THE EVOLUTION OF BUILT LANDSCAPES ADJACENT TO MOUNT ROYAL PARK SINCE 1876 OLMSTED'S PLAN

A Research Report submitted

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ABSTRACT

This report studies the evolution of urban forms in Montreal, Quebec. In 1876, Frederick Law Olmsted developed a park plan for the mountainous terrain of Mount Royal. It is argued here that his plan has encouraged the development of the landscapes and enhanced the walkability within the adjacent areas.

Montreal's unique characteristics contribute to the elements that relate to its architecture and urban design. The sensibility of design expresses the living art of Montreal, which also makes the city unique and significant. The center of Montreal is mostly characterized by Mount Royal and the mountain has been developed into a green linkage with streetscape, parks and open spaces.

This study illustrates how urban morphology relates to the Mount Royal Park plan and how the plan continues to influence its adjacent neighborhoods. This report presents evidence on how the landscape affects walkability by examining the Mount Royal Park plan. It is argued the plan has had an enduring influence on Montreal's shape and form. This report also shows how Montreal has achieved greater integration with different land uses to make Mount Royal a key factor in balancing the eco-system and to serve urban life.

Key Words: urban morphology, walkability, built landscape, open spaces

RÉSUMÉ

Ce rapport étudie l'évolution des formes urbaines de Montréal au Québec. En 1876, Frederick Law Olmsted a élaboré le plan du parc Mont-Royal. Son plan a favorisé le développement des paysages en améliorant le potentiel piétonnier dans les zones adjacentes.

Les Caractéristiques de Montréal ont aidé à façonner son architecture et son l'urbanisme. Cette conception met les paysages de Montréal en valeur tout en lui donnant un aspect original voire pittoresque. Le centre de Montréal est particulièrement caractérisé par le Mont-Royal qui a allié la flore aux espaces ouverts.

Cette étude montre comment la morphologie urbaine est en lien avec le plan du parc Mont-Royal et son impact sur ses quartiers adjacents. Ce rapport présente des données qui prouvent que le paysage affecte le potentiel piétonnier. De même, Il confirme que le plan a eu une influence constante sur la forme de Montréal. Ce rapport montre également comment Montréal a atteint une plus grande intégration en exploitant des terres pour concevoir le Mont-Royal, ce facteur clé a équilibré le système écologique et a amélioré la qualité de vie urbaine.

Mots clés: la morphologie urbaine, les déplacements à pied, paysage bâti, les espaces ouverts

LIST OF ILLUSTRATIONS

CHAPTER ONE

METROPOLITAN HISTORY BEGINS WITH GEOGRAPHY

1.1 Statement of Interest

This report studies the evolution of urban forms in Montreal, Quebec. In 1876, Frederick Law Olmsted developed a park plan for the mountainous terrain of the Mount Royal. It is argued here that his plan has encouraged the development of the landscapes and enhanced the walkability within the adjacent neighborhoods.

Urban morphology is the “study of city as human habitats” (Moudon, 1997, p.4). Urban morphology deals with the physical shape and form of the city. The spatial evolution of cities, towns, and regions are always developing. History and culture are implicated in the evolution of the city as well. Urban morphology studies the formation of human settlements and the transformation of their shapes (Moudon, 1997). This report helps to appreciate the nature and consequences from the evolution of the urban forms in Montreal.

This study illustrates how urban morphology relates to the Mount Royal Park plan and how the plan continues to influence its adjacent neighborhoods. This report presents evidence on how the landscape affects walkability by examining the Mount Royal Park plan. It is argued the plan has had an enduring influence on Montreal’s shape and form. This report also shows how Montreal has achieved greater integration with different land uses to make Mount Royal a key factor in balancing the eco-system and to serve urban life.

The development of built landscape contributes to the variety of the study areas. Understanding these unique characteristics helps designers to design and manage the growth efficiently in future.

1.2 Research Questions

The research questions for this report are:

1 How does the design of built landscapes affect the walkability and preservation of open space and eco-systems within three neighborhoods (Le Plateau, Ville-Marie and Westmount) adjacent to Mount Royal area?

2 How has Olmsted's plan been implemented in these neighborhoods, and how has his mission been achieved?

Olmsted's vision for the Mount Royal Park has always been considered as a pioneering approach among landscape architects (Wheeler, 2008). One of Olmsted's visions for the park was to emphasize a balanced relationship between man and nature. In addition, the plan also helped to structure the city aesthetically by preserving and enhancing natural resources.

To answer these questions, it is necessary to analyze the evolution of built landscapes around Mount Royal by using historic maps, aerial photographs, and GIS software. This report depends on the analysis of maps and plans to a large degree. Historic photos and GIS maps provide quantitative data of spatial structures within these neighborhoods (Taylor and Bogdan, 1998).

1.3 Mount Royal Park and Frederick Law Olmsted

Frederick Law Olmsted was the dominant figure in the landscape architecture profession in North America during the second half of the nineteenth century (Beveridge, 2009). During his years of practice, Olmsted developed a distinctive design style that can be seen in landscape projects from New York to Montreal and from Boston to Atlanta. For a full century, his firm was the most productive and influential group of landscape architects in North America (Beveridge, 2009). Olmstead emphasized nature as a public amenity and his designs sought to include all user groups (Beveridge, 2009).

In 1874, Mount Royal remained mountainous and inhospitable and was unable to provide natural benefits for citizens in Montreal due to the lack of infrastructure and accessibility (Wheeler, 2008). Thus, in 1876, Olmsted was given this project that could produce effects of natural scenery for urban life in Montreal because of the achievement of Central Park in New York and other significant landscape projects (Wheeler, 2008).

Figure 1.1 Historic photos (McCord Museum)

Mount Royal Park has played an important role in shaping Montreal and has provided a distinct urban morphology to the city. In addition, its landscapes provide habitats for vegetation and fauna. The park, as a resource of public health, has been fully recognized by Olmsted (Beveridge, 2009). The environmental experience of Mount Royal Park has always been appreciated by citizens. Mount Royal, as the largest green eco- system in the core area of the city, provides therapeutic benefits for people such as fresh air and natural vistas.

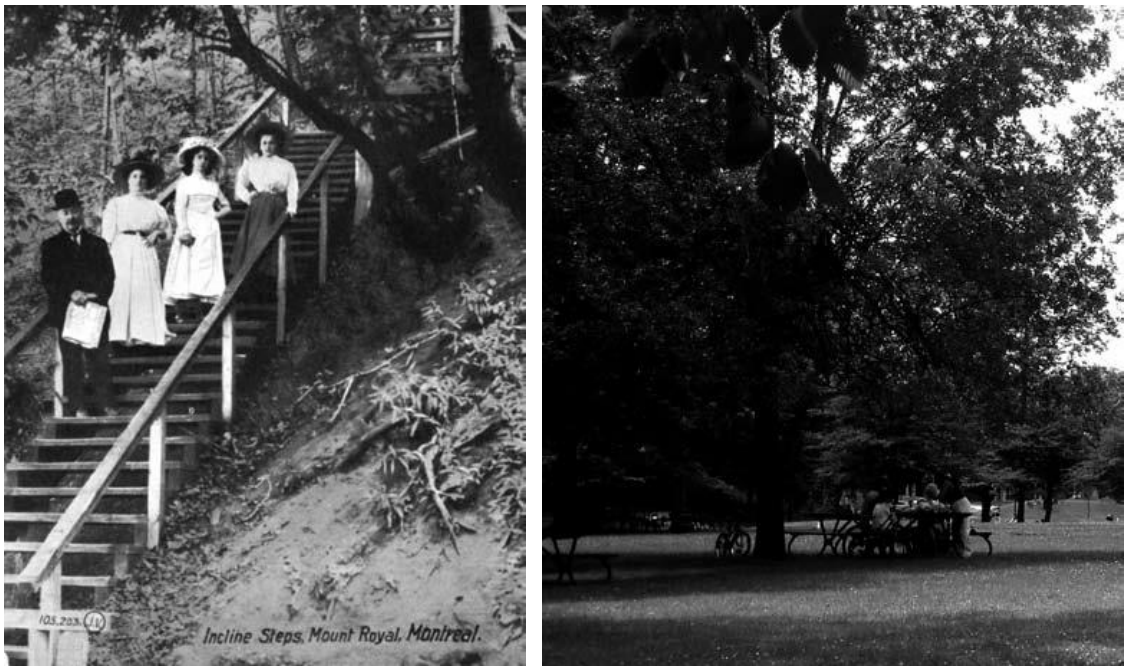


Figure 1.2 Historic photos (McCord Museum)

Mount Royal Park provides a varied and unique experience of natural scenery. It creates an atmosphere for citizens to get closer to nature where people can experience the park with its natural settings, different landscapes and vistas. Based on the study of the circulation system within the three neighborhoods, most of the major roads link the city to the mountain and provide vistas to attract people's attention towards it. In addition, park users benefit from the immersion in restorative and therapeutic passages of the landscape (Wheeler, 2008).

1.3.1 Montreal Vista as Picturesque Landscape

The topography of Mount Royal served as a basis of Olmsted's design. The arrangements of the different landscape materials, such as lawn, meadow, wood and water, provided the spatial framework for the projects. The linear sequences were powerful tools and drew visitors into the park. Olmsted was fully aware of such devices and used them consciously through the sequences he designed (Wheeler, 2008).

Figure 1.3 Parks and green space (Montreal Urban Plan, 2013)

Montreal has developed a series of objectives and actions aimed at sustaining high-quality, diversified and complete living environments (Beveridge, 2009). The remarkable urban context represents the characteristics of Montreal. Architecture provides a nostalgic environment for citizens. In addition, heritage buildings help to create a sequence of visual landscape experiences as urban morphology evolved.

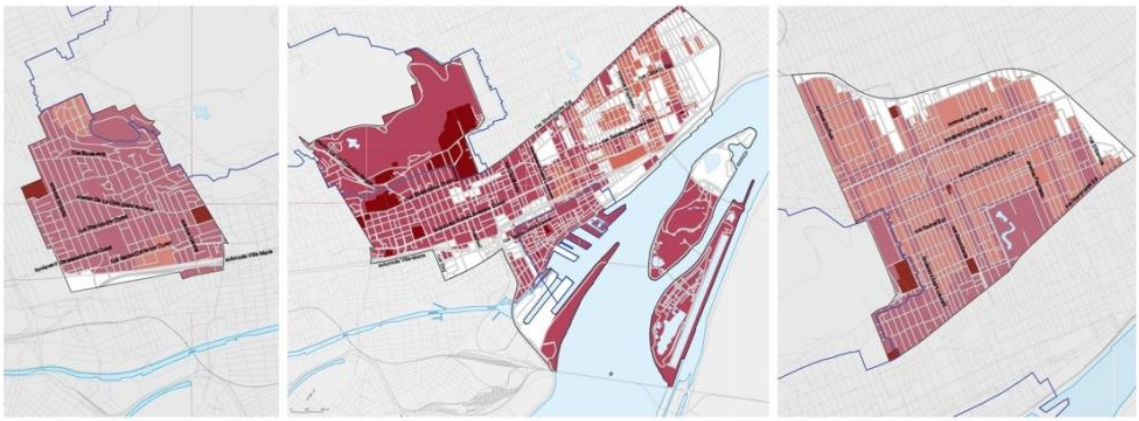


Figure 1.4 Building heritage (Montreal Urban plan, 2013)

1.4 Research Argument

This study deals with the open space and evolution of the urban environment in Montreal. The description of the city as a physical entity is an “attempt to circumscribe its evolution as an economic, social, and cultural organism, in as much as this evolution manifests itself in visible and tangible ways” (Marsan,1981). Montreal’s life cannot be

separated from its geographical situation on the North American continent, and the growth of the city is intimately linked with its significant location.

The argument of this report is: Mount Royal Park has encouraged walkability between adjacent neighborhoods. It is also the major factor in preserving open spaces and the eco-system of the city.

Geography is the most significant reason among the forces and influences of a city's development (Marsan,1981). Topography and natural features such as rivers, mountain and terrain have an influence of the city patterns. In addition, city street and block patterns help to build the order and structure of the city (Friedberg, 2004). The approach here is to analyze typical arrangements of streets, blocks, lots, buildings, land use, and open space at each neighborhood scale.

1.5 Three Neighborhoods

From its foundation in 1642 until the early nineteenth century, Montreal and its suburban villages were concentrated mainly between the river and south face of the Mount Royal (Laterreur, Schwartz , Laurin and Bronson, 2008). By the 1860s, the rural landscape was transformed into a series of suburban municipalities and several villages. These areas were constructed with mixed cultures, traditions and history (Marsan 1981).

The three neighborhoods are the study units, with primary variables characteristics as follows: firstly, these three neighborhoods are adjacent to Mount Royal Park; secondly, the major land use varies from each other; thirdly, they have different social and cultural backgrounds. These characteristics show the high potential hypothesis for supporting the results that the park encourages the walkability within the neighborhoods. Physical attachment to Mount Royal Park provides the opportunity for studying the accessibility to the mountain. Different land uses indicate the varied users and how these land uses influence the design of open spaces. Different history and cultural backgrounds demonstrate the origins and process of the urban evolution.

The three neighborhoods have their own unique characteristics, which provide different travel experiences. These characteristics contribute to the livability of Montreal. In addition, these different experiences, which are beloved and understood by the citizens, have become more significant for urban life over time. The qualities showed by these three neighborhoods are examined to illustrate the different pedestrian travel

experiences. These qualities include: their physical relationship to the mountain, walkability, different land uses, different appearance of buildings (defined by scale, size, style, construction, materials, color and decoration), and different circulation patterns. Pedestrian travel in mixed-use environment can be extremely different and crucial. It requires a safe, continuous and direction system (Moudon, Hess, Snyder and Stanilov,1997).

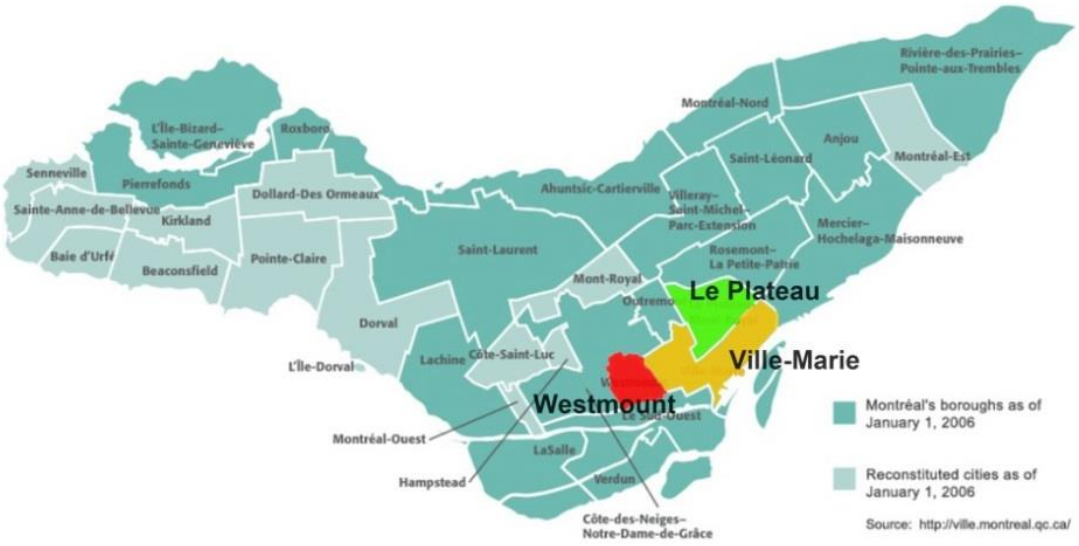


Figure 1.5 Location of the three neighborhoods

1.6 Summary

This report documents the evolution of urban morphology within the three neighborhoods as well as how Olmsted's visions for Mount Royal Park have become a reality. It develops a better understanding of the evolution of Mount Royal Park in Montreal since the 1870s and demonstrates the long term influence of a park plan to the city's urban morphology.

Mount Royal contributes to the city's historical texture, which also shapes the city's form to a large degree. The second chapter describes the urban morphology

theory from Europe to North America. The chapter presents an analysis of open spaces and built landscapes of Mount Royal and its adjacent areas. It also explains how street patterns can structure the city and how they evolved over time to encourage walkability within the three neighborhoods. Following the literature review, the third chapter explains the methodology used in this report, which mainly relies on the analysis of GIS maps and observations. The fourth chapter explains the analysis from the research process and investigates the results. It explores the roots from geographic, cultural, and social activities. The fourth chapter presents a large amount of observations and series of maps from various resources. It addresses the research questions and confirms evidence of the arguments. The last chapter highlights the significant findings and provides suggestions for future research.

CHAPTER TWO

LITERATURE REVIEW: EXISTING SITUATION AND THREATS

2.1 Introduction

This study deals with the open space and the evolution of the urban environment in Montreal. Geography is the most significant force influencing a city's structure and patterns. The unique characteristics of Montreal cannot be separated from its geographical situation. The growth of Montreal is intimately linked with its location on an island with Mount Royal and its steep terraces.

This chapter presents a review of literature that discusses the major aspects of urban morphology theory. First, it presents the relationship between landscape architecture and urban morphology. It explains how they contribute to the study of Montreal's evolution. In addition, it introduces the Conzen's theory, known as "Conzenian"(1981). This theory, based on the town plan analysis of Newcastle (Conzen, 1981) invites researchers to read the city through series of maps and plans. This approach allows the researcher to explore the continuing changes between history and future urban forms by the built and social environment created by various cultural and social backgrounds. Subsequent sections introduce the relationship between open space and urban morphology and a relatively short description of the backgrounds of the three neighborhoods over time.

2.2 Landscape Architecture and Urban Morphology

The shape of city is largely dependent on its natural landscape. The natural landscape shapes the city and highlights local features. According to Olmsted, above all, the design must respond to the environment, the geography, the vegetation, the hydrology and the built elements within the site (Kiley and Amidon, 1999).

It is important for city planners to study individual buildings as well as open spaces such as streets, plazas, parks and rivers (Friedberg, 2004). These open spaces have been designed over time, not just as contemporary places to live, but also become an expression for the unique history and culture (Friedberg, 2004). Cities around the world are growing at an accelerated pace all the time. Even when some of the sites have changed over time, the memory, and the sense of these places, still exists. This sense of place blends the physical features and people's memories (Fitch, 1982). Thus,

the aim of this study examines a city beyond plan and maps. It reviews the history and culture backgrounds and suggests an innovative study of urban morphology. It also contributes to the understanding of the physical expression of urban inequalities and suggests how to enhance the social cohesion.

It has been recognized that the built environment is a dynamic process (Friedberg, 2004). The importance and necessity of preserving natural resources have been recognized by people in recent years. The restoration of watersheds, river systems, and forest habitats are known as significant for natural networks (Friedberg, 2004). Parks, open space, and recreational opportunities not only enhance the quality of life and neighborhoods, but also preserve natural resources, and provide physical links between the neighborhoods.

Since World War II, landmark buildings, plazas, and parks have been destroyed to accommodate developments in the city (Hall, 2000). Designed open spaces have been sacrificed for what is considered to be more “practical and needed” facilities such as freeways, buildings, commercial and parking lots (Friedberg, 2004, p.31). The identification of these new urban elements and typological transformations must be refined and developed (Gilliland, 2004): the principal aim of morphological analysis of new fabric should lie in understanding the changes that have led to its creation. The problem, therefore, in considering urban morphology, is to analyze the contemporary urban fabric, to understand its distinctive components and to specific processes of formation (Gilliland, 2004).

Topography and natural features such as rivers, mountains and terrains can influence street patterns. These natural resources provide unique opportunity for the development of urban landscapes. The strong influence of urban landscapes can be seen in the arrangement of urban networks and the renovation of old neighborhoods in historical cities (Whitehand and Gu, 2007).

Streets are important in fostering the public realm. Streets are more than channels for vehicular movement. In addition, streets work as an expression of the history, culture and human activities of the city. Built environments, such as street patterns, can take full advantage of land consumption.

2.3 Urban Morphology

The formation of urban morphology in Montreal is generated by the physical and social situation over time. Recognizing landscape as a cultural, educational, intellectual, and economic resource helps to understand how individual features are connected historically and geographically (Whitehand and Gu, 2007).

Urban morphology was deeply rooted in German geography and became popular at the end of the nineteenth century (Moudon, 1997). In the summer of 1996, a group of urban morphologists from a variety of disciplines including architecture, geography, history, and planning, formalized the International Seminar on Urban Form. The meetings confirmed that several generations of scholars had been active in urban morphology, not only in England, but also in Italy and France, and that many individual researchers from a variety of other countries were contributing to the field (Moudon, 1997, p.4).

In English-speaking countries, the history of urban morphology is relatively short, dating essentially from the postwar years (Whitehand, 1987). In addition, outside central Europe, it became the mainstream of geography for long periods, especially in North America (Whitehand, 1987).

The study of urban forms in Canada has been widely studied by French and English researchers in a variety of disciplines (Gilliland, 2005). The most significant contributions to the study of urban form in Canada have come from two largely isolated streams: first, architects/planners, mostly from Quebec, who examine form as a relatively independent system and work in tradition from the “Italian school” while the other scholars are Anglophone urban and historical geographers who deal with built forms and urban morphogenesis as a product of external forces (Gilliland and Gauthier, 2005).

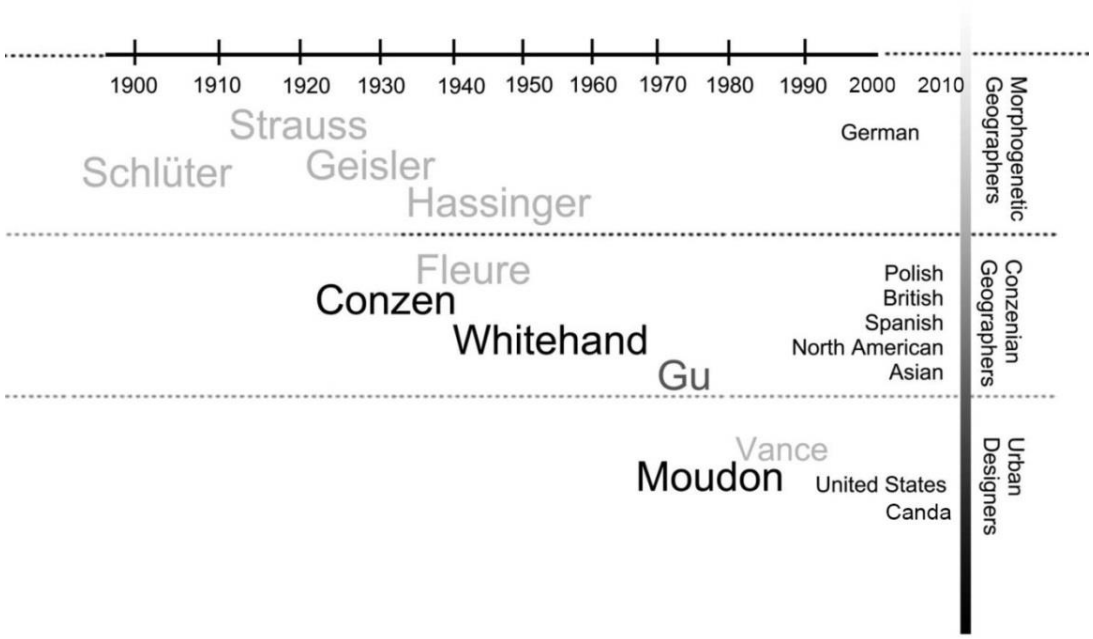


Figure 2.1 Issues and perspectives (Whitehand, 1987)

Since the 1960s, a variety of new theories and methods have been used for describing urban form and formation (Conzen, 1981). In contrast with the three classic theories of urban morphology illustrated below, new approaches such as “Conzenian” theory, named after its principal proponent, geographer Michael Robert Gunter Conzen, is applied for management of urban landscapes (Whitehand and Gu, 2007).

This chapter discusses the concept of urban morphology and the current research achievements based on “Conzenian” theory. Preserving and managing the historical culture and characteristics of the city is a crucial point of Conzen’s theory.

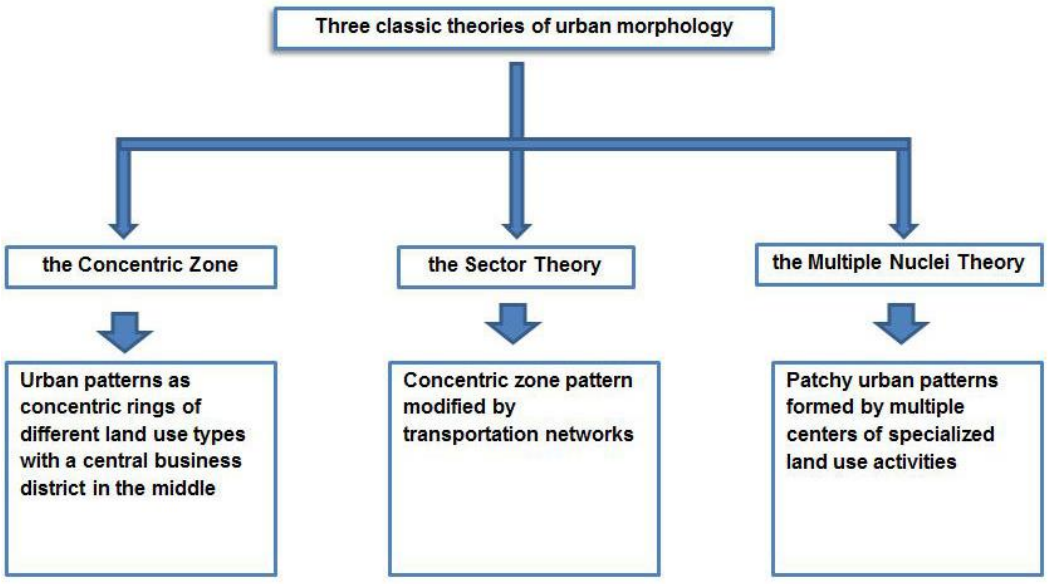


Figure 2.2 Three classic theories (Whitehand, 1987)

2.3.1 Conzenian

In analyzing relationship between the elements and their environments, Conzenian approaches have their advantages (Whitehand, 2010). Conzen was not only interested in the layout of the towns and cities but also contributed significantly to the separation of urban landscape into portions (Whitehand, 2010), such as streets, plots, sites, block plans, building fabric and building utilization (Conzen, 1981).

When trying to integrate the results of the individual portions, Conzen identified two important elements. The first was the "historicity of urban landscape" (Whitehand and Gu, 2010, p.6951), which means the "historical expressiveness"(Whitehand and Gu, 2010, p.6951). The development of a city is a schematic and chronological process. Thus, it is important to be aware of the "uncovering of historical and geographical order" (Whitehand and Gu, 2010, p.6951), which contributes to the intellectual activity of regionalization. Another significant element is "morphogenetic priority" (Whitehand and Gu, 2010, p.6951). This refers to those persistent or lifespan elements that comprise each complex form (Whitehand and Gu, 2007).

No matter how cities are formed, their spatial structure affects physical, ecological, and socioeconomic processes within their boundaries and beyond (Whitehand, 2010). A major goal of this report is to understand how urban spatial structure influences the development of open space.

2.4 Plan Analysis

In Conzen's research, plan analysis is a way to understand a city through changes from plans over time. He described it as "an evolutionary method of plan analysis"(Conzen, 1981, p.25). He believed that preserving traditional features is the key to the future development of a city. In order to understand how traditional features can influence contemporary patterns, it is significant to trace the changes through history. In this respect, the urban elements help to identify the city. Like the architecture of Old Montreal, regardless of its uses, styles and heritage values, is inseparable part of the characteristics of that area.

In Conzen's research, he compared historical maps of Newcastle from the eighteenth century to twentieth century. By comparing these historical maps, he tested three distinct changes in the plan (Conzen, 1981, p.28):

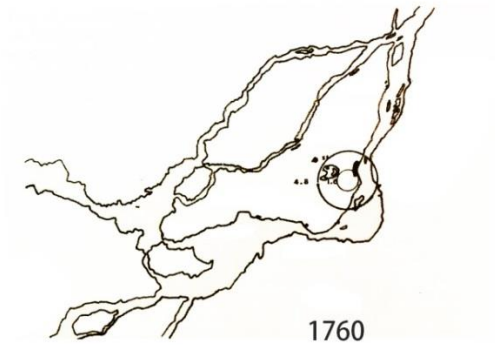
- *additions to the circulation system*
- *areas showing districts and representing through consistency the holdings of the enfranchised members of a medieval borough*
- *the ancient town fringe along the town wall*

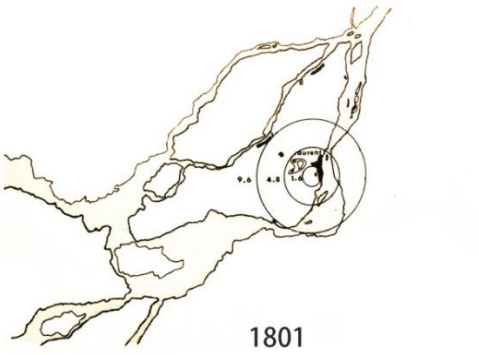
These significant test elements also provide precedence study for this research on the Mount Royal area. In this study, the qualities between these three neighborhoods are examined to illustrate the different characteristics. These qualities include: their physical relationship to the mountain, walkability, different land uses, different appearance of buildings (defined by scale, size, style, construction, materials, color and decoration), and different circulation patterns.

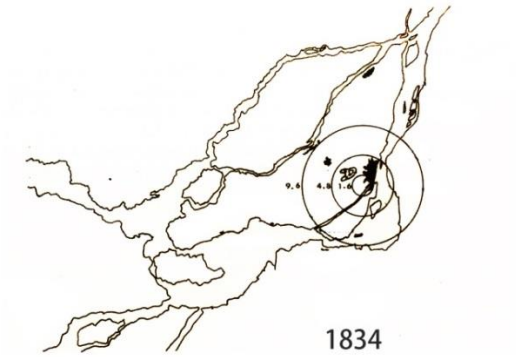
Pedestrian travel is significant in this study. Characteristics in mixed-use environment are essential for enhance the pedestrian travel experience. It requires a safe, continuous and direction system (Moudon, Hess, Snyder and Stanilov, 1997). There are four principles for measuring the quality of streets: tranquility, safety, connectivity, and visual delight (Southworth, 1997).

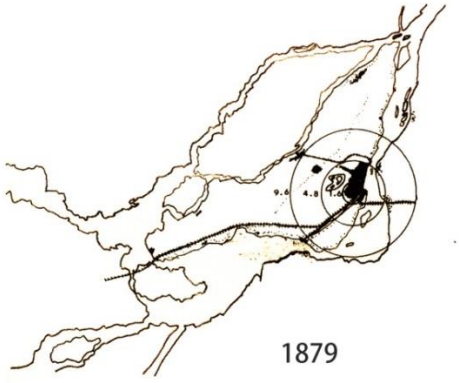
2.5 Image of the City Then and Now

Generally, the evolution of Montreal can be divided into three different periods: pre-industrial, industrial, and metropolitan (Marsan 1981). During the first period, Montreal was a rural territory and the most important concentration of dwellings was located in the center of Montreal. During the second period, with the development of transportation and economics, there are dramatic developments within the city. The physical linkage within the urban area becomes closely linked to the development of circulation. In recent years, more technological revolutions are taking place, such as in transportation and communication media. In addition, changes and developments also influence buildings types and the built environment, such as the downtown area. Residential towers are gradually appearing in response to the appearance of young general professionals and family.









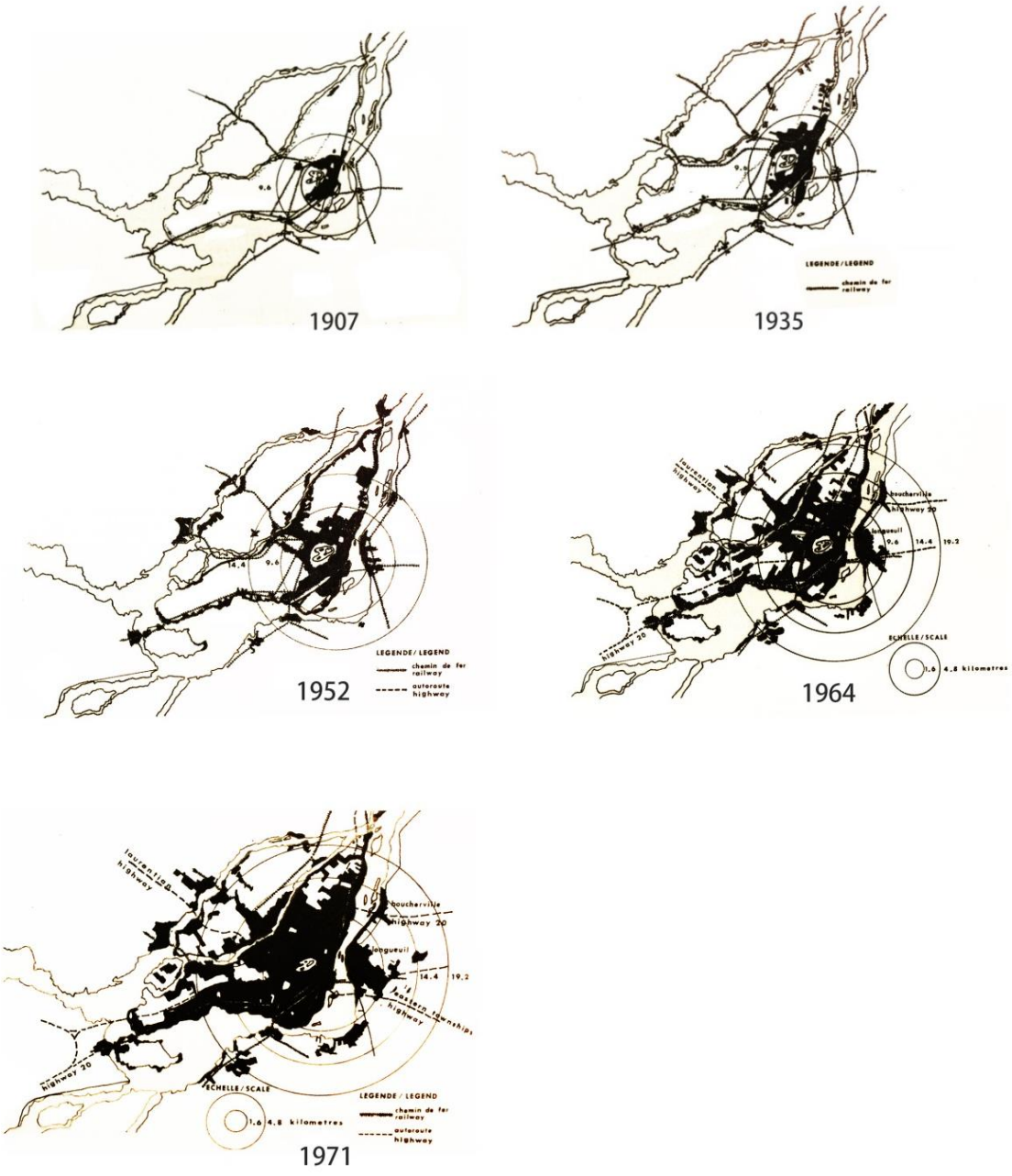


Figure 2.3 Evolution of city sprawl (Marsan, 1981)

The series of maps above by Jean-Claude Marsan present the sequence of the development of Montreal. It is obvious that the development started along the river and gradually moved towards the north. The development of the city also results from the

circulation system and it is influenced by natural geography features such as mountains and rivers.

2.5.1 Le Plateau

At the top of the cliff and extending eastwards from the mountain was a large flat area known as Le Plateau today (Marsan, 1981). In this area, institutional and civic nodes and several dynamic commercial streets contributed to the quality of urban life. The urban landscape of Le Plateau was lined with trees, back alleys, and different small parks (Laterreur, Schwartz , Laurin and Bronson, 2008). By the middle of the nineteenth century, the place was gradually being transformed into a series of suburban municipalities. In the early twentieth century, it developed into a mixed community with working-class and middle-class people. Because there are many institutions within the site, the built environments have been gradually appearing in respond to young students and professionals.

Le Plateau is comprised of mixed cultures, traditions and history, who contributes to its unique characteristics. This kind of mix makes the environment different and beloved by citizens. In 1992, Montreal adopted a Master Plan that recognized the heritage in Le Plateau by identifying over 100 individual buildings of heritage value (Ville de Montreal, 1993). With its rich culture and unique location, the value of Le Plateau has been highly recognized and protected. These actions also contribute to the livability of the whole city.

In addition to residential, commercial and civic constructions, Le Plateau also benefits from Mount Royal Park. The park creates a magnificent landscape extension of the neighborhoods. The park is a large recreational area and green space for residents and also attracts the commercial developments. Citizens take advantage of the park to get exercise, to get closer to nature and to enjoy the beautiful scenery.

Figure 2.4 McGill campus in 1873 (McCord Museum)

2.5.2 Ville-Marie

To the southwest of Le Plateau lies the borough, which is nowadays known as Ville-Marie. It is located in the center of the city, which also covers a large area, including downtown Montreal, Old Montreal, the Old Port and most of Mount Royal Park and more. There are institutional and civic nodes and several dynamic commercial buildings that contribute to urban activities in this area. It is the starting point and core area for the development of Montreal. With its significant location, the development of Montreal has a close relationship with the evolution of Ville-Marie. This area witnesses the history and prosperity of the city (Marsan, 1981). It provides an opportunity to trace the roots of the city's history and culture.

Ville-Marie plays an important role in the development of Montreal. Compared with other areas, it has the longest physical connection with the Mount Royal. Within the site, several major roads lead people to the mountain.

Figure 2.5 High resolution panorama, looking north-west, from the Aldred Building(McCord Museum)

2.5.3 Westmount

Compared with the other two areas, Westmount is a small, independent municipality covering about one and a half square miles. It lies along the slopes of Mount Royal (Gubbay, 1998). Westmount used to be recognized as a homogeneous area of mainly “British background, old-fashioned, elitist and protestant” while the community has become a complex society with a broad range of occupations and interests at present time (Gubbay, 1998).

The rapid growth of Westmount was during the period from 1895 to 1908 when it became the city of Westmount (Gubbay, 1998). There were a lot of ambitious civic projects constructed which also frame the structure of the area today (Gubbay, 1998). In addition, this kind of urban-rural mixed environment used to attract lots of families with young children whose parents were earning modest incomes.

Figure 2.6 Lawn Bowling Club, established in 1901. In 1906 the club hosted a visit from a British group, shown here, of forty bowlers accompanied by their families (Gubbay,1998).

2.6 Summary

This study deals with the evolution of the urban environment in Montreal. The aim is to trace a general picture of the evolution of Montreal based on its physical characteristics, such as streets, parks and open spaces. Besides the geographic forces that structure the city, social forces also stimulate the development of the city. These social forces include technology, demography, culture, economics and others (Marsan, 1981).

For landscape design, it starts with structure, geography, history, tradition, culture and other elements that relate to the site. In addition, it is important to understand the formation of the landscape is a process in a long evolution. The evolution of the built environment in Montreal and its relationship with urban morphology can help designers and planners to “read” the city better. Culture and natural resources have become important elements for the development of Montreal, and these important resources can also be used to enhance the city’s characteristics.

CHAPTER THREE
RESEARCH METHODS

3.1 Introduction

The primary aim of this report is to search evidence on how Mount Royal Park has encouraged walkability between adjacent neighborhoods over time. The study of urban morphology not only deals with geography but also relates to history and culture. This chapter explains the methodology used in this report. Historic documents and maps are collected from different resources. These archives provide background information for the study. The GIS tools are also adopted in this research to collect statistics and create precise maps. The GIS technology involves a series of data collections, such as land use, building footprints, transportation and vegetation, which helps to understand the general situation of the study area. In addition, field surveys and observations are also employed in this report.

3.2 Research Design

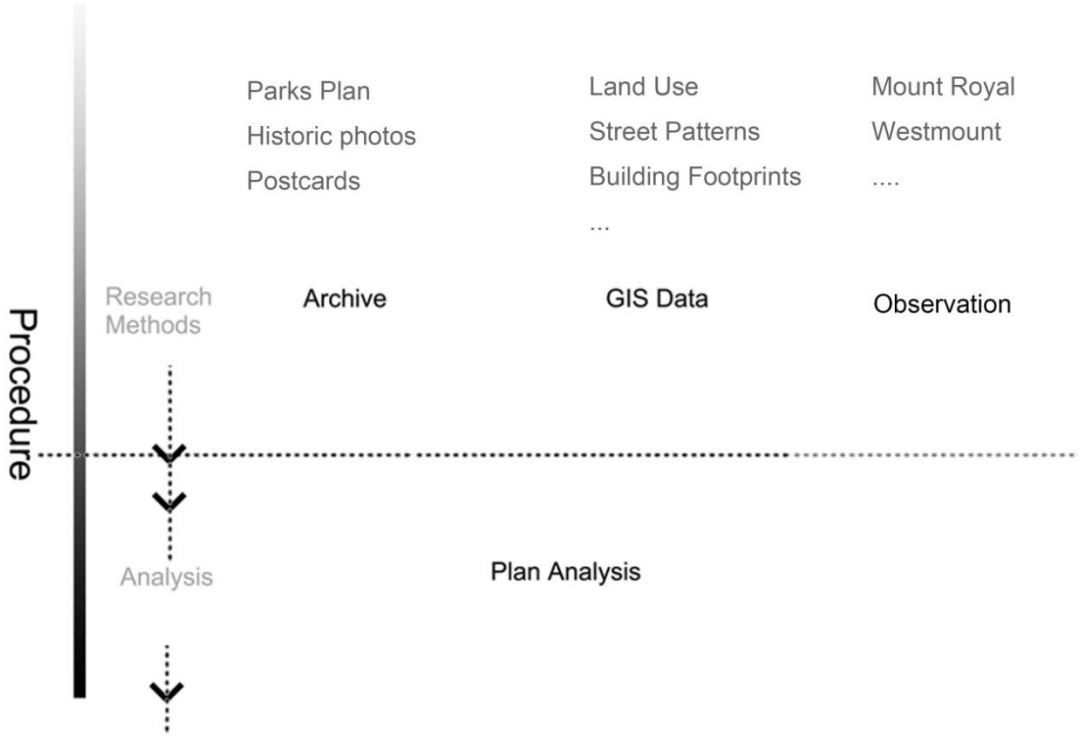


Figure 3.1 Research procedure

3.2.1 Geographic Approach

Maps created by the GIS program show the relationship between the parks and the city patterns. The GIS data of Montreal are acquired from the TRAM (Transportation Research at McGill) database.

Land use information provides a basic description of Montreal. In the TRAM database, land use information is available for the years 2000, 2001 and 2007. Land use information, besides GIS data, is also acquired from other sources such as field surveys and observations. Major land use categories in this report include: parks, recreation, government, institutions, open area, residential, industrial, water body and commercial (TRAM, 2007).

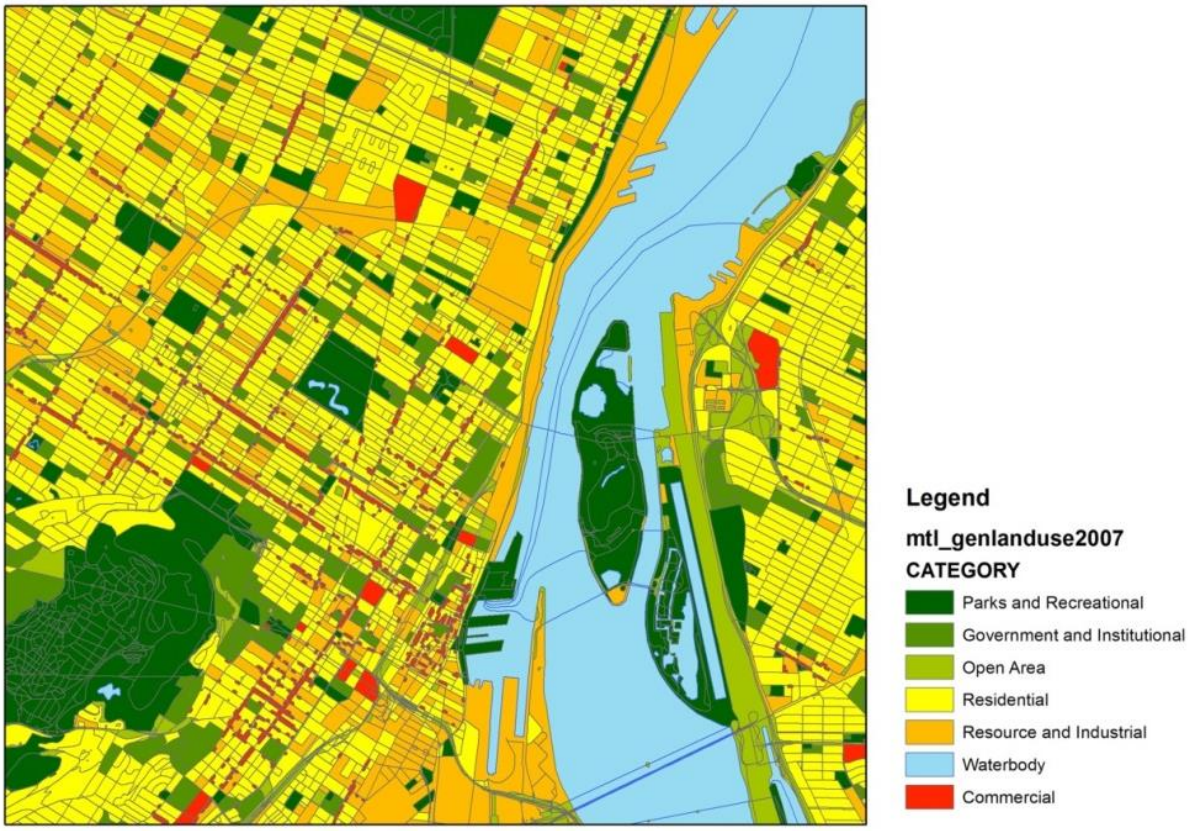


Figure 3.2 Example of land use GIS map (TRAM 2007)

Circulation plays a significant role in urban life. Transportation systems within the city link different areas together. Roads, streets, and highways bring people to their destinations (Wheeler, 2008). This linkage connects and provides different activities within the city. In addition, it creates opportunity for the design of open spaces.

Movements such as New Urbanism and Smart Growth have argued for different ways of designing urban fabrics to meet the goal which is to encourage the use of public transportation and pedestrian modes. The transportation forms discussed in this report mainly focus on the pedestrian travel experience within the study areas.

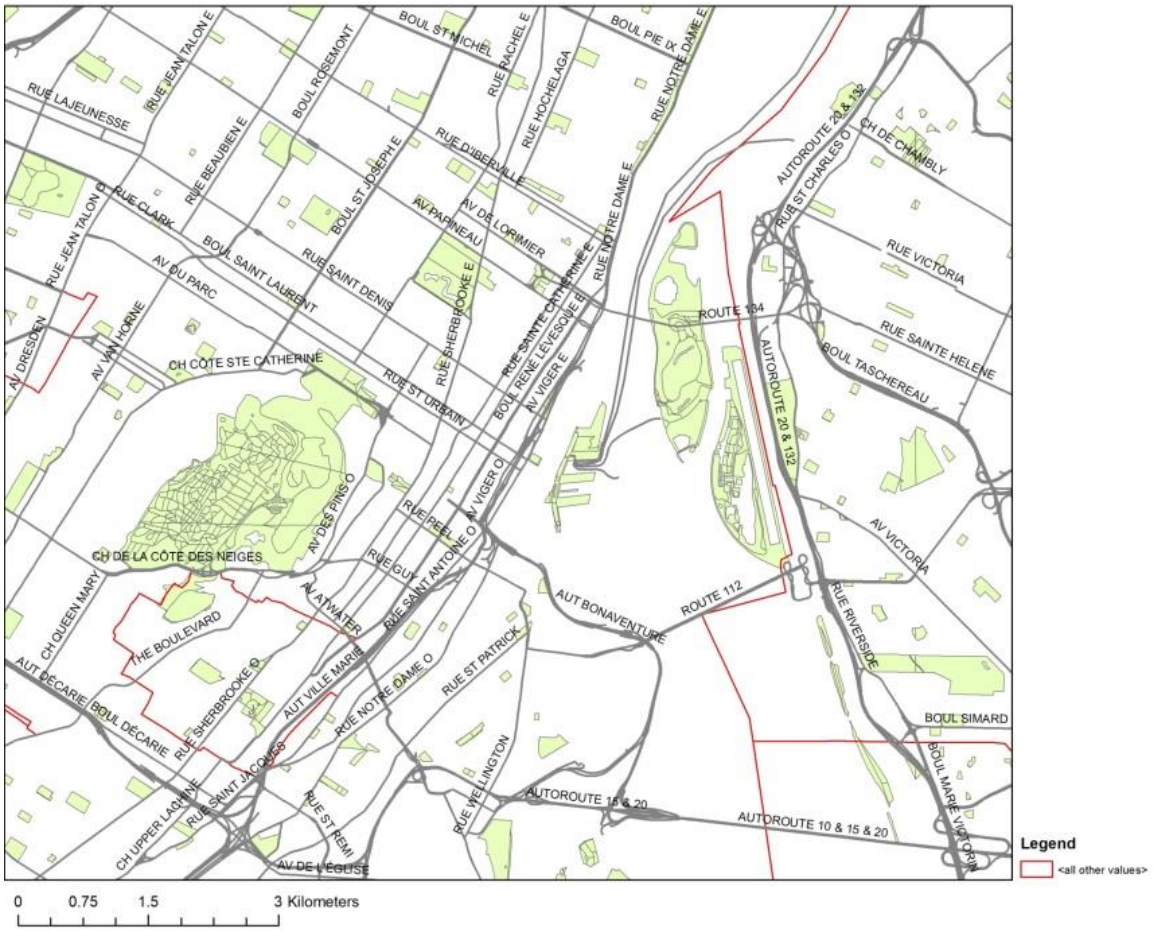


Figure 3.3 Example of circulation GIS map

3.2.2 Observations/ Field Survey

Pedestrian walking experience is one of the significant measurements for the quality of streets in this study. This research studies how the three neighborhoods present healthy walking environments adjacent to Mount Royal Park in Montreal. Field surveys contribute to the understanding of a better pedestrian travel experience within study areas. It also helps the researcher to understand the scale of streets, the sense of place and people's behavior. This information serves as a guide to create a successful public open space. In addition, a series of field sketches from the observations are presented and illustrated in this report as well.

From the image below, it shows the limitation of the GIS maps. Lacking information on canopy, it is hard to figure out the quality of the streetscape. The images on the right demonstrate the different landscape experiences between the two streets within Le Plateau. Thus, field surveys help to clarify the walking experience within study areas.

Figure 3.4 Illustration of different streetscape

Taking photos is another efficient way to document places. A lens can make an exact copy of a building façade and environment. A camera can produce an accurate image in a very short moment compared with free-hand sketching. But on the other hand, graphic experience enhances people's unique sense of places and environments. In addition, sketching allows people to spend a longer time within the area.

Take a study of Milton Street in Le Plateau for example. Milton Street provides lots of interesting things to explore over time. The characteristics of this street make people pause, step in, stay and see what it is like. The area is arranged with beautiful buildings and landscapes which create an enclosed atmosphere. It is more than physically comfortable. To be involved in the places, the researcher is able to understand the atmosphere and the scale accurately.

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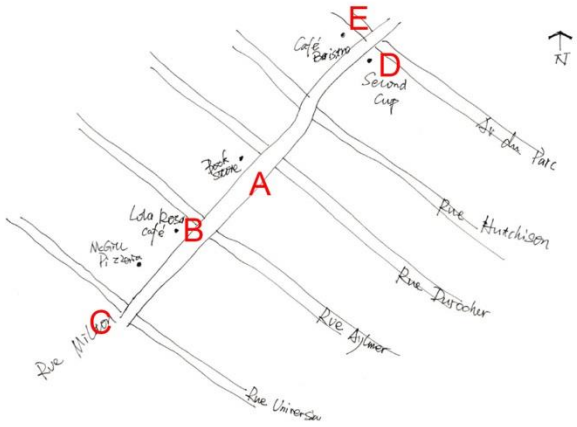


Bookstore on Rue Milton

Residential apartment on the intersection of Rue Aylmer and Rue Milton

Residential apartment on the intersection of Rue Unversity and Rue Milton

Cafe shop on the intersection of Avenue Du Parc and Rue Milton

Cafe shop on the intersection of Avenue Du Parc and Rue Milton

Figure 3.5 Sketches

Below is a series of 45 minute, quick sketches of the Lola Rosa Café around lunch time. During this peak time, it presents how people take advantage of the open spaces and how they behave when waiting outside.

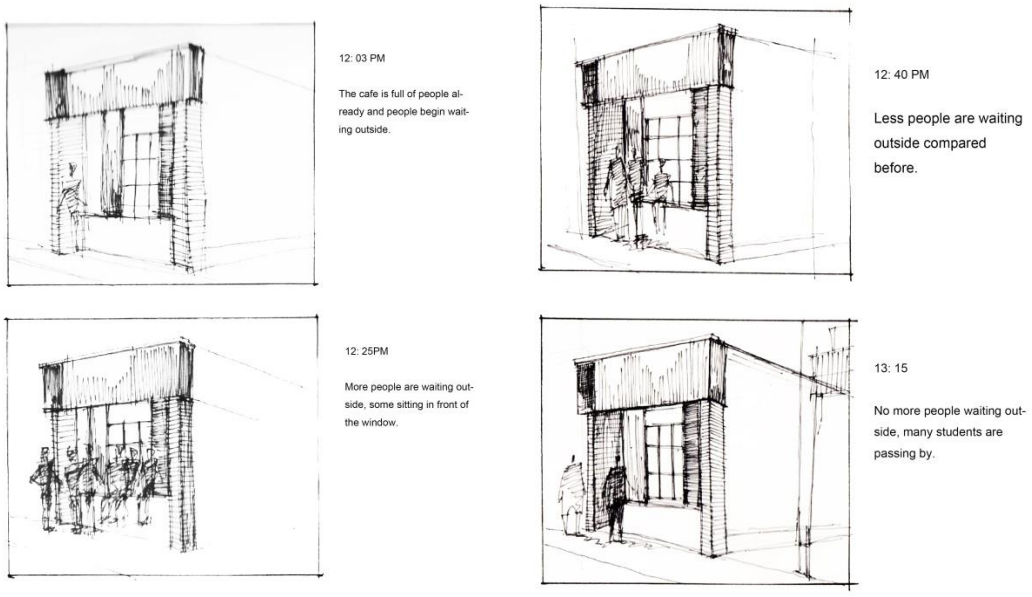


Figure 3.6 Sketches

Sketching is a particularly useful tool to employ in a field survey. Sketching brings the organization, structure and construction of the subjects into a graphic form. Sketches can have a combination of perspective, plan, section, and elevation. This combination can help in understanding complex relationship on the ground, especially when a map or other document is incomplete.

3.2.3 Urban Structure of the Three Neighborhoods

Using historic documents and precise GIS maps makes it possible to have an overall basic understanding of the three neighborhoods. The layout of streets, the patterns of buildings and open spaces can be easily conveyed by the GIS tools.

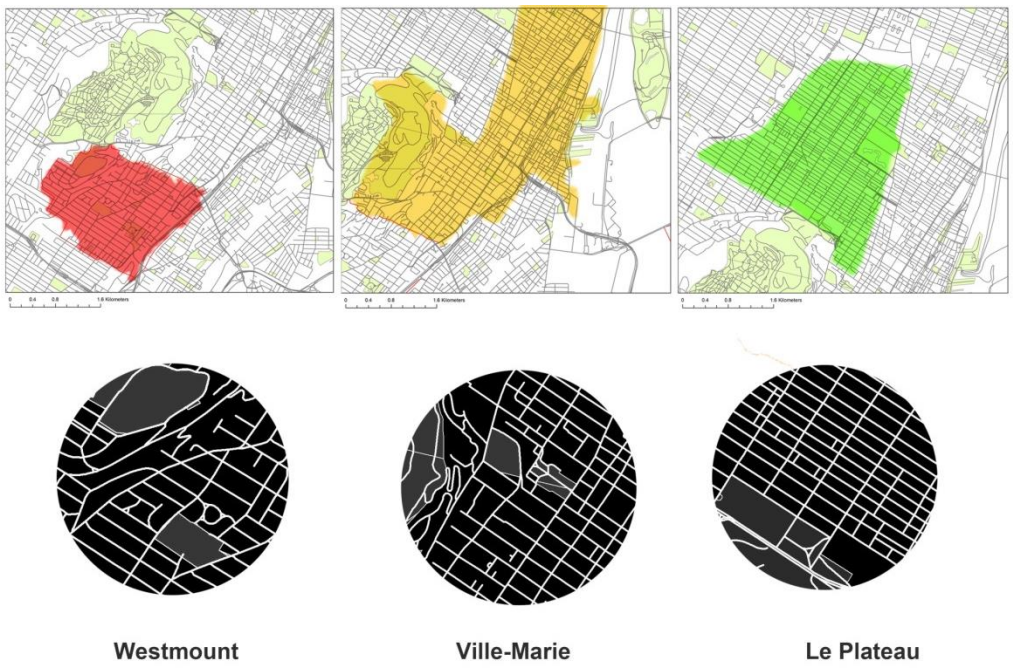


Figure 3.7 Illustration of figure ground study by GIS tool

3.2.4 Conclusion

Data collection contributes in three main ways: secondary data, archives and field surveys. The GIS tools are adopted in this study to collect the information and to answer the research questions. The GIS data provide precise and solid evidence in analyzing the development of urban patterns. It is argued that the built environment of Montreal is continuously shaped and reshaped over time. The methods present in this chapter show how to interpret evidence from various sources.

3.3 Limitation

In understanding this topic, the researcher notes several methodological limitations. The first weakness of this report is human error and bias. This report concentrates on the relationship between urban morphology and the built environment which requires a deep knowledge about the combination of land use, planning, open space, and history background. Although the researcher is impartial during the data collection and the review process, this particular research relied on the input of researcher. It opens for discussions of reliability and human error.

CHAPTER FOUR

ANALYSIS AND FINDINGS

4.1 Introduction

The first chapter presents the evolution of Montreal's urban morphology. The second chapter reviews literature that relates to urban morphology theory and the third chapter discusses the methodology used in this research. This chapter returns to examine how changes have developed and shifted in response to the geographical and cultural influence within the study area at the present time.

Section 4.2 describes the characteristics of the three neighborhoods based on land use maps created by the GIS program. In previous chapters, it describes the historical and cultural backgrounds of the study areas. Development of urban morphology in Montreal can be read through the available data followed by a series of maps created by the GIS program. Section 4.3 discusses the circulation system and street patterns within the three neighborhoods. Section 4.4 focuses on the walkability and the accessibility to the Mount Royal Park within the study areas. Key points and suggestions from these findings are highlighted at the end.

4.2 Characteristics of the Three Neighborhoods

Land use information provides a basic description of the three neighborhoods. Land use data contributes to an analysis of the individual urban elements in this research. It can divide the different land use into individual layers. The major land use category in this section includes (TRAM, 2007):

- Commercial
- Government and Institutional
- Open Area
- Parks and Recreational
- Residential
- Resources and Industries
- Bodies of Water

4.2.1 Le Plateau

Below is a series of the GIS land use maps of Le Plateau neighborhood. The major land use of Le plateau is residential, with mixed-use corridors along the major roads. Over 50% of the dwellings in Le Plateau were built before 1946 (Laterreur, Schwartz , Laurin and Bronson, 2008). Today, 78% of these areas are rental units, with a gradual increase of density over the last decades. Over time, the increasing mixed-use areas provide opportunities for the design and redevelopment of open spaces. Different land uses also help to distribute traffic. A friendly pedestrian environment helps to stimulate the development of mixed-use. On the other hand, retail and commercial activities can also benefit from slowing traffic through these areas.

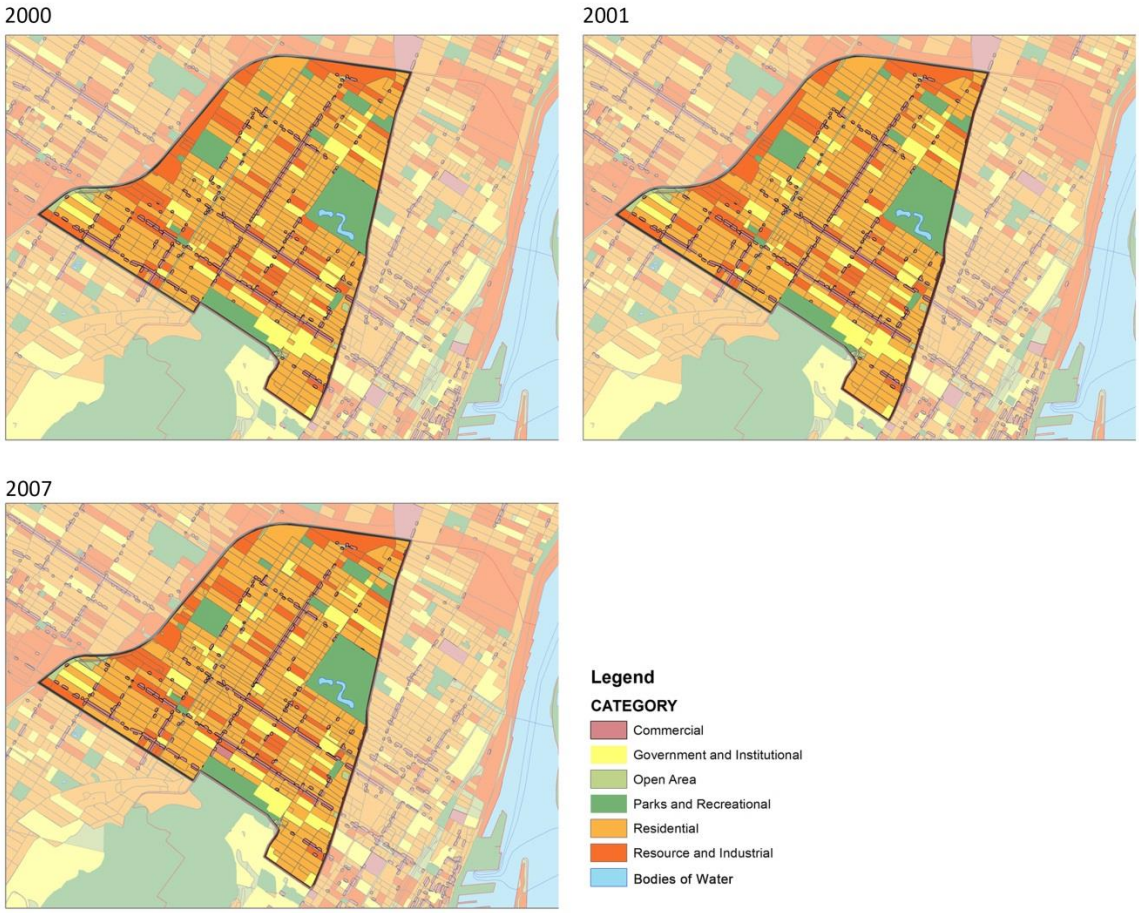


Figure 4.1 Land use in Le Plateau (TRAM McGill, 2015)

4.2.2 Ville-Marie

Ville-Marie is larger area than the other two neighborhoods. This report mainly focuses on the areas that are adjacent to the mountain. From the mountain to the river, land use turns from residential to mixed-use along major circulation points.

There is also an extreme difference in the buildings' height and density. Density is also a major influence and consequence of the organization of streets and buildings. At the same time, maintenance and redesign can also be challenging over hundreds of years. Because of its unique and important location, Ville-Marie provides a great opportunity for the clustering of commercial and mixed-use zones. These increasing mixed-use corridors give the opportunity for design and redesign of open spaces. In addition, the improvements of open spaces can attract people's attention and make people want to stay, which enhances the walkability of the areas.

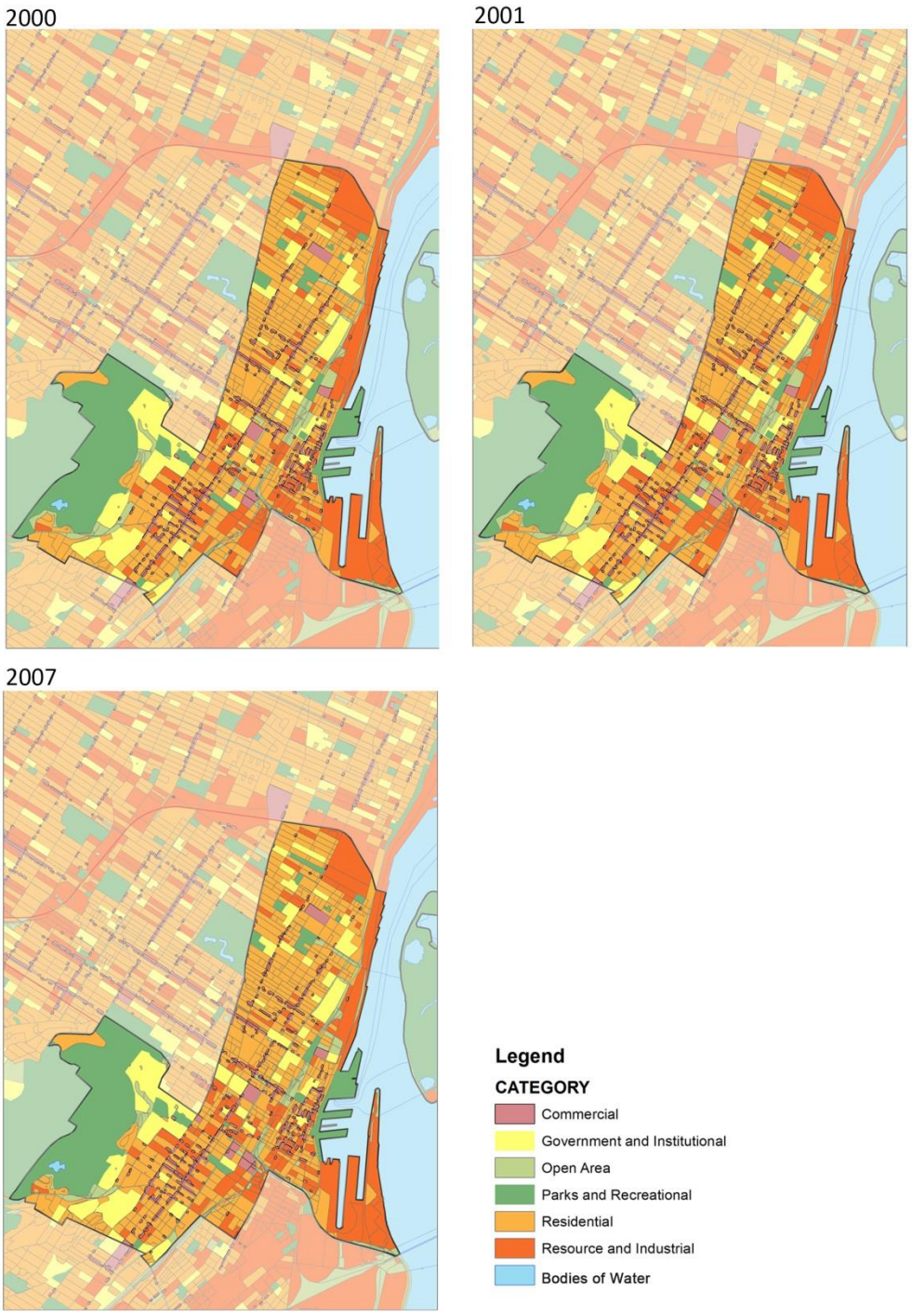


Figure 4.2 Land use in Ville-Marie (TRAM McGill, 2015)

4.2.3 Westmount

Residential is the dominant land use within Westmount. The land use is stable for a long time and few changes have been made to the developments when the city expands. The street patterns follow the geography and fit well into the built environment, which will be fully explained in the following section.

Figure 4.3 Land use in Westmount (TRAM McGill, 2015)

4.3 Circulation

Connections provide opportunities for different social activities and interactions. Streets play an important role in creating better living environments. Over time, street patterns in Montreal help to identify the city's order and structure. Circulation helps to link different neighborhoods. Streetscapes, such as trees, lights, curbs, paving and building façades contribute to identify the unique characteristics of the area.

Street patterns not only allow people to understand the physical structure of the area but also examine its function and utilization. Street patterns can influence the efficiency of transportation. Within a residential community, a street grid system can contribute to the creation of a safe and healthy environment.

In this research, the walkability within the study areas is a window through which to analyze the relationship between Mount Royal Park and its adjacent neighborhoods. There are two important measurements of walkability in this study. First is to measure the connectivity of a pedestrian network (Moudon, Hess, Snyder, and Stanilov, 1997). Connectivity is the basic function for a street and it is crucial for pedestrian facilities. The second key issue is "route directness" (Moudon, Hess, Snyder, and Stanilov, 1997), which is to measure the direction of the pedestrian paths. Walking distance from start to end is a significant way to choose the transportation methods.

An efficient design of street patterns needs different considerations. To list a few, first, it needs to have a clear division of cars and pedestrians. Second, among residential users, it needs to provide a system for safety, tranquility and sociability. Third, it needs open space and built landscapes for connectivity, interaction and natural delight. Finally, it also needs a hierarchical circulation to distribute traffic.

The following research focuses on the demonstration of the current condition of street patterns and the landscape. The results effectively express the relationship between urban morphology and built landscape in the three neighborhoods. The framing of squares, streets, and open space is significant, which plays an important role in identifying the characteristics of the place.

4.3.1 Le Plateau

Streets play an important role in communication. Different signs and displays attract people's attention and make people stay. Different paving materials indicate a different area. The slowly moving automobiles also contribute to the safety of the sites. These design elements create opportunities for people to have social and commercial exchanges.

Street patterns within Le Plateau show the significant characteristics of the neighborhoods. The streets and its streetscape create a comfortable environment for pedestrians. First, it is a continuous, open network with pedestrian streets, spaces and paths. Second, there are corridors of mixed-use zones, such as Avenue Des Pins. Third, there are lots of social and communication areas such as the setbacks of buildings and narrow porches. This kind of phenomenon results from the accumulation of commercial and mixed-use zones. Finally, the streets within residential and commercial areas are scaled to accommodate the entire atmosphere.

Figure 4.4 Typical social and gathering places in Le Plateau

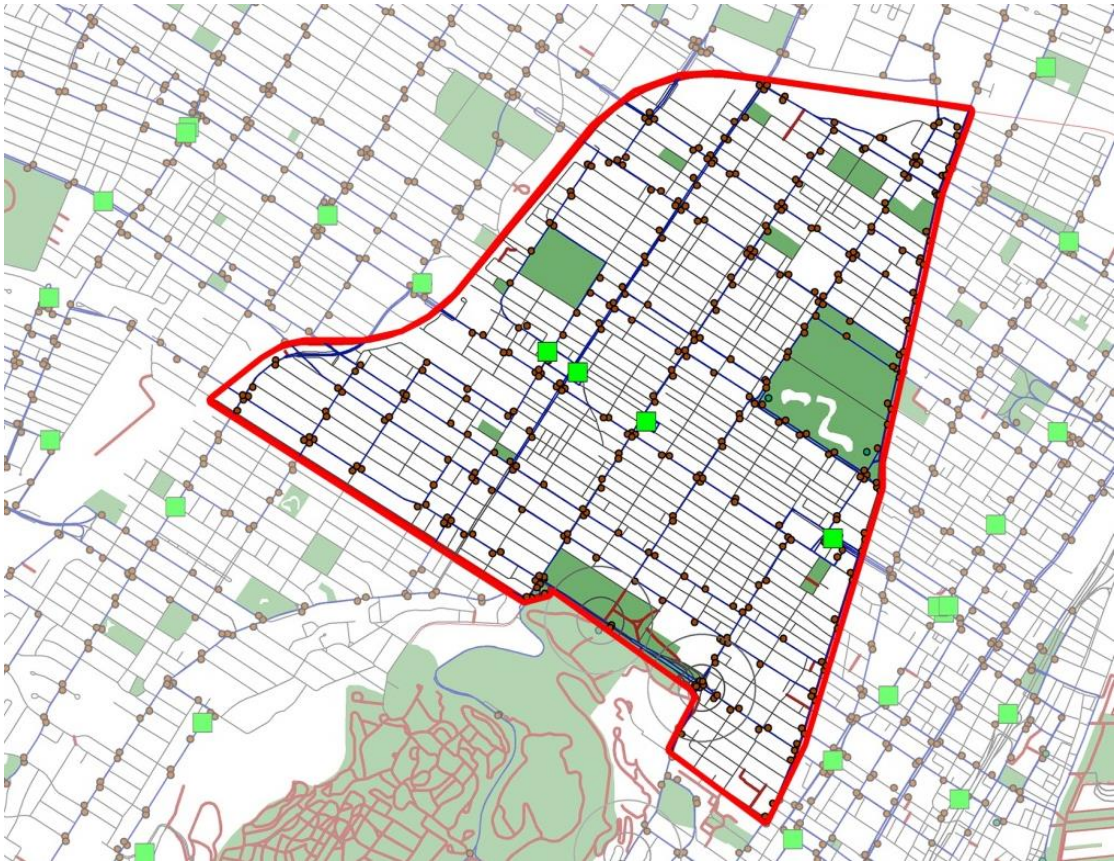


Figure 4.5 Circulation in Le Plateau (TRAM McGill, 2015)

The street in Le Plateau follows a grid system according to the geography. Design of the streets and open space is reconciled with road linkage. The hierarchy of the different streets influence land use and the land use also stimulates the improvement of the streetscape. For example, the accumulation of commercial activities on the Avenue Des Pins creates an opportunity for the improvements of open spaces, such as fountains, sitting areas and planting beds.

Figure 4.6 Different building façade

Density and mixed land use are important elements for attracting pedestrians (Moudon, 1997). An effective street not only works as a “channel for vehicular movement” (Southworth and Parthasarathy, 1997), but also indicates the history, culture and human activities within the sites. Most of the streets in Le Plateau are defined and lined with houses of similar height (two to three stories). Although the building facades are generally different in style and detail, they still get along well with each other.

Figure 4.7 Street patterns in Le Plateau (TRAM McGill, 2004)

4.3.1.1 Details of Avenue Du Parc

This section shows the specific examples of the streets within Le Plateau. It describes the characteristics based on observation.

Avenue Du Parc is a major road that goes parallel to the northwest of Mount Royal. According to the area within Le Plateau neighborhood, it shows three major significant characteristics. First, there are large open spaces for sitting and gathering along the road adjacent to Mount Royal Park. Second, the street trees are distributed uneven with disconnected designed streetscapes. Finally, there are various changes of the land use from parks, residential to commercials. These changes can be easily seen according to the changes in landscapes, such as pavements, streetscapes and public open spaces. These differences can influence the walkability within the sites.

Figure 4.8 Section of Avenue Du Parc

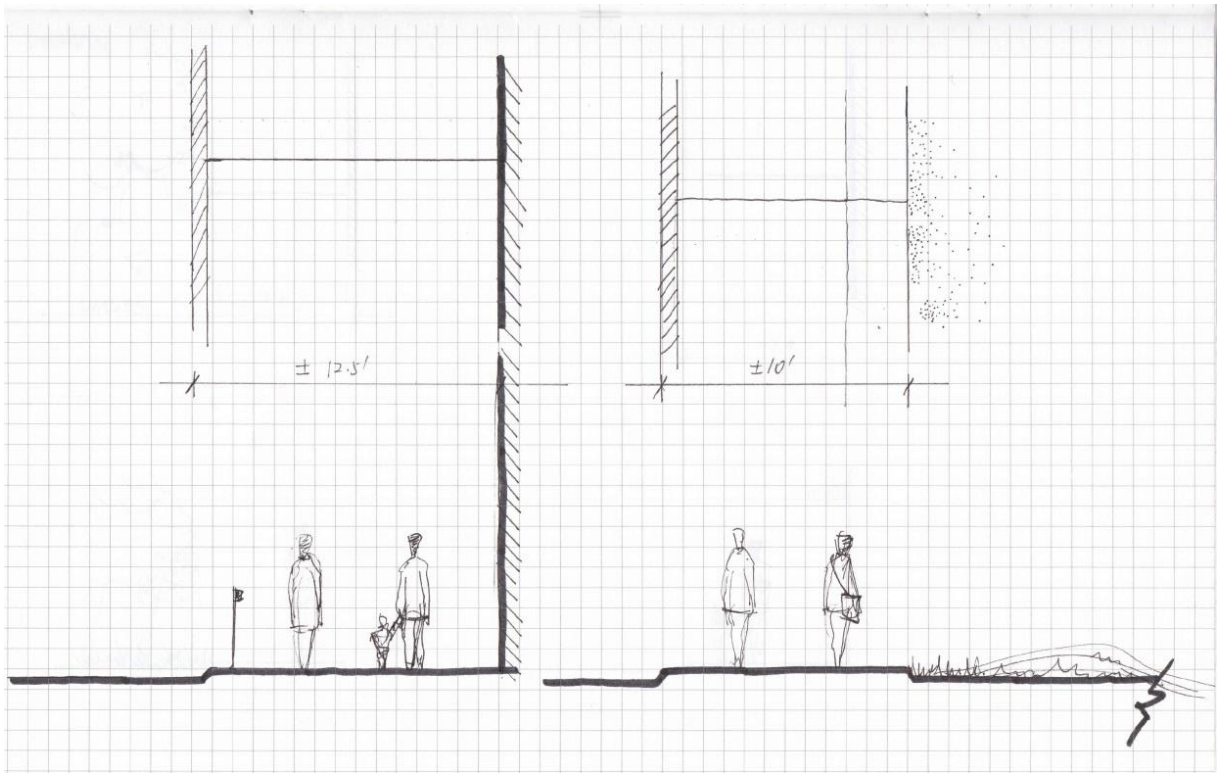


Figure 4.9 Plan and section of pedestrian on Parc Avenue

4.3.2 Ville-Marie

There are different kinds of physical and social diversity within Ville-Marie. There are more and different participants who help to define the unique characteristics of the streets. This area provides a good example of the influence of connectivity and complexity to open spaces.

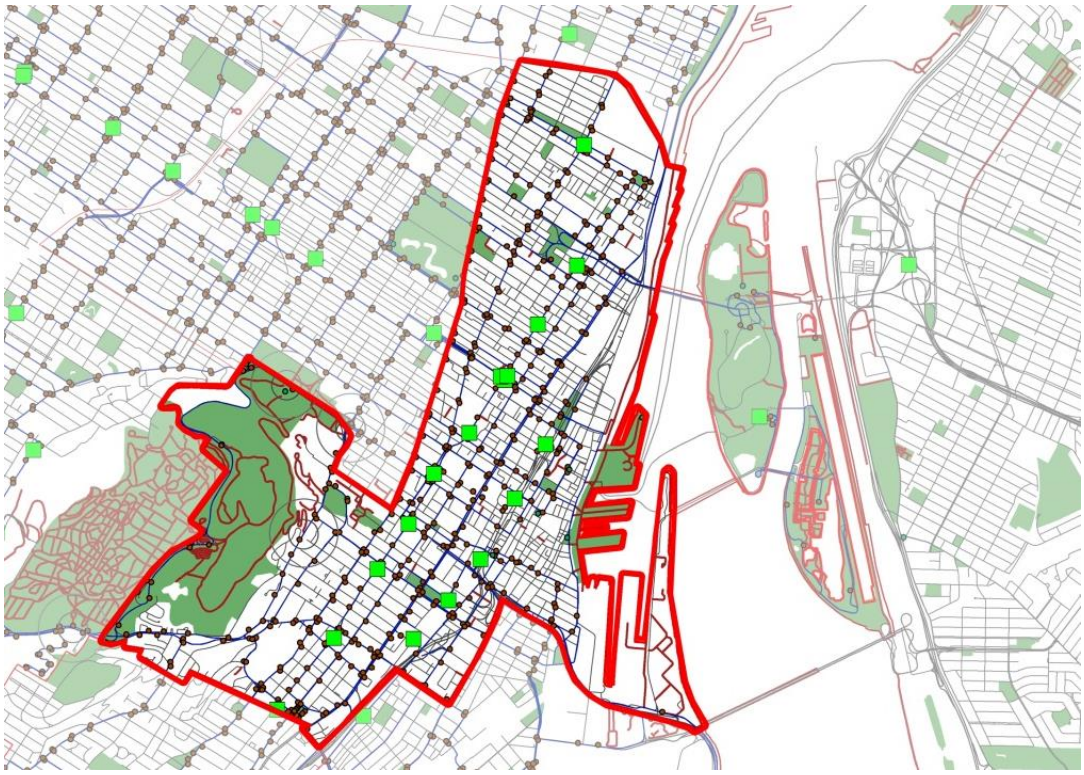


Figure 4.10 Circulation in Westmount (TRAM McGill, 2015)

There are three significant characteristics of the street patterns within Ville-Marie. First, the grid system has been modified according to geography. Second, there are streets that provide vistas towards the mountain, which link the city to the mountain in a linear sequence according to Olmsted's vision (Wheeler, 2008). The location and scale of the open space has been affected by its land use. Finally, parades and important events usually take place within this area.

Figure 4.11 Street patterns in Villa-Marie (TRAM McGill, 2004)

4.3.2.1 Details of Avenue Des Pins

Avenue Des Pins is a major road that sits close to Mount Royal. There are three major characteristics. First, the streets go along the mountain. Second, the width of the pedestrian path is limited by old street trees and heavy traffic. Thus, the pedestrian travel experience needs to be improved by slowing the traffic or expanding the pedestrian areas. Third, most buildings along the road are modest in scale and harmonize well with the background of the mountain.

Figure 4.12 Street section of Avenue Des Pins

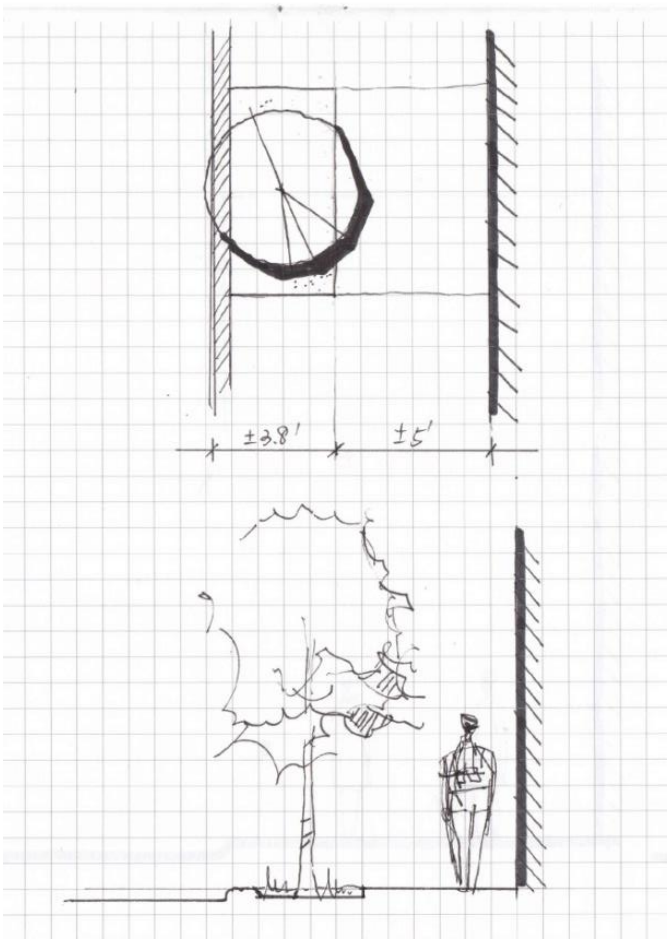


Figure 4.13 Plan and section of pedestrian on Avenue Des Pins

4.3.2.2 Details of Rue Peel

Rue Peel is an important road that connects the mountain to the river. The street also has beautiful sequences and vistas to draw people's attention towards the mountain. There are two distinguished characteristics of this street. First, there is a big difference of changes in land use from the mountain to the river, which contribute to the variety of the sites. The street not only shows a dynamic change and sequence of density and building heights but also in varied streetscapes. Second, this street leads people to get into the mountain directly by both public and private transportation. This area only provides limited parking space for visitors and citizens to get into the mountain.

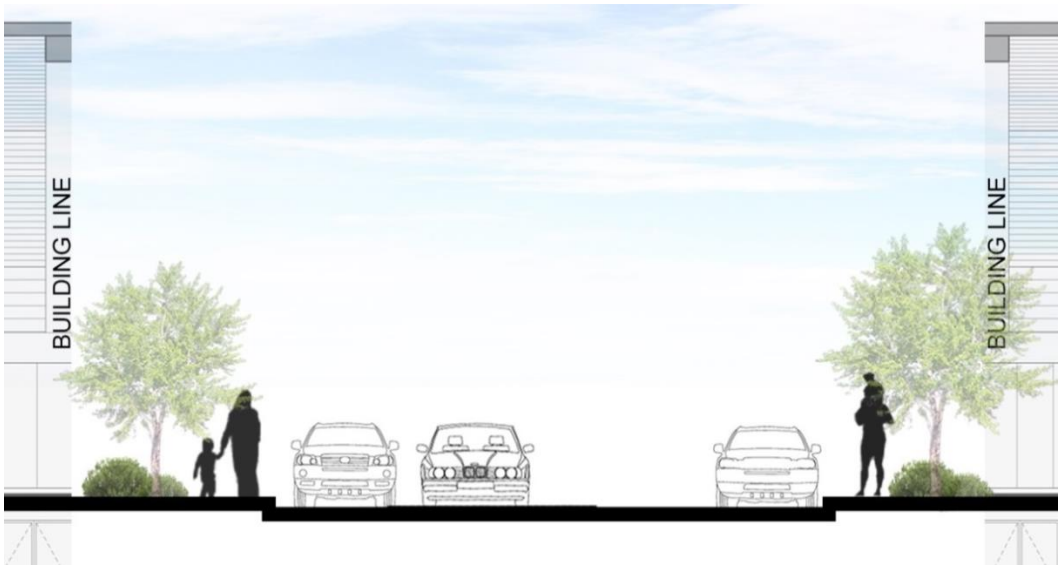
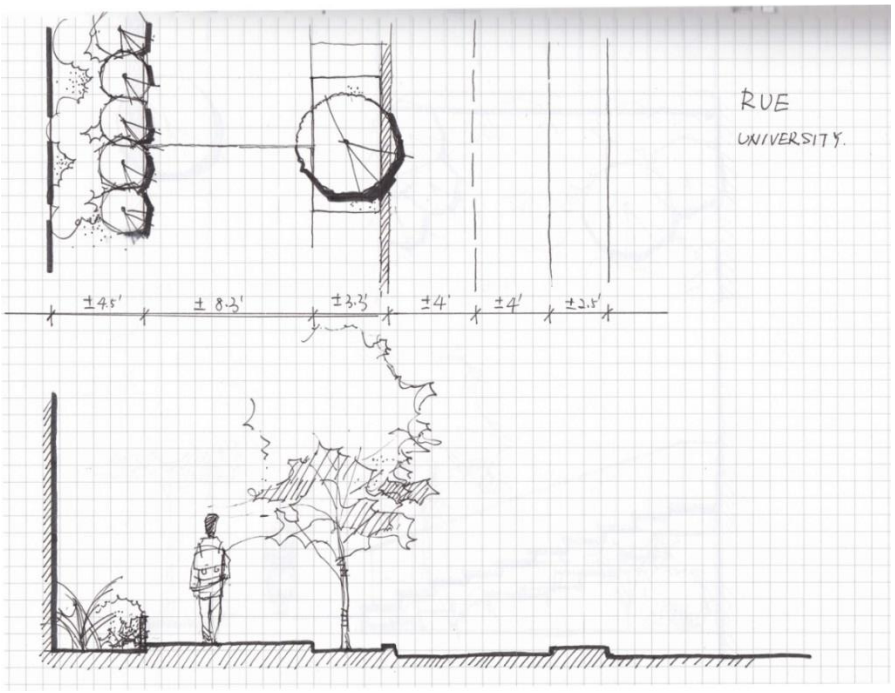


Figure 4.14 Street section of Rue Peel

Figure 4.15 Rue Peel towards the mountain

4.3.2.3 Details of Rue University

Rue University has a close relationship with major institutions. Most of the pedestrian users are from the university and residential adjacent area. There are three characteristics of this street. First, the street connects the city center to the mountain and it also leads people's attention towards the mountain. Second, the street is well equipped with planting beds and deciduous street trees. Street parking makes the street narrow but also helps to slow the traffic. Thus, it contributes to create a pedestrian-oriented moving environment. Third, there are a variety of transportation modes such as pedestrian, bicycle routes and vehicular lanes.



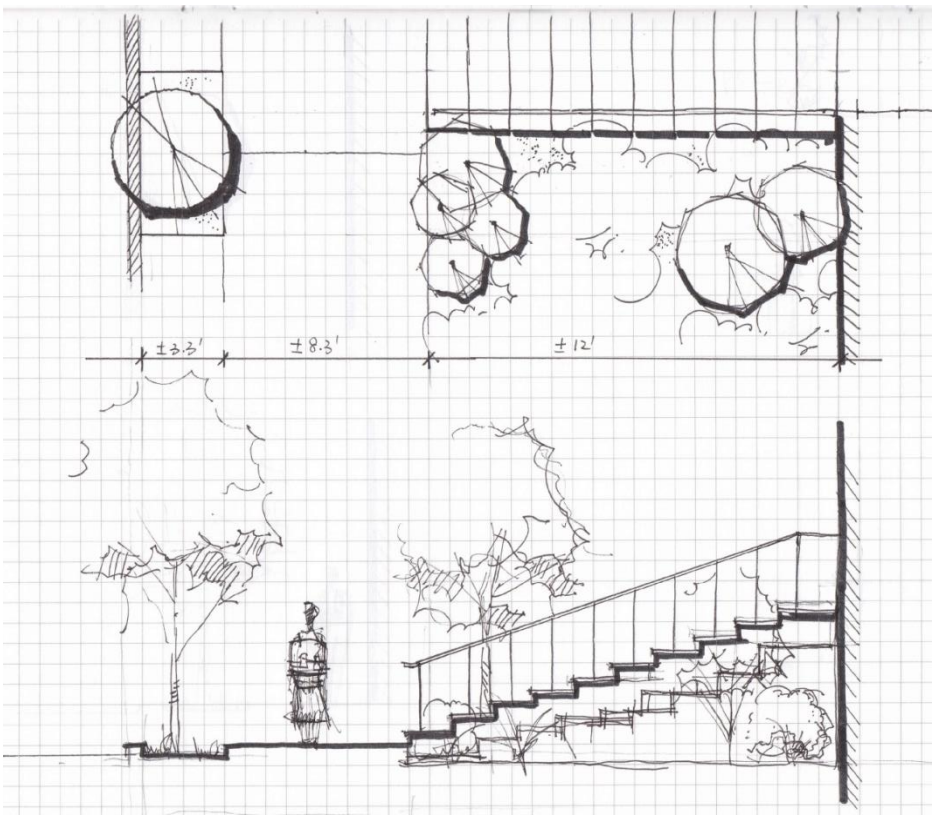


Figure 4.16 Plan and section of pedestrian on Rue University on both sides (a) (b)

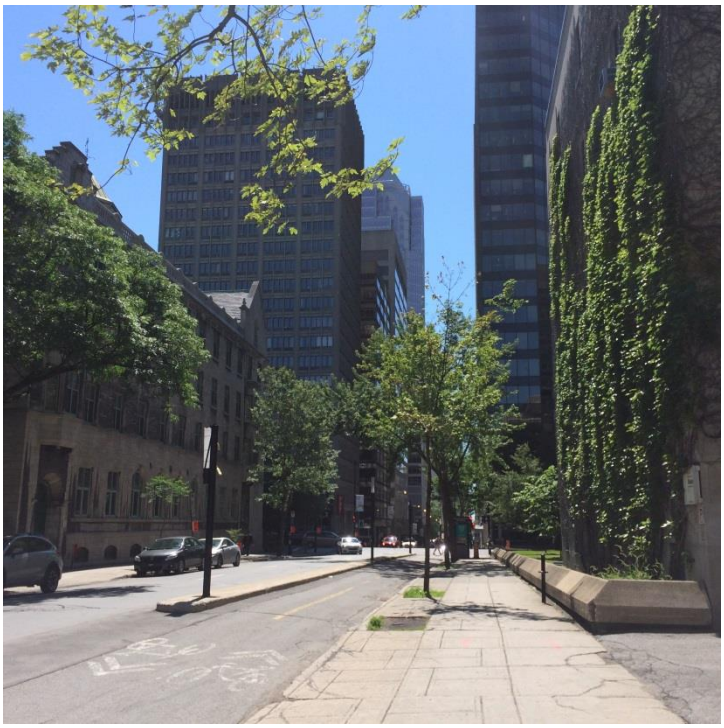


Figure 4.17 Photos of Rue University

4.3.3 Westmount

Loop and grid systems are two distinct kinds of street patterns systems. The loop system provides a safety, sociability and efficiency linkage while the grid system emphasizes connectivity and orientation. The street system in Westmount combines the two systems mentioned above. Comfortable is the significant characteristic for the streets in Westmount.

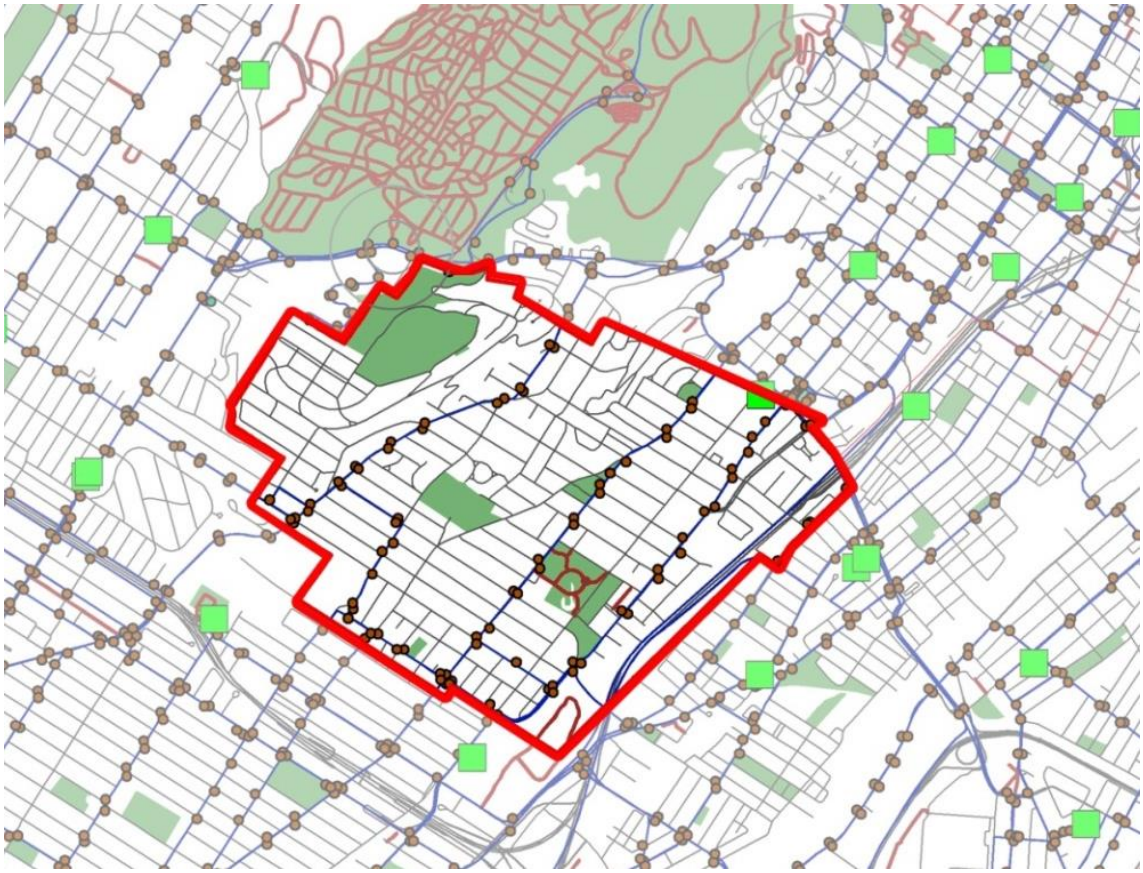


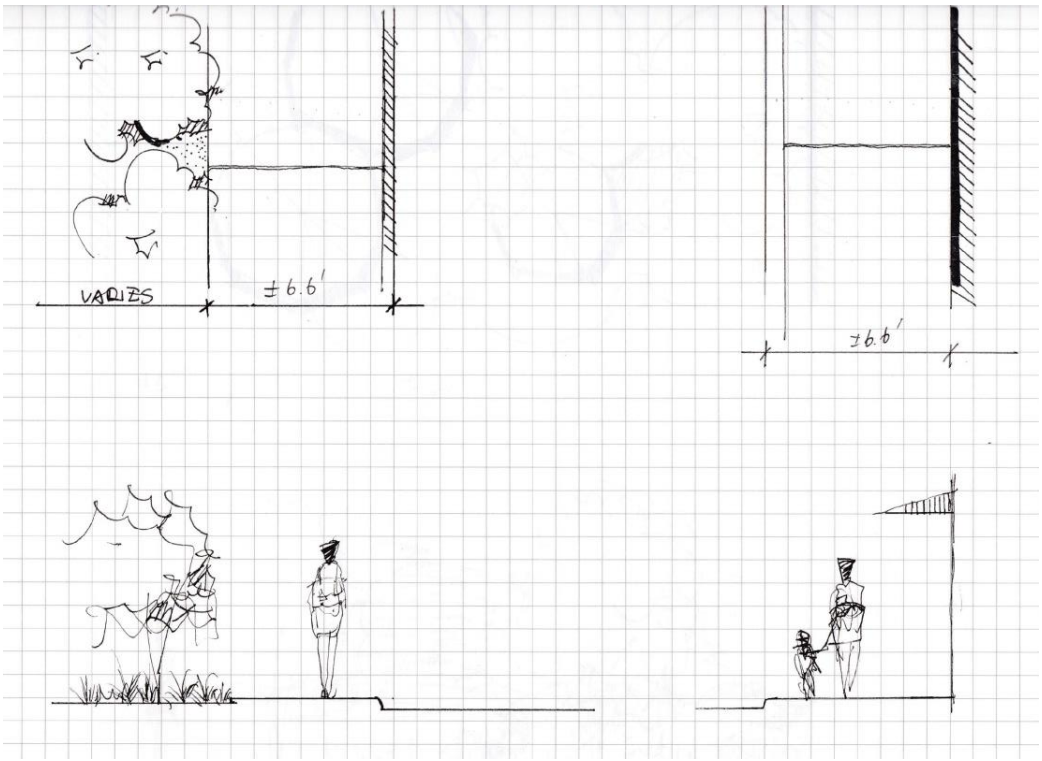
Figure 4.18 Circulation in Westmount (TRAM McGill, 2015)

Comparably, the street patterns within Westmount are settled according to the geography but also compromise for different land uses. The streets within Westmount are equipped with large open space and urban parks. There are more curvilinear streets in response to the geography.

Figure 4.19 Street patterns in Westmount (TRAM McGill, 2004)

4.3.3.1 Details of Chemin De La Cote-des-Neiges

There are three characteristics of the Chemin De La Cote-des-Neiges. First, there are several large open spaces for sitting and gathering along the roads. There are routes for people doing exercise. Second, there is a mix of land use area such as institutions, retail, offices and residential neighborhoods. Finally, the streetscape is continuous and carefully designed according to its major uses.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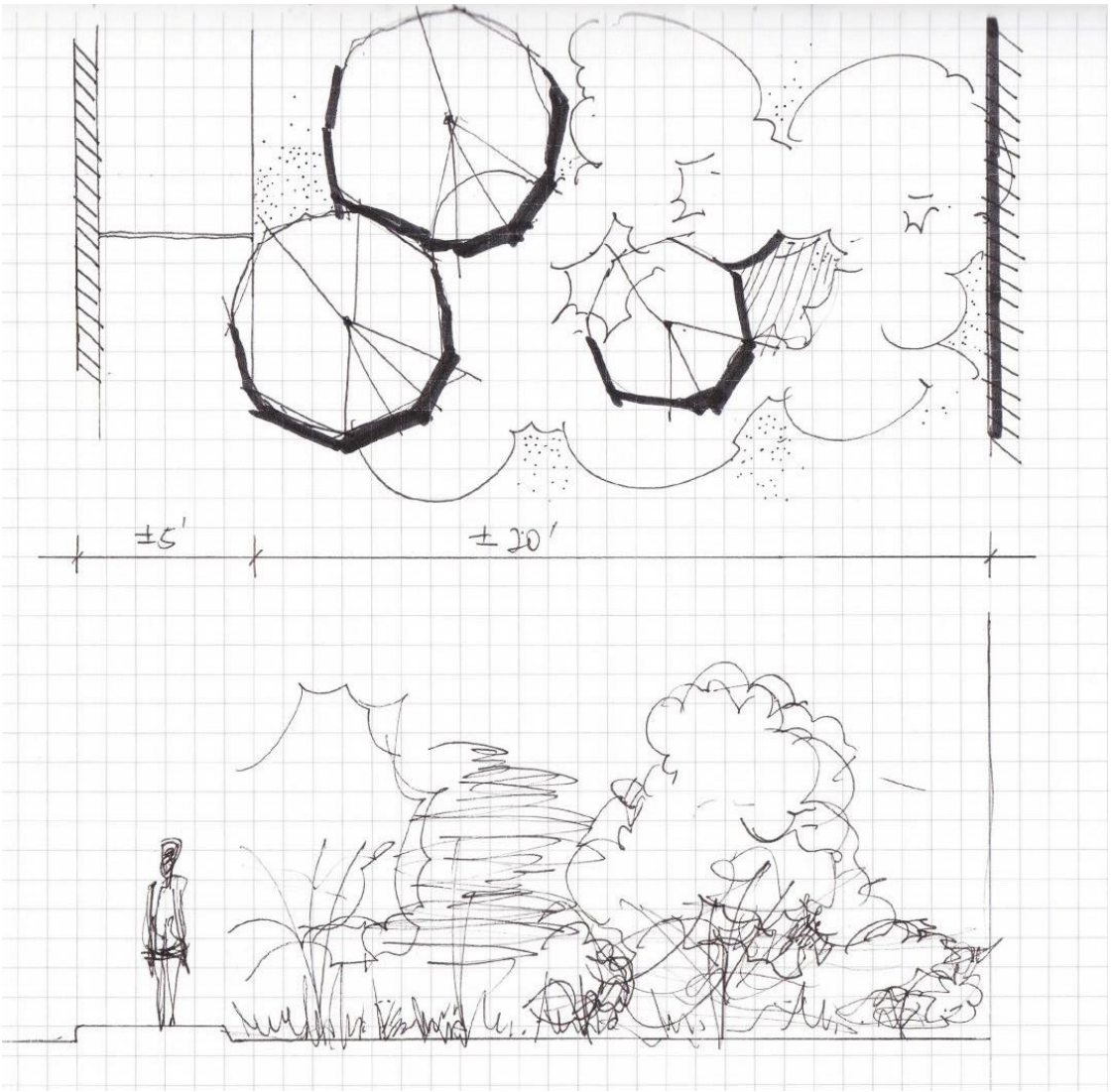

Figure 4.20 Plan and section of pedestrian on Chemin De La Cote-des-Neiges (a) (b)

The concerns with street plans and the city's morphology demand knowledge of how streets can serve and function well to meet citizen's needs. Scale, context, and natural resources help to identify the city. They relate to history, culture and geography of the city. Over time, these elements contribute to the functions and designs of the street. There are many benefits to study the physical patterns and scales of urban streets and blocks. An understanding of both nature and characteristics of the different neighborhoods helps us to have a better knowledge of the environment of streets.

Montreal's unique characteristics contribute to the elements that relate to its architecture and urban design. The sensibility of design expresses the living art of Montreal, which also makes the city unique and significant. The center of Montreal is mostly characterized by Mount Royal and the mountain has been developed into an extensive green linkage with streetscape, parks and open spaces.

4.4 Entrance of Mount Royal Park

A significant aspect of Olmsted's design concepts for Mount Royal Park was accessibility from bottom to top, which lead visitors to experience the landscape he created (Wheeler, 2008). The circulation system was particularly important for experiencing the entire progress from the edge to the summit. The path was prime evidence of his vision which is to provide access for everyone (Wheeler, 2008).

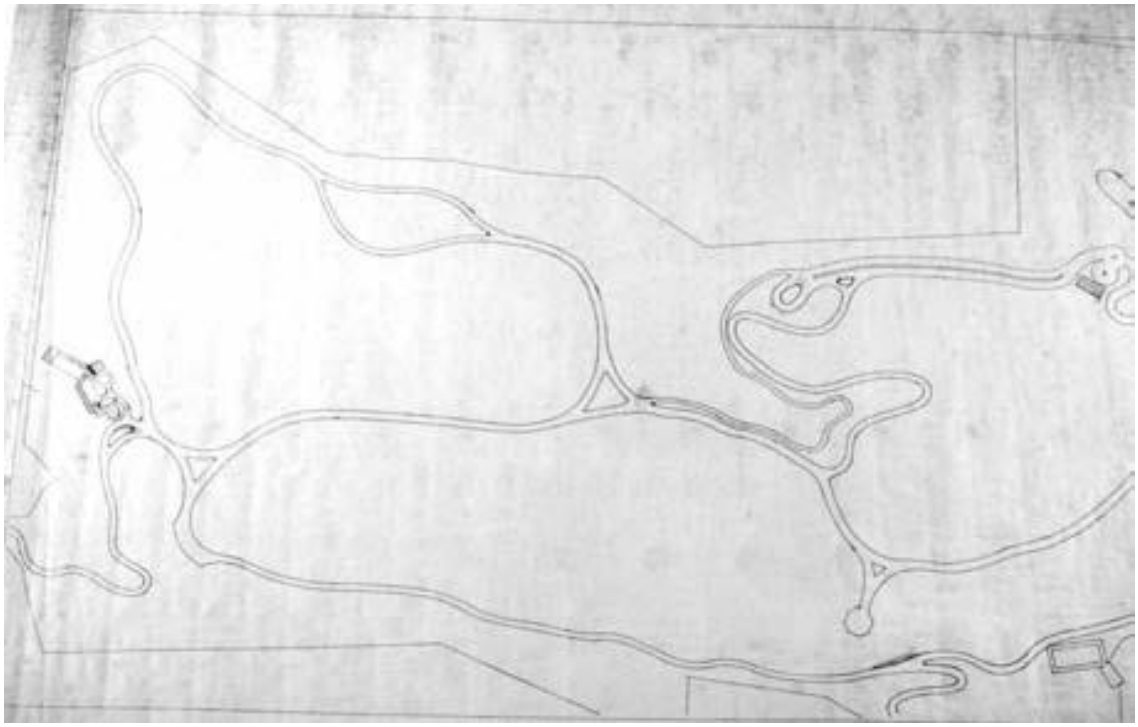

Figure 4.21 Olmsted's sketch (McCord Museum)

This section studies three entrances to Mount Royal Park within the three neighborhoods. The GIS maps provide the base information of circulation and walkability. Walkability is one of the most important measurements in analyzing the

accessibility of the park. A quarter mile, about six minutes' walk, is considered as a walkable distance. As Hank Dittmar, and Gloria Ohland mentioned in *The New Transit Town: Best Practices in Transit-Oriented Development*:

> *"Locate development close to transit. Effective TOD places residential and office space as close to transit as possible. The optimal walking distance between a transit station or stop and a place of employment is 500 to 1,000 feet. Residents are willing to walk slightly longer distances to get to transit, between a quarter- and a half-mile."*

	Minutes	Feet
In a highly attractive, completely weather-protected and artificially climatized environment	20	5,000
In a highly attractive environment in which sidewalks are protected from sunshine and rain	10	2,500
In an attractive but not weather-protected area during periods of inclement weather	5	1,250
In an unattractive environment (parking lot, garage, traffic-congested streets)	2	600

Figure 4.22 Chart to illustrate people's tolerance for walking (Ritter and Paul, 1982)

4.4.1 Le Plateau

The built landscape adjacent to the north area of the Mount Royal is quite different. Though the new landscape is not designed by Olmsted, the subsequent designers followed his visions. People take advantage of these areas for participating in big events. Public transportation is also within walkable distance to these landscape areas, which makes these open lawns and playground accessible for most citizens.

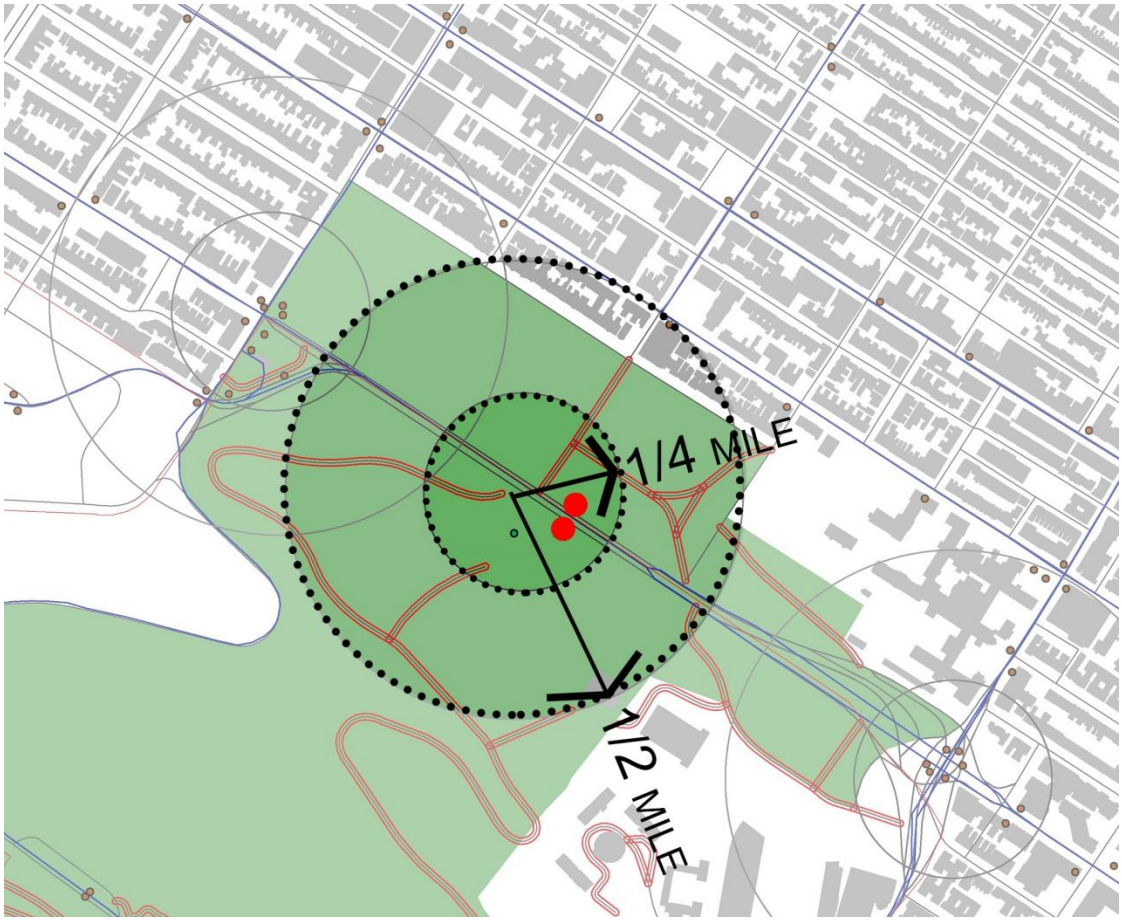

Figure 4.23 Entrance to Mount Royal Park within Le Plateau

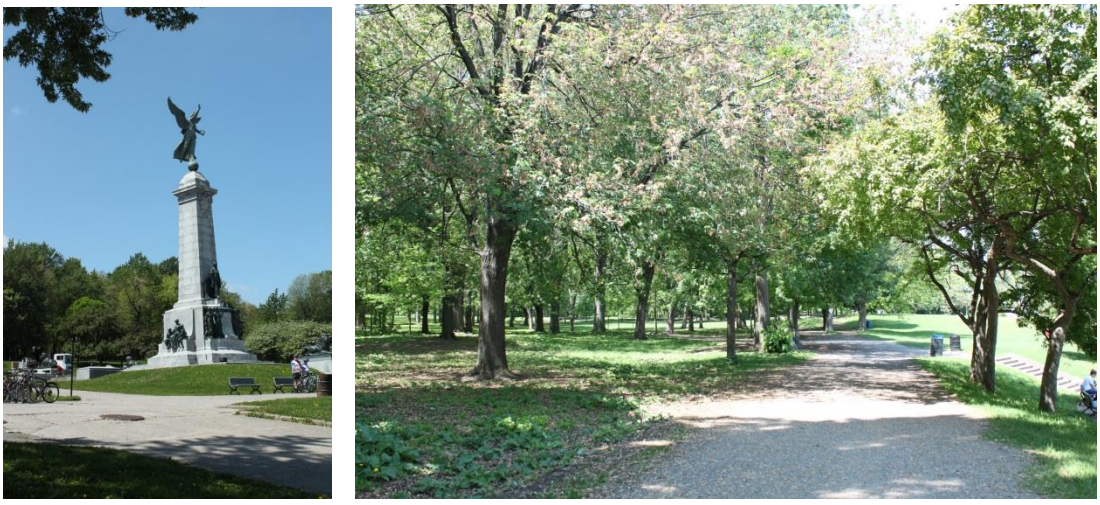

Figure 4.24 Entrance to Mount Royal Park within Le Plateau

4.4.2 Ville-Marie

The major entrance within Ville-Marie is located on the Avenue Des Pins. The entrance has been redesigned to enhance the different elevations. The designed water features help to collect and indicate the runoff.

Figure 4.25 Redesigned landscapes

From the maps created by the GIS program, there is one bus stop within a quarter mile traffic circle while there are three within a half mile. There is a limited number of on-street parking along Avenue Des Pins and Rue Peel. This entrance mainly serves the residential, institutional and hospital users. The limited public transportation and the limited parking space make this entrance less convenient for a large group of tourists and other citizens.

Figure 4.26 Entrance to Mount Royal Park within Ville-Marie

Figure 4.27 Site photos

4.4.3 Westmount

The entrance adjacent to the Westmount neighborhood provides easy access for large vehicles. Large tourist buses and private cars can park easily in the parking lot. The area is connected to the major arterials of the city. The lookout for Mount Royal is located on the south-east of the mountain. Thus, the lookout is adjacent to this entrance. In conclusion, public transportation can help citizens reach the area within walkable distance, but pedestrian and bicycle access lacks legibility and comfort.

Figure 4.28 Entrance to Mount Royal Park adjacent to Westmount neighborhood (TRAM McGill, 2015)

Figure 4.29 Panoramic view of the street towards Mount Royal Park

Figure 4.30 Pedestrian cut through without traffic lights

4.5 Conclusion

A green system provides an opportunity for citizens to communicate with the nature. Urban parks and plazas help to improve the living quality by creating a green eco-system. Mount Royal is the largest green resource and natural heritage in the core area of Montreal. Thus, the mountain plays an important role in building an eco-system to improve the quality of life and the urban environment.

In 1988, Montreal created the Mount Royal Heritage Site to preserve the park. Since then, lots of issues have been raised. One of the most crucial tasks is to take an innovative measure to recover the vulnerable eco-system. With the moving of the Royal

Victoria Hospital in 2015, it is also important to find a solution to deal with the protection of the heritage buildings and the potential expansion of major institutions, schools and infrastructure. Besides the architecture, the landscapes adjacent also need to be protected.

Mount Royal Park serves as a landmark and symbol of Montreal. It also reflects the city's history and culture. Ultimately, this study has presented the evolution of the built landscape associated with the park over a century. Though the beauty of landscape and streets varied, each of them has its own individual memory (Jacobs, 1993). In addition, it is a challenge to keep the different features of the landscape components within a memorial and archaeological site. On the other hand, such a cultural and historical interpretation of the landscapes contributes to the livability of Montreal.

CHAPTER FIVE

CONCLUSIONS

5.1 Importance of Findings

This report examines the evolution of the built landscape and how the city has implicated Olmsted's plan over time. This study indicates that Montreal's urban morphology has been influenced by its built landscape and the Mount Royal Park encourages the walkability within the study areas. Landscapes have also contributed to the integration and preservation of the natural features and resources in the three neighborhoods.

Olmsted's design proposal reflected his attitudes towards nature. He appreciated the beauty of nature and the therapeutic role Mount Royal played for the citizens (Wheeler, 2008). The adjacent landscapes have also been strongly influenced by Olmsted's plan for Mount Royal Park since 1876. In addition, his plan also has helped locating natural resources and provided an eco-linkage system for the city.

Based on the city's evolution, it can be concluded that after the 1870s, the form and the shape of Montreal have not only been influenced by Mount Royal Park. Many other significant elements have influenced city's patterns as well. For example, land use plays an important role in forming the landscapes. Different land use provides opportunities for design and the redevelopment of open spaces. For example, commercial areas need more open spaces and the accumulation of people, which requires a pedestrian-friendly environment.

Montreal's unique characteristics are not only deeply rooted in its geography, as defined by the mountain and the river, but also relate to its history and culture. An understanding of the built landscape involves the implication of geography, architecture, and linked discourses of historical and cultural identity. The GIS program provides an important methodology for analysis. The GIS program is an important tool for dividing landscape elements into portions and presents a long term evolution of urban forms over time.

5.2 Relevance to Landscape Architecture

Life encourages people to maintain a connection to an ever-changing, growing network (Kiley and Amidon, 1999). The process is evolutionary, with things moving and growing in related and organic ways (Kiley and Amidon, 1999). Thus, it is important for people to be prepared to see and respond to changes.

Nowadays the culture and natural resources have become significant elements in building the city's characteristics. By studying the green system in Montreal and its relationship with urban morphology, this research demonstrates how long-term planning can influence a city's shapes and forms. It can also provide background information for future developments. The landscape of Montreal serves as a symbol of the city's history and culture, and has contributed to the improvement of its inhabitants' living quality.

5.3 Suggestions for Future Research

This report reveals several opportunities for future research. In the study, the limitation of the GIS program shows an opportunity for developing an analysis tool by combining historical data with GIS technology. It is suggested to build a GIS program model that implicates historical documents and evidence for mapping and analyzing urban elements. This information can release spatial historical data via the Internet for public access

Mount Royal, born in part of glacial erosion, serves springs, ponds and streams that change from century to century (Marsan, 1981). Over time, people take advantage of topography and drainage to create pools, tanks, and ornamental water. Water helps to form the shape of streams, ponds and wetlands. In the meantime, natural streams and ponds disappear with the construction of new roads within Mount Royal. Water is channeled into the city sewers. Runoff causes a series of erosion problems. According to Olmsted, Mount Royal has great values not only to the nature art but also to public health (Beveridge, 2008). Thus, it is important to recover the vulnerable eco-system of the mountain.

Figure 5.1 Photos of the runoff

5.4 Summary

In *The American Scene,* novelist Henry James captured the flavor of Central Park in 1903:

> *"It has…something for everybody…it has had to multiply itself to extravagance, to pathetic little efforts of exaggeration and deception, to be breathlessly everywhere and everything at once…It has had to have feature at any price…"*

Like Central Park, Mount Royal Park presents healthy and agreeable scenery for citizens. Mount Royal Park designed by Olmsted has lasted for 150 years and reflects the fashion of the day (Kelly, Guillet and Hern, 1981). Some of the characteristics such as open lawns, irregular ponds, and gazebos create a tranquil suburban atmosphere for citizens and emphasize the experience for pedestrians. This landscape heritage of Montreal has been well protected over time (Kelly, Guillet and Hern, 1981).

In addressing the largest natural resources in the city, a large number of urban activities and events take place within Mount Royal Park. The mountain itself already plays an important role in identifying the city. It functions beyond being a simple landmark for city.

Figure 5.2 Photos of people doing exercises in the Mount Royal Park

As the development of the city, most of Olmsted's suggestions have been adopted (Beveridge, 2009). The linkage of parks, trails, and neighborhoods, represents Olmsted's idea for creating an ecological connectivity (Rybczynski, 1999). Citizens have become more aware of the roles they played in urban life. This kind of attention stimulates design inspiration as well as provides great opportunities for the full-usage of the urban park. Thus, Mount Royal Park becomes integrated and spatially relates to surrounding neighborhoods.

Olmsted contributed his efforts and influenced designers of future generations to the urban environment of Montreal (Beveridge, 2009). It is important to follow his suggestions to visualize a linkage of natural eco-systems and provide a healthy environment for citizens. It is the mission of both city and professionals (architects, landscape architects, urban planners and others) to work together to create a better environment through the management of natural resources. It is also important to equip the city with high quality recreational opportunities and urban activities.

No matter how cities are formed, their spatial structure affects their physical, ecological, and socioeconomic evolution (Whitehand, 2010). A major goal of this study is to present an evolution of the built landscape adjacent to Mount Royal Park. It also demonstrates the park encourages the walkability within the study areas. In addition, this study develops a methodology to examine the relationship between spatial structures of urbanization and the evolution of open spaces.

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