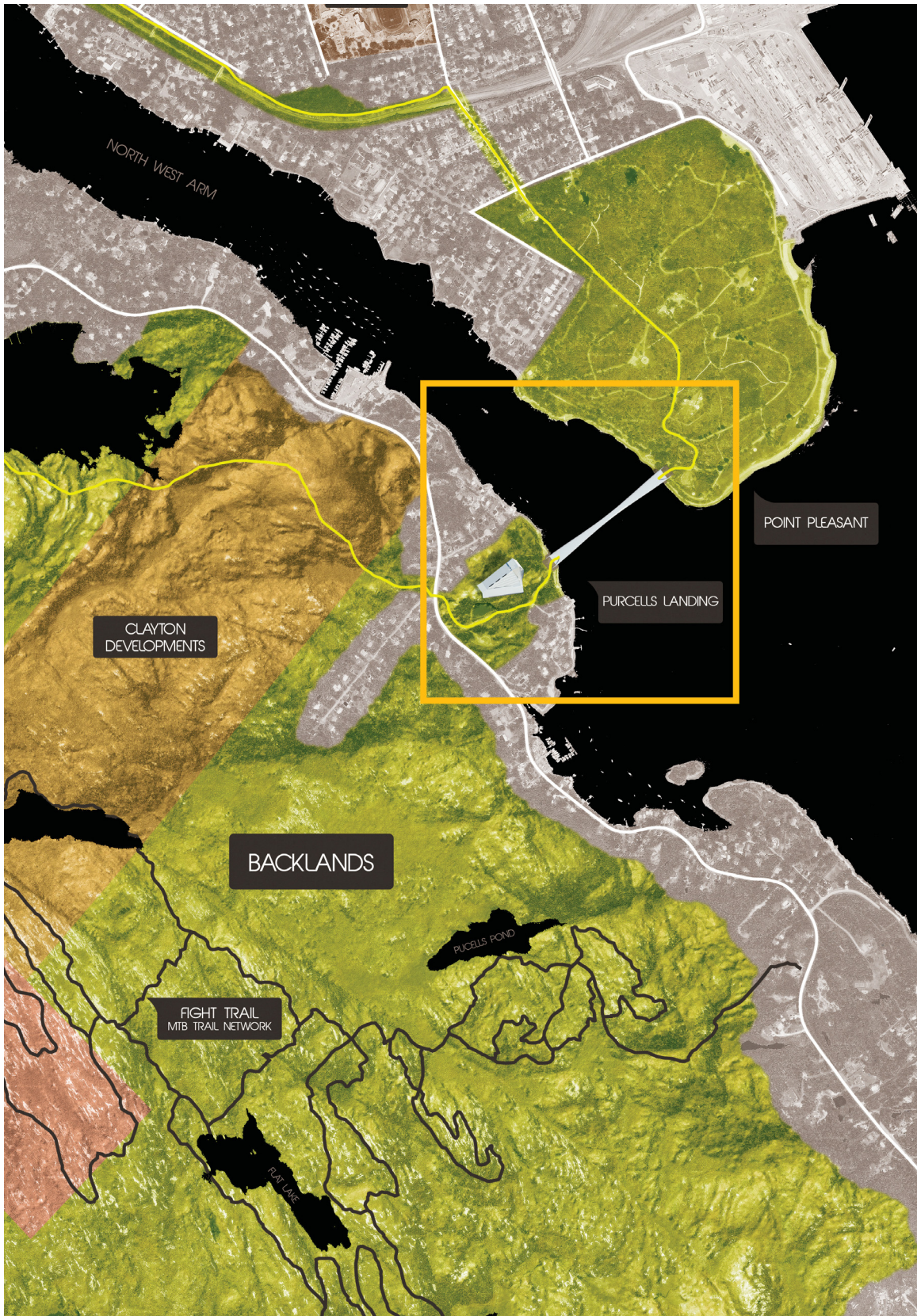


Image of a physical model of the bridge design



Map depicting the site of the pedestrian bridge and cycling center design. Base map from Google Maps

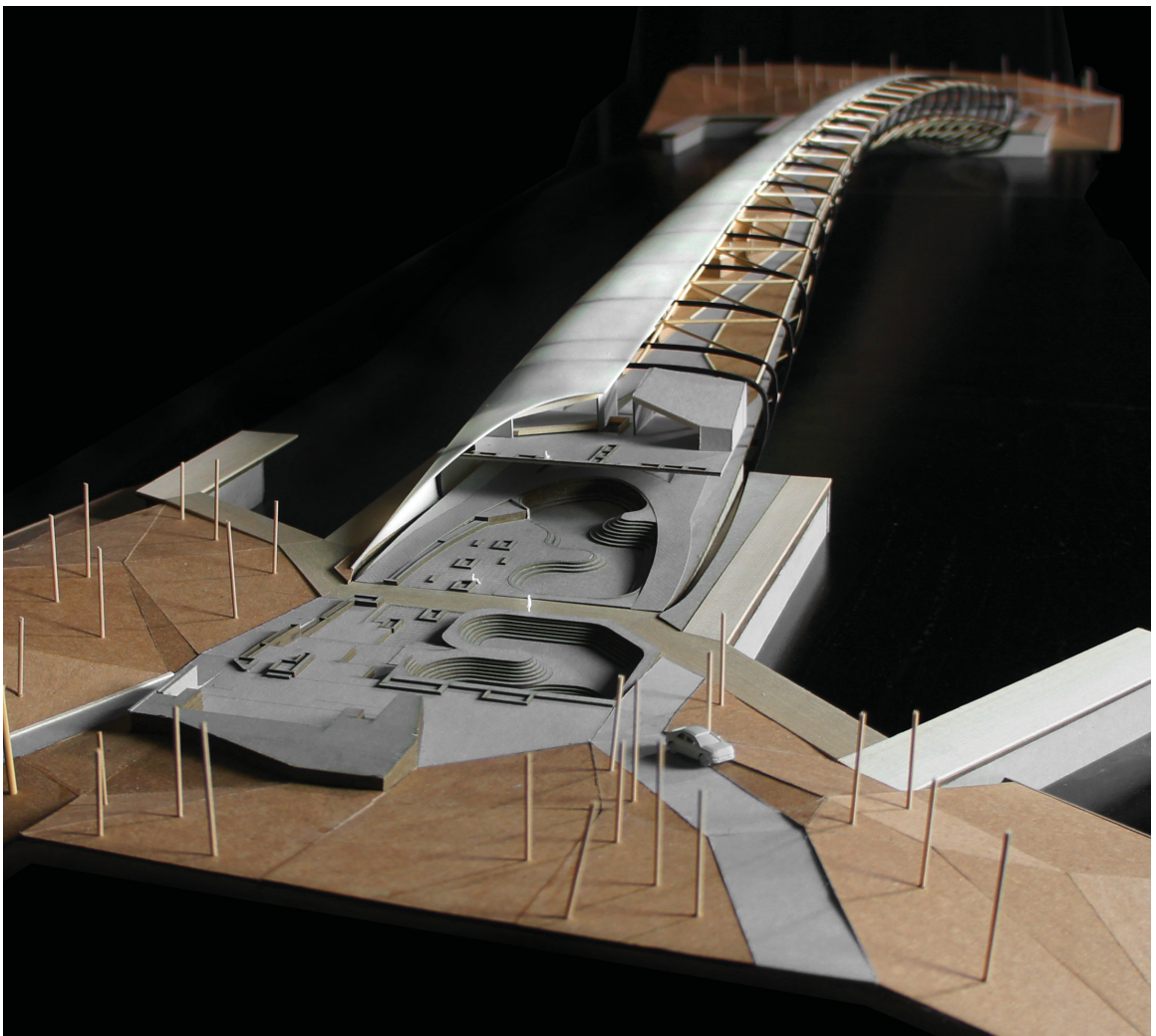
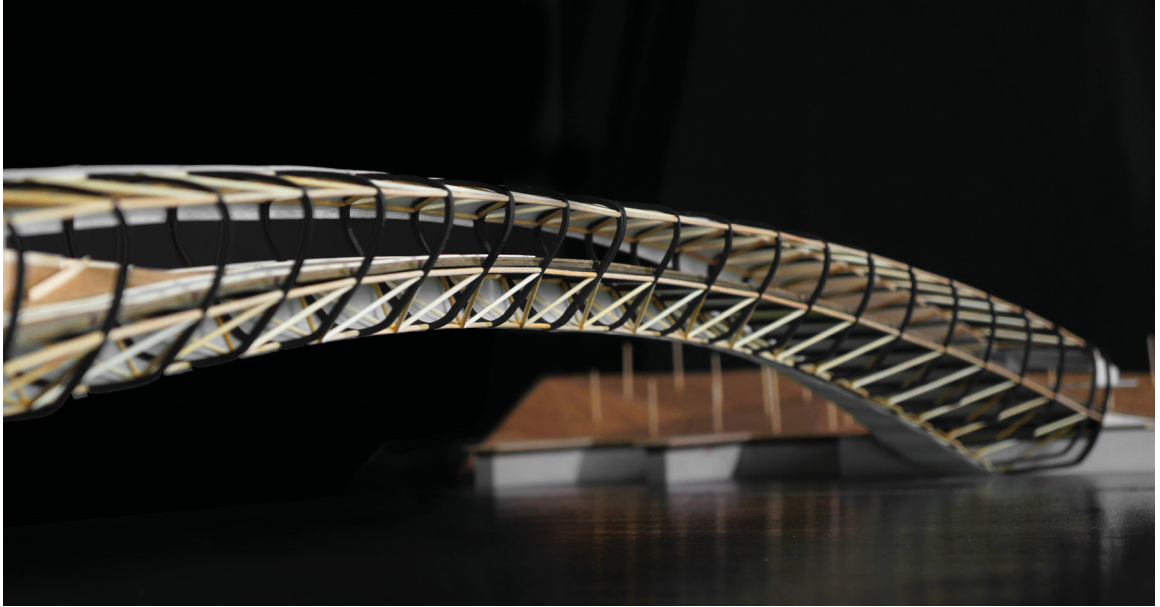
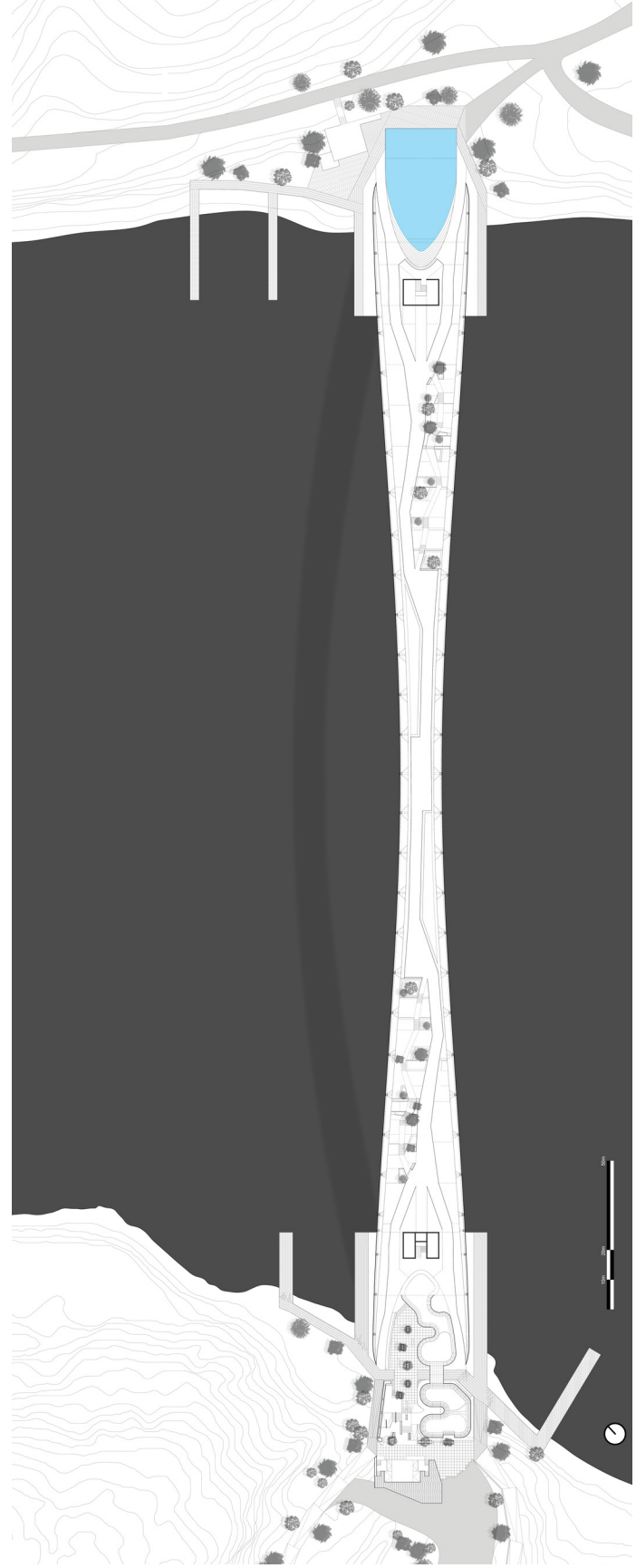
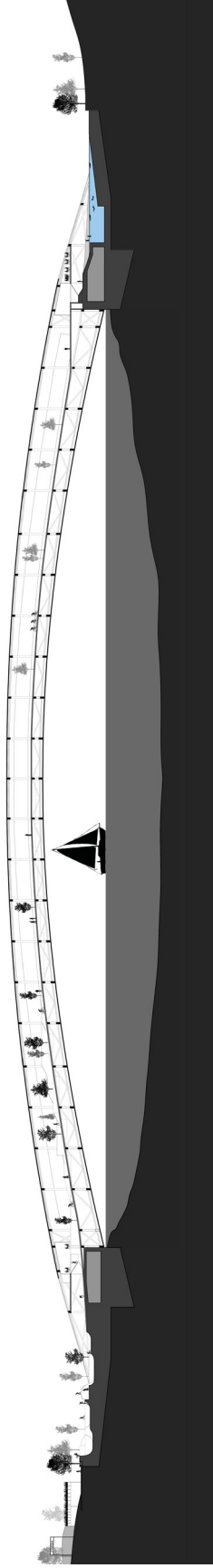


Image of a physical model of the bridge design



A plan and section of the bridge design



Images depicting the garden quality of the pedestrian bridge

The bridge provides a secondary path type as well for those traveling by foot. The users walking have the option of traveling a terraced path more like a typical garden. This path provides the traveller with multiple places for resting and viewing. The diagram on the following page illustrates these two different conditions.

The bridge joins two parks with very different programs at either end of the bridge. This diversity of program is one of the guidelines developed in chapter one. The mix of programs attracts different user groups and is key to activating the site and the recreation belt at all times of the day. At one end of the bridge is Point Pleasant Park, this historic site is predominantly used by joggers and dog walkers. The site does not offer areas for recreation and bicycles are restricted to the groomed trails. This type of park would be very different then the Backlands park being proposed in this thesis. The Backlands is a site of pure rugged beauty would be purely for recreation and escape from urban life. Unlike

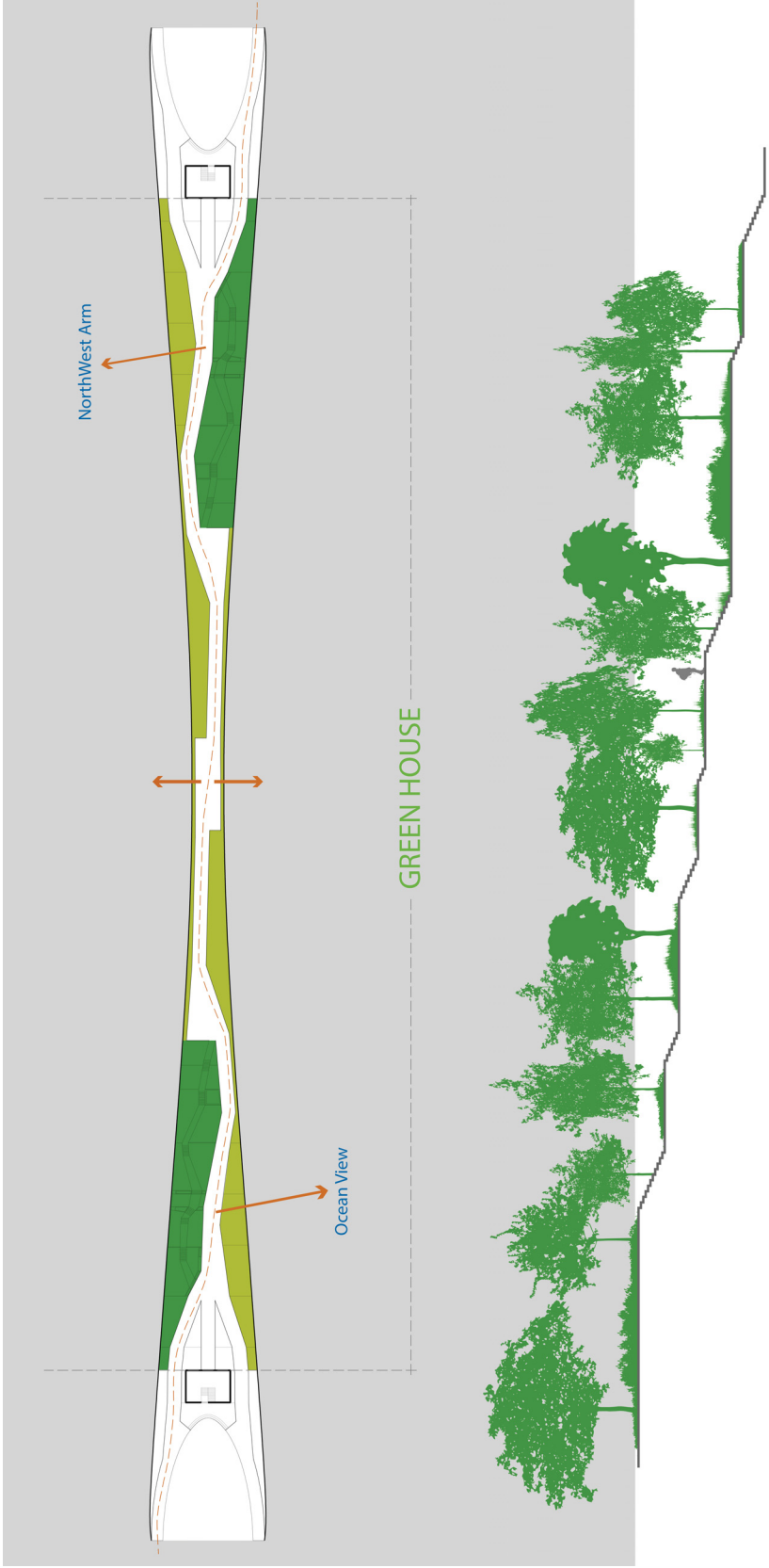
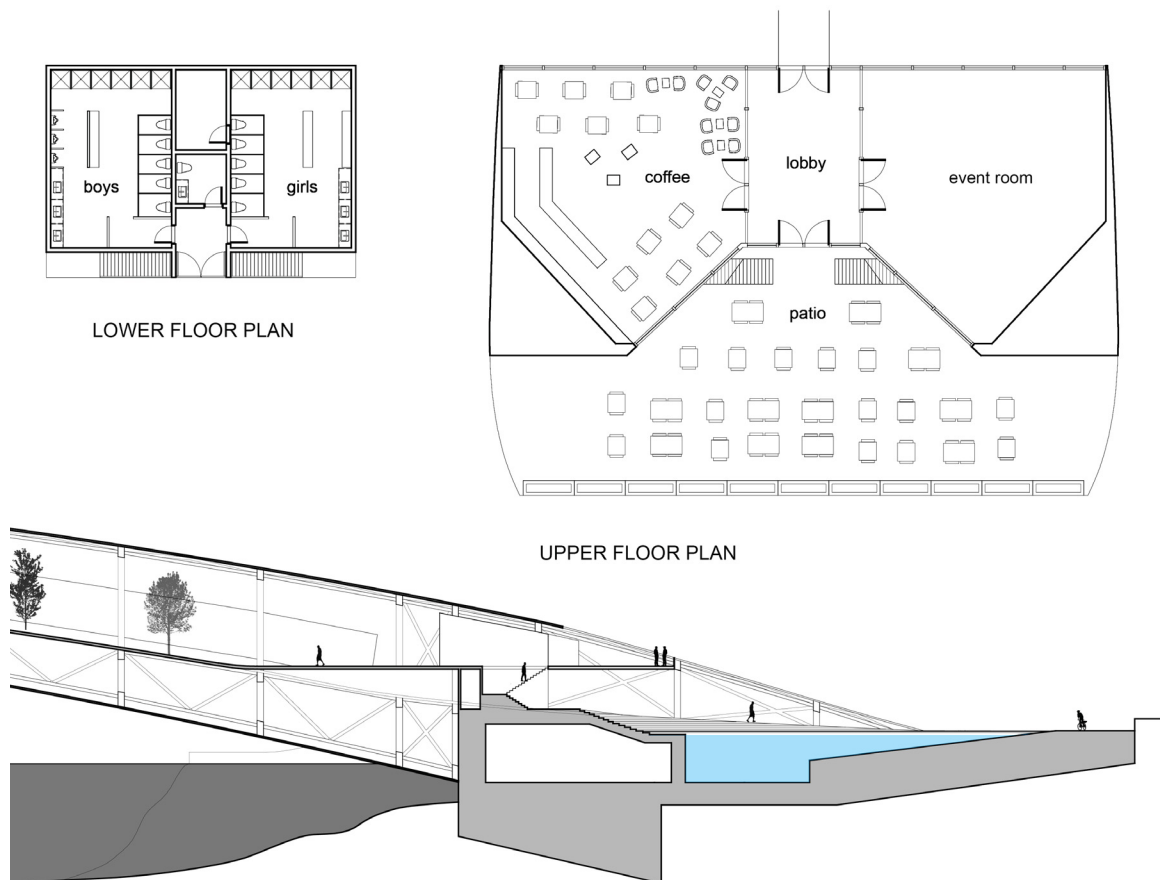


Image depicting the two types of conditions found on the pedestrian bridge

Point Pleasant Park it would offer a vast network of existing a proposed trail systems for outdoor sports like mountain biking, hiking, and would allow access to its amazing lakes and rivers. These two very different parks would attract different types of users and would aid in the activation of this recreational green belt.

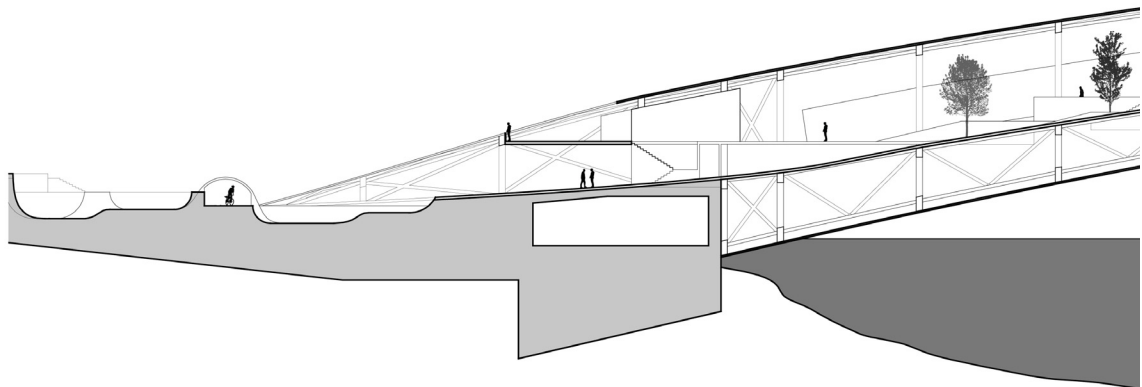
The connection between these two parks by the use of a pedestrian bridge also contains this idea of mixed programs. On the Point Pleasant Park side lies a public swimming pool at the base of the bridge. This pool would be the only swimmable waterfront destination on the peninsula. The Halifax harbour is significantly polluted but is currently seeing water treatment services and will hopefully be swimmable someday. Accompanying this public swimming pool is a pavilion anchored inside the bridge, it contains a canteen, event space and loft patio above and public change and shower rooms below.



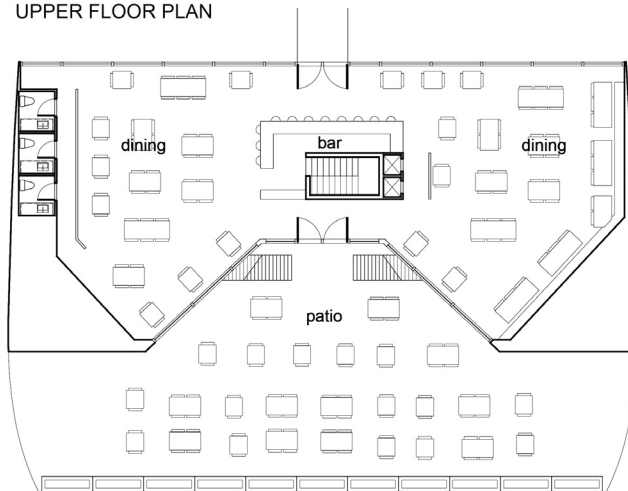
Images depicting the public swimming area and pavilion space

On the opposite side of the bridge at Purcells Landing lies a skate park plaza. Skate parks continue to become a staple item to be found in any major city. It is no longer enough to have just one local skate parks but in many cities they have almost replaced the neighbourhood park. This skate park blends itself as both public park space and skate park.

SKATE PLAZA LANDING



UPPER FLOOR PLAN



LOWER FLOOR PLAN



Images depicting the skatepark plaza and pavilion spaces

Shown below is the plan of the skate park Plaza containing two large bowls, a flat plaza like area with trees and benches, and terraced features like ramps and stairs. Again the users attracted to this site would vary drastically because of the programs contained around and within the bridge. This mixed program diversity would continue along the main path shown in the master plan, at a larger scale this same diversity would happen throughout the entire recreational green belt.

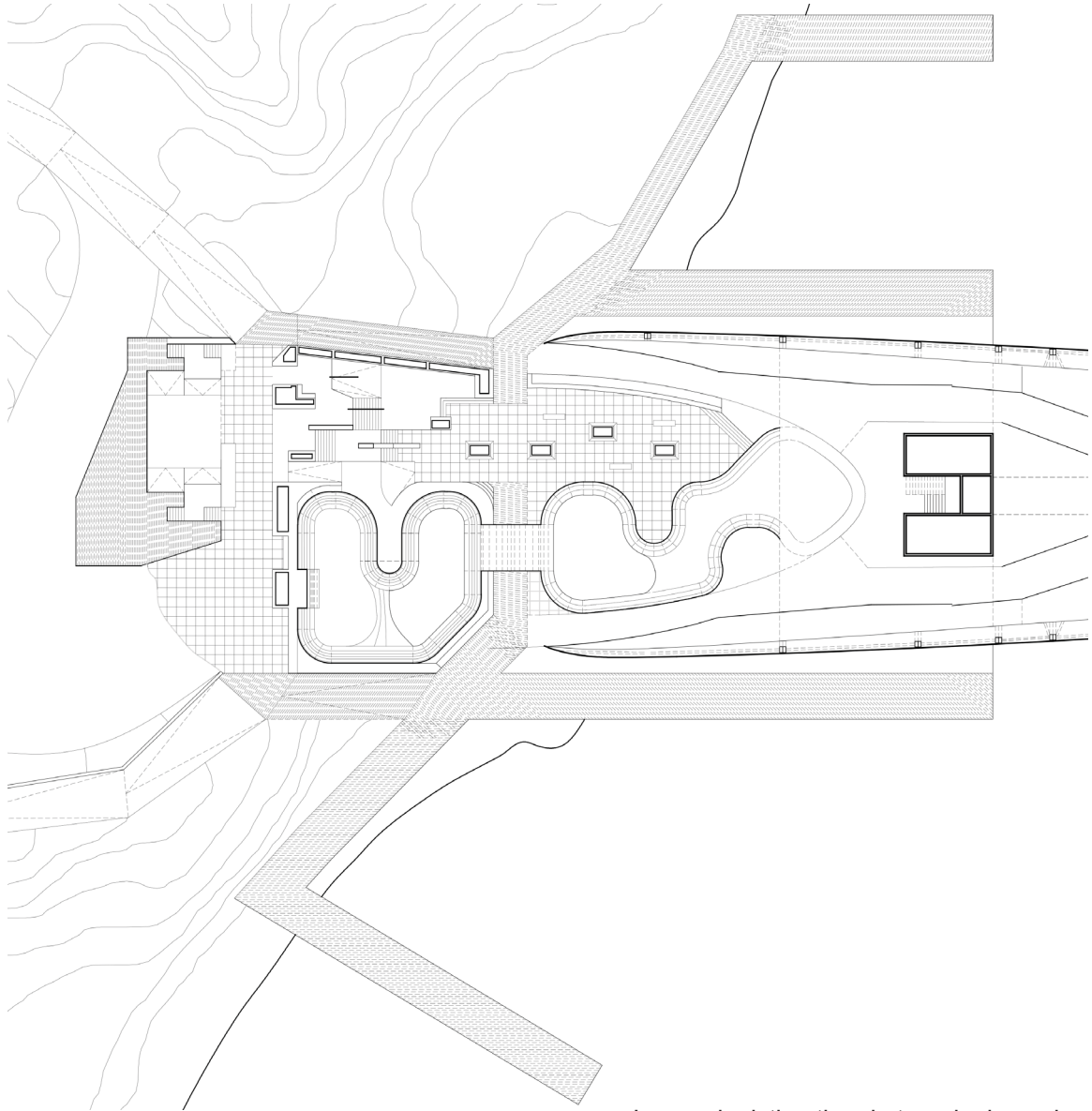
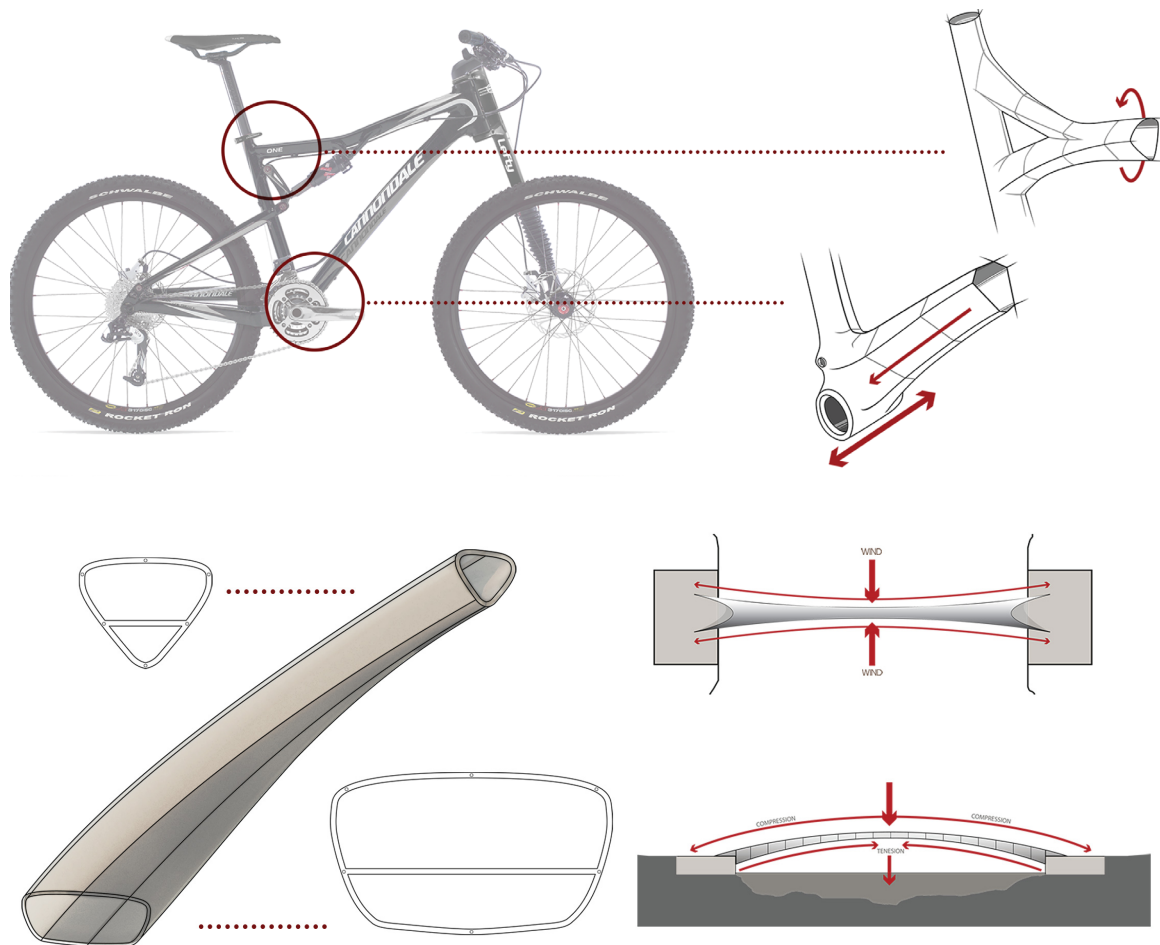


Image depicting the skatepark plaza plan

The form and construction of this bridge came from research of cycling. As mentioned previously there is a heavy focus on cycling within this thesis, from its ability to reduce auto dependency to its vast recreational uses. The Backlands site is a popular mountain biking destination and therefore prompted a series of architectural studies surrounding mountain biking. One of these studies became a driving force in the development of this bridge design. Mountain Bike technology has come a long way since its first mass produced bike in 1981. As the sport became more adventurous and demanding the bicycles responded. Today materials like carbon fibre and hydroformed aluminum are the industry leaders. The

bike frames deal with large impact loads and torsional loads from all directions. A study of hydroformed aluminum and the way it is used in mountain bike frames inspired the bridge design. Shown below is a representation of that process.



Images depicting the design concept based on mountain bike frame design

The form changes its sectional shape to deal with its respective loads and forces. The base of the bridge is wide and box-like for stability and dispersion of the arching loads. As the bridge spans towards the center it becomes much smaller in size, reducing its weight and increasing the spanning abilities. Secondly, it transforms in shape over the course of 13 structural frames from either side. The center piece is a triangular shape that creates a stiff and torsionally resistant frame.

The construction of this bridge was also thought of as part of the design process. It was conceived as being built off-site in units. These units would be brought in by barge and

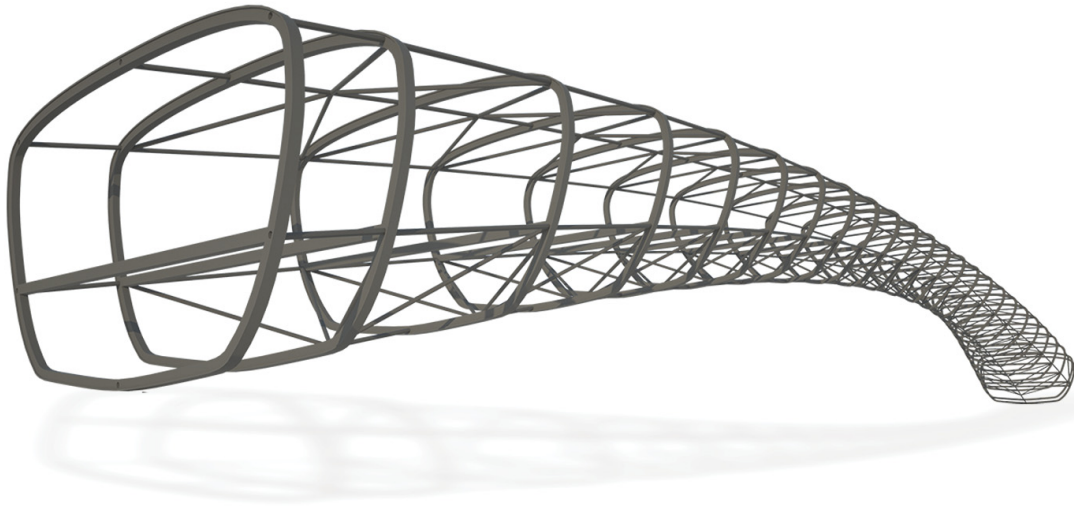


Image depicting the structural concept of the developed form

lifted into place with a barge crane. As the units are placed from the landings towards the center, they would be supported by additional floating barges. After the final keystone is in place, the supports would be removed. The image below illustrates this process.

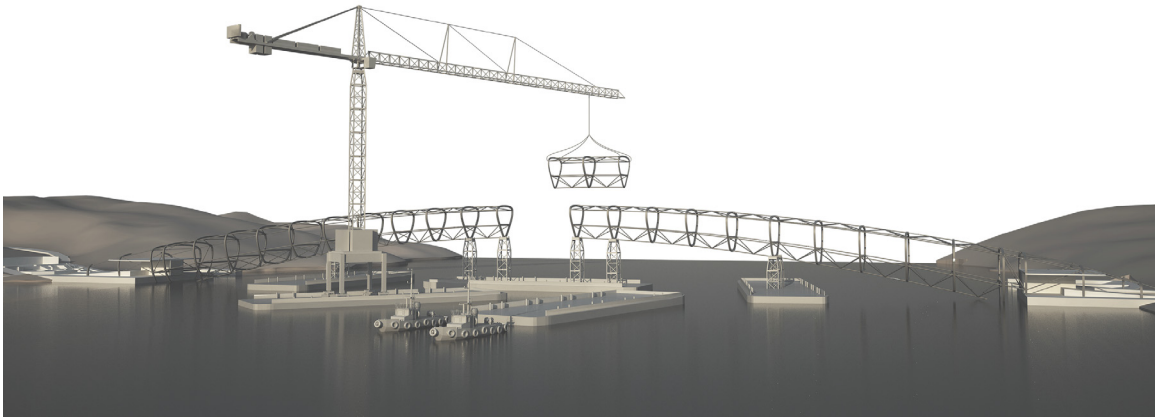


Image depicting the construction process

Each unit is slightly different in shape from the next. The units are conceived as welded and bolted bracing, while the main structural rings are “c” channels bolted together on site when in place. The main detail on each unit is the central node of the roof bracing. It contains a hub where the four cross braces meet, in the center is a large lighting feature that illuminate the bridge and its path at night. Shown below is the detail of this feature.



Image depicting the node detail and lighting system

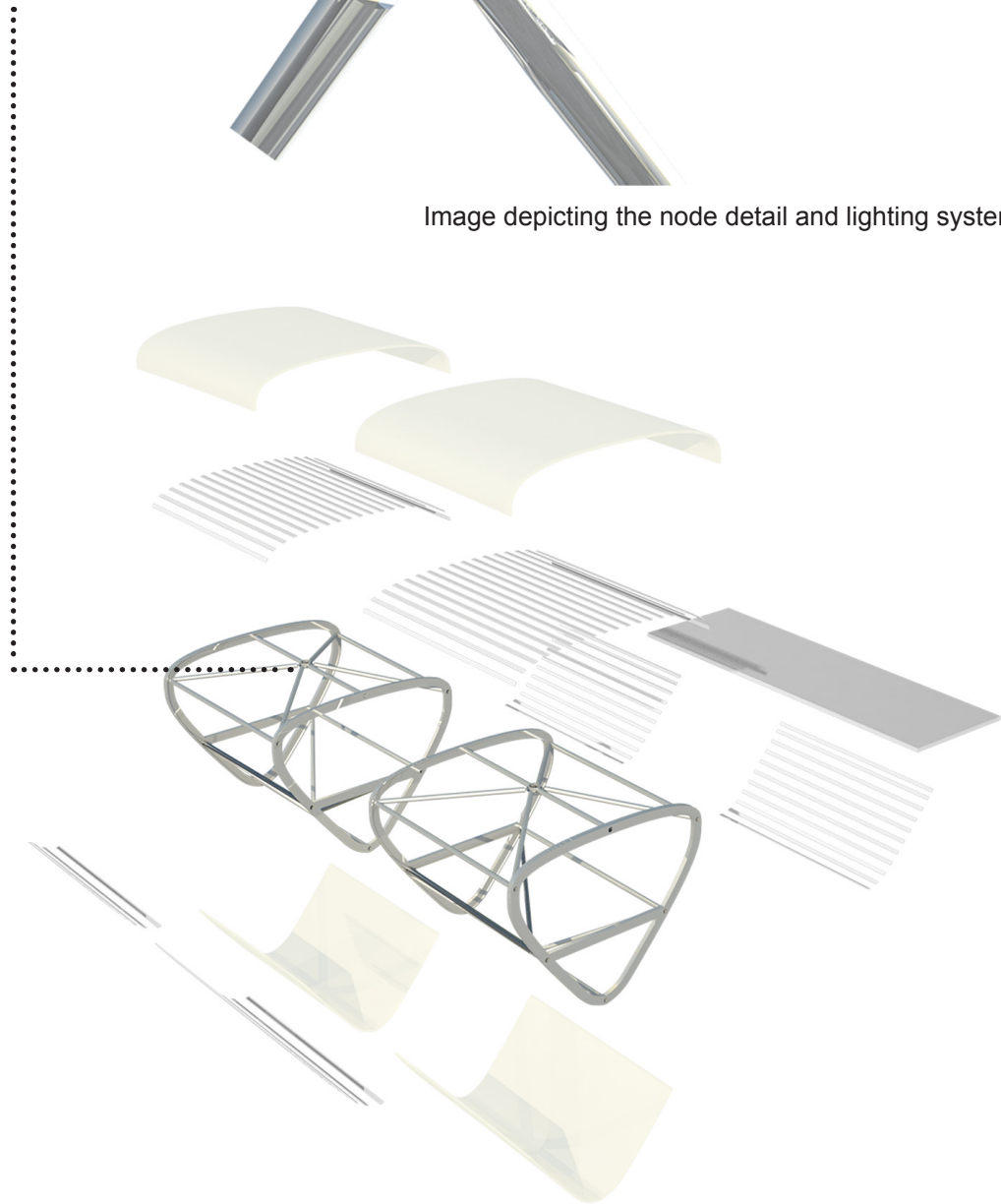
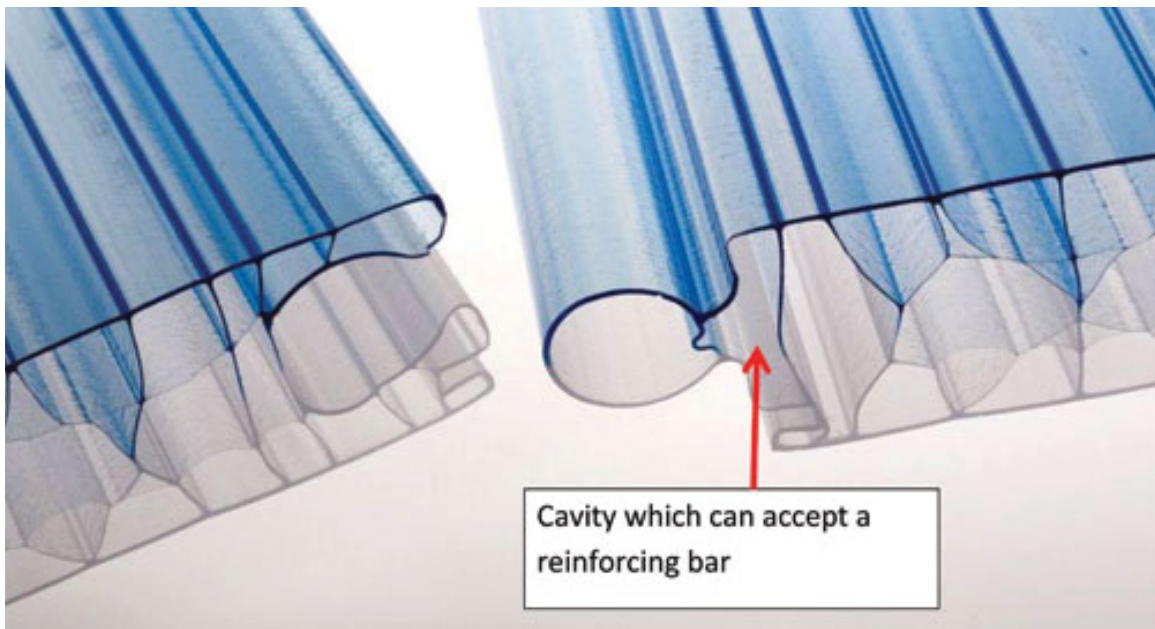


Image depicting unit components including EXTECH polycarbonate translucent skin

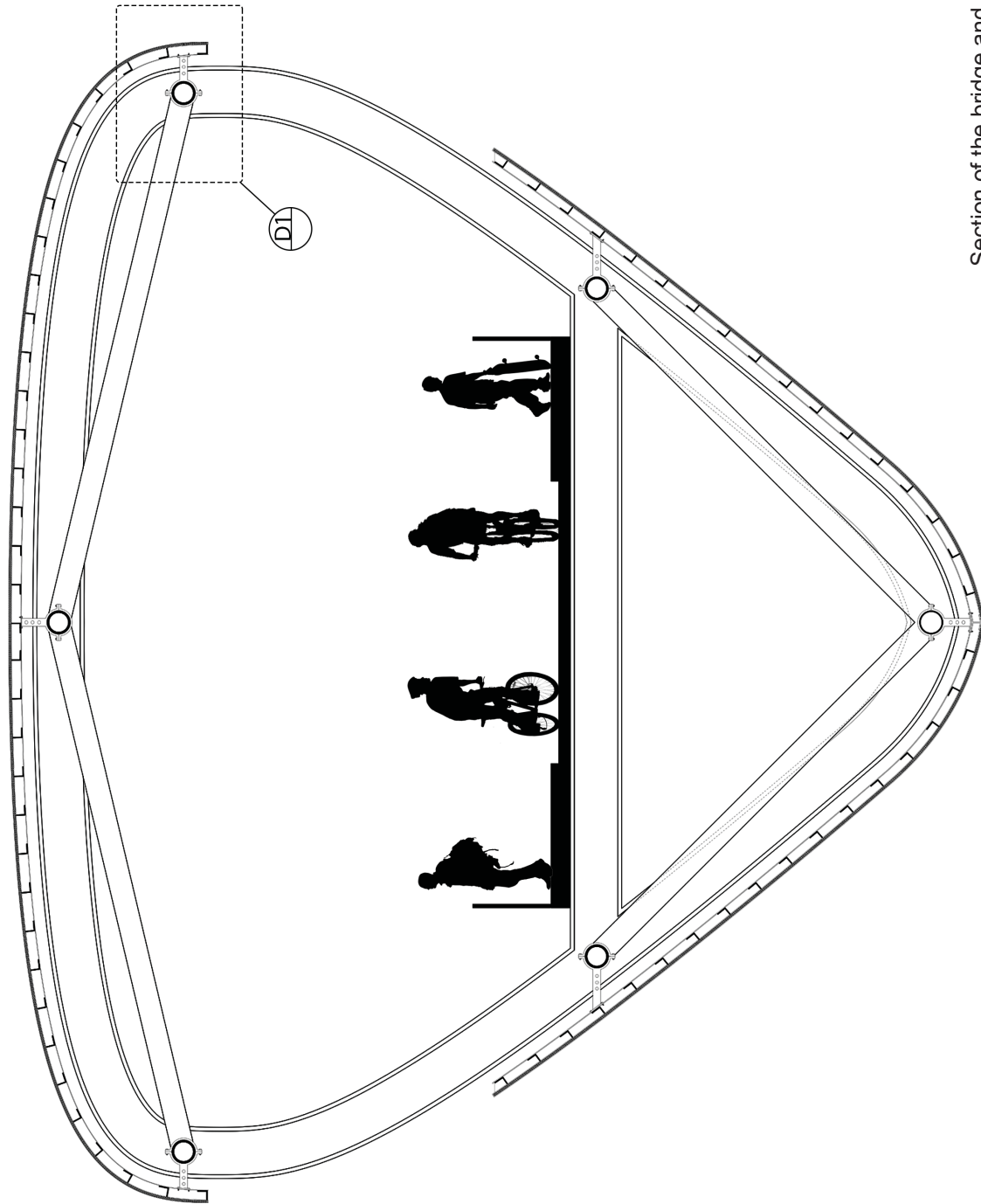
The bridge is semi enclosed providing shelter and added heat gain for the plants and trees. The cyclist and pedestrians who cross the bridge have views to the north and south through a continuous slit on either side of the bridge. In the winter these openings would be covered up by a removable transparent plastic cover. This cover would be similar to that found on winter covered boats, a snap on or zipper system that would protect the pedestrians and the plants from the harsh cold winters. The primary enclosure is composed of a translucent cellular polycarbonate interlocking system developed by EXTECH Exterior Technologies Inc.

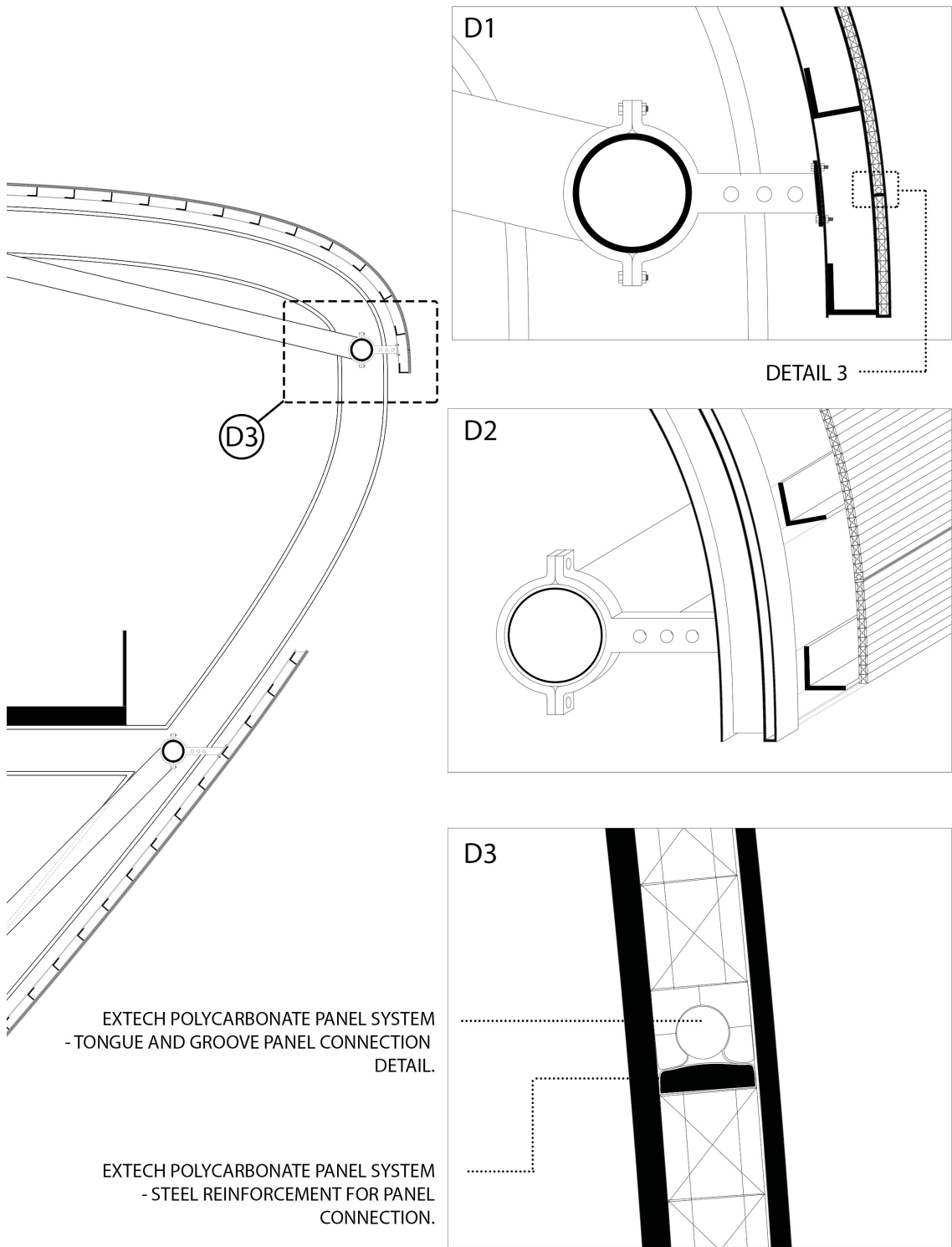


EXTECH polycarbonate translucent skin; from Karin Tetlow, *Translucent Cellular Polycarbonate*

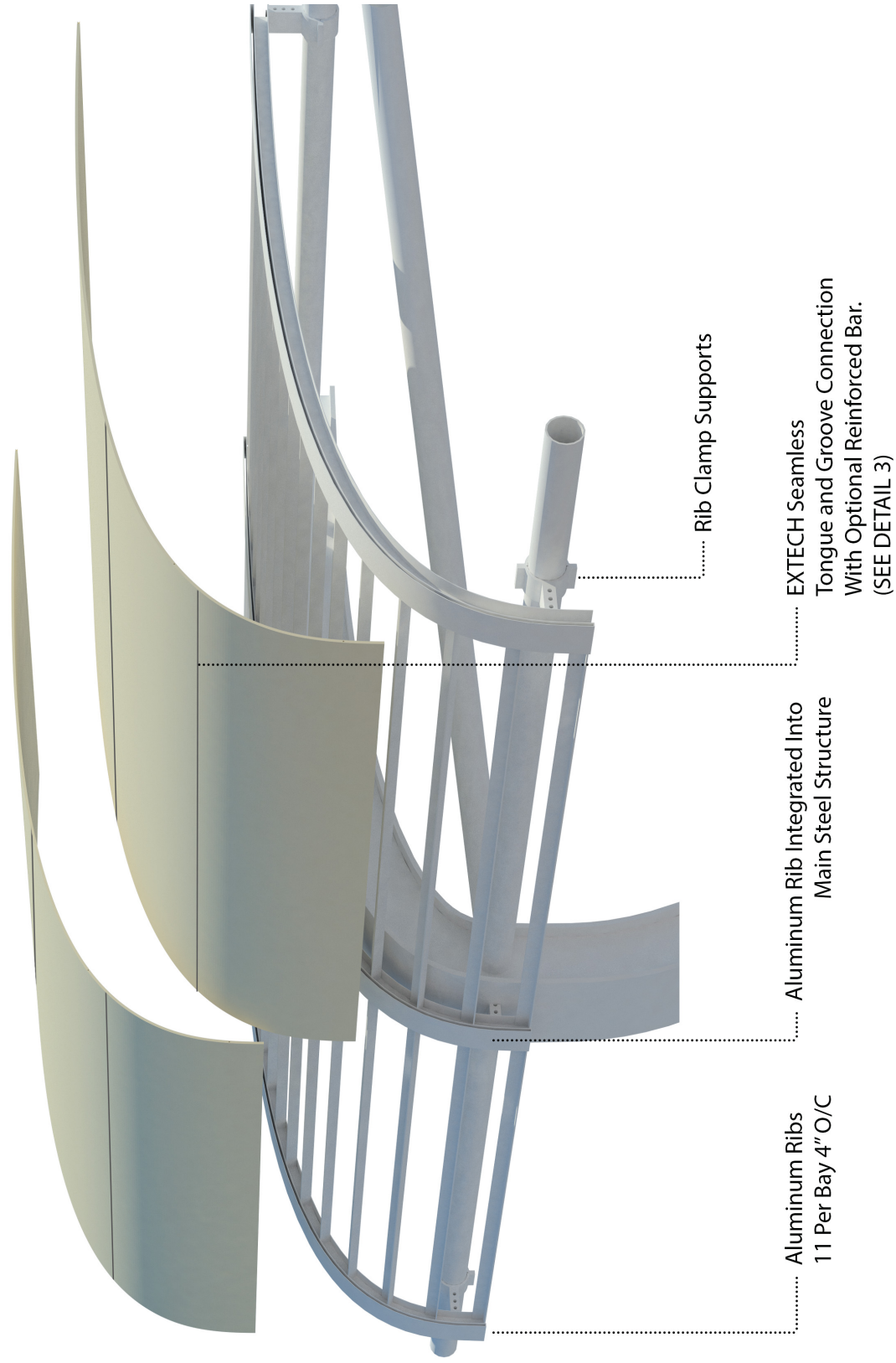


EXTECH polycarbonate translucent skin at Sikorsky Memorial Airport; from Karin, *Tongue and Groove Cellular Polycarbonate Panels*





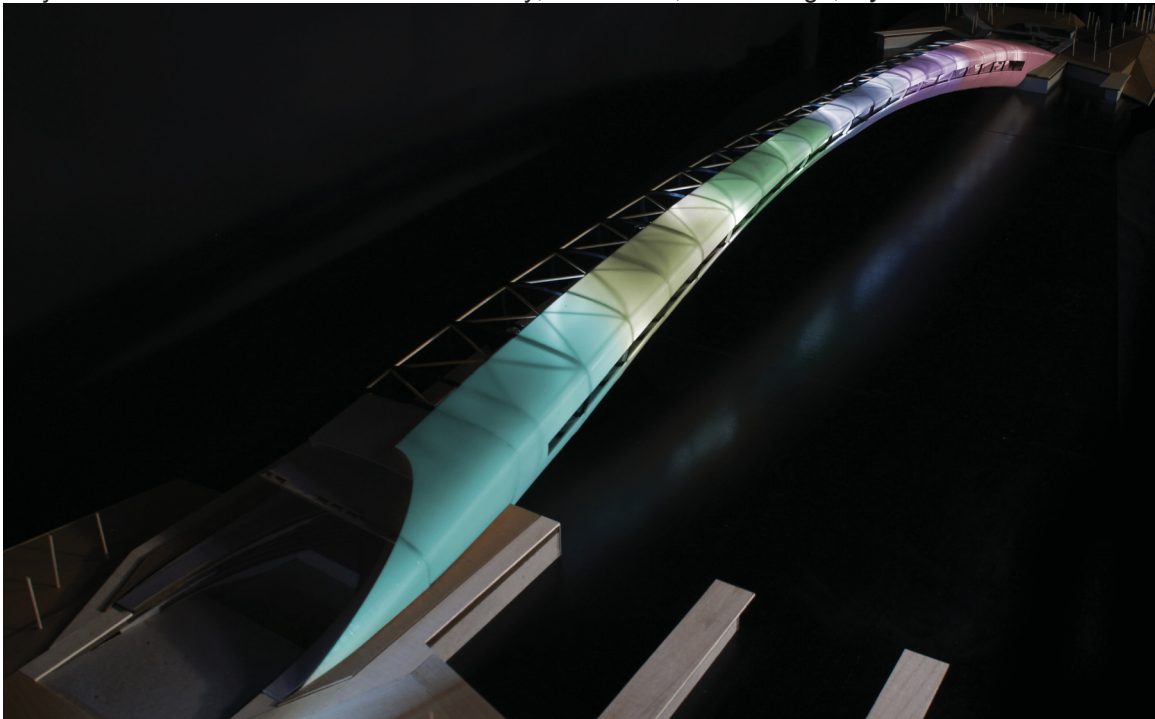
Images depicting Cladding Details



The result is a lightweight steel bridge with a translucent skin similar to that commonly found on a green house. The translucent material provides a diffused light inside the bridge during the day, and at night can be lit up by LED lights, transforming the skin of the bridge into a light show. This concept has been used at the Oklahoma City, Myriad Botanical Gardens and is shown below.



Myriad Botanical Gardens in Oklahoma City; from Flickr, Josue Goge, *Myriad Botanical Gardens*



Pedestrian bridge using a similar approach to night time lighting



The design of this bridge not only serves as a transportation device across the Northwest Arm of Halifax but it also creates spaces and programs that attract a variety of people. This device has become much more than a simple crossing, it has become a destination. As it stands now Point Pleasant Park is at the tip of the peninsula, it is somewhat of a dead end. Jane Jacobs says that a successful park is one that is not out of the way, but directly in the way of major public routes. With the addition of the two bridges and the 10km walking and cycling loop, Point Pleasant Park is now part of a transportation system, and with the addition of programs like those found in and around the bridge it will become a popular destination and route to travel.

Cycling Centre Design

The pedestrian bridge was not the only program added to this area. The study of the Backlands led to an interesting architectural type. Becoming increasingly popular in the sport of mountain biking is a category called Slopestyle. This style of riding is a spectator and competition based genre, composed of large jumps and structures where riders can perform an array of tricks. The most notable of these events is the previously mentioned Crankworx festival in Whistler, BC.



Crankworx slopestyle course; from Sven Martin, "Thomas Genon Takes on the Course"

The Backlands site although very popular amongst local mountain bikers, is not a suitable site for the practice or competition of this Slopestyle category. These events are typically found on ski/bike parks hills like Whistler because of the need for elevation. The following diagram breaks down the three major components of a bike park.

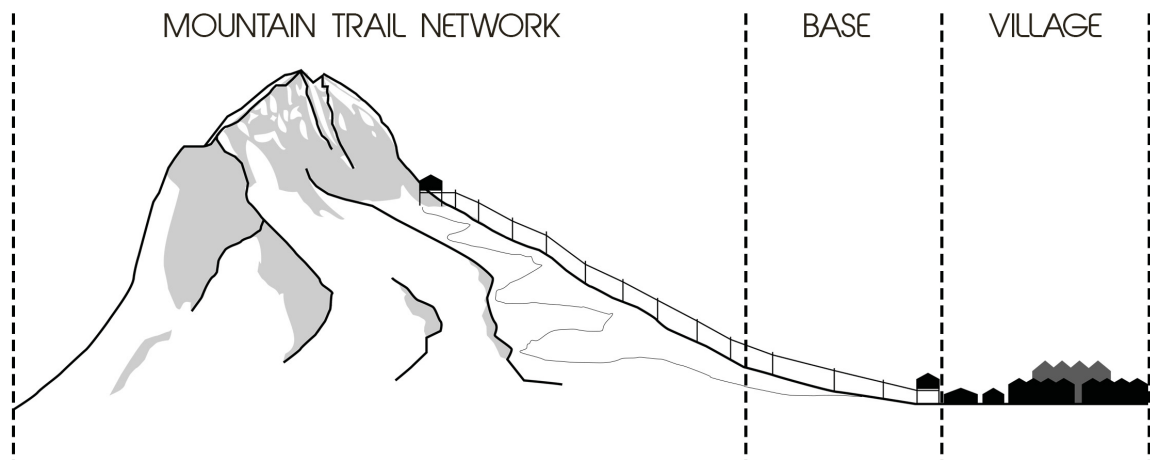


Diagram depicting the three major components of a ski/bike park

These three components are; 1. A trail network system. 2. The base or spectator area, where events like Crankworx happen. 3. The Village which provides accommodation, food, shopping, nightlife, etc.

When compared to the Backlands and its components, an architectural program and opportunity can be seen. If Halifax wants to create a healthier more livable city it must consider the facilities and resources needed for growing sports like mountain biking and its sub category of Slopestyle. The development of a cycling center for such activities as Slopestyle became the concept for a building that would enrich its location, adding to the already existing program of mountain biking found within the Backlands.

The basic concept was to combine the needed qualities in order to host an event like the Crankworx festival. Therefore the building would need to create a sloping platform that could be used for the course development and would also have to combine it with the

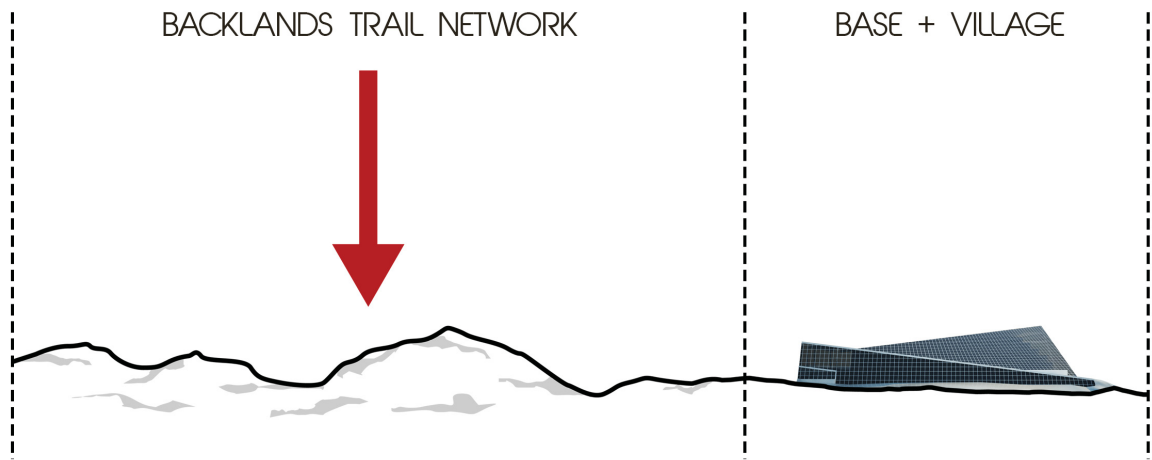


Diagram depicting an architectural idea for a new program responding to a condition in Halifax

facilities and services found within the village. In a way the design solution was to construct a small architectural mountain creating enough sloping distance for the competition length run and then have the village within the mountain.

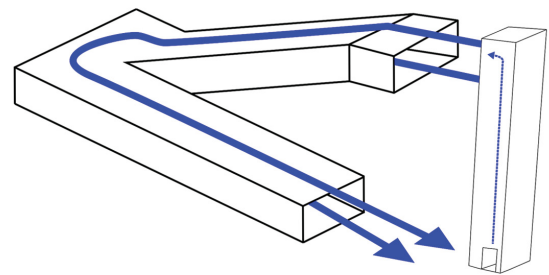
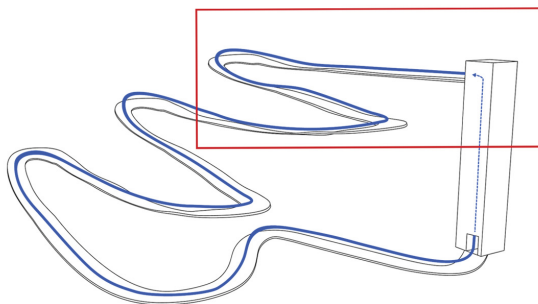
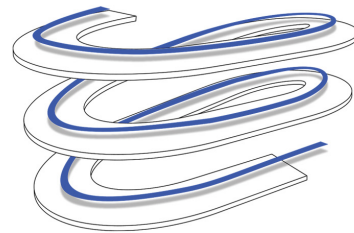
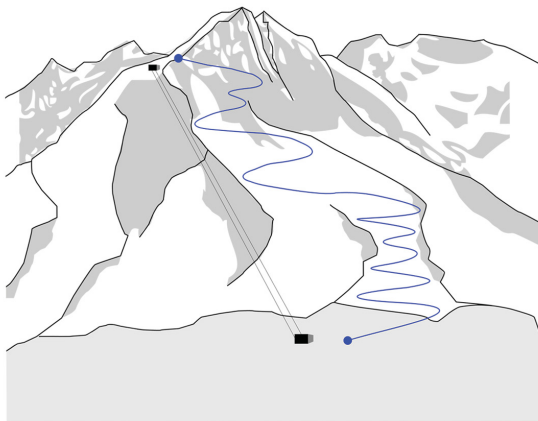


Diagram depicting an architectural idea for the building's riding path

The concept for the building started with an idea of the switchback. A simple trail design method used to reduce the slope of the trail by essentially creating zig zag patterns down the side of a mountain. This switchback concept also helped to create a longer path in a smaller area. The result was a large switch back tube with a vertical gondola at the end of the tube. The tube shape offered the ability to have both an outdoor (roof ramp) and an enclosed indoor ramp. The image on the following page breaks down the components of this building design.

The building is sited on the Purcells Cove side of the pedestrian bridge. It rest just over 60' above sea level on top of a hill overlooking the bridge and its skate park plaza. The building uses this height and the existing hillside to blend seamlessly into the rooftop bike path. The bike path or Slopestyle course exits onto the upper platform of the skate park plaza and then sweeps back up and around to the buildings main lobby. The path leads directly to the lower level which rest in and old rock quarry, from there the vertical gondola will take you up to the main floors or straight to the top where you can exit for either the indoor or outdoor ramps.

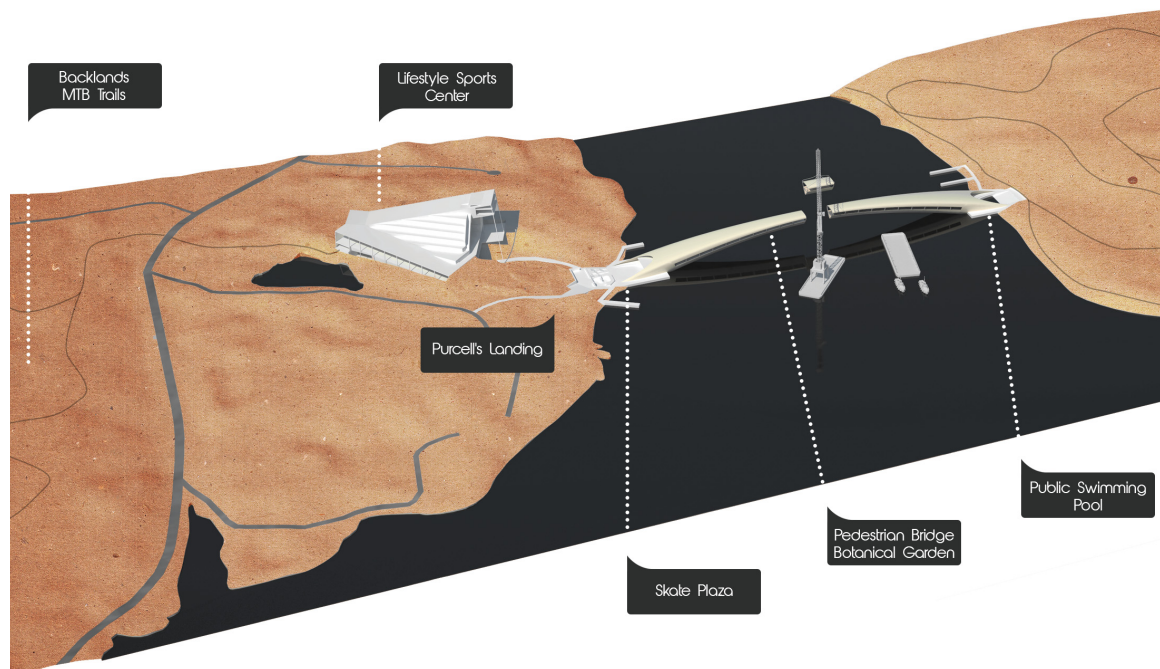


Diagram depicting the location of the building with regards to the bridge

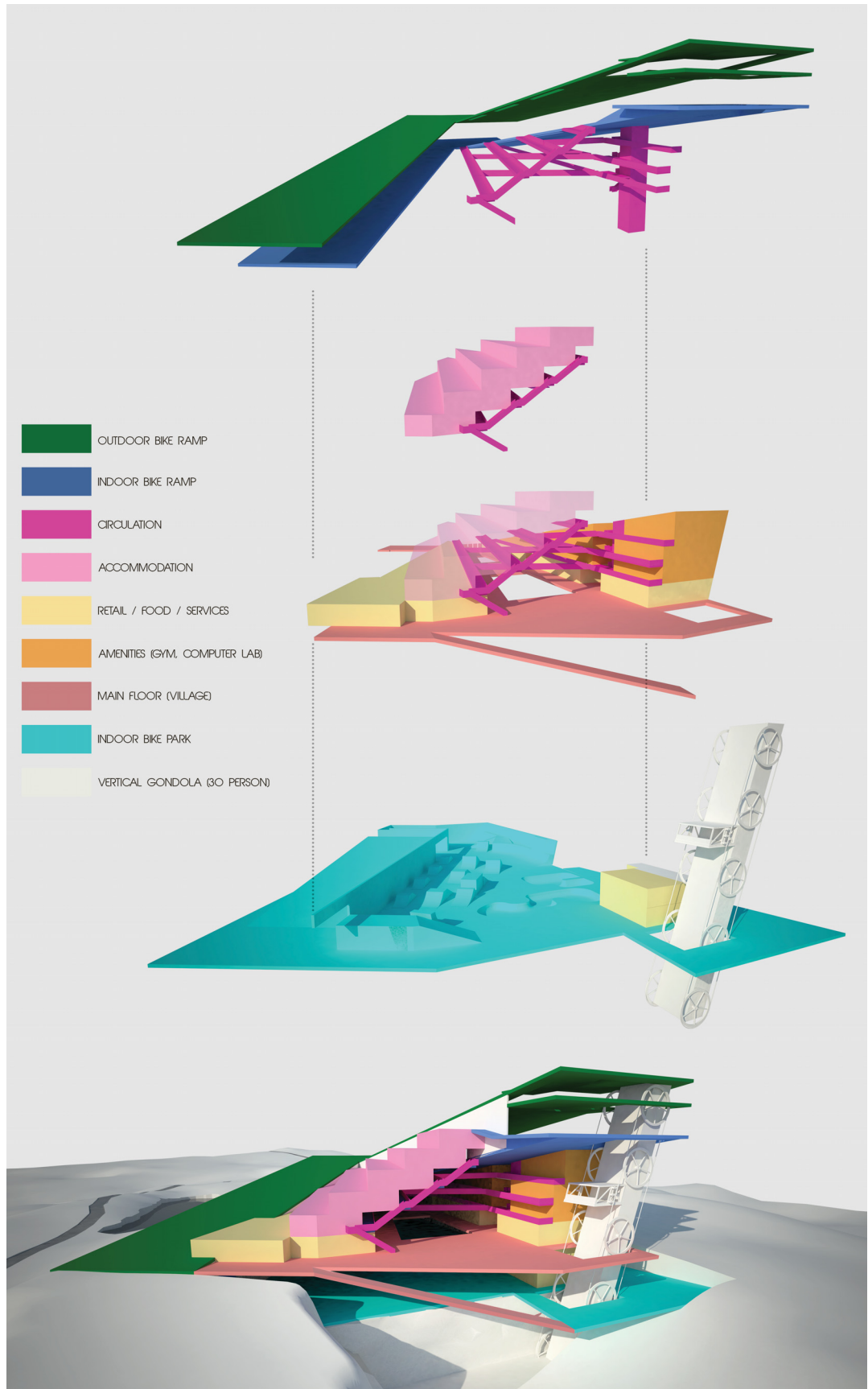
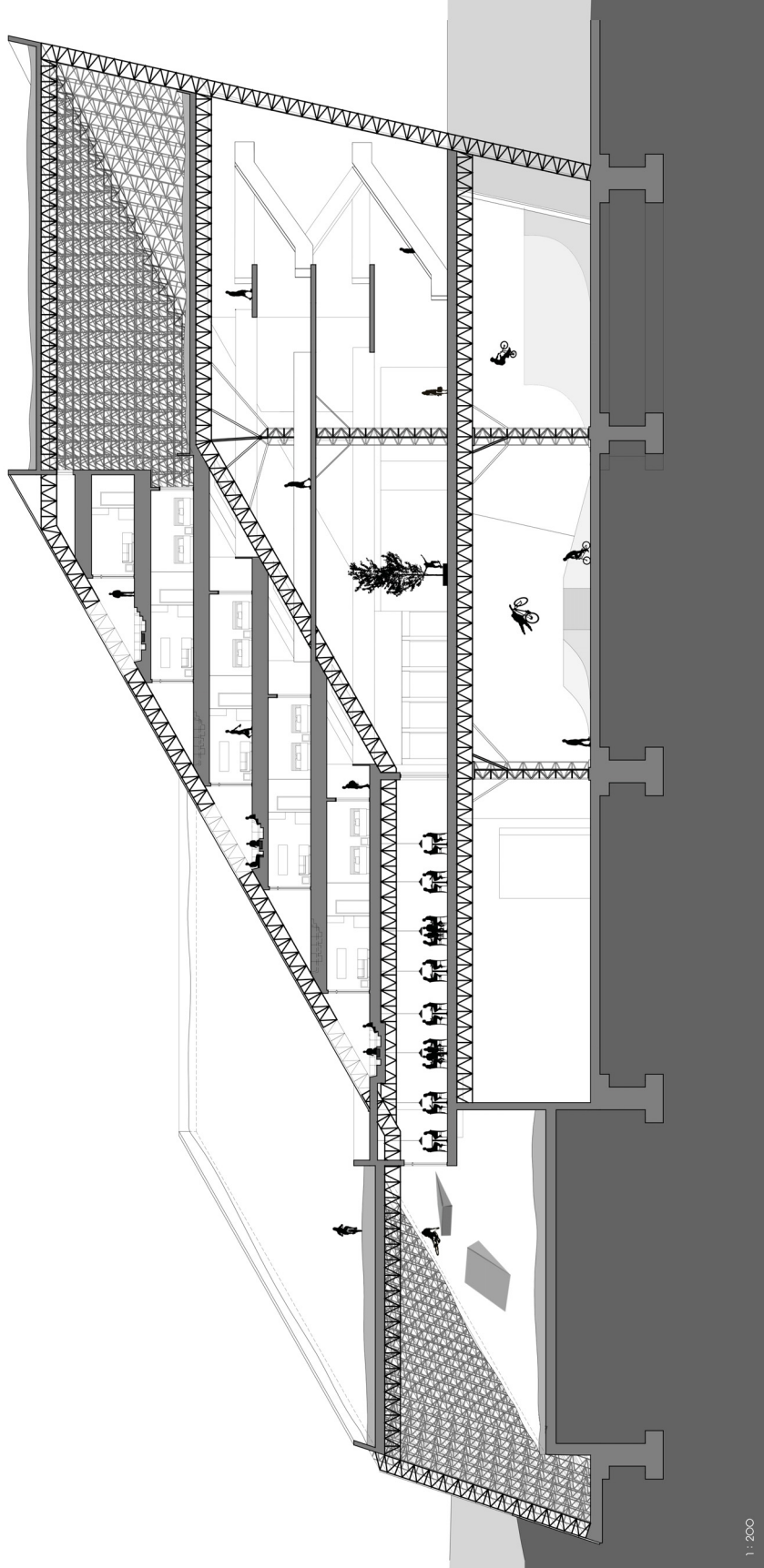


Diagram depicting the components and program of the building

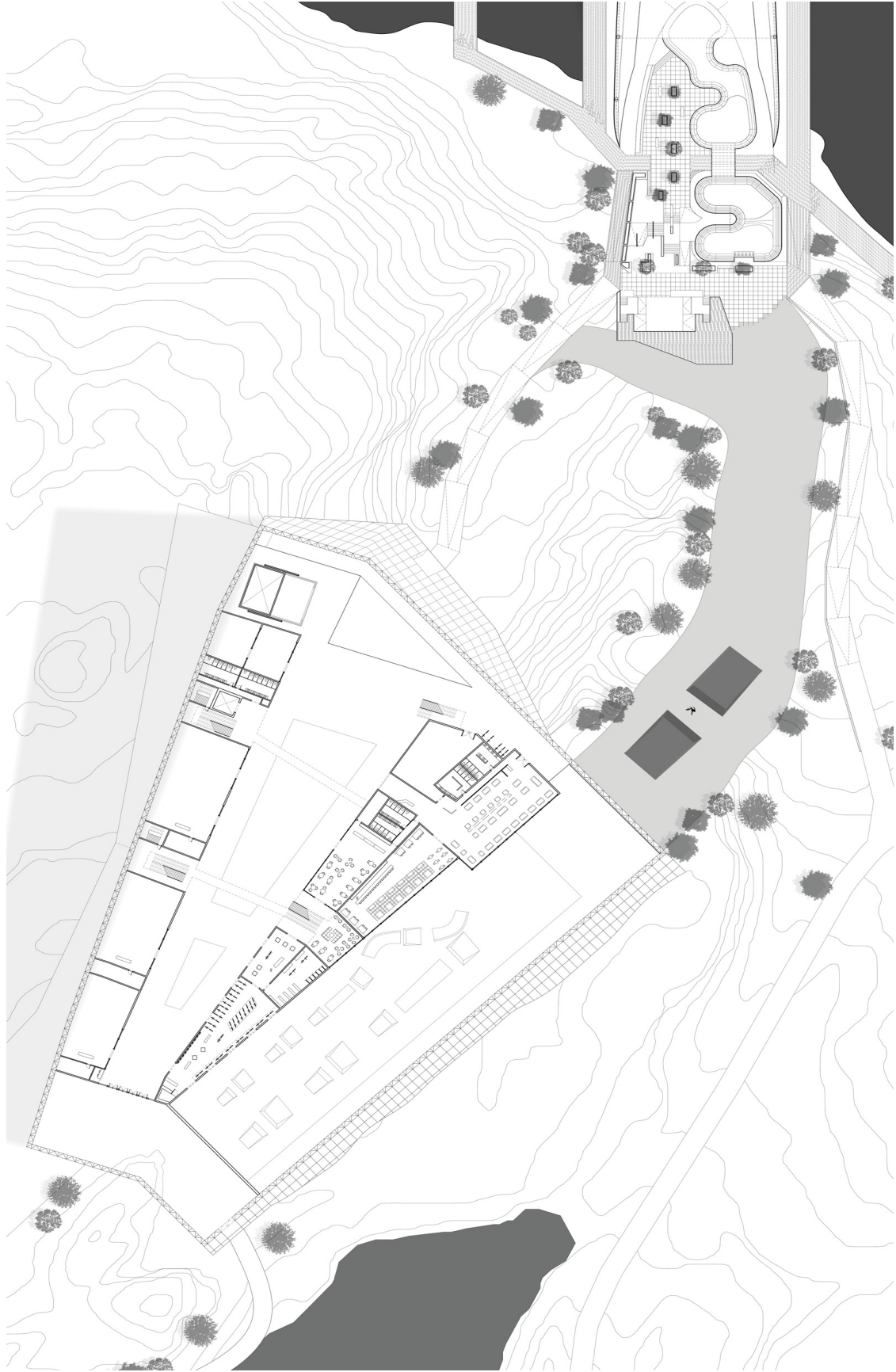
The architectural form was inspired by the switchback design of trail and by the rugged and jagged landscape of the site and its abandoned rock quarry. The form is meant to look as if it grew from its surrounding context, its angular and tilted form responds to the site conditions. In order to develop an monolithic facade that would emphasize its form, and to create long spans for the needed open spaces and ramps, a space frame design was used. The space frame created a series of planes that worked together in order to deal with many of these spans and sloped surfaces. Shown on the following page is a section where the space frame is seen as a continuous double layer wrapper, transforming the components of the building into one unique form and allowing for a paneling system for the exterior facade.

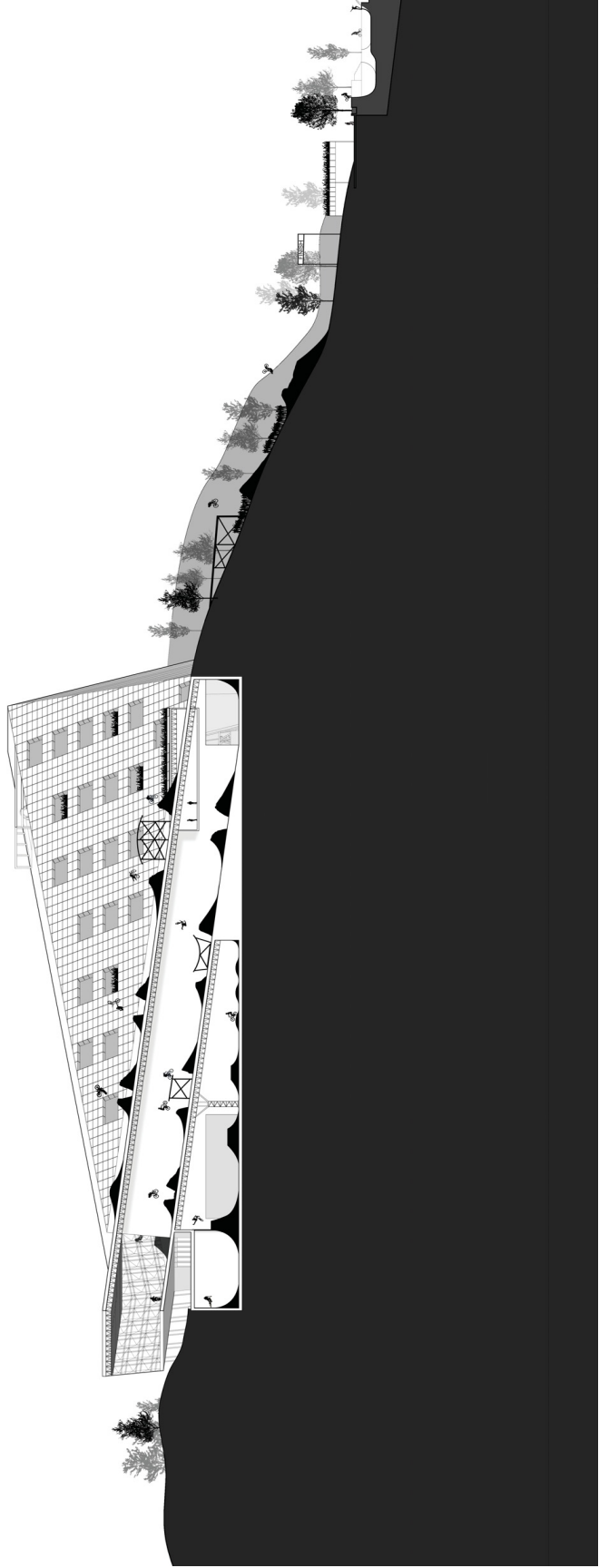
This glass panel system would give maximum ability in creating diffuse light, shading, and sunlight where needed within the building. Secondly vertical gondola would be seen from the bridge and Point Pleasant Park through this glass panel system. The movement of the gondola and its wheels would create a sense of activity and excitement within the building. While outside the excitement continues onto the roof.

The building offers so much for the cyclist and would become a tourist attraction itself. The building would offer accommodation for visitors to stay the night or two weeks, it would contain restaurants and shopping, a skate park on the lower level, and amenities like computer labs and gym equipment rooms. Its everything a mountain biker would need.



1 : 200





Long section depicting the building activity

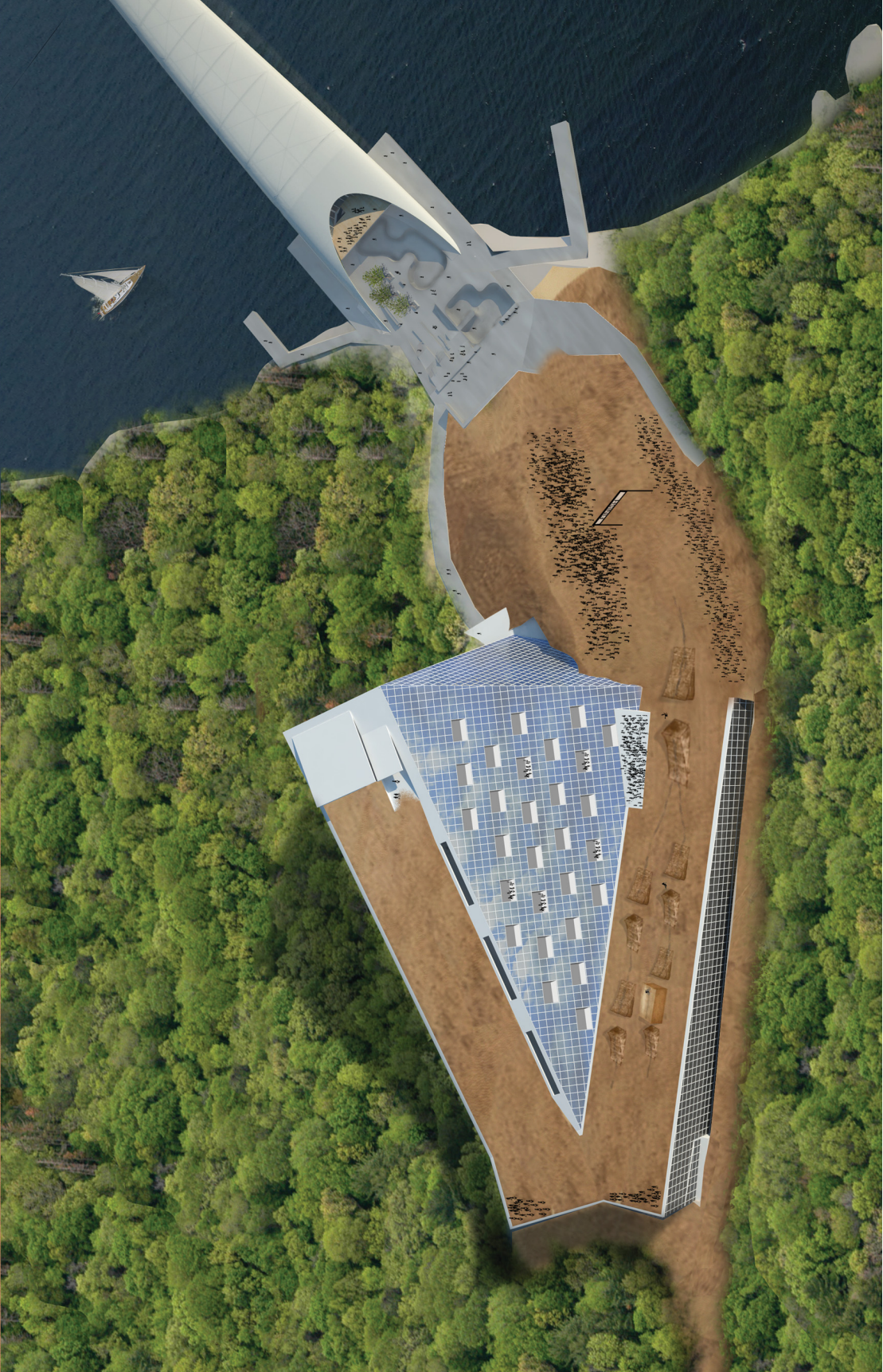


Image showing the building in event mode



Image showing one of the accommodation suites

CHAPTER 5: CONCLUSION

In the 21st century and beyond green belts should be seen as more than just a tool for urban growth containment. As a tool for creating a healthier more livable city, green belts have the potential to significantly shape and develop our cities in this direction. The green belt concepts developed here are strong tools for any city to determine what zones can and should be preserved for recreation, alternate modes of transportation, agriculture, and parks. The guidelines have proven to be helpful in the development of both a preliminary master plan and the supporting programs within. As an architect or planner the guidelines are a great reference to have when designing, as the design stages press forward they can help to maintain the course of the project towards the ultimate goal of creating a healthier more livable city.

One must understand that end results will always be different for each city and each sector of the green belts design. In the example of Halifax, it was found that there was not only a demand for increased park space and networks, including the pedestrian bridges allowing for healthier alternative lifestyles and transportation, but that there is also a rising interest in outdoor and adventure sports like mountain biking. These sports are being threatened by urban sprawl and the recreational green belt is the tool that can prevent this phenomena. Secondly it is apparent that there is potential for amazing architectural programs that have not yet been explored. In the case of Halifax, the cycling center for Slopestyle mountain biking was developed after a site analysis and an investigation into the sport itself. This unique mix of architecture and sport is a perfect proposal for a building that would be found within the recreational belt.

The architectural role of the developed green belt concepts will vary from place to place, but as these tools and concepts are used on each site or city, different architectural issues and investigations will arise with the same goal of creating a healthier more livable city.

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