Generative Urbanism:

Re-Imagining the Mid-size City

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Outline

Abstract	1
Introduction	2
Chapter One: Ottawa's Urban History	
1.1 1903 – Preliminary Report to the Ottawa Improvement Corporation	4
1.2 1915 – Report of the Federal Plan Commission on a General Plan For the Cities of Ottawa and Hull	7
1.3 1922 - Federal District Plan For Ottawa	11
1.4 Proposal of a Federal District	11
1.5 A Modern Plan for Canada's Capital: 1950 Greber Plan	13
1.6 1988 Plan for Canada's Capital: A federal land use plan	18
1.7 1999 – The Plan for Canada's Capital	20
Chapter Two: Current and Future Ottawa	
2.1 Current Ottawa	23
2.2 The Downtown Urban Design Strategy 2020	26
2.3 Case Studies: The LRT system	27
2.4 Case Studies: The Bronson "Makeover"	32
2.5 Development of "Midsize Cities"	33
Chapter Three: The Compact City	
3.1 Sustainable Cities, Cities and Ecosystems	36
3.2 Ecosystems	37
3.3 Cities as Sustainable Ecosystems	38
3.4 Sustainable Transportation	40
3.5 Biodiversity	41

3.6 Metabolism of Cities	42
Chapter Four: The Carless City	
4.1 The effects of Car Culture, Urban effects of car culture	45
4.2 Ecology and Car Culture	48
4.3 Sustainable Transportation Systems	49
4.4 Rail Transit Modes	49
4.4.1 Light Rail Transit (LRT)	50
4.5 Rail versus Bus	51
4.6 Bicycles	52
4.7 Pedestrians	54
Chapter Five: Generative Urbanism	
5.1 Actual Situation of Ottawa	56
5.2 Connecting Ottawa: From the suburbs to downtown	57
5.3 Nodes, Transportation Hubs + Social condensers	60
5.4 Programmatic Bleed: Downtown Ottawa Master Plan	65
Post-script	68
Annex: Palace of the Body	70
Acknowledgments	78
Bibliography	79

Abstract

In the past two decades, architects and urban planners have been searching for a new approach towards urban design. The “modernist” approach created “car-based cities” with common issues: sprawl, isolated suburbs, and depressed urban cores. Most urban centers, especially developing and “mid-size” cities, are struggling with these issues, which are affecting their productivity and efficiency.

Generative Urbanism is a proposal towards the social and spatial improvement of the “Mid-size City”. It takes advantage of the attributes of the existing city and mitigating its deficiencies. The project is based in Ottawa, Canada, a capital city with a difficult history of urban planning. Ottawa is a “car-based” city, facing complex issues of commuting, mass transportation, and overwhelming urban growth. The resulting architecture project [“*Palace of the body*”] develops strategies that connects the urban center with its surroundings, creates spaces for inter-action, and improves existing and future infrastructure and mass transportation systems.

Generative Urbanism re-imagines the “mid-size city” as a set of new and existing networks that work to generate a livable, functioning urban entity by linking new social programs to the provision of large-scale infrastructure.

Introduction

We live in a world that is highly urbanized; in 1900 only a tenth of the world's population lived in cities.¹ Today more than half the world's population lives in an urban center. The global urban population is growing at a staggering pace, concentrating development and economy within the urban boundaries. This expansion has created a new scenario, making architects and urban planners challenge the way cities have been conceived.

Our cities are a result of a "modernist" approach based on the use of the automobile, and the development of its infrastructure. The lack of success in managing urban growth added to a massive appeal of the automobile has resulted in a migration of population and activities to the outskirts of the urban core. The extensive suburban developments of the last decades has led to decentralized cities with complex commuting issues, depressed urban cores and an increase in congestion and pollution.

These issues are gradually developing in "midsize" cities. In the recent past, "megacities" accommodated urban migration, but its "economies of scale" are saturated, opening the door for "midsize" cities to become generators of economic activity. The competitiveness and quality of life of these cities depend on how these issues are undertaken; and what urban possibilities arise from these solutions. At the moment, cities are focusing on developing sustainable policies for their current and future plans. Most of these policies focus on technical subjects,

¹ Rogers, Richard. 1998. *Cities for a Small Planet*. Westview Press, p.4

neglecting the most important ingredient in the urban realm: its inhabitants.

Ottawa is one of these “midsize” cities; as the capital of Canada it appeals towards locals, visitors and investors. But Ottawa is a “car-based” city, it no longer has a lively downtown, it is not stimulating, and its streets and public places lack small events and convergence of activities. These issues combined with public concerns towards the mass transportation system and long commutes reflect in Ottawa’s lack of competitiveness and importance compared to other “midsize” cities in Canada.

This thesis addresses the potential of combining existing and new networks to generate an alternative proposal of the “mid-size” city. *Generative Urbanism* intends to create new links between existing infrastructures, mass transportation, and new social programs. It proposes new spaces of interaction that link the city with its center, by providing spaces for its inhabitants to have new social experiences. These new spaces would ultimately transform the “mid-size” city into a competitive and efficient urban center filled with activity, bringing its inhabitants together to fully develop its potential.

1. Ottawa's Urban History

Figure 1. Ottawa's Urban Growth From 1876 to 2000's. Source: National Capital Commission (NCC) 2010

1.1 1903 – Preliminary Report to the Ottawa Improvement Corporation

In 1903 Frederick G. Todd (1876 -1948) was assigned to produce a Report for the Ottawa Improvement Corporation. Todd was the founder of the Town Planning Institute of Canada and perhaps the first professional landscape architect in the country². Ottawa had an extensive amount of land, a growing population and unlimited source of waterpower for manufacturing. To take advantage of this, Todd presented a scheme based on the design of parks and open spaces to give the Capital a “national Character”.

At the time, people wanted Ottawa to be the “ Washington of the North”; but Todd completely disagreed, due to Ottawa's landscape characteristics. Instead, Todd proposed a plan for the future, suggesting great spaces for enjoyment in natural open areas. This would prevent crowded populations and promote

² Todd, Frederick. 1903. *Preliminary report for the Ottawa improvement commission*.
<https://qshare.queensu.ca/Users01/gordond/planningcanadascapital/todd1903/Title.htm>. Accessed September 20th, 2011.

health and pleasure. He anticipated Ottawa's dual stand between nature and industry, a conflict that he considered decisive in the future development of the Capital. The park system designed by Todd had the following components:

Large natural parks or reserves

Canada has some of the most beautiful forests in the world, for this reason Todd thought it was suitable to keep forest reserves close to the Capital city. These reserves would be examples of the natural forests for future generations and a place of nature that could be found at driving distance.³

Suburban Parks

Todd considered suburban parks vital for the city. This medium size parks were supposed to be located at a short distance from the city core. He considered that the use of these parks would animate the city, giving those who couldn't go out of the city in the summer a place for leisure and enjoyment.⁴

Boulevards and parkways

Boulevards and parkways are connecting routes, especially between the parks, the center of the city and through the riverbanks.

³ Todd, P. 7

⁴ Todd, P.10

Waterway parks - Bathing

Waterway parks are located along the banks of the river. Todd proposed that these waterway parks were designed in a way that people could use them for bathing. By doing this, the city would create a bathing culture and recognition of the bodies of water as an important asset of the city.⁵

City Parks and Squares

Since 1903 Todd anticipated the importance of small squares and city parks for a city. He saw them as breathing spaces that should be located throughout the city to counteract the crowded areas within the urban fabric. The city parks and squares proposed were different from the suburban parks; they provided a place for recreation in the immediate neighbourhood.⁶

Although Frederick Todd advised the commission to follow his preliminary parks plan for the capital; the Ottawa improvement commission decided to drop him as a consultant and relied on his staff to finish his work. Some of the parks proposed by Todd were built, but the work made by the OIC after he was dropped was disappointing. Although his plan was not completely taken into consideration, many of its parks and parkways resurfaced later on plans by Bennett (1915), Cauchon (1923) and Greber (1950).

⁵ Todd, P. 22

⁶ Todd, P. 23

The early years of the OIC were highly criticized; coincidentally they overlapped with the emergence of modern city planning in North America and Britain. During 1911 a typhoid epidemic and a housing shortage made Ottawa a principal candidate for a new city plan. After intense political battles, the federal plan commission appointed architect Edward Bennett as chief planning consultant (1913). The decision was appropriate, since Bennett was among the finest American planners of his time and a leading voice in the 'City Beautiful' movement.⁷

7

Bennett's Plan was presented in an exhibition at the Downtown Ottawa Office building in January 1915. The 1915 plan for the Federal Plan Commission consisted of the following components:

- Regional parks and forest preserves system
- Parkway and Playground plan
- Street layout for future suburban expansion
- Regional passenger and freight railway plans
- Regional Highway plans
- New plans for street railway lines
- Utility Analysis
- Waterway and flood analysis
- Plans for municipal and federal government buildings
- Central business district plan
- Preliminary Zoning scheme

The analyses made for this plan were well thought out and consequently predicted much of Ottawa's future development. The population projections were accurate, stating that the Ottawa-Hull region would grow from 125,000 to 250,000 by 1950.⁸ The parks system followed much of Todd's previous analysis. Bennett's team also prepared an estimate on traffic and rail system based on other American cities. It turned out to be relevant except on what concerned the use of the automobile, which had conservative projections.⁹ Bennett did not expect the massive appeal automobiles would have in the future. Probably one of the most insightful outcomes was in the Railway plans. Bennett saw a problem regarding the future streetcar congestion

⁸ Gordon, P. 284

⁹ Gordon, P.284

downtown, and advised the city to consider a streetcar subway under Wellington Street¹⁰.

Bennett gave the city a new identity by organizing the government center. He placed the parliament building on the edge of Barrack Hill; this was a special site due to its landscape characteristics (the view towards the river and its visual notoriety towards the city). In this reorganization, Bennett proposed that all federal government buildings were located along Wellington Street (west), while all the municipal buildings, along Elgin Street (south-east).¹¹ The 1915 plan included Hull, the overlooked parallel city across the river. Bennett proposed its civic center and bridge connections to Ottawa.

One of the most interesting decisions in the plan was the zoning provision; separating the city into six different districts ranging from industrial, transport areas to residential. Bennett also included height limitations to protect the prominence of the Parliament Buildings.

The 1915 plan was one of Canada's first comprehensive plans.¹² Unfortunately, its implementation and fate were not as successful, and was finally ignored. The Federal Commission made crucial mistakes in the printing and translation of the report. Those mistakes translated into distribution issues throughout Canada, and even some political rejection. The plan was finally dropped. Canada was focused on war, and on the reconstruction of the Centre Block of the Parliament Buildings,

¹⁰ Gordon, P. 285

¹¹ Gordon, P.285

¹² Gordon, P. 275

which caught fire. Either way, the plan suffered from opposition towards the 'City Beautiful' style consequently it was said it focused more on aesthetics than on town planning. This resulted to be its final downfall.

Figure 3. Drawing # 5 City of Ottawa, view of proposed municipal and railway centre and General Street System. Source: *1915 General plan for the cities of Ottawa an Hull*

Figure 4. General Street System. Source: *1915 General plan for the cities of Ottawa an Hull*

1.3 1922- Federal District Plan For Ottawa

Ottawa was entering a complicated path that other cities such as London or Washington did before. They developed different plans but they partially implemented them or did not execute them at all. The 1922 plan acknowledged that Ottawa didn't have a concrete plan for its current and future dimensions. The result of past plans had left the city with a tangible parliament building area, an urban grid and a few spaces saved for public gatherings.

Other than that, the city was suffering with a housing deficit that was evident since the 1915 plan. There were major health concerns due to slums establishing around and inside the city. This problem started to contrast against the natural beauty and landscape.¹³

The city of Hull was also a concern within the Federal District Plan. It was considered that Hull had been neglected in the past. The creation of a provincial town-planning department was vital to include Hull in the Capital Region.

1.4 Proposal of a Federal District

Noulan Cauchon, a consulting engineer and town planner, submitted a proposal to reconsider the political organization within the Capital Region (1922). He suggested the creation of a "Federal District Commission" that would be in charge of "controlling and developing the physical and infrastructural

¹³ Cauchon, Noulan. *1922 Federal district plan for Ottawa*. <https://qshare.queensu.ca/Users01/gordond/planningcanadascapital/cauchon1922/index.htm>. Accessed September 20th, 2011.

projects within the cities of Ottawa, Hull and its surroundings”¹⁴. Consequently, municipalities were going to give up some of its political power to a commission of experts that would guide the development of both cities. The new commission’s main objective was to guide the execution of plans considering current and future conditions. The 1922 plan proposed the following¹⁵:

Railways

The plan proposed the reorganization of the railway system by eliminating excessive amount of tracks and maintenance; it was imperative to improve the efficiency of the system.

Railways Right of Way and Rapid Transit Railways

The proposal consisted on turning radial railways into radial highways, thus creating rapid connections with the city. This allowed citizens to move longer distances, hence the possibility of having new housing areas for development.

Power and Industrial Development

A proposed dam at the “Little Chaudière” would create additional power needed for the industrial development of the city. Ottawa has always been situated in a strategic location within the economic map of the country. The proposal wanted to take advantage of the natural resources of the region.

¹⁴ *A Federal District for Ottawa*, Journal of the Town Planning Institute of Canada, Vol. 1, No. 9, April 1922, P. 3-6

¹⁵ *A Federal District for Ottawa*, P.3-6

National Parks

The plan proposed a national park at the Laurentian hills that started at the dam in the shore of the Ottawa River and extended towards the north. This mountain park was complementary to other proposals of internal parks and parkways within the Capital city.

Figure 5. Federal District Plan. Source: Cauchon, Noulan, 1922 *Federal District Plan*,

1.5 A Modern Plan for Canada's Capital: 1950 Greber Plan

After another disappointing and unfulfilled plan, Ottawa was still a chaotic and irregular city. Prime Minister Mackenzie King was determined to give Canadians a proper Capital. King, believed in town planning as a social reform tool, and understood the potential and the importance the city could have not only for its citizens but also for all Canadians.¹⁶ Ottawa and

¹⁶ Gordon, David. *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. https://qshare.queensu.ca/Users01/gordond/planningcanadascapital/greber1950/Greber_review.htm. Accessed September 20th, 2011.

Hull were immersed in an urban crisis. Both cities needed major improvements especially after World War II. In 1945, the city of Ottawa was crowded with temporary wood structures used as office buildings; this condition added to the infrastructure chaos and resulted in an unbearable situation.¹⁷

Prime Minister King met Jacques Greber during a trip to Paris in 1936. King instantly connected with Greber. Greber was France's leading urban planner and chief architect of the 1937 Paris World Fair site that Mackenzie King was visiting. Greber had experience working in North America; he worked on the 1917 Master Plan for the Benjamin Franklin Parkway (Philadelphia), among other private park commissions.

On this trip, King interviewed Greber and invited him to Ottawa to prepare an urban plan for the city's core. Greber travelled to Ottawa in 1937, and quickly understood the infrastructure problems the city was facing. He proposed an initial plan combining elements of Bennett and Cauchon's proposals. The result was the National War Memorial and Plaza unveiled in the Royal visit in 1939.¹⁸

After the success of the War Memorial King invited Greber to continue its plan for Ottawa and multiply its effect all throughout the downtown area. The plan got stalled due to the Second World War, when Greber had to return to France and was accounted for the reconstruction of Nord-Normandie.

¹⁷ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20th, 2011

¹⁸ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20th, 2011

To ensure success, King established the NCPC (National Capital Planning Committee), which was independent from the FDC (Federal District Commission) and had representatives from across Canada.¹⁹ Greber was appointed as consultant for the NCPS (National Capital Planning Service), the “only full time professional planning organization in Canada (1945)”.²⁰ With a team of architects, planners, Landscape architects and engineers Greber started the plan for a National Capital Region that included both Ottawa and Quebec side of the river. The components of the 1950 Plan were:

- Relocation of the Railway system and industries from the inner city to the suburbs
- Construction of new cross boulevards and bridges
- Decentralization of government offices to the suburbs
- Slum clearance and urban renewal of LeBreton Flats
- Expansion of urban area from 250,000 to 500,000 lots
- Surround future urban area with a Greenbelt
- A wilderness park at the Gatineau Hills and park systems along the rivers and canal

The relocation of the railway system turned to be crucial for the 1950's plan. It helped to reorganize the infrastructure of the downtown core by reconnecting the road grid and separating industry from housing areas. The government buildings were relocated near Parliament Hill; research, administrative and office areas were decentralized to suburban office parks. This

¹⁹ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20 2011

²⁰ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed February 29 2012

allowed the city to get rid of the temporary buildings and free up space for public institutions such as libraries, theaters and galleries.

The four-kilometer Greenbelt was planned around the urban areas to control sprawl and limit urbanization. If the city grew beyond 500,000 neighbourhood units it had to take place outside the Greenbelt, in Satellite towns.²¹ Greber recommended expanding the parkways all the way to the Greenbelt and to extend the Gatineau Park as close as possible to the downtown core.

One of the major problems the plan had was its population projection. No one expected the post-war baby boom and a strong government expansion. This resulted in a city of 500,000 in 1966 that grew to 1,1 million by 1996.²² By 1970, the suburban expansion outside the Greenbelt started, and the northern area of the Greenbelt (Quebec side), was completely populated.

Unfortunately the design of the streets and boulevards made by Greber were not taken into account. In fact, most of the street designs were made by provincial and regional traffic engineers, which didn't have the special touch that Greber expected. This resulted in streets and boulevards that omitted street furniture and substantial sidewalks in favour of traffic space.²³ Finally, the skyline that Bennett and Greber tried to preserve was ruined

²¹ A proposal based on Ebenezer Howard's 1898 social cities scheme

²² Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20 2011

²³ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20 2011

in 1965. In favour of more tax income, the government allowed skyscrapers in the downtown area to surpass the limit height. This ruined the view of Parliament hill from the south.

The 1950 Plan was the first urban plan that was implemented almost to completion. Mackenzie King's dream was fulfilled and the Ottawa became a genuine capital city. The reorganization of infrastructure, the investment in sewage treatments for the river, and the eventual construction of the Queensway changed completely the way the city operated. The open (Green) space network became iconic in the city. These changes transformed the public and leisure spaces developing tourism and a higher quality of life.

Figure 6. Master Plan. Greber, Jacques Source: *1950 Plan for The National Capital Region*

Figure 7. Proposed Highway Plan. Greber, Jacques Source: 1950 *Plan for The National Capital Region*

1.6 1988 Plan for Canada's Capital: A federal land use plan

It took more than two decades to complete Greber's 1950 plan. During this time, especially in the late 1960s, Ottawa suffered changes that had a meaningful influence on the city's future. In February 1969, during the Federal-Provincial Constitutional Conference, the city modified its boundaries integrating Ottawa, Hull and its surroundings. A new rule for the distribution of Federal employment was issued. Federal employment had to represent the demographic distribution of the Capital Region. To make this happen a new business area was created in Hull, changing its skyline and urban relations towards Ottawa.

In the late 1960s, two other changes influenced Ottawa's future: the creation of regional bodies with planning mandates, and new obligations for the NCC. Ontario created the Regional Municipality of Ottawa-Carleton, while Quebec created the Outaouais Regional Community. Both regional bodies had major influences in how the region was managed, and how its municipal services were executed. On the other hand, the NCC focused on transforming Canada's Capital into a "meeting place for all, that had to be preserved, and its national identity displayed". By the end of the 1980s, Greber's plan was completed; the city needed a new vision for the Capital.

In 1988, the new Federal Land Use Plan aimed to transform Canada's capital into a national symbol. It emphasized renovating public spaces into "Capital Stages". The idea was to incentivize tourism by improving the quality of city spaces and the access to the Capital. The plan also concentrated on boosting collaborations between planning entities within the region. The Plan had 4 main goals:

Consolidation of the federal presence in the Capital: priority to political, cultural and administrative institutions on federal lands, distributed the public service in the region, established cultural, national and international institutions in the city core and others

Enhancement of the Capital's green image and greater accessibility to riverbanks: institute and protect the park network, improve network of recreational pathways, guarantee public access to shore lands)

Enhance the quality and appearance of arrival points and scenic entries to the Capital: improve scenic routes and attractions, institutions, facilities and events of national importance, and improve the entry points to the City

Focus on the Capital as a symbol: creation of new urban design policies for the city²⁴

The 1988 Plan left an imprint on Canada's Capital. It created events such as the Canada Day celebrations and Winterlude. It promoted tourism and started to develop tools to attract visitors. There was an intense program of restoration and beautification of major parks and heritage buildings. And finally, major infrastructure rehabilitation took place specifically in the main entrances to the city and in the development of the first phase of Confederation Boulevard.

1.7 1999 – The Plan for Canada's Capital

The closing decade of the 20th century embodied technological and social changes that eventually started to influence planning and city building. The 1999 Plan for Canada's Capital recognized these changes and adapted the previous plan towards a sustainable, fast-growing, and multicultural city. Ottawa started to develop an interest in sustainable planning principles, which would become fundamental taking account the importance of its natural assets and its future population growth.

²⁴ National Capital Commission (NCC). *Horizon 2067 the plan for Canada's Capital*. Pg.28.
<http://www.canadascapital.gc.ca/sites/default/files/pubs/charting-the-future-of-canadas-capital-in-the-21st-century.pdf>. Accessed February 29th, 2012.

Canada was also facing other social changes that influenced Ottawa's future plans: an aging population, immigration and cultural diversity, new information technologies and an increasing role of other provinces. These issues forced the city to increase interaction between planning regional bodies towards the development of a new plan for the Capital Region.

The Plan for Canada's Capital intended to amalgamate the needs of the city with those of the region. The main goals of the 1999 Plan were Capital Settings, Capital Destinations and Capital Links:

Capital Settings: New sustainable principles adopted in city planning gave relevance to the protection of parks and public spaces. This became a fundamental issue for the city.

Capital Destinations: Ottawa increases preservation policies and intends to showcase cultural heritage and destination points to Canadians and foreign tourists. The city supports the development of Confederation Boulevard and the preservation of Parliament Hill as significant national cultural sites in the Capital core.

Capital Links: The plan proposes better connections and entrance points to the Capital Region. This includes interprovincial bridges, parkways and improving the transportation network.²⁵

²⁵ National Capital Commission (NCC). *Horizon 2067 the plan for Canada's Capital*. P. 27

After the implementation of the 1999 Plan, Downtown Ottawa and Gatineau were linked by the completion of the Confederation Boulevard project. Other infrastructure projects were executed (refurbishment of the Champlain Bridge), and a significant amount of land was acquired. Although this was important, the plan lacked execution in terms of its main goal: a more sustainable, fast growing, multicultural city. In consequence, a new strategy was proposed a few years later.

2. Current and Future Ottawa

2.1 Current Ottawa

Ottawa has slowly established itself as a Capital city. It is Canada's 4th largest city, with a population of 800,000 inhabitants (1.1 million in its Metropolitan area). The Capital is not only recognized for its vast natural and agricultural areas. It is gradually becoming one of Canada's cultural centers, a high tech research hub (with top Universities within its boundaries), and it is one of the top telecommunications research and development centers in the world. Ottawa has Canada's highest household income, and the most highly educated workforce in the country. The Capital has become a multicultural city; its Canada's 4th urban center for immigration, with 25% of its residents born outside the country.²⁶

Since the 1999 plan, Ottawa has faced new stimulating challenges. In 2001, the city decided to change its government structure by amalgamating 11 urban and rural municipalities and 1 regional municipality into 1 government structure. Taking this into account, the new city expects an incredible level of growth. A modest city, getting close to 800,000 inhabitants in the year 2000, is expected to grow to around 1,2 million or more within the next 20 years; transforming Ottawa into a complex urban region.

To respond to the new challenges, Ottawa has developed an

²⁶ City of Ottawa, *Official Plan Ottawa*. Pg.1
http://www.ottawa.ca/city_hall/ottawa2020/official_plan/vol_1/pdf/section_01_en.pdf. Accessed March 1st, 2012.

official plan based on the premise of sustainability.²⁷ Ottawa has acknowledged that it has to face similar challenges as other North American cities: weakening of the ecosystem, population growth, extensive use of the automobile and consumerism. Accordingly, Ottawa has developed a framework to manage its future growth. "Ottawa 20/20" view the city as a "compact, efficient, equitable, affordable, environmentally healthy city".²⁸

Within Ottawa 20/20 there is an Official Plan that supports the development inside and out the urban boundaries. It explores the possibilities the city has to increase its residential and employment densities along the main corridors. It also examines alternatives to the automobile through the promotion of new transit possibilities, cycling and walking. Ottawa 2020 has seven principles that direct the city's future:

A Caring and Inclusive City: Ottawa should be diverse and inclusive, with infrastructure for the disabled and inviting to new comers, immigrants and seniors. It should engage more with its citizens and fulfill its basic needs (such as security, leisure, transit, housing, among others).

A Creative City, Rich in Heritage, and Unique in Identity: Ottawa should promote a vibrant and attractive mix of activities within the arts and creative

²⁷ Sustainable development is defined by the Official Plan as: "development that meets the need of the present generation without compromising the ability of future generations to meet their own needs". City of Ottawa, *Official Plan Ottawa*. Pg.1

http://www.ottawa.ca/city_hall/ottawa2020/official_plan/vol_1/pdf/section_01_en.pdf. Accessed March 1st, 2012.

²⁸ City of Ottawa, Ottawa 2020 management Plan. *Ottawa pedestrian Plan*. Pg 11.

<http://ottawa.ca/cs/groups/content/@webottawa/documents/pdf/mdaw/mdyw/~edisp/con041239.pdf>. Accessed October 20th, 2011.

realm. It should generate a sense of place with its local heritage, arts, culture and its unique landscape.

A Green and Environmentally Sensitive City: Ottawa should preserve and strengthen its relationship with the natural habitats and the green spaces network. It should focus its future transportation needs on transit modes, cycling and walking. And should develop land wisely within the city avoiding urban sprawl.

A City of Distinct Liveable Communities: Communities in Ottawa are in need of an identity that makes them feel proud and that they are an integral part of the city. These communities have to be aesthetically pleasing and well connected between each other. They have to be well balanced between housing, employment and leisure activities and green spaces.

An Innovative City where Prosperity is Shared among All: Ottawa wants to create a vibrant economy based on strong local businesses and a recognized rural economy. The city wants to encourage education, training, and information to overcome obstacles and increase employment opportunities.

A Responsible and Responsive City: Ottawa wants to be responsible with its finances; the city wants the general public to be aware and knowledgeable of what is going on in order to be able to contribute.

A Healthy and Active City: Ottawa wants to create an environment where sports and recreation are main activities within its society. This will promote health through the creation of community facilities that are accessible to all.

29

2.2 The Downtown Urban Design Strategy 2020

With Ottawa 20/20, the city has prepared the “Downtown Ottawa Urban Design Strategy”. This plan recognizes the downtown area as an essential focal point of the city. The aim of “Downtown Ottawa Urban Design Strategy” is to re-urbanize the area by increasing the quality of public and urban environments. Consequently transforming a downtown area defined by its business district into an economical/cultural core full of vitality and activity. This new local identity should meet the “needs and demands” of a city of more than a million inhabitants.

The “Downtown Ottawa Urban Design Strategy” suggests a central area that encourages new residential developments, improves access to water and green spaces and promotes mixed-use projects. It also recommends reducing de reliance on automobiles by making public transit a priority and supporting walking and biking as means of transportation. It urges the use of compact/mixed use projects to reduce transportation demands, which would also help to minimize the land used for parking. The strategy also promotes heritage and conservation as principal themes within the urban core.

²⁹ City of Ottawa. *The Ottawa 2020 process and the guiding principles*. http://www.ottawa.ca/city_hall/ottawa2020/official_plan/vol_1/01_introduction/index_en-03.html. Accessed March 12th, 2012.

The “Downtown Ottawa Urban Strategy” creates a framework for the development of streetscape infrastructure, open spaces, and art. It targets 41 different strategies, which are a shared vision of the City of Ottawa, the National Capital Commission and the neighbourhoods. In this context, the downtown area becomes a central aspect in redefining the image of the city. Through these strategies the City of Ottawa expects to reconfigure public infrastructure to create a positive, successful and desirable place to live.

Figure 8. Downtown Urban Design Strategy 2020. Source City of Ottawa

2.3 Case Studies: The LRT system and The Bronson Makeover

After realizing that the traffic issue in Ottawa is growing year-by-year without apparent solution, the city decided to pursue the Light Rail System Project. The Project started in January 2007,

when a task force on transportation was created. They released the “Moving Ottawa” report (June 2007), recommending an “east-west rail tunnel bored through downtown to alleviate the current transit bottleneck and build a more inviting streetscape.”³⁰ With this recommendation in hand, the Transportation master plan was revised; consequently, cost and affordability studies were executed establishing a funding scheme.

The cost of the project was estimated in \$2.1 billion, a budget that was secured through the investment of provincial and federal funds. With the budget secured, studies and plans started in 2009. On May - June 2011 Council approved reports concerning the schedule and implementation of the project. Subsequently, on October 2011, the City shortlisted three consortia that will formulate a Request for Proposal (RFP).³¹ The construction of this project will start in early 2013 and should be operational by mid-2018.

Ottawa states that this project has multiple benefits. The project will span 12.5 km from Tunney’s pasture to Blair station, and will have 13 stations. With this project the city expects to reduce bus traffic by 50% within the city core, making Ottawa a “friendly place for pedestrian and bicycle users”. It is expected that by 2031, transit ridership will increase by 78%. This makes the LRT a priority taking account that the O-train already

³⁰ City Of Ottawa. *Ottawa Light Rail, Background, Task Force Report*. <http://www.ottawalightrail.ca/en/project-plan/background>. Accessed March 13th, 2012.

³¹ The three consortia chosen by the city are: Ottawa Transit Partners, led by Vinci Concessions, Rideau Transit Group, led by ACS Infrastructure Canada Inc., Rideau Transit Partners, led by Bouygues Travaux Publics S.A.

[illegible]

Although the LRT project seems to be a positive proposal towards improving the transportation system of the Capital, it still raises concerns. After a 2.1 billion investment, the introduction of the light rail will only increase 9% the transit use within the city. In fact, auto drivers and auto passengers dominate, accounting for 71% of transportation trips.³³

³² City of Ottawa. *Fast Facts Ottawa Light Rail*.
<http://www.ottawalightrail.ca/en/project-plan/fast-facts/page:5>. Accessed March 13th, 2012.

³³ City Of Ottawa. *Horizon 2067 The Plan For Canada's Capital*. Pg. 63.
<http://www.canadascapital.gc.ca/sites/default/files/pubs/charting-the-future-of-canadas-capital-in-the-21st-century.pdf>. Accessed November 11, 2011.

As stated before, the LRT project will open new spaces for pedestrian and bicycle users. But these users are only 12% of the riders (11% walk, 1 % Bicycle). Although there is a bicycle plan for 2018, it has a goal of increasing bicycle ridership from 1.7% to 3% (by 2021). A very low increase considering that 73% of households in Ottawa own bicycles³⁴; and pioneer cities such as Copenhagen have 36% of its population commuting to work.³⁵ The LRT project is not specific in its connections and its role within a multimodal transportation system.

The system is also conceived from Tunney's Pasture to Blair Station. In the NCR "the leading districts in terms of population, including several outer suburbs, contrast with the main sources of employment, with the downtown centres of both Ottawa and Gatineau having the lowest numbers of residents".³⁶ Accordingly, the centers have the highest amount of jobs but a low population, resulting in high volume flows of commuters. This is expected since 80% of the trips to Central Ottawa come from other Ontario districts.³⁷ Looking at the AM peak inter-district flows from suburban Ottawa, and the PM peak inter-district flows from central Ottawa, it is evident that a great amount of frequent east-west trips will not be attended in the proposed LRT project.

³⁴ City of Ottawa. *Ottawa Cycling Plan* (2008). Chapter 1, Pg. 6. Chapter 2 Pg. 4,5

³⁵ Outram Christine, Biderman Assaf and Ratt Carloi. 2010. *Self Engineering Ecologies*. Ecological Urbanism, Lars Muller Publishers. Pg. 172.

³⁶ HDR | iTRANS. *National Capital Region Travel Trend Study* (2011). TRANS Committee, http://www.ncr-trans-rcn.ca/uploadedFiles/resources/NCRTrendStudyPart1-FinalReport_20110207.pdf. Accessed March 1, 2012

³⁷ HDR | iTRANS. *National Capital Region Travel Trend Study* (2011). TRANS Committee. P. 38.

Figure 10. AM. peak inter-district flows from suburban Ottawa. Source: City of Ottawa, Source: *National Capital Region Travel Trend Study (2011)*

Figure 11. PM. peak inter-district flows from central Ottawa, Source: *National Capital Region Travel Trend Study (2011)*

In fact, the city is planning major rezoning and redevelopment around three of the stations of the LRT project. The stations outside the city core are bordered by light industry and low-density retail. If this situation continues, it is a possibility that the LRT project will not have enough users as projected. The city needs to double the population in these areas in the next 20 years to ensure success to the LRT project. If the LRT project

attended the inhabitants that come every day from the suburbs and back, ridership would most likely be ensured. In contrast, the city needs to find ways to elevate ridership and densify areas that are between the downtown core and the disconnected suburbs. In conclusion, the users that live in the suburbs will not be attended by the LRT project; therefore they would still use the automobile as their main transportation system.

2.4 The Bronson “Makeover”

On November 2011 it was publicly announced that Bronson Avenue was going to undertake a makeover. The main reason for reconstruction is to install new underground water and sewer lines. Since the beginning, the community and residents opposed this intervention. In the design, Bronson Avenue is going to be widened 0.6 m. City staff understands that Bronson is already a “constrained” Avenue, and that extra space for traffic is necessary. On the other hand, residents feel that the Avenue’s new design goes against safety measures. They understand that if the Avenue is wider, cars can go even faster and it would start to feel like a “provincial highway”.³⁸

Some community members recognize that the flow of traffic in the Avenue is important, but they consider that widening streets is closer to “1960’s Thinking” coincidentally when traffic engineers were in charge of street designs. The community is concerned with the lack of care towards pedestrians and bicycle users. They consider that it is very difficult to cross the street; an

³⁸ Tunney, Catharine. *Community Hails Bronson Ave. Decision*. Centretown News. February 3rd, 2012. Pg1,2.

issue that is critical considering that Parks, housing, a school and a Community Centre are bordering the Avenue.

The \$30 million project has become quite controversial. Since November, City Staff has made changes to its original design. They have widened some sidewalks, but the street keeps the same amount of lanes. Although residents expected major improvements (like a “road diet” cutting 4 lanes to 3), they didn’t come through, and speeding, loss of tenants due to the noisy street, and unsafe crossings will continue.³⁹ The city demonstrates once more its design priorities, continuing car-based city policies over pedestrians.

2.5 Development of “Mid-size Cities”

Half of the world’s population lives in cities, which indicates that a massive urbanization has taken place. Growth in the last decades has been focused on ‘megacities’; metropolises with populations over 10 million people. While cities such as Tokyo, Los Angeles, or Mexico D.F. have been a substantial agent for world economy, in the near future the trend will change. According to the McKinsey Global Institute, there are 600 urban centers (which have only a fifth of the population of the world) that generate 60% of the global GDP (Gross Domestic Product).⁴⁰ McKinsey refers to them as “middleweight” cities, urban centers with populations ranging from 150,000 to 10 million.

³⁹ Cockburn, Neco. *Battle Lines Forming as Bronson Makeover Looms*. The Ottawa Citizen, Section C. November 24th, 2011. Pg.1,4.

⁴⁰ McKinsey Global Institute. *Urban World: Mapping the Economic Power of Cities*. McKinsey & Company, March 2011.

These “middleweight” cities are expected to grow rapidly, becoming by 2025 vital generators of economic activity. In fact, McKinsey projects that these cities will report 50% of the global GDP growth between 2007 and 2025. Though the cities with the largest growth potential are located in the developing world, Canada should consider this subject decisive since it has 20 of the 600 “middleweight” cities within its territory. Canada should focus its efforts in developing “regional – second cities” like Ottawa and take advantage of this major growth potential.

Actually, these “middleweight” cities have another benefit: the potential to innovate. Regional clusters such as Ottawa have the possibility to unite diverse contributors (the private sector, the public sector, academia, large corporations, entrepreneurs among others), to pursue strategies and benefit from the expected growth patterns.⁴¹ It is important that these cities are prepared for the upcoming growth. Planning and management strategies become fundamental to organize the immediate and future objectives (50 years into the future). Therefore cities would avoid problems that would deteriorate the quality of life (congestion, pollution, lack of affordable housing, infrastructure), which would reduce the possibility of having a dynamic economy.

The reason why these middle size cities are such an influential factor is the “economies of scale” than can be developed in concentrated urban centers. This expansion will foster emerging markets that will reduce poverty and create opportunities for companies that can thrive form this dynamic situation. But this

⁴¹ Dobby Christine, *Rapid Growth: Coming to a City Near You*, The Ottawa Citizen, Section D Pg.1. November 24 2011

growth can only happen if the cities manage correctly future challenges. Cities will be obliged to anticipate urban trends, and they should be ready to handle complex scenarios that will gradually emulate the ones larger cities have. The “economies of scale” will allow industries to be more efficient and augment its productivity compared to the ones in rural settings. It is important to note that services are less expensive when provided to a concentrated population. Thus water, housing and education is projected to be 30 to 50% cheaper in these urban centers compared to sparsely populated areas.⁴²

The reason why “Megacities” have stopped thriving is because they have exhausted their “economies of scale”. For this reason, “midsize” cities have to create strategies to handle the above average growth in population and per capita GDP. By 2025, 13 “midsize” cities will grow beyond the 10 million inhabitants; the only one in North America is Chicago. If the government concentrates in aspects such as demographics, households and incomes “Middleweights” like Ottawa will have the opportunity to outperform other cities. To achieve this, the city has to become much more competitive, dynamic, and attractive for investors, citizens and visitors.

⁴² McKinsey Global Institute, *Urban World: Mapping the Economic Power of Cities*, McKinsey & Company, March 2011

3. The Compact City

3.1 Sustainable Cities, Cities and Ecosystems

Cities are providers of opportunities that enhance the exchange of goods and services and social/cultural interactions. In the last decades, urbanization trends have changed from dense, mix-use, small cities with local economies to sprawled 'megacities' governing over a distant global network. As a result, urban population expands at a rate of 1.78% per year.⁴³ If the trend continues, urban residents will be 66% of the population by the year 2025. This is a challenging situation for the development of cities, thus generating complex and diverse issues. With extreme growth, urban economies are prioritizing processes that transfer energy and materials into products for a predatory global market. The result of this approach is an economic and ecological imbalance that is represented in problems such as: climate change, water supply shortage, and reduction of oil reserves, regional environmental damage, and loss of biodiversity among others.

These problems impact directly the growth of cities. Issues such as sprawl and car dependence generate a lack of community and social alienation. The extreme growth rate of cities is also damaging the bioregional context and generating disconnect between the environment and the urban fabric. To address these issues, innovative cities have to redevelop their economic and social relationships with their surroundings and inhabitants.

⁴³ Newman Peter & Jennings Isabella. 2008. *Cities as sustainable ecosystems: principles and practices*. Washington D.C. Island Press. Pg. 34

3.2 Ecosystems

“Ecosystem: A dynamic and complex system of plant, animal and microorganism communities and their non-living environment all interacting as a functional unit within a defined physical location.”⁴⁴

Ecosystems are a perfect example in which to base the economic and social relationships needed. They are place based, cooperative, diverse, self-regulating through feedback loops, decentralized, conserving and solar based.⁴⁵ Ecosystems are divided in two: Autotrophic and Heterotrophic.

“Autotrophic: Self feeding. The term is applied to organisms that produce their own food (such as plants through photosynthesis) and to ecosystems that produce enough energy internally to meet their own needs.”⁴⁶

“Heterotrophic: “Other feeding”. A term applied to organisms that cannot make its own food – for example animals – or an ecosystem that cannot produce sufficient energy internally from photosynthetic processes to meet its own metabolism (that is, it need external inputs of energy besides light).”⁴⁷

⁴⁴ United Nations Environment Programme (UNEP). *Glossary of environmental terms*. <http://www.unep.org/action/ap1.htm>. Accessed October 28th, 2011.

⁴⁵ Newman and Jennings, P. 37

⁴⁶ Newman and Jennings, Glossary

⁴⁷ Luck et al. 2001. *The urban funnel and the spatially heterogeneous ecological footprint*. Ecosystems 4 : 782-96.

Actual urban ecosystems are considered heterotrophic. Cities are unable to support their own metabolism with their production (the consumption of organic matter is much bigger than the production of new organic matter). As a result cities are obliged to import resources such as food and fossil fuels to maintain their housing, commercial and industrial areas. In nature some ecosystems that are heterotrophic receive additional energy requirements from adjacent ecosystems. In this case these bounded ecosystems can be seen as autotrophic in a bioregional level. As stated, cities could work in a bioregional level with other cities to balance the production and consumption of energy. City economy, as we know it, would have to drastically change in order to create a local and autotrophic approach for the region.

3.3 Cities as Sustainable Ecosystems (CASE)

Cities are to be designed based on economies with restoring feedback loops implemented on their bioregion. By doing this, cities will be capable to respond to global issues (such as the impact on greenhouse gases, extreme oil consumption, biodiversity loss) balancing the global ecosystem with a sustainable production-consumption ratio. The Cities As Sustainable Ecosystems (CASE) approach invites cities to understand their role as part of bioregions that are constantly searching for an “ecological balance”.⁴⁸ By implementing bioregional economies, cities would balance themselves with the carrying capacity of their bioregion, instead of remote markets all over the world. This approach gives cities the chance to re

⁴⁸ Newman & Jennings, P. 44

explore their region in terms of production of food, energy, water and waste disposal.

Modern cities rely on fossil fuels and plant-based energy, which are unsustainable since they are finite resources. The future of sustainable cities is in the use of renewable resources. The transition to a sustainable production of energy has to be implemented in buildings, transportation and industry. Ideally, a city would have an infrastructure designed to support and develop these changes. Quality transit systems (preferably multimodal) are fundamental to structure the city, diminishing the dependence on cars. With a walking and cycling network as a support, all neighbourhoods and districts can be laced between each other. Cities should count with autotrophic energy systems with local and well distributed water systems. Waste management is also crucial; consequently production would shift and create as little waste as possible by implementing recycling policies.

As changes take place, and as infrastructure reunites the inhabitants of the city, new social relationships start to flourish. This new social infrastructure is decisive for the new bioregional economy to work. The strength of communities and the social connection between them creates a sense of belonging and a responsibility towards the city. Further development of infrastructure for social encounters would create bonds at the neighbourhood scale preventing isolated family units, common in today's cities.

3.4 Sustainable Transportation

One of the most effective ways to transform a city into sustainability is to introduce sustainable transportation. With the introduction of sustainable transportation urban economies transform. Cities have systems that depend on oil consumption such as the transportation of goods and people. This situation leaves cities with an economic and social vulnerability in regards to oil scarcity (and its elevating price). Cities that are car dependent suffer for the following reasons:

Car dependent cities spend 15 to 20 % of their wealth in transportation; transit oriented cities spend 5 to 8%.

From a sample of 100 cities those with strong rail systems are 43% more wealthy than weak rail cities.

Car dependence is expensive because cars waste space; cars take 2,500 people per hour in one lane, trains take 50,000.

People who live in car dependent cities use between 20 to 40% of their income in transportation⁴⁹

If cities are compact they don't need to rely on cars for transportation. In fact, other ways of transportation could be encouraged like walking or cycling. This brings an immense amount of benefits to a city from the economical (less fees in transportation, greater energy independence) to the social (fair access to transportation systems, promotion and sense of community, exercise and social activities). With an attractive mix of pedestrian and bicycle lanes, multimodal public

⁴⁹ Newman & Jennings, P. 45

transportation and interesting public spaces people have the opportunity to create a bond with their city and their community.

3.5 Biodiversity

“Biological diversity – or biodiversity - is the term given to the variety of life on Earth and the natural patterns it forms, encompassing the full range of species, genetic variation, and ecosystems in a given place.”⁵⁰

Biodiversity forms the networks in which we all live. All the activities in ecosystems depend directly on biodiversity thus the goods and services needed for sustainability rely on a healthy understanding of our environment. Biodiversity in cities is a subject that is fundamental due to the increase need, protection and handling of services such as water, air, waste, and recycling. Current city building places a heavy load to the ecosystems they inhabit, an issue that increases with sprawling.

Consumption in cities takes a bigger toll on ecosystems when there is an increase exploitation of energy and products that come from outside the bioregion. To turn around this situation cities have to link themselves with their bioregions in different levels. Certain strategies can be enforced to attain this links such as: the creation of static and dynamic reserves within the city and its surroundings, educate the population about their bioregion, reduce the ecological footprint of the city, and design ecological architecture and infrastructure and design cities as biodiversity arks.

⁵⁰ Newman & Jennings, P.65

3.6 Metabolism of Cities

Figure 12. Linear Metabolism, Cities consume and pollute at the same rate, Source: Rogers, Richard. *Cities for a small planet*

Figure 13. Circular Metabolism, Cities minimise new inputs and maximise recycling, Source: Rogers, Richard. *Cities for a small planet*

The introduction of sustainable planning has changed the way we understand the metabolism of cities. For decades planners have developed cities that exploit the environment, basing their designs in gaining profit through technological development. Changing this mentality towards sustainable objectives means to change the way we behave, govern, and build our cities. The "linear metabolism" used until now, consist of acquiring energy (coal, oil or nuclear) to satisfy our needs (food, energy and goods) in a specific environment, the city. With the use of linear metabolism we consume in excess and create high pollution ratings such as organic and inorganic wastes, and emissions.

Cities should shift towards a “circular metabolism”, where the energy used for our needs is renewable, and where those “inputs” can be recycled when needed. This way, the city can “output” less pollution and recycle as much waste as possible. Cities have to be viewed as ecological systems, and maximizing the use of resources is considered fundamental, and where efficiency is a valuable asset. In the past, planners used to develop projects like highways without taking account what would happen in terms of environmental and social issues. This type of planning has created cities with high ecological footprints that devour resources and create social barriers.⁵¹

Planners and architects can reverse the trend by designing compact cities. A compact city “grows around centers of social and commercial activity located at public transport nodes”.⁵² These nodes become a focal point in the city, a place where neighbourhoods can develop in a sustainable way with close by amenities. The *Compact City* is defined as “a network of these neighbourhoods, each with its own parks and public spaces and accommodating a diversity of overlapping private and public activities”.⁵³

⁵¹ Ottawa has an ecological footprint of 8.59, 4th largest footprint in Canada, and beyond the country’s average (7.25). Anielski, Mark. *Ecological footprints of Canadian municipalities and regions* (2005), <http://www.anielski.com/Documents/EFA%20Report%20FINAL%20Feb%2002.pdf> . Accessed March 2, 2012

⁵² Rogers, P. 38

⁵³ Rogers P. 39

Figure 14. Compact mixed-use nodes reduce journey requirements and create lively sustainable neighbourhoods, Source: Rogers, Richard. *Cities for a small planet*

Compact cities are associated with mass transit systems. Cities need transportation systems that can travel at high speeds across the city, linking neighbourhoods. This way, cross-city transportation is efficient; and local transportation can be done by local systems. This reduces the volumes of traffic, and creates effective local lines of tram, rail and buses; and open up safe spaces for cycling and walking. This generates new possibilities in the city, where planners and architects can design multifunctional “open minded spaces” where people can socialize and participate.

Figure 15. Compact nodes linked by mass transit systems can be arranged in response to local constraints, Source: Rogers, Richard. *Cities for a small planet*

4. The Carless City

4.1 The effects of Car Culture, Urban effects of car culture

The use of the automobile has created a culture that has transformed the way we perceive and relate to the cities we live in. Due to the extensive use of the automobile, cities have shifted from “traditional core dominated cities to polycentric and extended urban regions”. Cities have been growing in an intermittent manner through the creation of polycentric areas that have been intensively networked between each other. By loosening the central core and spreading activities throughout the urban region, cities extended their peripheral areas. This new extensions of the city, combined with the dominance of car culture created a new world of service stations, drive through, malls and leisure activities only accessible by the population that owned cars.⁵⁴

This condition transformed the urban landscape. Managed by traffic engineers’, cities were thought out through the lens of circulation and storage of vehicles. Nonetheless, people found new “freedom” with the use of the car. It made their lives flexible: they could go at the speed they wanted, at any time and any direction within a complex infrastructure that connected their main activities: work, home and leisure.⁵⁵

Contrariwise, the extensive use of the automobile didn’t translate into connectivity or accessibility. By designing new

⁵⁴ Graham Stephen and Marvin Simon. 2001. *Splintering Urbanism networked infrastructures, technological mobilities and the urban condition*. Routledge, New York.

⁵⁵ Graham and Marvin

and extensive road networks, the city, once compact, transformed into fragments connected by a system of roads and highways. In theory this new system was made to connect the city, but in practice it partitioned and fragmented the urban fabric. In fact, changes were evident in the transformation of the street. Once an epicenter of multi-use and meeting spaces, the street became a motorized transit space only made for car flows and parked vehicles.⁵⁶ This new situation created not only physical fragmentation but also social separation within neighbourhoods and communities.

The use of the automobile changed our perception of the city. Due to the extensive network created, cities have stretched and widened their urban fabrics resulting in long distances only covered by car. The consequence for the city is segregation within the urban region. Since the implementation of car based networks, our cities and cultures have separated basic city conditions: home from work, rich from poor, old from young.⁵⁷

The extreme fragmentation that cities are suffering calls for new social spaces, but because of the way cities are built these spaces are not visible or accessible. Essentially, the street became a dangerous place. With the use of the car, the social use of the street decreased. With less eyes and activities on these areas, street crime rates went up, which resulted in an alienation of the street space.⁵⁸

Highways and street networks were designed between the 1920's and 1960's to improve cohesion. These networks that

⁵⁶ Graham and Marvin

⁵⁷ Graham and Marvin, P. 120

⁵⁸ Graham and Marvin, P.117 - 120

became the main element of urban plans, intended to maximize regional connections and productivity. The search of this unified city through a car oriented urban form took urban planners such as Robert Moses to “create a system in perpetual motion”. Urban planners became enthusiastic about the possibilities opened up by terms such as “flow” or “traffic”. A new utopian era had started in which the arterial highways dominated over city spaces, to the point that the city itself could become an impediment for traffic flow. Commuters became a main character, and the city was designed and manufactured to their own appeal. Since commuters were generally white middle (working) class, other population (such as the poor and the black) were neglected by urban planners slowly segregating this minority groups.⁵⁹

The new sprawling city lacks a concrete center; in fact the boundary between center and periphery is unclear.⁶⁰ The infrastructure that configures the city links a large amount of city spaces that are loosely connected between each other.

“The urban plane only accommodates necessary movement, fundamentally the car; highways are a superior version of boulevards and plazas, taking more and more space; their design, seemingly aiming for automotive efficiency, is in fact surprisingly sensual, a utilitarian pretence entering the domain of smooth space.”⁶¹

⁵⁹ Graham and Marvin, P.123

⁶⁰ Graham and Marvin, P. 115-120

⁶¹ Koolhaas Rem and Mau Bruce. 1995. *S, M, L, XL, Essay: The Generic City*. Monacelli Press.

4.2 Ecology and Car Culture

In the early 1970's there was a reaction against the energy crises: the environmental movement. Car culture has been a fundamental figure regarding the environmental issues we face since the 1970's. Once the world noticed that our energy resources were finite, the use of the car has exposed our relationship with energy and waste. The environmental movement was fundamental in shaping how infrastructure was developed after the 1970's. The infrastructure networks focused on energy supply connections specifically solving concerns about system vulnerability and dependence of energy sources.⁶²

Although the research of new energy sources has not reached a massive appeal, and we are still dependent on oil-based energy, some changes have been made. There has been a great investment in expansion and research looking to diversify energy sources especially for transportation.⁶³ Due to these new interests, governments have been forced to consider alternative options, offering more investment to mass transit, which have replaced the urban highway projects of the past. This change of focus is altering dramatically how cities are being designed and configured.

Mass transportation is not only shifting the way we go from point A to B, but also our relationships towards our surroundings. More and more transport stations and hubs are becoming social spaces of interaction and leisure.⁶⁴ The shift

⁶² Graham and Marvin

⁶³ Graham and Marvin

⁶⁴ Graham and Marvin

from the personal space of the car towards the social space of the mass transit is a reality cities are facing every day.

4.3 Sustainable Transportation Systems

Cities are looking for solutions to their transportation needs. For years traffic engineers have been in charge of solving the problem, but their solutions are generally car based. They have created bigger and faster highways, larger streets and complex street systems. The experience of the last few decades' shows how if a street system or a highway is expanded it will eventually get filled with thousands of new users creating even more traffic.

Since car based cities have become chaotic, cities have turned their attention towards sustainable transportation systems. These arrays of transportation systems go from complex rail transit systems to bicycle and pedestrian paths. Ottawa is investing in a new mass transit system: Rail Transit.

4.4 Rail Transit Modes

Rail Transit Modes have four specific characteristics: external guidance, rail technology, electric propulsion and ROW separation. These characteristics are defined in *Urban Transit Systems and Technology* (2007 .V. Vuchic) as follows:

External Guidance: Rail transit modes are guided by tracks, having a superior quality compared to other non-guided modes. This translates to a permanent and growing identity towards the system, which results in

higher passenger rates and an impact on urban developments in areas connected by the system.

Rail Technology: Rail technology is efficient and simple. It consists of steel wheels running on two steel rails that are in charge of guiding the system; it is unique and superior to other systems due to a single contact point to the ground.

Electric Propulsion: Most of the rail transit systems in the world use electricity as their main source of power. It produces excellent performance, low maintenance, low levels of pollution and noise and energy recovery during braking (also known as regeneration).

ROW separation: Determines the investment and the operation of transportation modes. A rail system provides a physical separation, making it superior in features such as capacity, safety and speed. In general terms, rail systems will have an advantage when the row separation is augmented; except in cases where there are short services, where the bus has a well-defined advantage.

4.4.1 Light Rail Transit (LRT)

Light Rail Transit is one of the most popular systems used in cities. Its characteristics are appealing, and its flexibility is advantageous when planning transit strategies (It can travel in tunnels, and stop in high or low platforms depending on the needs of a station). Light rail transit is electrically powered; it

has high capacity (around 250 persons – 20 to 50% seated), its quiet and has a high riding quality. LRT can operate 1 to 4 car trains, with a completely separated Right Of Way. Its design allows it to have maximum speeds between 70 to 80 km / hr., although certain models can reach 100 to 125 km /hr.

4.5 Rail versus Bus

For many cities there is a choice that has to be made in regards to mass transit systems: should Rail be implemented? Buses? Or both? The operation of one or the other generally depends on the demand of passengers. A Rail system is not very efficient when working under low demand routes. On the other hand, it is an effective system when a high demand of passengers requires a specific transit route.

The high level of investment in a rail system also reflects in a higher service quality and a stronger identity towards it, some of the even becoming icons of the city itself. Thus rail systems, especially when having a separated ROW, have an enormous impact on transit ridership and change completely the way the transit of the city is organized:

“Major study on rail transit, found out that the per capita bus travel (in the US) cities with rail transit is the same or slightly higher than in cities served by bus transit only. This indicates that rail systems increase total transit usage, in the long run, by the number of trips they serve. In other words, the introduction of an LRT or metro line

usually generates more transit trips on all modes than it diverts from the bus lines it replaces.”⁶⁵

Cities that use bus systems as its only transportation system reflect that transit is considered less important than the ones that have rail systems.⁶⁶ This is exposed in features like rail transit lines generally offer a simple and comprehensive type of service; it's in general terms quite constant during the whole day. When a rail system is connected to a bus system through a transportation hub or station, they create an integrated network that results in high efficiency. Rail transit systems are an investment that create densification and land use around their main stations. This means that a Rail transit system tends to play a major role in the intensification of investment in a city, boosting local economy.

4.6 Bicycles

“The average American, as of 2005, spent thirty eight hours annually stuck in traffic. In 1969, nearly half of the American children walked or biked to school; now just 16 percent do. From 1977 to 1995, the number of trips people made on foot dropped by nearly half. This has given rise to a joke: In America a pedestrian is someone who has just parked their car”.⁶⁷

The bicycle is a key element in the success of a sustainable city. It gives people the chance to transport themselves in short or

⁶⁵Vuchic, Vukan R. 2007. *Urban Transit Systems and Technology*. Hoboken, NJ: John Wiley & Sons. Print. P.. 300

⁶⁶ Vuchic, Vukan R.

⁶⁷ Vanderbilt, Tom. 2008. *Traffic, Why we drive the way we do (and what says about us)*. Random House Inc. P.16.

medium distances for a minimum price and effort. Nonetheless some cities have prioritized car traffic policies and have made bicycle traffic dangerous and unappealing. In Ottawa, bicycles have constantly been a popular topic in the political arena, but in reality, the city's infrastructure consists of unconnected paths or unequipped streets.

Figure 16. Actual bicycle paths in Ottawa (2008), Red: existing bicycle lane Blue: City owned Pathways, Cyan: NCC Pathway Source: Ottawa Bicycle Plan.

The discrepancy between governmental promises and reality makes Ottawa one of the cities where only 1 or 2 % of the trips are done by bicycles. For cities to have a coherent policy, they have to focus their attention in making room for bicycles in conventional streets. Like any other person in traffic, someone in a bike also has errands, school, and work or leisure activities. The policies implemented have to transform the cyclist from an endangered transit type, to a citizen that has the infrastructure to go safely across the city.

Ottawa plans to implement a bicycle strategy that would increase its critical mass by 1.3% in 20 years. At the moment the plan consists of creating a network of facilities that can be used

by active cyclists. In the long run the city wants Ottawa to be identified as the “premiere cycling capital of Canada and one of the most sustainable transportation cities in the world”.⁶⁸

To achieve what Ottawa wants takes more than expanding, linking and connecting facilities. Cities that have focused their energy in implementing bicycle policies have reduced parking spaces and driving lanes in favor of bicycle paths. They have also made bicycle traffic an integrated part of their transportation strategies. This way bicycles can be transported within subways, buses and trains, which makes it possible to combine bicycle trips with transportation systems.

Cities have facilitated bicycle parking at stations, schools, and offices or near housing. These cities have created bicycle lanes that are safe and separated from car traffic, generating a special space for bicycle users. Above all, its essential to create a bicycle culture implementing campaigns like “open bicycle streets” that allows the city to create a positive mass effect towards bicycles as it has been done in New York and South America.⁶⁹

4.7 Pedestrians

Pedestrians are critical to functioning cities: they bring life and interaction while making small demands in terms of infrastructure.⁷⁰ Pedestrian traffic consumes very little resources since it's the same user the one providing the energy;

⁶⁸ City of Ottawa. *Ottawa Cycling Plan*. 2008

⁶⁹ Gehl Jan. 2010. *Cities for People*. Washington D.C. Island Press: Pg. 185-188.

⁷⁰ Gehl , P. 105

consequently creating a transport that is clean and silent. An acceptable walking distance for a pedestrian is around 500 m, although it depends on the quality of the path.⁷¹ In general terms, most of the city centers have an area of 1 square km, providing pedestrians with most of the city services at walking distance.⁷²

Before cars based cities, pedestrians were very important in the streets. Since the introduction of the car, pedestrians have been pushed towards the sidewalks. These spaces are not fit for pedestrians; they are filled with obstacles such as signs, lampposts, parking meters, and parked bikes or cars. Cities should make decisions thinking from the pedestrian point of view. Pedestrians make spaces lively, they are economically significant for retail, and they bring safety and vitality to the streets. Planners and architects can improve pedestrian traffic by giving them higher priority in intersection crossings, less waiting times in lights, and creative paths that are enjoyable and manageable, generating surprise and interest.

⁷¹ Gehl , P. 121

⁷² Gehl , P. 121

5. Generative Urbanism

5.1 Actual Situation of Ottawa

“The city of the future will function as a place of interchange and intersection. Architecture will lie at the crossroads of modal connectivity.”⁷³

Like many “mid - size” cities, Ottawa has found itself in a crossroad. After more than a century of urban planning, the city is dispersed. Consequently, it has developed small peripheral urban areas away from the city core. The notion of city is blurred, and the boundaries that correspond to it are unclear. In fact, many “citizens” of Ottawa, may not even consider themselves as “Ottawans”; they rather identify themselves as part of the small peripheral urban areas.

Ottawa has the same focal points as it did seventy years ago: Parliament buildings, Beautiful landscapes and office (Government) areas. Since the 1970’s people have populated the peripheral areas more than the urban core, a trend that still continues. The city has failed to deliver urban spaces for people to enjoy different lifestyles and activities; therefore citizens look for other (sub)urban areas that can provide those qualities. Unfortunately, this trend, (helped by the car-based urban strategies of the past) has resulted in a “lifeless” downtown core, and an extensive daily commute within the urban region.

⁷³ Hoete, Anthony. 2003. *ROAM Reader On the Aesthetics of Mobility*, Black Dog Publishing, London. P.110.

Figure 2: POPULATION GROWTH

AVERAGE COMMUTE TO WORK (km)

Source: Statistics Canada, 2001 Census

Figure 17. Population growth and Average distance to commute to work
Source: City of Ottawa.

Ottawa is expected to have a population growth of 50% in the next 10 to 20 years. It is also one of the “mid-size” cities that could generate vast economic activity. Although Ottawa has an initiative based on sustainable development (Ottawa 2020), it is unclear how it would manage vast population growth, avoid sprawl, reconnect with the (sub)urban areas, and revitalize the urban core. These subjects are key for a “mid-size” city to be competitive. A new urban proposal is, therefore, advanced: *Generative Urbanism*.

5.2 Connecting Ottawa: From the suburbs to downtown

One of the principal components of a competitive city is its transportation system. In the past decades, Ottawa based its public transportation in a bus system. The system connects the suburban areas through “Transit ways” with independent lanes for buses. Although fast, the system collapses once it enters the downtown area, where the once “independent” system, mixes

with regular transit, therefore creating congestion and lack of efficiency.

Figure 18. Ottawa Transitway map Source: OC transpo

The city decided to introduce Light Rail to overcome its transit issues. As stated before, the proposed LRT will not connect the suburbs, and will force the city to develop areas just to ensure enough transit volume. The city developed a previous Rail strategy, the “O-Train” which has been successful, although not very influential in terms of passenger volume and transit solutions.

The proposed strategy is based on connection. To boost competitiveness, a “mid-size” city should bring together private and public actors of the metropolitan area, integrating them in a “relative space”.⁷⁴ The actual LRT connects the city through an “east-west” corridor. The new proposal will extend this corridor, using the biggest “east-west” infrastructure in the city: Highway 417. The 417 cruises through the city segregating north from south; but it works perfectly as a connector, since all the small urban areas in the region have direct access to it.

⁷⁴ Dobby. P.1

Figure 19. Section through Highway 417, North South Segregation

Source: *Generative Urbanism Proposal*

This “Regional” light rail line would connect the suburbs, starting at Orleans, and finishing in Kanata. This “east-west” corridor would be fundamental for the city’s connection; hence it would link the areas with the highest percent of growth and commuters, with the downtown core. This new line would not replace the LRT proposed by the city; it would complement it. The new scheme would connect the downtown LRT with the new “417 line” and with the “O-train” creating a strong “east-west” connection as well as “north-south”. With the development of this new system, the city is not only interconnecting its urban centres, but its linking itself to the bus station, train station, and eventually the airport. This will allow the city to re-connect efficiently with the region and the world.

Figure 20. Schematic Proposal of a New Transportation System

Source: *Generative Urbanism* Proposal

"It is transport that will make or break the sustainability of a city. Compacted mixed-use communities should be grouped round public transport hubs with the individual community planned around walking and cycling distances".⁷⁵

5.3 Nodes, Transportation Hubs + Social condensers

The new rail line through Highway 417, creates a different scenario; the redevelopment of infrastructure within a new network. Having a rail transportation line changes the urban relationships with the context. A rail project generally boosts investment and densification in areas close to the main stations. This is essential for the "417" corridor, since vacant lots, unused green spaces, parking lots and light industry border it.

⁷⁵ Rogers P. 166

The downtown core has 3 main “north-south” corridors, Elgin St, Bank St and Bronson Ave. In the intersection of these main corridors with the 417, transit stations would be placed, creating spaces of interchange – or *nodes*: “A node is an intersection of two modes or two modal lines and is, thus, a potential interchange. Some nodes are materialized in space as railway stations, airports network hubs, and ultimately cities.”⁷⁶ Knowing that a considerable amount of people would flow through the new transportation system, the nodes would be spaces of interaction. These nodes would boost city life, creating spaces of exchange with programs like leisure, work, housing or retail.

**Figure 21. Urban analysis of mayor intersections with Highway 417 :
Elgin Street, Bank Street and Bronson Avenue**

Source: *Generative Urbanism Proposal*

⁷⁶ Hoete. P. 13

These nodes would change the 417 corridor. The base of the 417 would change from a concrete structure, to retail areas. This will allow a major economic and social benefit, plus the possibility of piercing the 417 structure, creating new north-south pedestrian connections. This structure would have two transportation stations: the light rail station at the highway level, and a connecting bus station at the pedestrian level. This way the Rail system that transits through the 417 would have immediate connection with the local transportation system: the bus.

To take advantage of the flow of people a "new" typology would be introduced: the *Social Condenser*.⁷⁷ This typology consists of a public building that would hover over the Rail station. This building would contain a program that would improve interaction, thus introducing those social spaces that the city is lacking. The program of these buildings would depend on the urban analysis made of each area; consequently Bank Street would have a Palace of the Body, Bronson a Palace of Education, and Elgin a Palace of Culture.⁷⁸

⁷⁷ Soviet architects introduced social condensers in 1925-1932; they were developed to transform society, using architecture as a vessel. The "social condensers" were made to transform the individual of a capitalist society, into a socialist "militant", where his interests would merge with the interests of all.

Kopp, Anatole. 1970. *Town and Revolution; Soviet Architecture and City Planning, 1917-1935*. New York: G. Braziller,

⁷⁸ The "Palace" is significant in modern architecture. Soviet architects considered the palace "a Building designed to serve all of society". The "Palace of culture" or Clubs, were developed to give society "facilities for recreation and relaxation after a day of work". The "Palace" became the place where children or adults could broaden individual interests, thus becoming "collective human beings". In fact, sports were an important activity in this new search of social interests; sports became a critical part of social culture. Lissitzky, El. 1970. *Russia: architecture for world revolution*. Cambridge, Massachusetts: MIT Press.

The "Palace of the Body" was developed as an example of one of these "Social Condensers". Its program consists of a sports facility that would enhance activity in the area. Bank Street is known as a commercial strip, but it lacks spaces for sports and leisure, a critical issue in a soon to be populated downtown core. Office buildings occupy the area that surrounds the node; this tendency was also included in the condenser. Consequently, the condenser is a cross programming of a sports facility (platform) and a "densified" office building (towers). The introduction of these two programs, plus the transportation stations and retail make the building a complete transportation hub. It is a mixed-use 24-hour building that improves interaction and social activity.

Figure 22. "Palace of the Body", View from Highway 417

Source: *Generative Urbanism Proposal*

Figure 23. "Palace of the Body", View from Catherine Street

Source: *Generative Urbanism Proposal*

Figure 24. "Palace of the Body", Perspective view

Source: *Generative Urbanism Proposal*

Figure 25. “Palace of the Body”, Perspective view

Source: *Generative Urbanism* Proposal

5.4 Programmatic Bleed: Downtown Ottawa Master Plan

The social condensers along the 417 will be connected with the city in two ways: through a pedestrian/bicycle access and by a bus system. The pedestrian access would allow connecting the platform with its surroundings. This will generate the redevelopment of unused green areas into urban parks that would eventually connect with each other and with the green space network of the city. The interaction of the Social Condenser with the parks would activate them, and reintroducing this areas to the urban fabric. The introduction of a complete bicycle and pedestrian path system would connect the “social condensers” with its local surroundings. This with these connections multi modal transportation is enhanced and car usage is expected to drop considerably.

Figure 26. "Master Plan" Connecting Networks Source: *Generative Urbanism Proposal*

The transportation hub would also be connected to the city through a bus system. Next to the retail, each hub would have a bus station that would connect the project in a "north south" axis. This connection, would improve the interaction between the hub and the city.

Since the amount of activity is bound to increase due to the "social condensers", it is expected that the activity of the corridor increase as well. This means that the "potential development sites" that the city of Ottawa mentions in its "Downtown Urban Strategy" would increase value, and would become perfect sites for the redevelopment of the downtown core. The increased connection between the "Social condensers" and the city would incentivize a programmatic bleed; where social activity and interaction would filter in the urban core.

This will force the city to develop the vacant lots and parking spaces, to redevelop parks and waterfronts, creating a dynamic and interconnected downtown area.

Figure 27. Potential development sites joined by the New Master Plan
Source: Downtown Ottawa Urban Strategy & *Generative Urbanism* Proposal

Postscript

“Mid-size” cities are becoming competitive in terms of urban planning; it’s a fact that their productivity and efficiency will be fundamental for a dynamic economy. Like Ottawa, many of these cities are looking for a “compact, efficient, equitable, affordable, environmentally friendly city”. But how can a city manage to overcome obstacles such as extreme population growth, sprawl, and revitalization of urban centers and at the same time achieve the above characteristics?

Many of these “Mid-size” cities have planning strategies for their immediate and future goals. But most of them fail in the execution. Ottawa has a history of unfulfilled urban plans; half way through the “Ottawa 2020” strategy it seems that it is bound to repeat its mistakes.

The *Generative Urbanism* plan developed in this thesis could be executed in many “mid size” cities. It establishes new relationships with existing infrastructure, it connects the urban centers around the region, it creates new urban spaces of interaction, it works simultaneously with mass transportation, and above all it generates urban renewal within an established urban core. All of these characteristics would ultimately make a city much more competitive, efficient and attractive for locals, visitors and investors.

Ultimately, the strategies presented in *Generative Urbanism* try to improve a city that is aware of its deficiencies but also of its attributes. Ottawa has huge issues with commutes; its numbers are close to the ones of Montreal and not far away from those of

Toronto. It is by all means a city that is heterotrophic. It relies excessively on having large amounts of land for development and agriculture, not realizing that it's a precious but finite resource. On the contrary, *Generative Urbanism* intends to explore the attributes of the city. It connects its most important resource, its inhabitants. A city that lives from government labour, a growing amount of students and immigrants should strengthen its communities. This social connection will not only bring economical benefits but would finally create belonging and responsibility towards the city from all inhabitants.

Consequently, *Generative Urbanism* is a first step towards an Autotrophic city. A city that interacts and exchanges flows of people, produce and energy with its region to support itself. That is finally what cities like Ottawa are looking for, cities that flourish economically and are enjoyable by all.

Annex: Palace of the Body

Figure 28. Exterior Perspective (Isabella Street and Bank Street) Source: Generative Urbanism Proposal

Figure 29. Exterior Perspective (Highway 417 and Bank Street) Source: Generative Urbanism Proposal

Figure 30. Interior Perspective, Main Hall Source: Generative Urbanism Proposal

Figure 31. Interior Perspective, Sports Hall Source: Generative Urbanism Proposal

Figure 32. Interior Perspective, Office Area Source: Generative Urbanism Proposal

Figure 33. Exterior Perspective, View from Bank Street Source: Generative Urbanism Proposal

Figure 34. Exterior Perspective, View from Bank Street Source: Generative Urbanism Proposal

Figure 35. Ground Floor Plan

Figure 36. Rail Station Floor Plan

Figure 36. Food Court

Figure 37. Main Floor

Figure 38. Roof Floor

Figure 39. Office Spaces

Figure 40. Office Spaces

Figure 41. Roof Plan

Figure 42. Transversal Section

Figure 43. Longitudinal Section

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Generative Urbanism:

Re-Imagining the Mid-size City

BY FELIPE GONZALEZ

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Outline

Abstract	1
Introduction	2
Chapter One: Ottawa's Urban History	
1.1 1903 – Preliminary Report to the Ottawa Improvement Corporation	4
1.2 1915 – Report of the Federal Plan Commission on a General Plan For the Cities of Ottawa and Hull	7
1.3 1922 - Federal District Plan For Ottawa	11
1.4 Proposal of a Federal District	11
1.5 A Modern Plan for Canada's Capital: 1950 Greber Plan	13
1.6 1988 Plan for Canada's Capital: A federal land use plan	18
1.7 1999 – The Plan for Canada's Capital	20
Chapter Two: Current and Future Ottawa	
2.1 Current Ottawa	23
2.2 The Downtown Urban Design Strategy 2020	26
2.3 Case Studies: The LRT system	27
2.4 Case Studies: The Bronson "Makeover"	32
2.5 Development of "Midsize Cities"	33
Chapter Three: The Compact City	
3.1 Sustainable Cities, Cities and Ecosystems	36
3.2 Ecosystems	37
3.3 Cities as Sustainable Ecosystems	38
3.4 Sustainable Transportation	40
3.5 Biodiversity	41

3.6 Metabolism of Cities	42
Chapter Four: The Carless City	
4.1 The effects of Car Culture, Urban effects of car culture	45
4.2 Ecology and Car Culture	48
4.3 Sustainable Transportation Systems	49
4.4 Rail Transit Modes	49
4.4.1 Light Rail Transit (LRT)	50
4.5 Rail versus Bus	51
4.6 Bicycles	52
4.7 Pedestrians	54
Chapter Five: Generative Urbanism	
5.1 Actual Situation of Ottawa	56
5.2 Connecting Ottawa: From the suburbs to downtown	57
5.3 Nodes, Transportation Hubs + Social condensers	60
5.4 Programmatic Bleed: Downtown Ottawa Master Plan	65
Post-script	68
Annex: Palace of the Body	70
Acknowledgments	78
Bibliography	79

Abstract

In the past two decades, architects and urban planners have been searching for a new approach towards urban design. The “modernist” approach created “car-based cities” with common issues: sprawl, isolated suburbs, and depressed urban cores. Most urban centers, especially developing and “mid-size” cities, are struggling with these issues, which are affecting their productivity and efficiency.

Generative Urbanism is a proposal towards the social and spatial improvement of the “Mid-size City”. It takes advantage of the attributes of the existing city and mitigating its deficiencies. The project is based in Ottawa, Canada, a capital city with a difficult history of urban planning. Ottawa is a “car-based” city, facing complex issues of commuting, mass transportation, and overwhelming urban growth. The resulting architecture project [“*Palace of the body*”] develops strategies that connects the urban center with its surroundings, creates spaces for inter-action, and improves existing and future infrastructure and mass transportation systems.

Generative Urbanism re-imagines the “mid-size city” as a set of new and existing networks that work to generate a livable, functioning urban entity by linking new social programs to the provision of large-scale infrastructure.

Introduction

We live in a world that is highly urbanized; in 1900 only a tenth of the world's population lived in cities.¹ Today more than half the world's population lives in an urban center. The global urban population is growing at a staggering pace, concentrating development and economy within the urban boundaries. This expansion has created a new scenario, making architects and urban planners challenge the way cities have been conceived.

Our cities are a result of a "modernist" approach based on the use of the automobile, and the development of its infrastructure. The lack of success in managing urban growth added to a massive appeal of the automobile has resulted in a migration of population and activities to the outskirts of the urban core. The extensive suburban developments of the last decades has led to decentralized cities with complex commuting issues, depressed urban cores and an increase in congestion and pollution.

These issues are gradually developing in "midsize" cities. In the recent past, "megacities" accommodated urban migration, but its "economies of scale" are saturated, opening the door for "midsize" cities to become generators of economic activity. The competitiveness and quality of life of these cities depend on how these issues are undertaken; and what urban possibilities arise from these solutions. At the moment, cities are focusing on developing sustainable policies for their current and future plans. Most of these policies focus on technical subjects,

¹ Rogers, Richard. 1998. *Cities for a Small Planet*. Westview Press, p.4

neglecting the most important ingredient in the urban realm: its inhabitants.

Ottawa is one of these “midsize” cities; as the capital of Canada it appeals towards locals, visitors and investors. But Ottawa is a “car-based” city, it no longer has a lively downtown, it is not stimulating, and its streets and public places lack small events and convergence of activities. These issues combined with public concerns towards the mass transportation system and long commutes reflect in Ottawa’s lack of competitiveness and importance compared to other “midsize” cities in Canada.

This thesis addresses the potential of combining existing and new networks to generate an alternative proposal of the “mid-size” city. *Generative Urbanism* intends to create new links between existing infrastructures, mass transportation, and new social programs. It proposes new spaces of interaction that link the city with its center, by providing spaces for its inhabitants to have new social experiences. These new spaces would ultimately transform the “mid-size” city into a competitive and efficient urban center filled with activity, bringing its inhabitants together to fully develop its potential.

1. Ottawa's Urban History

Figure 1. Ottawa's Urban Growth From 1876 to 2000's. Source: National Capital Commission (NCC) 2010

1.1 1903 – Preliminary Report to the Ottawa Improvement Corporation

In 1903 Frederick G. Todd (1876 -1948) was assigned to produce a Report for the Ottawa Improvement Corporation. Todd was the founder of the Town Planning Institute of Canada and perhaps the first professional landscape architect in the country². Ottawa had an extensive amount of land, a growing population and unlimited source of waterpower for manufacturing. To take advantage of this, Todd presented a scheme based on the design of parks and open spaces to give the Capital a “national Character”.

At the time, people wanted Ottawa to be the “ Washington of the North”; but Todd completely disagreed, due to Ottawa's landscape characteristics. Instead, Todd proposed a plan for the future, suggesting great spaces for enjoyment in natural open areas. This would prevent crowded populations and promote

² Todd, Frederick. 1903. *Preliminary report for the Ottawa improvement commission*.
<https://qshare.queensu.ca/Users01/gordond/planningcanadascapital/todd1903/Title.htm>. Accessed September 20th, 2011.

health and pleasure. He anticipated Ottawa's dual stand between nature and industry, a conflict that he considered decisive in the future development of the Capital. The park system designed by Todd had the following components:

Large natural parks or reserves

Canada has some of the most beautiful forests in the world, for this reason Todd thought it was suitable to keep forest reserves close to the Capital city. These reserves would be examples of the natural forests for future generations and a place of nature that could be found at driving distance.³

Suburban Parks

Todd considered suburban parks vital for the city. This medium size parks were supposed to be located at a short distance from the city core. He considered that the use of these parks would animate the city, giving those who couldn't go out of the city in the summer a place for leisure and enjoyment.⁴

Boulevards and parkways

Boulevards and parkways are connecting routes, especially between the parks, the center of the city and through the riverbanks.

³ Todd, P. 7

⁴ Todd, P.10

Waterway parks - Bathing

Waterway parks are located along the banks of the river. Todd proposed that these waterway parks were designed in a way that people could use them for bathing. By doing this, the city would create a bathing culture and recognition of the bodies of water as an important asset of the city.⁵

City Parks and Squares

Since 1903 Todd anticipated the importance of small squares and city parks for a city. He saw them as breathing spaces that should be located throughout the city to counteract the crowded areas within the urban fabric. The city parks and squares proposed were different from the suburban parks; they provided a place for recreation in the immediate neighbourhood.⁶

Although Frederick Todd advised the commission to follow his preliminary parks plan for the capital; the Ottawa improvement commission decided to drop him as a consultant and relied on his staff to finish his work. Some of the parks proposed by Todd were built, but the work made by the OIC after he was dropped was disappointing. Although his plan was not completely taken into consideration, many of its parks and parkways resurfaced later on plans by Bennett (1915), Cauchon (1923) and Greber (1950).

⁵ Todd, P. 22

⁶ Todd, P. 23

The early years of the OIC were highly criticized; coincidentally they overlapped with the emergence of modern city planning in North America and Britain. During 1911 a typhoid epidemic and a housing shortage made Ottawa a principal candidate for a new city plan. After intense political battles, the federal plan commission appointed architect Edward Bennett as chief planning consultant (1913). The decision was appropriate, since Bennett was among the finest American planners of his time and a leading voice in the 'City Beautiful' movement.⁷

7

Bennett's Plan was presented in an exhibition at the Downtown Ottawa Office building in January 1915. The 1915 plan for the Federal Plan Commission consisted of the following components:

- Regional parks and forest preserves system
- Parkway and Playground plan
- Street layout for future suburban expansion
- Regional passenger and freight railway plans
- Regional Highway plans
- New plans for street railway lines
- Utility Analysis
- Waterway and flood analysis
- Plans for municipal and federal government buildings
- Central business district plan
- Preliminary Zoning scheme

The analyses made for this plan were well thought out and consequently predicted much of Ottawa's future development. The population projections were accurate, stating that the Ottawa-Hull region would grow from 125,000 to 250,000 by 1950.⁸ The parks system followed much of Todd's previous analysis. Bennett's team also prepared an estimate on traffic and rail system based on other American cities. It turned out to be relevant except on what concerned the use of the automobile, which had conservative projections.⁹ Bennett did not expect the massive appeal automobiles would have in the future. Probably one of the most insightful outcomes was in the Railway plans. Bennett saw a problem regarding the future streetcar congestion

⁸ Gordon, P. 284

⁹ Gordon, P.284

downtown, and advised the city to consider a streetcar subway under Wellington Street¹⁰.

Bennett gave the city a new identity by organizing the government center. He placed the parliament building on the edge of Barrack Hill; this was a special site due to its landscape characteristics (the view towards the river and its visual notoriety towards the city). In this reorganization, Bennett proposed that all federal government buildings were located along Wellington Street (west), while all the municipal buildings, along Elgin Street (south-east).¹¹ The 1915 plan included Hull, the overlooked parallel city across the river. Bennett proposed its civic center and bridge connections to Ottawa.

One of the most interesting decisions in the plan was the zoning provision; separating the city into six different districts ranging from industrial, transport areas to residential. Bennett also included height limitations to protect the prominence of the Parliament Buildings.

The 1915 plan was one of Canada's first comprehensive plans.¹² Unfortunately, its implementation and fate were not as successful, and was finally ignored. The Federal Commission made crucial mistakes in the printing and translation of the report. Those mistakes translated into distribution issues throughout Canada, and even some political rejection. The plan was finally dropped. Canada was focused on war, and on the reconstruction of the Centre Block of the Parliament Buildings,

¹⁰ Gordon, P. 285

¹¹ Gordon, P.285

¹² Gordon, P. 275

which caught fire. Either way, the plan suffered from opposition towards the 'City Beautiful' style consequently it was said it focused more on aesthetics than on town planning. This resulted to be its final downfall.

Figure 3. Drawing # 5 City of Ottawa, view of proposed municipal and railway centre and General Street System. Source: *1915 General plan for the cities of Ottawa an Hull*

Figure 4. General Street System. Source: *1915 General plan for the cities of Ottawa an Hull*

1.3 1922- Federal District Plan For Ottawa

Ottawa was entering a complicated path that other cities such as London or Washington did before. They developed different plans but they partially implemented them or did not execute them at all. The 1922 plan acknowledged that Ottawa didn't have a concrete plan for its current and future dimensions. The result of past plans had left the city with a tangible parliament building area, an urban grid and a few spaces saved for public gatherings.

Other than that, the city was suffering with a housing deficit that was evident since the 1915 plan. There were major health concerns due to slums establishing around and inside the city. This problem started to contrast against the natural beauty and landscape.¹³

The city of Hull was also a concern within the Federal District Plan. It was considered that Hull had been neglected in the past. The creation of a provincial town-planning department was vital to include Hull in the Capital Region.

1.4 Proposal of a Federal District

Noulan Cauchon, a consulting engineer and town planner, submitted a proposal to reconsider the political organization within the Capital Region (1922). He suggested the creation of a "Federal District Commission" that would be in charge of "controlling and developing the physical and infrastructural

¹³ Cauchon, Noulan. *1922 Federal district plan for Ottawa*. <https://qshare.queensu.ca/Users01/gordond/planningcanadascapital/cauchon1922/index.htm>. Accessed September 20th, 2011.

projects within the cities of Ottawa, Hull and its surroundings”¹⁴. Consequently, municipalities were going to give up some of its political power to a commission of experts that would guide the development of both cities. The new commission’s main objective was to guide the execution of plans considering current and future conditions. The 1922 plan proposed the following¹⁵:

Railways

The plan proposed the reorganization of the railway system by eliminating excessive amount of tracks and maintenance; it was imperative to improve the efficiency of the system.

Railways Right of Way and Rapid Transit Railways

The proposal consisted on turning radial railways into radial highways, thus creating rapid connections with the city. This allowed citizens to move longer distances, hence the possibility of having new housing areas for development.

Power and Industrial Development

A proposed dam at the “Little Chaudière” would create additional power needed for the industrial development of the city. Ottawa has always been situated in a strategic location within the economic map of the country. The proposal wanted to take advantage of the natural resources of the region.

¹⁴ *A Federal District for Ottawa*, Journal of the Town Planning Institute of Canada, Vol. 1, No. 9, April 1922, P. 3-6

¹⁵ *A Federal District for Ottawa*, P.3-6

National Parks

The plan proposed a national park at the Laurentian hills that started at the dam in the shore of the Ottawa River and extended towards the north. This mountain park was complementary to other proposals of internal parks and parkways within the Capital city.

Figure 5. Federal District Plan. Source: Cauchon, Noulan, 1922 *Federal District Plan*,

1.5 A Modern Plan for Canada's Capital: 1950 Greber Plan

After another disappointing and unfulfilled plan, Ottawa was still a chaotic and irregular city. Prime Minister Mackenzie King was determined to give Canadians a proper Capital. King, believed in town planning as a social reform tool, and understood the potential and the importance the city could have not only for its citizens but also for all Canadians.¹⁶ Ottawa and

¹⁶ Gordon, David. *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. https://qshare.queensu.ca/Users01/gordond/planningcanadascapital/greber1950/Greber_review.htm. Accessed September 20th, 2011.

Hull were immersed in an urban crisis. Both cities needed major improvements especially after World War II. In 1945, the city of Ottawa was crowded with temporary wood structures used as office buildings; this condition added to the infrastructure chaos and resulted in an unbearable situation.¹⁷

Prime Minister King met Jacques Greber during a trip to Paris in 1936. King instantly connected with Greber. Greber was France's leading urban planner and chief architect of the 1937 Paris World Fair site that Mackenzie King was visiting. Greber had experience working in North America; he worked on the 1917 Master Plan for the Benjamin Franklin Parkway (Philadelphia), among other private park commissions.

On this trip, King interviewed Greber and invited him to Ottawa to prepare an urban plan for the city's core. Greber travelled to Ottawa in 1937, and quickly understood the infrastructure problems the city was facing. He proposed an initial plan combining elements of Bennett and Cauchon's proposals. The result was the National War Memorial and Plaza unveiled in the Royal visit in 1939.¹⁸

After the success of the War Memorial King invited Greber to continue its plan for Ottawa and multiply its effect all throughout the downtown area. The plan got stalled due to the Second World War, when Greber had to return to France and was accounted for the reconstruction of Nord-Normandie.

¹⁷ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20th, 2011

¹⁸ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20th, 2011

To ensure success, King established the NCPC (National Capital Planning Committee), which was independent from the FDC (Federal District Commission) and had representatives from across Canada.¹⁹ Greber was appointed as consultant for the NCPS (National Capital Planning Service), the “only full time professional planning organization in Canada (1945)”.²⁰ With a team of architects, planners, Landscape architects and engineers Greber started the plan for a National Capital Region that included both Ottawa and Quebec side of the river. The components of the 1950 Plan were:

- Relocation of the Railway system and industries from the inner city to the suburbs
- Construction of new cross boulevards and bridges
- Decentralization of government offices to the suburbs
- Slum clearance and urban renewal of LeBreton Flats
- Expansion of urban area from 250,000 to 500,000 lots
- Surround future urban area with a Greenbelt
- A wilderness park at the Gatineau Hills and park systems along the rivers and canal

The relocation of the railway system turned to be crucial for the 1950's plan. It helped to reorganize the infrastructure of the downtown core by reconnecting the road grid and separating industry from housing areas. The government buildings were relocated near Parliament Hill; research, administrative and office areas were decentralized to suburban office parks. This

¹⁹ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20 2011

²⁰ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed February 29 2012

allowed the city to get rid of the temporary buildings and free up space for public institutions such as libraries, theaters and galleries.

The four-kilometer Greenbelt was planned around the urban areas to control sprawl and limit urbanization. If the city grew beyond 500,000 neighbourhood units it had to take place outside the Greenbelt, in Satellite towns.²¹ Greber recommended expanding the parkways all the way to the Greenbelt and to extend the Gatineau Park as close as possible to the downtown core.

One of the major problems the plan had was its population projection. No one expected the post-war baby boom and a strong government expansion. This resulted in a city of 500,000 in 1966 that grew to 1,1 million by 1996.²² By 1970, the suburban expansion outside the Greenbelt started, and the northern area of the Greenbelt (Quebec side), was completely populated.

Unfortunately the design of the streets and boulevards made by Greber were not taken into account. In fact, most of the street designs were made by provincial and regional traffic engineers, which didn't have the special touch that Greber expected. This resulted in streets and boulevards that omitted street furniture and substantial sidewalks in favour of traffic space.²³ Finally, the skyline that Bennett and Greber tried to preserve was ruined

²¹ A proposal based on Ebenezer Howard's 1898 social cities scheme

²² Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20 2011

²³ Gordon, *Weaving a Modern Plan for Canada's Capital: Jacques Greber and the 1950 Plan for The National Capital Region*. Accessed September 20 2011

in 1965. In favour of more tax income, the government allowed skyscrapers in the downtown area to surpass the limit height. This ruined the view of Parliament hill from the south.

The 1950 Plan was the first urban plan that was implemented almost to completion. Mackenzie King's dream was fulfilled and the Ottawa became a genuine capital city. The reorganization of infrastructure, the investment in sewage treatments for the river, and the eventual construction of the Queensway changed completely the way the city operated. The open (Green) space network became iconic in the city. These changes transformed the public and leisure spaces developing tourism and a higher quality of life.

Figure 6. Master Plan. Greber, Jacques Source: *1950 Plan for The National Capital Region*

Figure 7. Proposed Highway Plan. Greber, Jacques Source: 1950 *Plan for The National Capital Region*

1.6 1988 Plan for Canada's Capital: A federal land use plan

It took more than two decades to complete Greber's 1950 plan. During this time, especially in the late 1960s, Ottawa suffered changes that had a meaningful influence on the city's future. In February 1969, during the Federal-Provincial Constitutional Conference, the city modified its boundaries integrating Ottawa, Hull and its surroundings. A new rule for the distribution of Federal employment was issued. Federal employment had to represent the demographic distribution of the Capital Region. To make this happen a new business area was created in Hull, changing its skyline and urban relations towards Ottawa.

In the late 1960s, two other changes influenced Ottawa's future: the creation of regional bodies with planning mandates, and new obligations for the NCC. Ontario created the Regional Municipality of Ottawa-Carleton, while Quebec created the Outaouais Regional Community. Both regional bodies had major influences in how the region was managed, and how its municipal services were executed. On the other hand, the NCC focused on transforming Canada's Capital into a "meeting place for all, that had to be preserved, and its national identity displayed". By the end of the 1980s, Greber's plan was completed; the city needed a new vision for the Capital.

In 1988, the new Federal Land Use Plan aimed to transform Canada's capital into a national symbol. It emphasized renovating public spaces into "Capital Stages". The idea was to incentivize tourism by improving the quality of city spaces and the access to the Capital. The plan also concentrated on boosting collaborations between planning entities within the region. The Plan had 4 main goals:

Consolidation of the federal presence in the Capital: priority to political, cultural and administrative institutions on federal lands, distributed the public service in the region, established cultural, national and international institutions in the city core and others

Enhancement of the Capital's green image and greater accessibility to riverbanks: institute and protect the park network, improve network of recreational pathways, guarantee public access to shore lands)

Enhance the quality and appearance of arrival points and scenic entries to the Capital: improve scenic routes and attractions, institutions, facilities and events of national importance, and improve the entry points to the City

Focus on the Capital as a symbol: creation of new urban design policies for the city²⁴

The 1988 Plan left an imprint on Canada's Capital. It created events such as the Canada Day celebrations and Winterlude. It promoted tourism and started to develop tools to attract visitors. There was an intense program of restoration and beautification of major parks and heritage buildings. And finally, major infrastructure rehabilitation took place specifically in the main entrances to the city and in the development of the first phase of Confederation Boulevard.

1.7 1999 – The Plan for Canada's Capital

The closing decade of the 20th century embodied technological and social changes that eventually started to influence planning and city building. The 1999 Plan for Canada's Capital recognized these changes and adapted the previous plan towards a sustainable, fast-growing, and multicultural city. Ottawa started to develop an interest in sustainable planning principles, which would become fundamental taking account the importance of its natural assets and its future population growth.

²⁴ National Capital Commission (NCC). *Horizon 2067 the plan for Canada's Capital*. Pg.28.
<http://www.canadascapital.gc.ca/sites/default/files/pubs/charting-the-future-of-canadas-capital-in-the-21st-century.pdf>. Accessed February 29th, 2012.

Canada was also facing other social changes that influenced Ottawa's future plans: an aging population, immigration and cultural diversity, new information technologies and an increasing role of other provinces. These issues forced the city to increase interaction between planning regional bodies towards the development of a new plan for the Capital Region.

The Plan for Canada's Capital intended to amalgamate the needs of the city with those of the region. The main goals of the 1999 Plan were Capital Settings, Capital Destinations and Capital Links:

Capital Settings: New sustainable principles adopted in city planning gave relevance to the protection of parks and public spaces. This became a fundamental issue for the city.

Capital Destinations: Ottawa increases preservation policies and intends to showcase cultural heritage and destination points to Canadians and foreign tourists. The city supports the development of Confederation Boulevard and the preservation of Parliament Hill as significant national cultural sites in the Capital core.

Capital Links: The plan proposes better connections and entrance points to the Capital Region. This includes interprovincial bridges, parkways and improving the transportation network.²⁵

²⁵ National Capital Commission (NCC). *Horizon 2067 the plan for Canada's Capital*. P. 27

After the implementation of the 1999 Plan, Downtown Ottawa and Gatineau were linked by the completion of the Confederation Boulevard project. Other infrastructure projects were executed (refurbishment of the Champlain Bridge), and a significant amount of land was acquired. Although this was important, the plan lacked execution in terms of its main goal: a more sustainable, fast growing, multicultural city. In consequence, a new strategy was proposed a few years later.

2. Current and Future Ottawa

2.1 Current Ottawa

Ottawa has slowly established itself as a Capital city. It is Canada's 4th largest city, with a population of 800,000 inhabitants (1.1 million in its Metropolitan area). The Capital is not only recognized for its vast natural and agricultural areas. It is gradually becoming one of Canada's cultural centers, a high tech research hub (with top Universities within its boundaries), and it is one of the top telecommunications research and development centers in the world. Ottawa has Canada's highest household income, and the most highly educated workforce in the country. The Capital has become a multicultural city; its Canada's 4th urban center for immigration, with 25% of its residents born outside the country.²⁶

Since the 1999 plan, Ottawa has faced new stimulating challenges. In 2001, the city decided to change its government structure by amalgamating 11 urban and rural municipalities and 1 regional municipality into 1 government structure. Taking this into account, the new city expects an incredible level of growth. A modest city, getting close to 800,000 inhabitants in the year 2000, is expected to grow to around 1,2 million or more within the next 20 years; transforming Ottawa into a complex urban region.

To respond to the new challenges, Ottawa has developed an

²⁶ City of Ottawa, *Official Plan Ottawa*. Pg.1
http://www.ottawa.ca/city_hall/ottawa2020/official_plan/vol_1/pdf/section_01_en.pdf. Accessed March 1st, 2012.

official plan based on the premise of sustainability.²⁷ Ottawa has acknowledged that it has to face similar challenges as other North American cities: weakening of the ecosystem, population growth, extensive use of the automobile and consumerism. Accordingly, Ottawa has developed a framework to manage its future growth. "Ottawa 20/20" view the city as a "compact, efficient, equitable, affordable, environmentally healthy city".²⁸

Within Ottawa 20/20 there is an Official Plan that supports the development inside and out the urban boundaries. It explores the possibilities the city has to increase its residential and employment densities along the main corridors. It also examines alternatives to the automobile through the promotion of new transit possibilities, cycling and walking. Ottawa 2020 has seven principles that direct the city's future:

A Caring and Inclusive City: Ottawa should be diverse and inclusive, with infrastructure for the disabled and inviting to new comers, immigrants and seniors. It should engage more with its citizens and fulfill its basic needs (such as security, leisure, transit, housing, among others).

A Creative City, Rich in Heritage, and Unique in Identity: Ottawa should promote a vibrant and attractive mix of activities within the arts and creative

²⁷ Sustainable development is defined by the Official Plan as: "development that meets the need of the present generation without compromising the ability of future generations to meet their own needs". City of Ottawa, *Official Plan Ottawa*. Pg.1

http://www.ottawa.ca/city_hall/ottawa2020/official_plan/vol_1/pdf/section_01_en.pdf. Accessed March 1st, 2012.

²⁸ City of Ottawa, Ottawa 2020 management Plan. *Ottawa pedestrian Plan*. Pg 11.

<http://ottawa.ca/cs/groups/content/@webottawa/documents/pdf/mdaw/mdyw/~edisp/con041239.pdf>. Accessed October 20th, 2011.

realm. It should generate a sense of place with its local heritage, arts, culture and its unique landscape.

A Green and Environmentally Sensitive City: Ottawa should preserve and strengthen its relationship with the natural habitats and the green spaces network. It should focus its future transportation needs on transit modes, cycling and walking. And should develop land wisely within the city avoiding urban sprawl.

A City of Distinct Liveable Communities: Communities in Ottawa are in need of an identity that makes them feel proud and that they are an integral part of the city. These communities have to be aesthetically pleasing and well connected between each other. They have to be well balanced between housing, employment and leisure activities and green spaces.

An Innovative City where Prosperity is Shared among All: Ottawa wants to create a vibrant economy based on strong local businesses and a recognized rural economy. The city wants to encourage education, training, and information to overcome obstacles and increase employment opportunities.

A Responsible and Responsive City: Ottawa wants to be responsible with its finances; the city wants the general public to be aware and knowledgeable of what is going on in order to be able to contribute.

A Healthy and Active City: Ottawa wants to create an environment where sports and recreation are main activities within its society. This will promote health through the creation of community facilities that are accessible to all.

29

2.2 The Downtown Urban Design Strategy 2020

With Ottawa 20/20, the city has prepared the “Downtown Ottawa Urban Design Strategy”. This plan recognizes the downtown area as an essential focal point of the city. The aim of “Downtown Ottawa Urban Design Strategy” is to re-urbanize the area by increasing the quality of public and urban environments. Consequently transforming a downtown area defined by its business district into an economical/cultural core full of vitality and activity. This new local identity should meet the “needs and demands” of a city of more than a million inhabitants.

The “Downtown Ottawa Urban Design Strategy” suggests a central area that encourages new residential developments, improves access to water and green spaces and promotes mixed-use projects. It also recommends reducing de reliance on automobiles by making public transit a priority and supporting walking and biking as means of transportation. It urges the use of compact/mixed use projects to reduce transportation demands, which would also help to minimize the land used for parking. The strategy also promotes heritage and conservation as principal themes within the urban core.

²⁹ City of Ottawa. *The Ottawa 2020 process and the guiding principles*. http://www.ottawa.ca/city_hall/ottawa2020/official_plan/vol_1/01_introduction/index_en-03.html. Accessed March 12th, 2012.

The “Downtown Ottawa Urban Strategy” creates a framework for the development of streetscape infrastructure, open spaces, and art. It targets 41 different strategies, which are a shared vision of the City of Ottawa, the National Capital Commission and the neighbourhoods. In this context, the downtown area becomes a central aspect in redefining the image of the city. Through these strategies the City of Ottawa expects to reconfigure public infrastructure to create a positive, successful and desirable place to live.

Figure 8. Downtown Urban Design Strategy 2020. Source City of Ottawa

2.3 Case Studies: The LRT system and The Bronson Makeover

After realizing that the traffic issue in Ottawa is growing year-by-year without apparent solution, the city decided to pursue the Light Rail System Project. The Project started in January 2007,

when a task force on transportation was created. They released the “Moving Ottawa” report (June 2007), recommending an “east-west rail tunnel bored through downtown to alleviate the current transit bottleneck and build a more inviting streetscape.”³⁰ With this recommendation in hand, the Transportation master plan was revised; consequently, cost and affordability studies were executed establishing a funding scheme.

The cost of the project was estimated in \$2.1 billion, a budget that was secured through the investment of provincial and federal funds. With the budget secured, studies and plans started in 2009. On May - June 2011 Council approved reports concerning the schedule and implementation of the project. Subsequently, on October 2011, the City shortlisted three consortia that will formulate a Request for Proposal (RFP).³¹ The construction of this project will start in early 2013 and should be operational by mid-2018.

Ottawa states that this project has multiple benefits. The project will span 12.5 km from Tunney’s pasture to Blair station, and will have 13 stations. With this project the city expects to reduce bus traffic by 50% within the city core, making Ottawa a “friendly place for pedestrian and bicycle users”. It is expected that by 2031, transit ridership will increase by 78%. This makes the LRT a priority taking account that the O-train already

³⁰ City Of Ottawa. *Ottawa Light Rail, Background, Task Force Report*. <http://www.ottawalightrail.ca/en/project-plan/background>. Accessed March 13th, 2012.

³¹ The three consortia chosen by the city are: Ottawa Transit Partners, led by Vinci Concessions, Rideau Transit Group, led by ACS Infrastructure Canada Inc., Rideau Transit Partners, led by Bouygues Travaux Publics S.A.

exceeded its initial user forecast: 7,300 users a day (expected) compared to 10,200 riders a day (current).³²

Figure 9. Ottawa Light Rail. Source :City of Ottawa, www.ottawalightrail.ca

Although the LRT project seems to be a positive proposal towards improving the transportation system of the Capital, it still raises concerns. After a 2.1 billion investment, the introduction of the light rail will only increase 9% the transit use within the city. In fact, auto drivers and auto passengers dominate, accounting for 71% of transportation trips.³³

Figure 10. Ridership Share. Source City of Ottawa

³² City of Ottawa. *Fast Facts Ottawa Light Rail*. <http://www.ottawalightrail.ca/en/project-plan/fast-facts/page:5>. Accessed March 13th, 2012.

³³ City Of Ottawa. *Horizon 2067 The Plan For Canada's Capital*. Pg. 63. <http://www.canadascapital.gc.ca/sites/default/files/pubs/charting-the-future-of-canadas-capital-in-the-21st-century.pdf>. Accessed November 11, 2011.

As stated before, the LRT project will open new spaces for pedestrian and bicycle users. But these users are only 12% of the riders (11% walk, 1 % Bicycle). Although there is a bicycle plan for 2018, it has a goal of increasing bicycle ridership from 1.7% to 3% (by 2021). A very low increase considering that 73% of households in Ottawa own bicycles³⁴; and pioneer cities such as Copenhagen have 36% of its population commuting to work.³⁵ The LRT project is not specific in its connections and its role within a multimodal transportation system.

The system is also conceived from Tunney's Pasture to Blair Station. In the NCR "the leading districts in terms of population, including several outer suburbs, contrast with the main sources of employment, with the downtown centres of both Ottawa and Gatineau having the lowest numbers of residents".³⁶ Accordingly, the centers have the highest amount of jobs but a low population, resulting in high volume flows of commuters. This is expected since 80% of the trips to Central Ottawa come from other Ontario districts.³⁷ Looking at the AM peak inter-district flows from suburban Ottawa, and the PM peak inter-district flows from central Ottawa, it is evident that a great amount of frequent east-west trips will not be attended in the proposed LRT project.

³⁴ City of Ottawa. *Ottawa Cycling Plan* (2008). Chapter 1, Pg. 6. Chapter 2 Pg. 4,5

³⁵ Outram Christine, Biderman Assaf and Ratt Carloi. 2010. *Self Engineering Ecologies*. Ecological Urbanism, Lars Muller Publishers. Pg. 172.

³⁶ HDR | iTRANS. *National Capital Region Travel Trend Study* (2011). TRANS Committee, http://www.ncr-trans-rcn.ca/uploadedFiles/resources/NCRTrendStudyPart1-FinalReport_20110207.pdf. Accessed March 1, 2012

³⁷ HDR | iTRANS. *National Capital Region Travel Trend Study* (2011). TRANS Committee. P. 38.

Figure 10. AM. peak inter-district flows from suburban Ottawa. Source: City of Ottawa, Source: *National Capital Region Travel Trend Study (2011)*

Figure 11. PM. peak inter-district flows from central Ottawa, Source: *National Capital Region Travel Trend Study (2011)*

In fact, the city is planning major rezoning and redevelopment around three of the stations of the LRT project. The stations outside the city core are bordered by light industry and low-density retail. If this situation continues, it is a possibility that the LRT project will not have enough users as projected. The city needs to double the population in these areas in the next 20 years to ensure success to the LRT project. If the LRT project

attended the inhabitants that come every day from the suburbs and back, ridership would most likely be ensured. In contrast, the city needs to find ways to elevate ridership and densify areas that are between the downtown core and the disconnected suburbs. In conclusion, the users that live in the suburbs will not be attended by the LRT project; therefore they would still use the automobile as their main transportation system.

2.4 The Bronson “Makeover”

On November 2011 it was publicly announced that Bronson Avenue was going to undertake a makeover. The main reason for reconstruction is to install new underground water and sewer lines. Since the beginning, the community and residents opposed this intervention. In the design, Bronson Avenue is going to be widened 0.6 m. City staff understands that Bronson is already a “constrained” Avenue, and that extra space for traffic is necessary. On the other hand, residents feel that the Avenue’s new design goes against safety measures. They understand that if the Avenue is wider, cars can go even faster and it would start to feel like a “provincial highway”.³⁸

Some community members recognize that the flow of traffic in the Avenue is important, but they consider that widening streets is closer to “1960’s Thinking” coincidentally when traffic engineers were in charge of street designs. The community is concerned with the lack of care towards pedestrians and bicycle users. They consider that it is very difficult to cross the street; an

³⁸ Tunney, Catharine. *Community Hails Bronson Ave. Decision*. Centretown News. February 3rd, 2012. Pg1,2.

issue that is critical considering that Parks, housing, a school and a Community Centre are bordering the Avenue.

The \$30 million project has become quite controversial. Since November, City Staff has made changes to its original design. They have widened some sidewalks, but the street keeps the same amount of lanes. Although residents expected major improvements (like a “road diet” cutting 4 lanes to 3), they didn’t come through, and speeding, loss of tenants due to the noisy street, and unsafe crossings will continue.³⁹ The city demonstrates once more its design priorities, continuing car-based city policies over pedestrians.

2.5 Development of “Mid-size Cities”

Half of the world’s population lives in cities, which indicates that a massive urbanization has taken place. Growth in the last decades has been focused on ‘megacities’; metropolises with populations over 10 million people. While cities such as Tokyo, Los Angeles, or Mexico D.F. have been a substantial agent for world economy, in the near future the trend will change. According to the McKinsey Global Institute, there are 600 urban centers (which have only a fifth of the population of the world) that generate 60% of the global GDP (Gross Domestic Product).⁴⁰ McKinsey refers to them as “middleweight” cities, urban centers with populations ranging from 150,000 to 10 million.

³⁹ Cockburn, Neco. *Battle Lines Forming as Bronson Makeover Looms*. The Ottawa Citizen, Section C. November 24th, 2011. Pg.1,4.

⁴⁰ McKinsey Global Institute. *Urban World: Mapping the Economic Power of Cities*. McKinsey & Company, March 2011.

These “middleweight” cities are expected to grow rapidly, becoming by 2025 vital generators of economic activity. In fact, McKinsey projects that these cities will report 50% of the global GDP growth between 2007 and 2025. Though the cities with the largest growth potential are located in the developing world, Canada should consider this subject decisive since it has 20 of the 600 “middleweight” cities within its territory. Canada should focus its efforts in developing “regional – second cities” like Ottawa and take advantage of this major growth potential.

Actually, these “middleweight” cities have another benefit: the potential to innovate. Regional clusters such as Ottawa have the possibility to unite diverse contributors (the private sector, the public sector, academia, large corporations, entrepreneurs among others), to pursue strategies and benefit from the expected growth patterns.⁴¹ It is important that these cities are prepared for the upcoming growth. Planning and management strategies become fundamental to organize the immediate and future objectives (50 years into the future). Therefore cities would avoid problems that would deteriorate the quality of life (congestion, pollution, lack of affordable housing, infrastructure), which would reduce the possibility of having a dynamic economy.

The reason why these middle size cities are such an influential factor is the “economies of scale” than can be developed in concentrated urban centers. This expansion will foster emerging markets that will reduce poverty and create opportunities for companies that can thrive form this dynamic situation. But this

⁴¹ Dobby Christine, *Rapid Growth: Coming to a City Near You*, The Ottawa Citizen, Section D Pg.1. November 24 2011

growth can only happen if the cities manage correctly future challenges. Cities will be obliged to anticipate urban trends, and they should be ready to handle complex scenarios that will gradually emulate the ones larger cities have. The “economies of scale” will allow industries to be more efficient and augment its productivity compared to the ones in rural settings. It is important to note that services are less expensive when provided to a concentrated population. Thus water, housing and education is projected to be 30 to 50% cheaper in these urban centers compared to sparsely populated areas.⁴²

The reason why “Megacities” have stopped thriving is because they have exhausted their “economies of scale”. For this reason, “midsize” cities have to create strategies to handle the above average growth in population and per capita GDP. By 2025, 13 “midsize” cities will grow beyond the 10 million inhabitants; the only one in North America is Chicago. If the government concentrates in aspects such as demographics, households and incomes “Middleweights” like Ottawa will have the opportunity to outperform other cities. To achieve this, the city has to become much more competitive, dynamic, and attractive for investors, citizens and visitors.

⁴² McKinsey Global Institute, *Urban World: Mapping the Economic Power of Cities*, McKinsey & Company, March 2011

3. The Compact City

3.1 Sustainable Cities, Cities and Ecosystems

Cities are providers of opportunities that enhance the exchange of goods and services and social/cultural interactions. In the last decades, urbanization trends have changed from dense, mix-use, small cities with local economies to sprawled 'megacities' governing over a distant global network. As a result, urban population expands at a rate of 1.78% per year.⁴³ If the trend continues, urban residents will be 66% of the population by the year 2025. This is a challenging situation for the development of cities, thus generating complex and diverse issues. With extreme growth, urban economies are prioritizing processes that transfer energy and materials into products for a predatory global market. The result of this approach is an economic and ecological imbalance that is represented in problems such as: climate change, water supply shortage, and reduction of oil reserves, regional environmental damage, and loss of biodiversity among others.

These problems impact directly the growth of cities. Issues such as sprawl and car dependence generate a lack of community and social alienation. The extreme growth rate of cities is also damaging the bioregional context and generating disconnect between the environment and the urban fabric. To address these issues, innovative cities have to redevelop their economic and social relationships with their surroundings and inhabitants.

⁴³ Newman Peter & Jennings Isabella. 2008. *Cities as sustainable ecosystems: principles and practices*. Washington D.C. Island Press. Pg. 34

3.2 Ecosystems

“Ecosystem: A dynamic and complex system of plant, animal and microorganism communities and their non-living environment all interacting as a functional unit within a defined physical location.”⁴⁴

Ecosystems are a perfect example in which to base the economic and social relationships needed. They are place based, cooperative, diverse, self-regulating through feedback loops, decentralized, conserving and solar based.⁴⁵ Ecosystems are divided in two: Autotrophic and Heterotrophic.

“Autotrophic: Self feeding. The term is applied to organisms that produce their own food (such as plants through photosynthesis) and to ecosystems that produce enough energy internally to meet their own needs.”⁴⁶

“Heterotrophic: “Other feeding”. A term applied to organisms that cannot make its own food – for example animals – or an ecosystem that cannot produce sufficient energy internally from photosynthetic processes to meet its own metabolism (that is, it need external inputs of energy besides light).”⁴⁷

⁴⁴ United Nations Environment Programme (UNEP). *Glossary of environmental terms*. <http://www.unep.org/action/ap1.htm>. Accessed October 28th, 2011.

⁴⁵ Newman and Jennings, P. 37

⁴⁶ Newman and Jennings, Glossary

⁴⁷ Luck et al. 2001. *The urban funnel and the spatially heterogeneous ecological footprint*. Ecosystems 4 : 782-96.

Actual urban ecosystems are considered heterotrophic. Cities are unable to support their own metabolism with their production (the consumption of organic matter is much bigger than the production of new organic matter). As a result cities are obliged to import resources such as food and fossil fuels to maintain their housing, commercial and industrial areas. In nature some ecosystems that are heterotrophic receive additional energy requirements from adjacent ecosystems. In this case these bounded ecosystems can be seen as autotrophic in a bioregional level. As stated, cities could work in a bioregional level with other cities to balance the production and consumption of energy. City economy, as we know it, would have to drastically change in order to create a local and autotrophic approach for the region.

3.3 Cities as Sustainable Ecosystems (CASE)

Cities are to be designed based on economies with restoring feedback loops implemented on their bioregion. By doing this, cities will be capable to respond to global issues (such as the impact on greenhouse gases, extreme oil consumption, biodiversity loss) balancing the global ecosystem with a sustainable production-consumption ratio. The Cities As Sustainable Ecosystems (CASE) approach invites cities to understand their role as part of bioregions that are constantly searching for an “ecological balance”.⁴⁸ By implementing bioregional economies, cities would balance themselves with the carrying capacity of their bioregion, instead of remote markets all over the world. This approach gives cities the chance to re

⁴⁸ Newman & Jennings, P. 44

explore their region in terms of production of food, energy, water and waste disposal.

Modern cities rely on fossil fuels and plant-based energy, which are unsustainable since they are finite resources. The future of sustainable cities is in the use of renewable resources. The transition to a sustainable production of energy has to be implemented in buildings, transportation and industry. Ideally, a city would have an infrastructure designed to support and develop these changes. Quality transit systems (preferably multimodal) are fundamental to structure the city, diminishing the dependence on cars. With a walking and cycling network as a support, all neighbourhoods and districts can be laced between each other. Cities should count with autotrophic energy systems with local and well distributed water systems. Waste management is also crucial; consequently production would shift and create as little waste as possible by implementing recycling policies.

As changes take place, and as infrastructure reunites the inhabitants of the city, new social relationships start to flourish. This new social infrastructure is decisive for the new bioregional economy to work. The strength of communities and the social connection between them creates a sense of belonging and a responsibility towards the city. Further development of infrastructure for social encounters would create bonds at the neighbourhood scale preventing isolated family units, common in today's cities.

3.4 Sustainable Transportation

One of the most effective ways to transform a city into sustainability is to introduce sustainable transportation. With the introduction of sustainable transportation urban economies transform. Cities have systems that depend on oil consumption such as the transportation of goods and people. This situation leaves cities with an economic and social vulnerability in regards to oil scarcity (and its elevating price). Cities that are car dependent suffer for the following reasons:

Car dependent cities spend 15 to 20 % of their wealth in transportation; transit oriented cities spend 5 to 8%.

From a sample of 100 cities those with strong rail systems are 43% more wealthy than weak rail cities.

Car dependence is expensive because cars waste space; cars take 2,500 people per hour in one lane, trains take 50,000.

People who live in car dependent cities use between 20 to 40% of their income in transportation⁴⁹

If cities are compact they don't need to rely on cars for transportation. In fact, other ways of transportation could be encouraged like walking or cycling. This brings an immense amount of benefits to a city from the economical (less fees in transportation, greater energy independence) to the social (fair access to transportation systems, promotion and sense of community, exercise and social activities). With an attractive mix of pedestrian and bicycle lanes, multimodal public

⁴⁹ Newman & Jennings, P. 45

transportation and interesting public spaces people have the opportunity to create a bond with their city and their community.

3.5 Biodiversity

“Biological diversity – or biodiversity - is the term given to the variety of life on Earth and the natural patterns it forms, encompassing the full range of species, genetic variation, and ecosystems in a given place.”⁵⁰

Biodiversity forms the networks in which we all live. All the activities in ecosystems depend directly on biodiversity thus the goods and services needed for sustainability rely on a healthy understanding of our environment. Biodiversity in cities is a subject that is fundamental due to the increase need, protection and handling of services such as water, air, waste, and recycling. Current city building places a heavy load to the ecosystems they inhabit, an issue that increases with sprawling.

Consumption in cities takes a bigger toll on ecosystems when there is an increase exploitation of energy and products that come from outside the bioregion. To turn around this situation cities have to link themselves with their bioregions in different levels. Certain strategies can be enforced to attain this links such as: the creation of static and dynamic reserves within the city and its surroundings, educate the population about their bioregion, reduce the ecological footprint of the city, and design ecological architecture and infrastructure and design cities as biodiversity arks.

⁵⁰ Newman & Jennings, P.65

3.6 Metabolism of Cities

Figure 12. Linear Metabolism, Cities consume and pollute at the same rate, Source: Rogers, Richard. *Cities for a small planet*

Figure 13. Circular Metabolism, Cities minimise new inputs and maximise recycling, Source: Rogers, Richard. *Cities for a small planet*

The introduction of sustainable planning has changed the way we understand the metabolism of cities. For decades planners have developed cities that exploit the environment, basing their designs in gaining profit through technological development. Changing this mentality towards sustainable objectives means to change the way we behave, govern, and build our cities. The "linear metabolism" used until now, consist of acquiring energy (coal, oil or nuclear) to satisfy our needs (food, energy and goods) in a specific environment, the city. With the use of linear metabolism we consume in excess and create high pollution ratings such as organic and inorganic wastes, and emissions.

Cities should shift towards a “circular metabolism”, where the energy used for our needs is renewable, and where those “inputs” can be recycled when needed. This way, the city can “output” less pollution and recycle as much waste as possible. Cities have to be viewed as ecological systems, and maximizing the use of resources is considered fundamental, and where efficiency is a valuable asset. In the past, planners used to develop projects like highways without taking account what would happen in terms of environmental and social issues. This type of planning has created cities with high ecological footprints that devour resources and create social barriers.⁵¹

Planners and architects can reverse the trend by designing compact cities. A compact city “grows around centers of social and commercial activity located at public transport nodes”.⁵² These nodes become a focal point in the city, a place where neighbourhoods can develop in a sustainable way with close by amenities. The *Compact City* is defined as “a network of these neighbourhoods, each with its own parks and public spaces and accommodating a diversity of overlapping private and public activities”.⁵³

⁵¹ Ottawa has an ecological footprint of 8.59, 4th largest footprint in Canada, and beyond the country’s average (7.25). Anielski, Mark. *Ecological footprints of Canadian municipalities and regions* (2005), <http://www.anielski.com/Documents/EFA%20Report%20FINAL%20Feb%2002.pdf> . Accessed March 2, 2012

⁵² Rogers, P. 38

⁵³ Rogers P. 39

Figure 14. Compact mixed-use nodes reduce journey requirements and create lively sustainable neighbourhoods, Source: Rogers, Richard. *Cities for a small planet*

Compact cities are associated with mass transit systems. Cities need transportation systems that can travel at high speeds across the city, linking neighbourhoods. This way, cross-city transportation is efficient; and local transportation can be done by local systems. This reduces the volumes of traffic, and creates effective local lines of tram, rail and buses; and open up safe spaces for cycling and walking. This generates new possibilities in the city, where planners and architects can design multifunctional “open minded spaces” where people can socialize and participate.

Figure 15. Compact nodes linked by mass transit systems can be arranged in response to local constraints, Source: Rogers, Richard. *Cities for a small planet*

4. The Carless City

4.1 The effects of Car Culture, Urban effects of car culture

The use of the automobile has created a culture that has transformed the way we perceive and relate to the cities we live in. Due to the extensive use of the automobile, cities have shifted from “traditional core dominated cities to polycentric and extended urban regions”. Cities have been growing in an intermittent manner through the creation of polycentric areas that have been intensively networked between each other. By loosening the central core and spreading activities throughout the urban region, cities extended their peripheral areas. This new extensions of the city, combined with the dominance of car culture created a new world of service stations, drive through, malls and leisure activities only accessible by the population that owned cars.⁵⁴

This condition transformed the urban landscape. Managed by traffic engineers’, cities were thought out through the lens of circulation and storage of vehicles. Nonetheless, people found new “freedom” with the use of the car. It made their lives flexible: they could go at the speed they wanted, at any time and any direction within a complex infrastructure that connected their main activities: work, home and leisure.⁵⁵

Contrariwise, the extensive use of the automobile didn’t translate into connectivity or accessibility. By designing new

⁵⁴ Graham Stephen and Marvin Simon. 2001. *Splintering Urbanism networked infrastructures, technological mobilities and the urban condition*. Routledge, New York.

⁵⁵ Graham and Marvin

and extensive road networks, the city, once compact, transformed into fragments connected by a system of roads and highways. In theory this new system was made to connect the city, but in practice it partitioned and fragmented the urban fabric. In fact, changes were evident in the transformation of the street. Once an epicenter of multi-use and meeting spaces, the street became a motorized transit space only made for car flows and parked vehicles.⁵⁶ This new situation created not only physical fragmentation but also social separation within neighbourhoods and communities.

The use of the automobile changed our perception of the city. Due to the extensive network created, cities have stretched and widened their urban fabrics resulting in long distances only covered by car. The consequence for the city is segregation within the urban region. Since the implementation of car based networks, our cities and cultures have separated basic city conditions: home from work, rich from poor, old from young.⁵⁷

The extreme fragmentation that cities are suffering calls for new social spaces, but because of the way cities are built these spaces are not visible or accessible. Essentially, the street became a dangerous place. With the use of the car, the social use of the street decreased. With less eyes and activities on these areas, street crime rates went up, which resulted in an alienation of the street space.⁵⁸

Highways and street networks were designed between the 1920's and 1960's to improve cohesion. These networks that

⁵⁶ Graham and Marvin

⁵⁷ Graham and Marvin, P. 120

⁵⁸ Graham and Marvin, P.117 - 120

became the main element of urban plans, intended to maximize regional connections and productivity. The search of this unified city through a car oriented urban form took urban planners such as Robert Moses to “create a system in perpetual motion”. Urban planners became enthusiastic about the possibilities opened up by terms such as “flow” or “traffic”. A new utopian era had started in which the arterial highways dominated over city spaces, to the point that the city itself could become an impediment for traffic flow. Commuters became a main character, and the city was designed and manufactured to their own appeal. Since commuters were generally white middle (working) class, other population (such as the poor and the black) were neglected by urban planners slowly segregating this minority groups.⁵⁹

The new sprawling city lacks a concrete center; in fact the boundary between center and periphery is unclear.⁶⁰ The infrastructure that configures the city links a large amount of city spaces that are loosely connected between each other.

“The urban plane only accommodates necessary movement, fundamentally the car; highways are a superior version of boulevards and plazas, taking more and more space; their design, seemingly aiming for automotive efficiency, is in fact surprisingly sensual, a utilitarian pretence entering the domain of smooth space.”⁶¹

⁵⁹ Graham and Marvin, P.123

⁶⁰ Graham and Marvin, P. 115-120

⁶¹ Koolhaas Rem and Mau Bruce. 1995. *S, M, L, XL, Essay: The Generic City*. Monacelli Press.

4.2 Ecology and Car Culture

In the early 1970's there was a reaction against the energy crises: the environmental movement. Car culture has been a fundamental figure regarding the environmental issues we face since the 1970's. Once the world noticed that our energy resources were finite, the use of the car has exposed our relationship with energy and waste. The environmental movement was fundamental in shaping how infrastructure was developed after the 1970's. The infrastructure networks focused on energy supply connections specifically solving concerns about system vulnerability and dependence of energy sources.⁶²

Although the research of new energy sources has not reached a massive appeal, and we are still dependent on oil-based energy, some changes have been made. There has been a great investment in expansion and research looking to diversify energy sources especially for transportation.⁶³ Due to these new interests, governments have been forced to consider alternative options, offering more investment to mass transit, which have replaced the urban highway projects of the past. This change of focus is altering dramatically how cities are being designed and configured.

Mass transportation is not only shifting the way we go from point A to B, but also our relationships towards our surroundings. More and more transport stations and hubs are becoming social spaces of interaction and leisure.⁶⁴ The shift

⁶² Graham and Marvin

⁶³ Graham and Marvin

⁶⁴ Graham and Marvin

from the personal space of the car towards the social space of the mass transit is a reality cities are facing every day.

4.3 Sustainable Transportation Systems

Cities are looking for solutions to their transportation needs. For years traffic engineers have been in charge of solving the problem, but their solutions are generally car based. They have created bigger and faster highways, larger streets and complex street systems. The experience of the last few decades' shows how if a street system or a highway is expanded it will eventually get filled with thousands of new users creating even more traffic.

Since car based cities have become chaotic, cities have turned their attention towards sustainable transportation systems. These arrays of transportation systems go from complex rail transit systems to bicycle and pedestrian paths. Ottawa is investing in a new mass transit system: Rail Transit.

4.4 Rail Transit Modes

Rail Transit Modes have four specific characteristics: external guidance, rail technology, electric propulsion and ROW separation. These characteristics are defined in *Urban Transit Systems and Technology* (2007 .V. Vuchic) as follows:

External Guidance: Rail transit modes are guided by tracks, having a superior quality compared to other non-guided modes. This translates to a permanent and growing identity towards the system, which results in

higher passenger rates and an impact on urban developments in areas connected by the system.

Rail Technology: Rail technology is efficient and simple. It consists of steel wheels running on two steel rails that are in charge of guiding the system; it is unique and superior to other systems due to a single contact point to the ground.

Electric Propulsion: Most of the rail transit systems in the world use electricity as their main source of power. It produces excellent performance, low maintenance, low levels of pollution and noise and energy recovery during braking (also known as regeneration).

ROW separation: Determines the investment and the operation of transportation modes. A rail system provides a physical separation, making it superior in features such as capacity, safety and speed. In general terms, rail systems will have an advantage when the row separation is augmented; except in cases where there are short services, where the bus has a well-defined advantage.

4.4.1 Light Rail Transit (LRT)

Light Rail Transit is one of the most popular systems used in cities. Its characteristics are appealing, and its flexibility is advantageous when planning transit strategies (It can travel in tunnels, and stop in high or low platforms depending on the needs of a station). Light rail transit is electrically powered; it

has high capacity (around 250 persons – 20 to 50% seated), its quiet and has a high riding quality. LRT can operate 1 to 4 car trains, with a completely separated Right Of Way. Its design allows it to have maximum speeds between 70 to 80 km / hr., although certain models can reach 100 to 125 km /hr.

4.5 Rail versus Bus

For many cities there is a choice that has to be made in regards to mass transit systems: should Rail be implemented? Buses? Or both? The operation of one or the other generally depends on the demand of passengers. A Rail system is not very efficient when working under low demand routes. On the other hand, it is an effective system when a high demand of passengers requires a specific transit route.

The high level of investment in a rail system also reflects in a higher service quality and a stronger identity towards it, some of the even becoming icons of the city itself. Thus rail systems, especially when having a separated ROW, have an enormous impact on transit ridership and change completely the way the transit of the city is organized:

“Major study on rail transit, found out that the per capita bus travel (in the US) cities with rail transit is the same or slightly higher than in cities served by bus transit only. This indicates that rail systems increase total transit usage, in the long run, by the number of trips they serve. In other words, the introduction of an LRT or metro line

usually generates more transit trips on all modes than it diverts from the bus lines it replaces.”⁶⁵

Cities that use bus systems as its only transportation system reflect that transit is considered less important than the ones that have rail systems.⁶⁶ This is exposed in features like rail transit lines generally offer a simple and comprehensive type of service; it's in general terms quite constant during the whole day. When a rail system is connected to a bus system through a transportation hub or station, they create an integrated network that results in high efficiency. Rail transit systems are an investment that create densification and land use around their main stations. This means that a Rail transit system tends to play a major role in the intensification of investment in a city, boosting local economy.

4.6 Bicycles

“The average American, as of 2005, spent thirty eight hours annually stuck in traffic. In 1969, nearly half of the American children walked or biked to school; now just 16 percent do. From 1977 to 1995, the number of trips people made on foot dropped by nearly half. This has given rise to a joke: In America a pedestrian is someone who has just parked their car”.⁶⁷

The bicycle is a key element in the success of a sustainable city. It gives people the chance to transport themselves in short or

⁶⁵Vuchic, Vukan R. 2007. *Urban Transit Systems and Technology*. Hoboken, NJ: John Wiley & Sons. Print. P.. 300

⁶⁶ Vuchic, Vukan R.

⁶⁷ Vanderbilt, Tom. 2008. *Traffic, Why we drive the way we do (and what says about us)*. Random House Inc. P.16.

medium distances for a minimum price and effort. Nonetheless some cities have prioritized car traffic policies and have made bicycle traffic dangerous and unappealing. In Ottawa, bicycles have constantly been a popular topic in the political arena, but in reality, the city's infrastructure consists of unconnected paths or unequipped streets.

Figure 16. Actual bicycle paths in Ottawa (2008), Red: existing bicycle lane Blue: City owned Pathways, Cyan: NCC Pathway Source: Ottawa Bicycle Plan.

The discrepancy between governmental promises and reality makes Ottawa one of the cities where only 1 or 2 % of the trips are done by bicycles. For cities to have a coherent policy, they have to focus their attention in making room for bicycles in conventional streets. Like any other person in traffic, someone in a bike also has errands, school, and work or leisure activities. The policies implemented have to transform the cyclist from an endangered transit type, to a citizen that has the infrastructure to go safely across the city.

Ottawa plans to implement a bicycle strategy that would increase its critical mass by 1.3% in 20 years. At the moment the plan consists of creating a network of facilities that can be used

by active cyclists. In the long run the city wants Ottawa to be identified as the “premiere cycling capital of Canada and one of the most sustainable transportation cities in the world”.⁶⁸

To achieve what Ottawa wants takes more than expanding, linking and connecting facilities. Cities that have focused their energy in implementing bicycle policies have reduced parking spaces and driving lanes in favor of bicycle paths. They have also made bicycle traffic an integrated part of their transportation strategies. This way bicycles can be transported within subways, buses and trains, which makes it possible to combine bicycle trips with transportation systems.

Cities have facilitated bicycle parking at stations, schools, and offices or near housing. These cities have created bicycle lanes that are safe and separated from car traffic, generating a special space for bicycle users. Above all, its essential to create a bicycle culture implementing campaigns like “open bicycle streets” that allows the city to create a positive mass effect towards bicycles as it has been done in New York and South America.⁶⁹

4.7 Pedestrians

Pedestrians are critical to functioning cities: they bring life and interaction while making small demands in terms of infrastructure.⁷⁰ Pedestrian traffic consumes very little resources since it's the same user the one providing the energy;

⁶⁸ City of Ottawa. *Ottawa Cycling Plan*. 2008

⁶⁹ Gehl Jan. 2010. *Cities for People*. Washington D.C. Island Press: Pg. 185-188.

⁷⁰ Gehl , P. 105

consequently creating a transport that is clean and silent. An acceptable walking distance for a pedestrian is around 500 m, although it depends on the quality of the path.⁷¹ In general terms, most of the city centers have an area of 1 square km, providing pedestrians with most of the city services at walking distance.⁷²

Before cars based cities, pedestrians were very important in the streets. Since the introduction of the car, pedestrians have been pushed towards the sidewalks. These spaces are not fit for pedestrians; they are filled with obstacles such as signs, lampposts, parking meters, and parked bikes or cars. Cities should make decisions thinking from the pedestrian point of view. Pedestrians make spaces lively, they are economically significant for retail, and they bring safety and vitality to the streets. Planners and architects can improve pedestrian traffic by giving them higher priority in intersection crossings, less waiting times in lights, and creative paths that are enjoyable and manageable, generating surprise and interest.

⁷¹ Gehl , P. 121

⁷² Gehl , P. 121

5. Generative Urbanism

5.1 Actual Situation of Ottawa

“The city of the future will function as a place of interchange and intersection. Architecture will lie at the crossroads of modal connectivity.”⁷³

Like many “mid - size” cities, Ottawa has found itself in a crossroad. After more than a century of urban planning, the city is dispersed. Consequently, it has developed small peripheral urban areas away from the city core. The notion of city is blurred, and the boundaries that correspond to it are unclear. In fact, many “citizens” of Ottawa, may not even consider themselves as “Ottawans”; they rather identify themselves as part of the small peripheral urban areas.

Ottawa has the same focal points as it did seventy years ago: Parliament buildings, Beautiful landscapes and office (Government) areas. Since the 1970's people have populated the peripheral areas more than the urban core, a trend that still continues. The city has failed to deliver urban spaces for people to enjoy different lifestyles and activities; therefore citizens look for other (sub)urban areas that can provide those qualities. Unfortunately, this trend, (helped by the car-based urban strategies of the past) has resulted in a “lifeless” downtown core, and an extensive daily commute within the urban region.

⁷³ Hoete, Anthony. 2003. *ROAM Reader On the Aesthetics of Mobility*, Black Dog Publishing, London. P.110.

Figure 2: POPULATION GROWTH

AVERAGE COMMUTE TO WORK (km)

Source: Statistics Canada, 2001 Census

Figure 17. Population growth and Average distance to commute to work

Source: City of Ottawa.

Ottawa is expected to have a population growth of 50% in the next 10 to 20 years. It is also one of the “mid-size” cities that could generate vast economic activity. Although Ottawa has an initiative based on sustainable development (Ottawa 2020), it is unclear how it would manage vast population growth, avoid sprawl, reconnect with the (sub)urban areas, and revitalize the urban core. These subjects are key for a “mid-size” city to be competitive. A new urban proposal is, therefore, advanced: *Generative Urbanism*.

5.2 Connecting Ottawa: From the suburbs to downtown

One of the principal components of a competitive city is its transportation system. In the past decades, Ottawa based its public transportation in a bus system. The system connects the suburban areas through “Transit ways” with independent lanes for buses. Although fast, the system collapses once it enters the downtown area, where the once “independent” system, mixes

with regular transit, therefore creating congestion and lack of efficiency.

Figure 18. Ottawa Transitway map Source: OC transpo

The city decided to introduce Light Rail to overcome its transit issues. As stated before, the proposed LRT will not connect the suburbs, and will force the city to develop areas just to ensure enough transit volume. The city developed a previous Rail strategy, the “O-Train” which has been successful, although not very influential in terms of passenger volume and transit solutions.

The proposed strategy is based on connection. To boost competitiveness, a “mid-size” city should bring together private and public actors of the metropolitan area, integrating them in a “relative space”.⁷⁴ The actual LRT connects the city through an “east-west” corridor. The new proposal will extend this corridor, using the biggest “east-west” infrastructure in the city: Highway 417. The 417 cruises through the city segregating north from south; but it works perfectly as a connector, since all the small urban areas in the region have direct access to it.

⁷⁴ Dobby. P.1

Figure 19. Section through Highway 417, North South Segregation

Source: *Generative Urbanism Proposal*

This “Regional” light rail line would connect the suburbs, starting at Orleans, and finishing in Kanata. This “east-west” corridor would be fundamental for the city’s connection; hence it would link the areas with the highest percent of growth and commuters, with the downtown core. This new line would not replace the LRT proposed by the city; it would complement it. The new scheme would connect the downtown LRT with the new “417 line” and with the “O-train” creating a strong “east-west” connection as well as “north-south”. With the development of this new system, the city is not only interconnecting its urban centres, but its linking itself to the bus station, train station, and eventually the airport. This will allow the city to re-connect efficiently with the region and the world.

Figure 20. Schematic Proposal of a New Transportation System

Source: *Generative Urbanism* Proposal

"It is transport that will make or break the sustainability of a city. Compacted mixed-use communities should be grouped round public transport hubs with the individual community planned around walking and cycling distances".⁷⁵

5.3 Nodes, Transportation Hubs + Social condensers

The new rail line through Highway 417, creates a different scenario; the redevelopment of infrastructure within a new network. Having a rail transportation line changes the urban relationships with the context. A rail project generally boosts investment and densification in areas close to the main stations. This is essential for the "417" corridor, since vacant lots, unused green spaces, parking lots and light industry border it.

⁷⁵ Rogers P. 166

The downtown core has 3 main “north-south” corridors, Elgin St, Bank St and Bronson Ave. In the intersection of these main corridors with the 417, transit stations would be placed, creating spaces of interchange – or *nodes*: “A node is an intersection of two modes or two modal lines and is, thus, a potential interchange. Some nodes are materialized in space as railway stations, airports network hubs, and ultimately cities.” ⁷⁶ Knowing that a considerable amount of people would flow through the new transportation system, the nodes would be spaces of interaction. These nodes would boost city life, creating spaces of exchange with programs like leisure, work, housing or retail.

**Figure 21. Urban analysis of mayor intersections with Highway 417 :
Elgin Street, Bank Street and Bronson Avenue**

Source: *Generative Urbanism Proposal*

⁷⁶ Hoete. P. 13

These nodes would change the 417 corridor. The base of the 417 would change from a concrete structure, to retail areas. This will allow a major economic and social benefit, plus the possibility of piercing the 417 structure, creating new north-south pedestrian connections. This structure would have two transportation stations: the light rail station at the highway level, and a connecting bus station at the pedestrian level. This way the Rail system that transits through the 417 would have immediate connection with the local transportation system: the bus.

To take advantage of the flow of people a "new" typology would be introduced: the *Social Condenser*.⁷⁷ This typology consists of a public building that would hover over the Rail station. This building would contain a program that would improve interaction, thus introducing those social spaces that the city is lacking. The program of these buildings would depend on the urban analysis made of each area; consequently Bank Street would have a Palace of the Body, Bronson a Palace of Education, and Elgin a Palace of Culture.⁷⁸

⁷⁷ Soviet architects introduced social condensers in 1925-1932; they were developed to transform society, using architecture as a vessel. The "social condensers" were made to transform the individual of a capitalist society, into a socialist "militant", where his interests would merge with the interests of all.

Kopp, Anatole. 1970. *Town and Revolution; Soviet Architecture and City Planning, 1917-1935*. New York: G. Braziller,

⁷⁸ The "Palace" is significant in modern architecture. Soviet architects considered the palace "a Building designed to serve all of society". The "Palace of culture" or Clubs, were developed to give society "facilities for recreation and relaxation after a day of work". The "Palace" became the place where children or adults could broaden individual interests, thus becoming "collective human beings". In fact, sports were an important activity in this new search of social interests; sports became a critical part of social culture. Lissitzky, El. 1970. *Russia: architecture for world revolution*. Cambridge, Massachusetts: MIT Press.

The "Palace of the Body" was developed as an example of one of these "Social Condensers". Its program consists of a sports facility that would enhance activity in the area. Bank Street is known as a commercial strip, but it lacks spaces for sports and leisure, a critical issue in a soon to be populated downtown core. Office buildings occupy the area that surrounds the node; this tendency was also included in the condenser. Consequently, the condenser is a cross programming of a sports facility (platform) and a "densified" office building (towers). The introduction of these two programs, plus the transportation stations and retail make the building a complete transportation hub. It is a mixed-use 24-hour building that improves interaction and social activity.

Figure 22. "Palace of the Body", View from Highway 417

Source: *Generative Urbanism Proposal*

Figure 23. "Palace of the Body", View from Catherine Street
 Source: *Generative Urbanism Proposal*

Figure 24. "Palace of the Body", Perspective view
 Source: *Generative Urbanism Proposal*

Figure 25. “Palace of the Body”, Perspective view

Source: *Generative Urbanism* Proposal

5.4 Programmatic Bleed: Downtown Ottawa Master Plan

The social condensers along the 417 will be connected with the city in two ways: through a pedestrian/bicycle access and by a bus system. The pedestrian access would allow connecting the platform with its surroundings. This will generate the redevelopment of unused green areas into urban parks that would eventually connect with each other and with the green space network of the city. The interaction of the Social Condenser with the parks would activate them, and reintroducing this areas to the urban fabric. The introduction of a complete bicycle and pedestrian path system would connect the “social condensers” with its local surroundings. This with these connections multi modal transportation is enhanced and car usage is expected to drop considerably.

Figure 26. "Master Plan" Connecting Networks Source: *Generative Urbanism Proposal*

The transportation hub would also be connected to the city through a bus system. Next to the retail, each hub would have a bus station that would connect the project in a "north south" axis. This connection, would improve the interaction between the hub and the city.

Since the amount of activity is bound to increase due to the "social condensers", it is expected that the activity of the corridor increase as well. This means that the "potential development sites" that the city of Ottawa mentions in its "Downtown Urban Strategy" would increase value, and would become perfect sites for the redevelopment of the downtown core. The increased connection between the "Social condensers" and the city would incentivize a programmatic bleed; where social activity and interaction would filter in the urban core.

This will force the city to develop the vacant lots and parking spaces, to redevelop parks and waterfronts, creating a dynamic and interconnected downtown area.

Figure 27. Potential development sites joined by the New Master Plan
Source: Downtown Ottawa Urban Strategy & *Generative Urbanism* Proposal

Postscript

“Mid-size” cities are becoming competitive in terms of urban planning; it’s a fact that their productivity and efficiency will be fundamental for a dynamic economy. Like Ottawa, many of these cities are looking for a “compact, efficient, equitable, affordable, environmentally friendly city”. But how can a city manage to overcome obstacles such as extreme population growth, sprawl, and revitalization of urban centers and at the same time achieve the above characteristics?

Many of these “Mid-size” cities have planning strategies for their immediate and future goals. But most of them fail in the execution. Ottawa has a history of unfulfilled urban plans; half way through the “Ottawa 2020” strategy it seems that it is bound to repeat its mistakes.

The *Generative Urbanism* plan developed in this thesis could be executed in many “mid size” cities. It establishes new relationships with existing infrastructure, it connects the urban centers around the region, it creates new urban spaces of interaction, it works simultaneously with mass transportation, and above all it generates urban renewal within an established urban core. All of these characteristics would ultimately make a city much more competitive, efficient and attractive for locals, visitors and investors.

Ultimately, the strategies presented in *Generative Urbanism* try to improve a city that is aware of its deficiencies but also of its attributes. Ottawa has huge issues with commutes; its numbers are close to the ones of Montreal and not far away from those of

Toronto. It is by all means a city that is heterotrophic. It relies excessively on having large amounts of land for development and agriculture, not realizing that it's a precious but finite resource. On the contrary, *Generative Urbanism* intends to explore the attributes of the city. It connects its most important resource, its inhabitants. A city that lives from government labour, a growing amount of students and immigrants should strengthen its communities. This social connection will not only bring economical benefits but would finally create belonging and responsibility towards the city from all inhabitants.

Consequently, *Generative Urbanism* is a first step towards an Autotrophic city. A city that interacts and exchanges flows of people, produce and energy with its region to support itself. That is finally what cities like Ottawa are looking for, cities that flourish economically and are enjoyable by all.

Annex: Palace of the Body

Figure 28. Exterior Perspective (Isabella Street and Bank Street) Source: Generative Urbanism Proposal

Figure 29. Exterior Perspective (Highway 417 and Bank Street) Source: Generative Urbanism Proposal

Figure 30. Interior Perspective, Main Hall Source: Generative Urbanism Proposal

Figure 31. Interior Perspective, Sports Hall Source: Generative Urbanism Proposal

Figure 32. Interior Perspective, Office Area Source: Generative Urbanism Proposal

Figure 33. Exterior Perspective, View from Bank Street Source: Generative Urbanism Proposal

Figure 34. Exterior Perspective, View from Bank Street Source: Generative Urbanism Proposal

Figure 35. Ground Floor Plan

Figure 36. Rail Station Floor Plan

Figure 36. Food Court

Figure 37. Main Floor

Figure 38. Roof Floor

Figure 39. Office Spaces

Figure 40. Office Spaces

Figure 41. Roof Plan

Figure 42. Transversal Section

Figure 43. Longitudinal Section

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