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EMERGING URBANISM AND CYCLING DEVELOPMENT

A NEW CYCLING AGENDA FOR THE CITY OF TORONTO

By:

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"The right to the city cannot be conceived of as a simple visiting right or as a return to traditional cities. It can only be formulated and renewed right to urban life."

- Henri Lefebvre

Executive Summary

This report titled *Emerging Urbanism and Cycling Development – a New Cycling Agenda for the City of Toronto* is assembled to inform a comprehensive cycling program for the City of Toronto. It offers an assembly of secondary research to help construct long-term cycling strategy in Toronto based on new urban theories as well as a thorough understanding of opportunities particular to the City of Toronto.

The assembly of secondary research for this report was researched over a period of a year and assembled in partial completion of graduate training in urban development at Ryerson University in Toronto. The research presented in this report has been reviewed by two faculty members at Ryerson University's School of Urban and Regional Planning, Professor Ron. Keeble and Professor Zhixi Cecelia Zhuang.

Abstract

Cycling is an urban enabler. It is an innately positive contribution to the urban environment allowing recreation, transport, and travel. Today cycling pathways systems in Toronto are dispersed and fragmented. Evidence suggests that the bicycle need be provided with a network, strategized and conceptualized at a higher level so that its enabling function of integrating the urban environment can be achieved.

In Canada and Toronto, cycling development is impeded by a lack of tradition, no federal development support and *ad-hoc* implementation procedures, ultimately creating unfavourable urban pathways. This report asserts the critical need to move beyond the *ad-hoc* implementation of cycling paths towards a comprehensive approach informed by the objective of integrating the urban environment. It begins with a review of the current municipal cycling strategy for Toronto, followed by a discussion exploring the changing mobility demands of Toronto, subsequently reviews creative implementation techniques in other jurisdictions and concludes with supplementary policies and guiding principles to inform a revitalized cycling infrastructure strategy in Toronto.

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1.0. Introduction

The push to implement large pieces of public transit infrastructure in Toronto is well underway. The objectives of these plans are to improve the quality of urban transportation. While a lot of attention in Ontario is focused on the execution of large and industrious transport infrastructures, other equally valid transportation typologies cannot be overlooked. Within academic circles, transportation infrastructures are increasingly discussed as enablers of mobility, establishing and providing meaningful multi-layered access to the city. Cycling and its related infrastructures are vital components of this new multi-layered mobility city as well as instrumental to the desired objective of re-urbanization. If however, cycling is to achieve its potential as an enabler of urbanization, the principles to direct the development of these infrastructures must evolve.

The experience of implementing an effective cycling strategy in Toronto has been noticeably difficult and the ability of cycling to improve the quality of the street environment within urban areas suffered due to tensions arising between this and other mobility priorities. Indeed the planning dilemmas pertaining to the expansion of cycling in the City of Toronto broadly provide meaningful insight into some procedural and institutional limitations of municipal practice. At the same time, a new vision for cycling expressed in policy provides support for the expansion of cycling infrastructure. This report is an attempt to offer a renewed conceptual understanding of the role of cycling to the city of the 21st century to inform a comprehensive development strategy in Toronto.

Exploring new planning directions and contemporary economic and social aspirations provides inspiration pertinent to the formulation of a renewed approach to the implementation of cycling. As the first chapter of this assignment elaborates further, the role of public policy cannot be underestimated as it pertains to the development and the expansion of cycling in Toronto. As a guiding instrument, public policy not only informs the direction and shape of urban growth, but also reflects a city's understanding of itself and its ambitions for the future. Cycling network expansion needs to be informed by a governing set

of principles; principles that "inform but do not finalize the myriad of individualizations that must become the goal of a revitalized urban design practice." (Sorkin, 2001;5)

What remains particularly exciting and interesting in contemporary urban policy is the new attention to mobility objectives in the city. In many ways, mobility and multi-level access to the city represent the future trajectory of city planning supported by contemporary theories and associated with other city initiatives to the experience of the city. In the end, mobility as expressed in cycling represents a new pathway to experience urban life. The re-working and re-imagining process related to cycling is part of larger urban revitalization efforts in North America. In this exploration of flexible mobility infrastructure the potential of cycling becomes increasingly evident, not only as an instrument of revitalization but a catalyst for reshaping urbanism in the 21st century.

1.1. Research Question

What strategies can the City of Toronto employ to build a comprehensive cycling program?

1.2. Objective

The current cycling strategy in Toronto, known as the Toronto Bike Plan, expires in 2010. So far the cornerstone of the plan – the provision of infrastructures- has not succeeded in achieving higher numbers of utilitarian cyclists. The expiry of the Toronto's cycling policy framework presents an opportunity to reflect on the existing program and explore new concepts to increase the number of utilitarian cyclists in Toronto. The objective of this report is to determine what strategies might help the City of Toronto achieve higher utility cycling rates.

1.3. Method

This report reviews a variety of secondary research in order to help synthesize new principles for a comprehensive cycling strategy in Toronto. This qualitative research project is divided into three components; a review of Toronto's existing cycling framework, a review of contemporary theories in urban mobility and a review of case study municipalities. Together this review of new directions and strategies inform the final section, proposed principles for the development for a comprehensive cycling program.

The first section reviews Toronto's existing policy framework including: history of cycling, its cycling policy structure, its official plan, financing mechanism, statistical monitoring program and its cycling culture. The second section explores the transformation of urban mobility by reviewing economic, design and social theories demonstrating the changing requirements of cycling infrastructure as they relate to the evolution of the city from industrial to post-industrial. This section uses academic sources (books, journals and articles) to help contextualize cycling within the transformation of the urban environment. The third section of this report reviews official plans, national strategies, infrastructure designs and financing

structures for case study jurisdictions within OCED countries. The case study municipalities of Amsterdam, Copenhagen, Berlin, New York and Vancouver, each demonstrate interesting experiences as to the formulation of a comprehensive cycling program. The final component makes use of findings presented in the three preceding components of this report to outline principle in chart format to inform new directions for cycling development.

2.0. Cycling Armatures in Toronto

Cycling as a method of commuting has been evident in Canada for nearly forty years. Since the 1970's greater metropolitan regions in Canada have provided cycling paths to encourage citizens to cycle to work. According to Pucher and Buehler (2005) "biking accounted for an average of 1.2 [percent] of work trips in Canada in 2001, but with considerable variation by province and metropolitan area." (Pucher, Buehler, 2005a;43-61) The considerable variation in municipal cycling rates is largely the effect of no federal cycling program. As Pucher, Buehler, remark;

> "[In Canada] *the extent of provincial involvement in cycling policies and funding varies considerably by province. Quebec has been deeply involved in a range of programs to promote cycling, increase its safety, co-ordinate local efforts and fund improvements. By comparison, Ontario provides virtually no funding, planning or program co-ordination. Ontario's involvement is limited to the regulations that most provinces have about whether helmet use is mandatory and on which highways cycling is permitted." (Pucher, Buehler,2005a;43-61I)*

In Ontario cycling is left to be primarily expressed and implemented in municipal policy. In the Greater Toronto Area, the Metrolinx transportation plan referred to as 'The Big Move' anticipates a future "25 years from now... [where] one-third of trips to work will be taken by transit and one in five will be taken by walking or cycling." (Metrolinx, 2008;14) The provincial agency plans to provide financially for this expansion, yet the vision and the articulation of cycling will within the context of Toronto, remain a municipal *affaire.*

Municipalities have the challenge within Ontario's planning framework of developing effective urban cycling paths where the automobile retains its authority. The authority of the automobile by comparison to the bicycle is upheld in well structured provincial and federal transportation departments with appropriate financing mechanisms and institutional support. As of 2010, both provincial and federal

governments do not recognize the bicycle as an urban vehicle. Together, they have had little to do with the provision of urban cycling paths. At the level of provincial and federal governments, the cyclist is regarded as recreational, programs and policies effectively refer to the cyclist in line with the pedestrian.

The regard for the bicycle as a recreational vehicle is due to the tradition of cycling in North American culture. As Pucher, Komaroff, and Schimek remark; "bicycling in Canada and especially the United States is impeded by the lack of a tradition of cycling for utilitarian purposes and by the marginal legal, cultural and infrastructure status of cyclists in both countries' automobile-based transport systems." (Pucher, Komaroff, and Schimek, 1999,1)

The marginalization of cycling from an institutional perspective is responsible for the poor articulation of cycling within the urban environment. The environmental conditions of cycling pathways on streets and urban arterials in Toronto reinforce the negative and dangerous perceptions of urban cycling. Indeed, the perceptions of dangers associated with cycling represent one of the biggest obstacles to cycling development. Municipal, federal and provincial safety campaigns for helmet use draw attention to the dangers of cycling and indirectly target the cyclist as the source of danger, absolving the motorist from responsibility.

In his research Shimrek, summarizes eight "dilemmas" which he describes as barriers to the expansion of utilitarian cycling namely; inaccurate perceptions (including danger, bicyclist's right to the road), professional neglect, uncomfortable routes, lack of design considerations, the lack of capital spending programs, and roadway enforcement. (Shimrek, 1996;2) These dilemmas are mirrored in Toronto's cycling surveys.

Efforts to build a successful network in Toronto are impeded by ongoing development patterns and a narrow vision for cycling in Toronto. Toronto has throughout its history ignored the bicycle, reducing its role from urban vehicle to recreational option. Toronto's current cycling development strategy, titled 'Toronto Bike Plan' was initiated in 2001 as a reaction to the city's cycling infrastructure deficit. As

Pucher and Buehler remark; "Toronto's Bike Plan sets out an ambitious goal of 1000 km of bikeways by 2011, but it has a long way to go, and funding is limited." (Pucher, Buehler, 2005a;45-61)

As a reaction to its cycling infrastructure deficit, the cornerstone of the city's cycling strategy has become the provision of infrastructure. Yet the strategy to increase the number of cyclists in Toronto through the provision of cycling paths has proven ineffective over the past ten years. As part of its cycling strategy, the City of Toronto has completed two complementary bicycle surveys one in 1999, and the second in 2009 aimed at monitoring use and perception of cycling. The results from the 1999 and 2009 bicycle surveys illustrate that the provision of infrastructure did achieve a higher percentage of utilitarian cycling. The findings demonstrate perhaps the limitations of a strategy based solely on the provision of infrastructure because despite the tremendous increase in the number of cycling routes since 1999, the increase in the number of utilitarian cyclists has been between 1-2%. (IPSOS,City of Toronto, 2009)

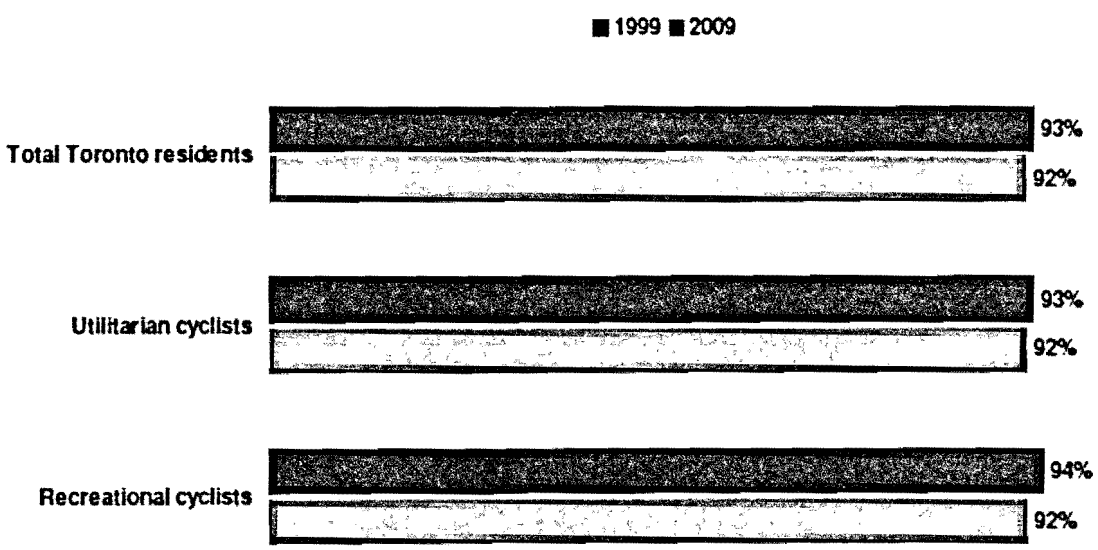


Figure 2.0.1 Demonstrates the increase in utilitarian cyclists and the increase in the total population of the city. (Chart Retrieved from IPSOS, City of Toronto 2009 Cycling Survey.)

The small increase in utility cycling illustrates the failure of infrastructure to meet the characteristics that would make cycling appealing to a greater segment of the urban population. The same

survey outlined deterrents to utilitarian cycling in Toronto. They are; poor quantity of separated bike lanes, automobile traffic and road maintenance of cyclists.

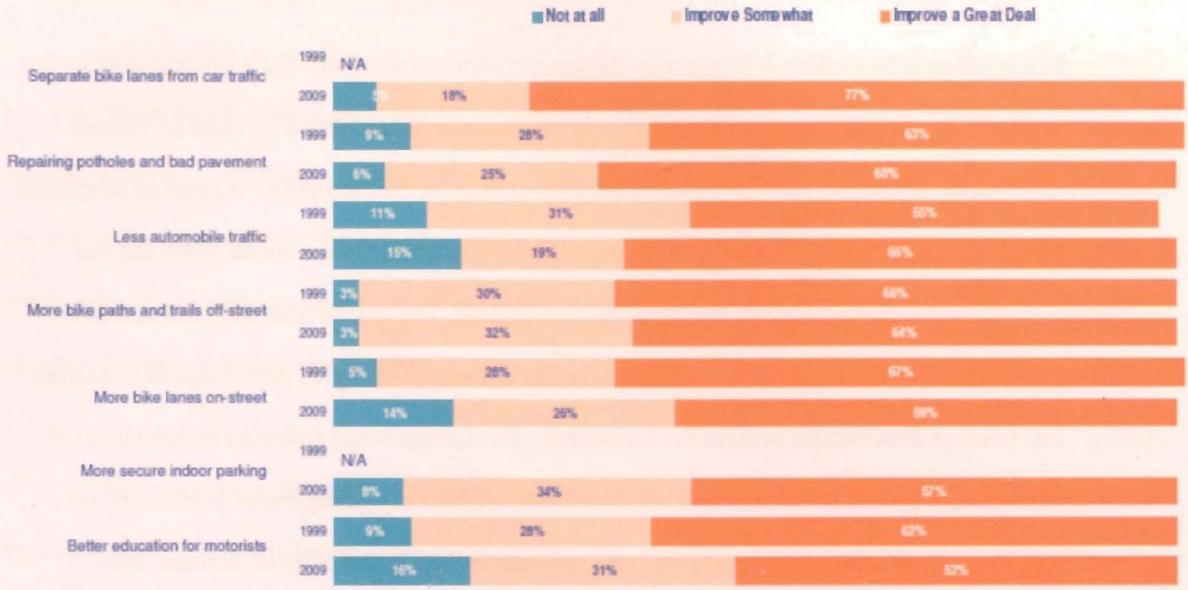


Figure 2.0.2 Demonstrates of cycling measured in the 2009 cycling survey. (Chart Retrieved from IPSOS, City of Toronto 2009 Cycling Survey.)

The concerns illustrated in the City of Toronto (1999) and (2009) bike surveys mirror the barriers outlined by Shimrek earlier. Together these documents demonstrate chief concerns range from safety, to visibility, to the effectiveness of the path. All illustrated concerns are observed in the Toronto Bike Plan thought the strategy's commitment to monitoring cycling infrastructure satisfaction. The current strategy however fails to express how these concerns will be addressed in the expansion of the network development or other programs and initiatives. It appears the current framework in Toronto is strategized to accommodate existing travel behaviour. If the cycling strategies are designed to accommodate existing travel patterns then increasing the use of cycling paths will likely become more difficult in the future.

The City of Toronto's 2010 Bike Plan exemplifies what McClintock author of *Planning for Cycling* (2002) refers to as an *ad-hoc* implementation strategy- a strategy where cycling is located along pathways where it is easy and where little conflict or opposition will ensue. Over the past ten years the Toronto Bike Plan has pursued the development of a cycling network on secondary paths and of road

corridors. While the strategy is supported with arguments made for cyclist safety, it is also convenient from an implementation perspective.

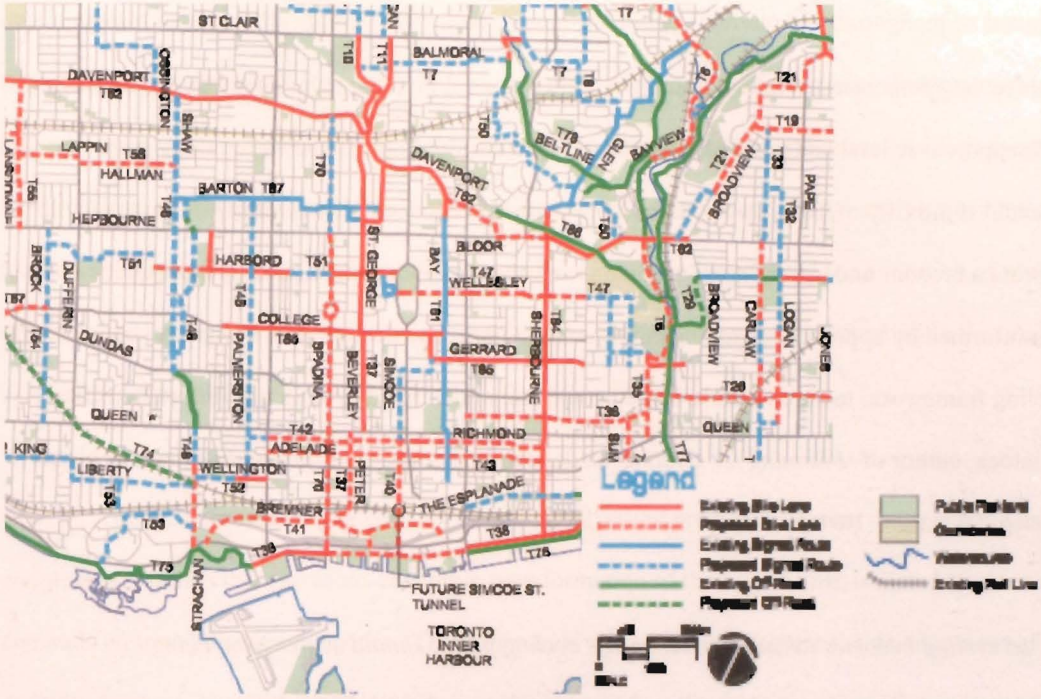


Figure 2.0.3. Excerpt from the Toronto Bike Plan's Proposed Bikeway Network. This excerpt demonstrates the proposed cycling network development over a period of ten years. The cycling paths are located on secondary streets and corridors. (City of Toronto, Bike Plan 2001)

The strategy to locate paths on secondary avenues has several effects on the effectiveness of the cycling network. One of the first effects of an *ad-hoc* strategy is 'dead end' paths. Figure 2.0.3 demonstrates two dead end cycling corridors; one at the Gerrard and Parliament and another at the intersection of Beverly and Richmond. By strategically locating cycling along these routes, the City of Toronto fails to acknowledge the importance linear cycling arteries. The linear cycling pathway is especially vital to an increase in utilitarian cycling, where the effectiveness of the cycling path and its linkages to important city nodes re-enforce its strategic appeal.

Another effect of an ad-hoc cycling strategy is the location of cycling paths only on secondary urban roads where there is likely to be little conflict or opposition. To date Toronto's arterial urban roads (Queen

Street, Yonge Street, Bloor Street and University Avenue) are not slated to include cycling paths. This effect is particularly dangerous given that cyclists (like motorists) need direct urban linkages and the infrastructure to connect with important urban nodes.

This review demonstrates that utilitarian cycling potential in Toronto is limited by the lack of institutional support at federal and provincial levels and by a narrow implementation strategy at the municipal level. If the City of Toronto wishes to increase the level of utilitarian cycling its strategy will need to; express a broader understanding of cycling as an urban instrument and develop a comprehensive cycling plan informed by approaches taken in other jurisdictions. The evolution of Toronto's static and isolated cycling framework, towards a multi-dimensional and multi-tiered cycling network exemplifies what McClintock, author of '*Planning for Cycling*' understands as transition from *ad-hoc* towards higher cycling conceptualization. He remarks;

> *"as cycling becomes taken more seriously, cycling policy should evolve from being ad-hoc and concentrating largely on the easily implementable physical provision of infrastructure. It should become more integrated with a series of other policy activities and be implemented according to a carefully thought out strategy in partnership with a variety of other agencies, on a regular and systematic basis, including monitoring of the effectiveness of earlier initiatives of different kinds." (McClintock, 2002;14)*

The development of a comprehensive cycling strategy in the City of Toronto is an enormously complex endeavour. This report attempts to illustrate the various dimensions of cycling previously unexplored. The following two components of this report are dedicated; to broadening the understanding of cycling by a review of the relationship between urban transformation of urban movement and secondly by reviewing successful comprehensive cycling strategies as evident in case study regions.

(Laforest, 2010)

3.0 Toronto's Transformation from Static to Flexible

If cycling is to be regarded as its own transportation type then opportunity exists to imagine how cycling might be aligned with Toronto's urban transformation. Toronto has throughout its history experienced tremendous implementation success with industrious transportation infrastructures yet cycling and its related infrastructures are noticeably different in their infrastructural as well as their programmatic requirements. This section explores how urban economies cultures and design aspirations might impact cycling policies in Toronto. The connections made between the bicycle and the evolution of mobility demands are anticipated to help form a comprehensive cycling framework responding to the unique climate of change in Toronto.

Today, Toronto is at the end of a de-industrialization process, effecting the economic and social composition of the city. The socio-economic transformation of the city in turn, is slated to place new demands on transportation networks. These demands will ultimately require the development of flexible mobility systems. (Ascher, 2003) An urban cycling network is the demonstration of a resilient and a flexible transportation system understood by Jensen (2009) and Ascher (2003) as vital to the function of post-industrial cities.

Figure 3.0.1. Gardiner Expressway in Toronto. A Static Infrastructure Project that demonstrating contained approaches to mobility designs. (Picture by Jennifer Laforest)

This conversation begins with Jenson's (2009) understanding of the tensions between current perceptions of the city as the site of enclosed spaces, "enclaves" and new theories which discuss "armatures"- that is infrastructure channels and transit spaces. (Jenson, 2009) To Jenson; "[cities are] marked by the physical traces of dead and passive layered morphologies (...) equally constituted by the multiple flows, interactions and linkages from the local to the global." (Jenson, 2009) The increasing attention to linkages and flows is largely the effect of new urban cultures and the need for flexible transportation infrastructures, at the time compatible with the urban environment.

The post-industrial city is increasingly reliant on diverse mobility infrastructures that enable global as well as local connections. This transformation of the city will bring with it new movement priorities which are not slated to radically alter the city but rather infuse it with new mobility dimensions, so that greater flexibility, autonomy and resilience is achieved.

3.2.0. Experiencing Toronto through Static Infrastructure

Toronto is the product of enclosed infrastructures as the majority of its citizens today use contained infrastructures (primarily in the form super-expressways and subway lines) to access the city. These static infrastructures thoroughly dictate urban experience and provide very little in the way of spontaneity, flexibility or choice. Most importantly, these infrastructures define the urban environment as a set of destinations rather than an integrated surface. The effect of a tradition in regarding mobility as separate from the urban context contributes to the persistent fragmentation of the urban surface.

The majority of Toronto's large mobility infrastructures were conceptualized as part of the 1943 Master Plan. The 1943 Master Plan demonstrated for the first time intentions to insert a series of fast expressways [super-expressways] throughout the metropolitan area. These expressways were technologically utopian supported by the notion that they would connect people as well as enhance efficiency and rapid access to the city. The super-expressway was in itself the symbol of an advanced and attractive city demonstrating new engineering abilities and implementation capacity. The design of Toronto's new super-expressway system mirrored the approaches taken in Manhattan and Germany and attempted to align Toronto with other world-class cities of the time. Thomas B. McQuesten, Minister of Highways, for example, sent provincial staff to study Hitler's Autobahn in Germany. As former mayor of Toronto John Sewell remarks;

> *"This new form of expressway was a departure from the traditional notions of the street which prior to the early-twentieth century included consideration for landscaping, sidewalks, monuments and attention to the experience of the pedestrian. Isolating and separating functions was part of the machine as a model modernization of the cities" (Sewell, 2009;146).*

The effect of rational and machine-like infrastructures was the heightened regard for efficiency and speed of the transportation corridor. The segregation of the traditional integrated functions of the street was a stark departure in the values associated with the inclusivity. As Nan Ellin remarks;

> *"[as] pedestrian and vehicular paths thus separated. So did land uses, activities buildings and districts, resulting in the city spaces composed of free standing high-rise and suburban tract houses linked by highways." (Ellin, 2006;18)*

Streets and corridors once understood as spaces for public life with integrated functions including schools, hospitals, commercial strips and parks became bland arteries where the connection to the environment in-between travel destinations became void. As Sennett remarks;

> *"as urban space becomes a mere function of motion, it thus becomes less stimulating in itself; the driver wants to go through the space not be aroused by it... the body of moves passively, desensitized in space, to destinations set in a fragmented and discontinuous urban geography." (Sennett, 1994;18) (Jensen, 2009)*

These dead-zones are places within highly urbanized areas, sometimes accommodating millions of travelers a day, yet by way of their segregated design remain conceptually empty, unable to support urban life.

The tradition of implementing infrastructure in isolation from other urban objectives hinders the potential of cycling paths to act as urban enablers. The insertion of cycling within the urban environment will need recognize the static tradition of transportation infrastructure and regard the bicycle in light of its potential flexible and integral functions.

Unlike the personal vehicle or the subway system, the bicycle is compatible with the existing urban surface and can be articulated in a variety of capacities yet to be outlined or explored in City of Toronto cycling policies. Cycling pathways can serve recreational, experiential and utility functions informing its characterization in this exploration as a flexible mobility. As Toronto transforms from industrial to post-industrial, evidence suggest its mobility demands become increasingly diverse. The following will explore how new economic and cultures associated with this transformation are particularly inclined to shape transportation requirements of Toronto.

3.3.0. Post-Fordism and the Evolution of Mobility

Today the economic composition of Toronto and many other North-American cities is evolving to become what some characterize as post-industrial. The de-industrialization process, largely the result of new global trade agreements combined with the decentralization of production and further enhanced by new mechanisms of communication, characterize the post-Fordist city. Post-Fordism is a term used to describe new global and interconnected economies. It described the shift in North American from a centralized model of mass production and mass consumption to a model based on more specialized and decentralized production. Generally it is a term used to describe the post-industrial city economy and it is used to discuss the resulting social and economic transformation of the city inclusively. One of the most dramatic impacts of post-Fordism is the removal of industrial land uses and employment sectors. The effect of which are new urban economic cultures, cultures while dependent on global connections also value rootedness.

Jensen (2006) remarks; "only by understanding the important role of [mobility has] in creating new relations to our consociates and the physical environment, can we hope to start comprehending the way circulation shapes and moulds flows of meaning and cultures of movements." (Jensen, 2006;155).Mobility infrastructures enable movement and provide what can be regarded as a fundamental access to the urban environment.

The evolution of cities from industrial to post-industrial, from Fordist [contained] to post-Fordist [decentralized] informs the tensions discussed earlier by Jensen (2009), between static mobility infrastructure and new approaches to flexible mobility. The post-Fordist city favours increasingly, non-static mobility allowing for greater personal autonomy, recreation and urban experience.

The economic and social complexity of the urban environment as expressed in post-Fordist urban theories demonstrates the need to revisit the exclusionary and simplistic attitudes of mobility designs expressed in the modern approach to the street, the corridor, the path and the expressway. An effective cycling policy would not strategize or implement a program based solely on the provision of infrastructure but rather express how cycling might contribute to other urban objectives. Cycling networks might then for example ensue the revitalization of certain nodes or as the following demonstrates be implemented in creative clusters as enabler of urban exchange.

3.4.0 New Mobility and the Creative Economy

A vital consequence of the economic transformation of the city from Fordist to post-Fordist, is the changing employment and cultural composition of urban areas. This changing social composition of the urban regions informed by economic re-structuring is framed by Florida (2003) as the emergence of the Creative Class. Competition and globalization have created new kinds of employment cultures within the city. Toronto (in the same way it once competed for banking and manufacturing employment) is now engaged in a process of attracting creative and knowledge employment sectors. As Landry remarks; "cultural resources are [today] the raw materials of the city and its value base; its assets replacing coal, steel or gold. Creativity is the method of exploiting these resources and helping them grow."(Landry, 2000;7)

The appearance of the Creative Class, is the effect of the socio-economic transformation of the city from Fordist to post-Fordist of what Florida characterizes as the "remaking of the economic geography of the city." (Florida, 2003;11) This transformation will have potentially dramatic effects on the shape and the use of the city as the defining characteristics of this emerging employment sector is its preference for

urbanized environments, conducive to exchange, flexibility and experience. As Florida remarks; "[members of the Creative Class] gravitate to stimulating creative environments - to places that offer not only opportunities and amenities, but openness to diversity, where they feel they can express themselves and validate their identities." (Florida, 2003;11)

Many cities, including Toronto, are currently in the process of trying to appeal to employment sectors known to gravitate towards urban environments conducive to exchange. The mobility characteristics of urban environments and the opportunities they offer for flexibility and exchange make them generally more attractive spaces for economic clustering of the Creative Class. (Florida, 2005) As an employment group, the Creative Class, typically work long non-standard hours in front of a computer. This work is also noticeably individualistic and non-physical. (Florida, 2003;174) The effect of these characteristics is a nomadic employment culture, where work is carried informally anywhere at any time.

It is precisely the nomad culture, gaining traction in the urban environment through the creative employment sectors, that reinforces the need for cycling and less static mobility infrastructures. Indeed, the preference for active and experiential mobility infrastructure is researched and documented by Florida. Focus group interviews reveal; "members of the Creative Class value active outdoor activity because the nature of creative work is largely intellectual and sedentary, thus Creative Class people seek to recharge through physical activity." (Florida, 2003;173-174)

The preference for physical activity and the nomadic dimensions of Creative Class employment informs a new appreciation for what Florida refers to as the third space. As he elaborates;

> *"Third places are neither home nor work, the "first two" places-but venues like coffee shops, bookstores and cafes in which we find less formal acquaintances. According to Oldenburg, these third places comprise of the heart of the community's social vitality, where people hang out for the pleasures of good company and livelily conversation."(Florida, 2003;174)*

This third place draws similar parallels to what Jensen (2009) describes as the intermezzo. Jenson builds on the notion of nomad expressed by Deleuze&Guattari, who remark;

> *"the key feature of the nomad is exactly the importance of the in-between, the path and the intermezzo. The nomad has a territory; he follows customary paths; he goes from one point to another, he is not ignorant of points. (...) the Path is always between two points, but the in-between has taken on all the consistence and enjoys both an autonomy and a direction of its own. The life of the nomad is the intermezzo."* (Deleuse &Guattari, 1987, 2003;380)

The evolving economic composition of the city and the emergence of creative employment sectors will bring new mobility demands namely in the form of localized and flexible The advent of utilitarian cycling is in tandem with the desire among creative class employment cultures for exchange, experience and recreation. As Florida remarks; "on many fronts, the Creative Class lifestyle comes down to a passionate quest for experience (...) [t]hey like indigenous street-level culture, a teaming blend of cafes, sidewalk musicians and small galleries and bistros, where it is hard to draw the line between participant and observer, or between creativity and its creators."(Florida, 2003;167)

The desire for street-life, urban exchange and physical activity, compelled with an understanding of the nomadic preferences of new employment cultures, supports the adaptation of urban spaces for the use of cycling. The preference of the creative class for the third space and the intermezzo also suggest the need to locate cycling paths in urban arteries and locations hosting vibrant street amenities.

3.5.0. New Directions in Urban Design

As noted, Toronto today is largely experienced through Fordist infrastructures, which construct the city into a series of destinations rather than an integrated environment. In light of this separation, it is precisely the objective of contemporary urban design practices to re-connect the urban surface.

This section refers to two related urban design theories; integral urbanism and landscape urbanism to explore how the urban surface might be re-integrated. Together these theories support the intentional design of urban mobility environments in the effort of re-connecting the urban surface.

3.5.1. Cycling as a Catalyst for an Integrated Metropolis

Today cycling paths are hostile. They occupy the fringe areas of the urban street and are implemented with standardized rigueur. As noted earlier, achieving higher levels of utilitarian cycling requires a re-evaluation of paths and the experience of the cyclist within the urban environment.

The Fordist super-expressway not only changed the scale and movement patterns of the city but fundamentally the design of the street. Mobility paths today are conceptualized for rapid movement, with little consideration given to the experience in between destination points. As Ellin, author of Integral Urbanism remarks;

> *"dispersal and fragmentation occurred hand in hand, spelling an end to the connectedness walkability and sense of the pre-vehicular landscape. Integral urbanism aims to bring these back through hybridity and connectivity."*(Ellin, 2006;18)

Ellin's (2006) support for integrated land uses stems from an understanding of traditional function of the street as the center for exchange and commerce. The practice of integral urbanism is

informed by the practical objectives of increasing urban densities and maximizing space within the urban environment. It however looks towards historical precedents as well as newer ones. As she continues;

> *"The creation of great civic spaces with strong connections between them was a primary goal of city design from antiquity to the nineteenth century, most famously exemplified in Ancient Greek cities, sixteenth century Rome of Sixtus V and Dominico Fontana, and nineteenth century Paris of Napoleon III and Baron Haussmann. The mass production and consumption of cars in the early twentieth century however transformed city building as it altered the logic and the scale of development." (Ellin, 2006;18)*

The objectives of integral urbanism support the location of cycling on Toronto's existing automobile streets because it achieves a plurality. Locating cycling paths on streets is difficult and will ultimately demand the coordination of planners, urban designers, architects, and engineers to achieve attractive environments for the cyclist. Ellin describes this approach as a; "programmatic integration through the deliberate intentions of designers, planners and developers to achieve punctual interventions that contribute to activating places, making connections, creating uses for neglected, abandoned, and in-between spaces." (Ellin, 2006;9) The ideal strategy is then one that re-defines the street from the single use of the automobile towards a new regard for the street as public space to support multi-level movement. Everything from pedestrian, the rollerblade, and automotive movement might be located in a single corridor. The juxtaposition of varying mobility infrastructures contribute to an integrated urban surface.

A super-expressway might not seem like the ideal environment for integrated mobility infrastructure designs however it is precisely the objective of contemporary urban design objectives to engage with these hostile environments in the effort of re-connecting the urban surface. The integration of these environments through the fusion of multiple transportations reflects the desire of current urban cultures that value recreation, experience and exchange.

3.5.2. *The Characteristics of Experiential Mobility*

The process of cycling network expansion is adaptive, requiring a localized and site specific organization to support and manage multiple and adjacent flows. Landscape urbanism is particularly concerned with the design mobility infrastructure. As the following elaborates further; Mobility corridors need be regarded as cultural artefacts to begin the adaptive and additive process associated with this urban theory. Expressways in landscape urbanism theory are the often compared to rivers as enabling components of the city's metabolic process.

As Jensen remarks;

> *"the knowledge of urban travel as an important and potentially enjoyable experience has been addressed within the approach to urban design and planning termed 'landscape urbanism'. This approach has grown out of dissatisfaction with the established notion of cities as single-nucleus and bounded sites. It is a critique of the city as an enclave and opens up to the understanding of cities as integral to their armatures since; the importance of mobility and access in the contemporary metropolis brings to infrastructure the character of collective space."* (Wall, 1999;238) (Jensen, 2006;154)

Landscape urbanism both supports the desire to reconnect the urban surface and proposes framework. Its origins as Charles Waldheim theorizes; "can be traced to the post-modern critiques of modernist architecture and planning" (Waldheim, 2006;38) and its failure of post-modernism to appreciate the fabrication of the city as a historical construction of collective consciousness. Post-modernism is criticized by proponents of landscape urbanism for the theory's failure to address what Waldheim characterizes as "the structural conditions of industrialized modernity that tended towards the decentralization of urban form."(Waldheim, 2006;38) Essentially post-modernism failed as an urban

project because it did not address flow, or how the urban field might be re-connected as a departure of modern isolated and static practices.

The relationship between the introduction of cycling infrastructures and landscape urbanism is characterized in the planning theory's approach to re-making the spaces of mobility and recognising these environments as public space. The transformation of highly inhospitable Fordist mobility environments represent efforts discussed in Landscape Urbanism to engage with difficult spaces. According to Mossop;

> *"the significance of the automobile must be dealt with rather ignored in a nostalgic yearn for a pre-car urbanism or blindly embraced for its romantic associations. It's time to engage with these spaces that have been so poorly served by design. They have been a kind of shadow city, inhabited only by default."*
> (Mossop, 2006;173)

Traditionally, urban mobility corridors have been perceived as "ubiquitous urban environments (...) evaluated solely on technical criteria and somehow exempted from having to function socially, aesthetically or ecologically." (Mossop, 2006;171)

Generally, the theories of landscape urbanism suggest, the spaces, process and practices become additive, steering away from renewal or what amounts to a recreationist sterile environment of singular architectural form. Landscape urbanism is a contextual urbanism which regards the city as a cultural artefact.

As an adaptive practice, the principles of landscape urbanism make explicit, the pre-eminence of what Waldheim describes as the 'horizontal surface.' While reference to the horizontal surface might conjure the image of a paved 'urbanized' area, it is a term intended to illustrate a neutral starting reference point for the construction of urban environments conducive to human habitation. Together considerations for nature, culture and people create environments that are attractive to the urban dweller. The following

will briefly explore how these 'generating components' are conceptualized within landscape urbanism, and how they might be applied then, apply to the construction of successful urban cycling environments.

A successful urban cycling network is reliant on attractive environments. One of the many re-occurring themes of landscape urbanism is nature. Traditionally, cities had been regarded as apart from nature. Landscape urbanism addresses this by promoting the integration of nature within the urban environment. In Toronto natural systems have characterized the location of large mobility infrastructure. Toronto's most iconic expressways, the Don Valley and the Gardiner Expressway follow dramatic natural patterns of the city and demonstrate the primary ordering role of natural systems.

An effort to make urban surface more connected, the environment in and around these corridors might be adapted to include cycling paths. At a more microscopic level, the articulation of these paths might cycling bridges with mesh horizontal surfaces of the use of eco-friendly materials like permeable concrete to limit the impact of this network within the city's green spaces.

The second consideration of adaptive practice is framed as culture. The new dimensions of landscape urbanism reflect the need to foster a sense of place to reconnect the urban surface. The expansion of cycling armatures into environments previously considered unusable helps to build a stronger sense of place. Cycling armatures might then make use of old railway bridges, industrial parks, boardwalks, hydro corridors to create dynamic routes. The provision of alternate and innovative armatures into urban spaces makes these routes attractive to urban cyclists as well as desirable to cycling tourism.

The third consideration and/or principle for rehabilitation can be framed as people. This principle attempts to explain how human interaction and exchange make attractive spaces. As illustrated in previous discussions, the evolution of mobility from transport to travel will demand new considerations for the experiential qualities of the spaces and places in-between travel destinations, but they will also need function as places for exchange, referring to the advent of the urban nomad. As Lyster remarks; "the act of exchange from ancient trade routes between Asia and Europe to the rapid dissemination of information

over the world wide web-has been largely responsible for the articulation of the public realm in the West since antiquity." (Lyster, 2006;220)

A potential expression of this principle might be a shared road system along a vibrant urban street with cafes and evening entertainment. In Europe for example there has been a lot of experimentation with the shared road system, where the ordering alignment of the surface is removed so that cyclists, pedestrians, skateboarders and cars take on a greater personal autonomy. While the application of this road typology is not applicable to all settings, it might inform the design of some corridors, paths and public spaces in creative clusters.

Final Remarks

Contemporary directions expressed in integral, landscape urbanism theories have yet to be reflected in urban policy related to cycling infrastructure. Integral urbanism demonstrates the wish to bring together uses and activities traditionally considered incompatible. While integral urbanism is a concept advocating broadly for the integration of the functions on the street, landscape urbanism argues to the reconnection of the urban surface though additive and adaptive process.

The introduction of cycling corridors, paths and roadways demands a renewed approach from city planning officials. City of Toronto planners need recognize cycling as a tool to stimulate urban objectives expressed in contemporary theory. These mobility armatures can perform diverse functions pertinent to the cultures of a post-Fordist Toronto. The changes which must occur in the regard for cycling infrastructure from static to flexible is supported by Hajer & Rejindrop, who remark;

> *"The expanded and mobile city implies a new agenda for the design of public space, not only in relation to the urban centers or in the new residential districts, but especially in the ambiguous in-between areas (...) We seem to think too much about public space in the sense of fixed and permanent physical spaces and we*

give insufficient consideration to the way in which public domain comes into being in flux, often extremely temporality." (Hajer&Reijndorp, 2001;14;16)

Cycling can contribute enormously to the rehabilitation of the urban surface. However the continued regard for cycling as independent from other urban objectives threatens its enabling and integrating function. The concern over the quality of the urban environment along the corridor is of concern for many in social sciences, architecture and planning disciplines. To Sharon Zukin, the urban environments along corridors and streets are; "the primary site of culture, they are the window into the city's soul. [These spaces] are an important means of framing a vision of social life in the city a vision for both those who live there and interact in urban public spaces every day." (Zukin, 2001;260)

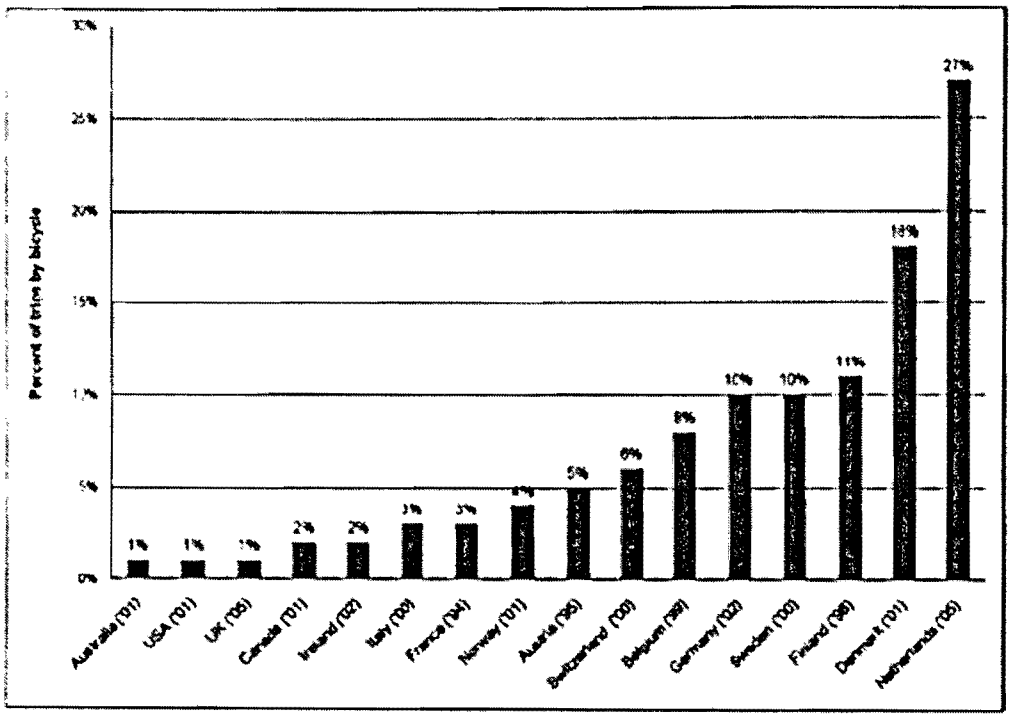
4.0. Cycling Armatures on the Ground

In 2009 Copenhagenize.com, one of the most visited urban cycling blogs in the world, compiled a list of OCED countries with the most bicycle friendly cities in the world. Copenhagen is at the top of the because it has achieved a total 55% of all trips made and 37% of all commutes. Copenhagen is followed by Gronningen in the Netherlands with 55%, Greifswald in Germany with 44%, Assen in the Netherlands at 40%, Amsterdam with a total of 40% and finally Munster, Germany with estimated 40%. (Copenhagenize.com, 2009) But just what has made these communities so successful in achieving such high percentages of trips made via the bicycle?

Within these municipalities, planners, designers, engineers and politicians are together to build and implement creative cycling infrastructure strategies and programs. Today

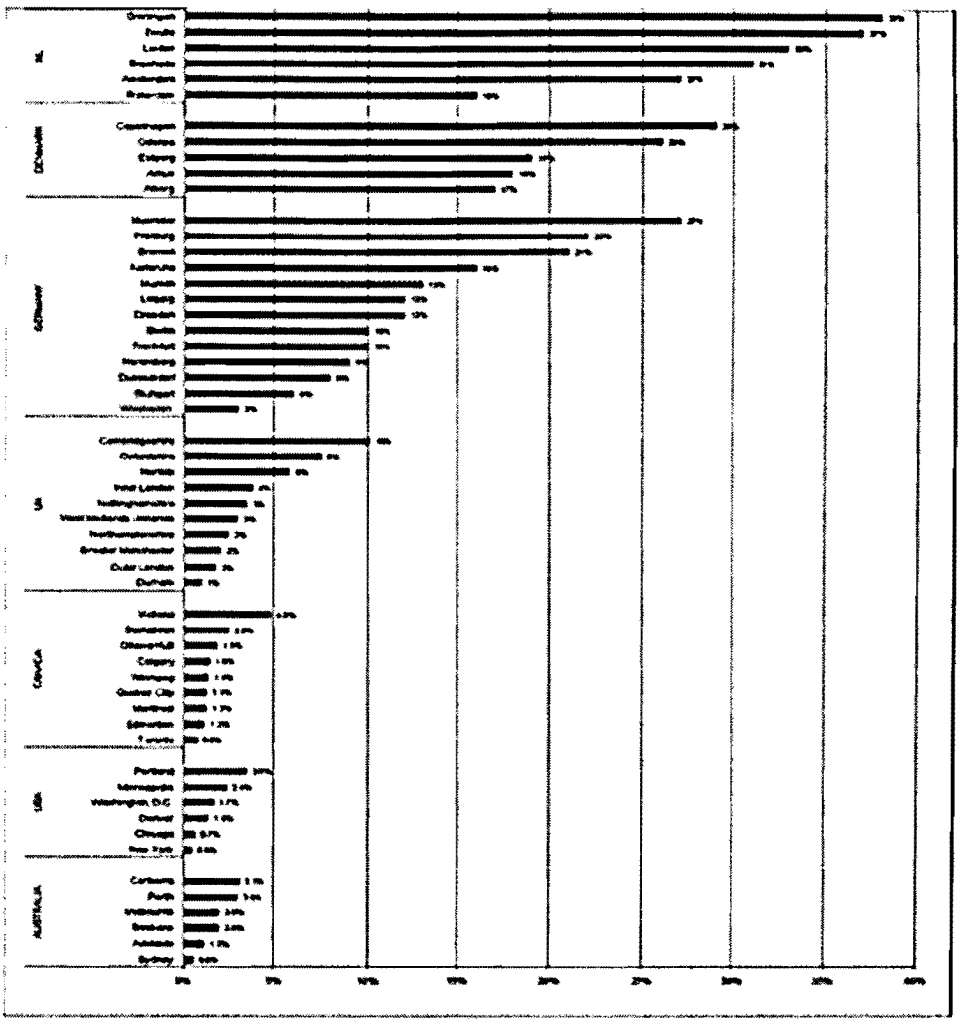
> *"[i]n the Netherlands, Germany and Denmark, cycling is truly for everyone and for all trip purposes. Moreover, cycling in those countries is not viewed as requiring expensive equipment, advanced training, or high degree of physical fitness."*
> *(Pucher, Buehler, 2008)*

A review of jurisdictions by Pucher and Buehler (2008) demonstrates the range of percentages of utility cycling among OCED countries. A chart below (Figure 4.0.1) demonstrates the bicycle share of trips in Europe, the United States, Australia and Canada, The country with the highest is the Netherlands with a total of 27%, followed by Copenhagen with a total of 18%, Germany with 10%, Canada with 2%, and the United States with a total of 1%. (Pucher and Buehler, 2008)



Sources: European Union (2003); German Federal Ministry of Transport (2003); U.S. Department of Transportation (2003); European Conference of the Ministers of Transport (2004); Department for Transport (2005); Organisation for Economic Cooperation and Development (2005); Netherlands Ministry of Transport (2006); Australian Bureau of Statistics (2007)

Figure: 4.0.1 Bicycle share of Trips in Europe, North America and Australia. (Chart retrieved from Pucher, Buehler, 2008)



Sources: Andersen (2005); Department for Transport (2006); Dutch Bicycling Council (2006); Australian Bureau of Statistics (2007); Netherlands Ministry of Transport (2007); Socialdata (2007); Statistics Canada (2007)

Figure 4.0.2: Bike Share of Trips in Selected cities in the Netherlands, Denmark, Germany the United Kingdom, Canada, the USA and Australia. This chart illustrates the effectiveness of National Policies. As noted National Cycling strategies exist in Germany, Denmark and the Netherlands, regions witnessing the highest percentages of trips made via the bicycle. (Chart Retrieved from Pucher, Buehler, 2008)

At the municipal level, cycling use varies considerably. This section of the report explores five municipalities demonstrating various strategies to promote cycling within their boundaries. The sample municipalities reviewed are not chosen based on their demonstrated percentage of utilitarian trips made, but rather on basis of the diversity of their experience with the expansion of utility cycling. Amsterdam, Copenhagen, Berlin, New York and Vancouver each demonstrate interesting implementation mechanisms, successful policies and challenges related to achieving utility cycling increases .

(Laforest, 2010)

The following compares components of each jurisdiction's comprehensive cycling strategy. Because the components of cycling strategies are framed differently according to the region's specific political framework, this review uses a total of seven indicators as a basis for comparison. The components of successful cycling strategy (outlined below in Figure 4.0.3) are supported by Banister, Pucher and Lee-Gosselin (2007) in their description of the elements of sustainable transportation strategy, by Rietveld and Daniel (2004) in their review cycling policy variables, by Pucher, Dill, Handy (2010) in their analysis of cycling infrastructure interventions and finally supported by findings presented at the 2003 European Conference of Ministers of Transport exploring the capacity of local and regional governments in matters of urban transportation.

Indicators of Successful Cycling Program	Considerations	Reasoning/Justification
Municipal Statistics (Including Geographic and Population Data)	• Population density • Geographic size of municipality • Geographic size of urban region • Climate	The viability of cycling is generally supported by population density, climate and the geography of the region or municipality. However as illustrated by Pucher, Buehler, (2008) European cities with comparable densities have dramatically different percentages of utilitarian cycling. This indicator is employed to demonstrate that higher density and agreeable climate might not directly parallel higher utilitarian cycling rates.
History of Cycling Development	• Date of first cycling program • Top down / bottom up strategy • Cycling champions • Important events related to cycling expansion • Tradition in land-use and transportation planning	A review of the history of cycling development illustrates the length of time taken to form a cycling network. This indicator is an attempt to demonstrate a relationship between long-term strategies and higher percentages of utility cycling.
Cycling Programs	• Evidence of national cycling strategy • Evidence of state or provincial cycling strategy • Demonstrated integration of cycling with other policies, objectives and strategies • Decentralization of cycling implementation • Cycling as part of traffic management plan • Disincentives for automobile use • Demonstration of project monitoring • Performance reviews • Evidence of cycling surveys	According to Pucher, Dill, Handy; "designing the appropriate mix of policies for each city's particular situation requires careful planning and ongoing citizen input, especially from bicyclists. (...) That multifaceted, coordinated approach offers the promise of substantial growth in bicycling, even in cities with low bicycling levels."(Pucher, Dill, Handy, 2010) All successful cycling programs whether introduced from national or municipal strategies acknowledge the unique barriers and opportunities within its jurisdictions. This indicator is employed to determine what methods and tools sample municipalities are using to increase utility cycling. As McClintock remarks; "A serious commitment to cycling will not only recognize the significant of the fact that a bicycle is a vehicle but also seek to promote cycling through a range of approaches beyond the physical provision (...) [t]hese wider approaches include the co-ordination of cycling policies with other

		community plans, improved enforcement and taking opportunities to encourage cycling in wider strategies for health, air quality, leisure, recreation and tourism." (McClintock, 2003;14)
Sources of Funding for Cycling Infrastructure	• Evidence of systematic financial support for cycling programs • Evidence of multiple funding sources • Evidence of project grants from various departments	At the 2003 European Conference of Ministers of Transport, 'economic instruments' were identified as a vital instrument in building cycling capacity at local and regional governments. Financial instruments that secure both systematic and grant funding for cycling projects are crucial to the expansion of cycling over the long run. (European Conference of Ministers of Transport, 2003)
Creative Cycling Initiatives	• Evidence of creative cycling infrastructure • Demonstrated experimentation with cycling infrastructure • Evidence of innovative marketing and/or cycling promotion activities	This indicator is employed to determine the amount of exploration and experimentation the municipality is willing to undertake to explore cycling infrastructural and program solutions for its own context. Some municipalities for example might set up a competition for new cycling infrastructural standards whereas others might employ an innovative marketing firm to promote cycling for young adults.
Visual Journal	• Attractive cycling environment • Components creating a better experience for the cyclist	This indicator is used to visually survey the physical expressions of cycling infrastructure both in terms of the proposed network development and with various elements within the public space that make cycling easier.
Barriers to Expansion of Cycling	• Infrastructural • Political • Conceptual	As Pucher Dill and Handy illustrate; "the very same infrastructure provision, program, or policy might have different impacts on bicycling in different contexts, making it risky to generalize about the effectiveness of any individual measure." (Pucher, Dill, Handy, 2010) For this reason there will be an attempt to illustrate the contextual barriers to the expansion of utility cycling within the sample municipality.
Cultural Approach to Cycling	• Unique aspects of cycling particular to the jurisdiction • Unique policies / approaches to cycling	"Variations in cycle use between countries and within countries are significant because they influence not only the social acceptability of cycling but also official willingness to provide for cyclists and give serious recognition to its importance, especially for shorter trips. These official attitudes also affect the way in which infrastructure for cyclists is designed, for example whether or not the bicycle is regarded effectively as a pedestrian with wheels or as a vehicle." (McClintock, 2003;13) One of the most important components of a cycling program is the cultural willingness to support cycling infrastructure programs over the long run. The development of an effective cycling program is either limited or propelled by its status among the population of the city.

Figure 4.0.3. Indicators of a Successful Cycling Program based on findings illustrated in three recent cycling studies and conferences

(Laforest, 2010)

4.1.0. *Case Study Region - Amsterdam, Netherlands*

4.1.1. *Municipality Region*

Throughout the Netherlands bicycle use varies, but municipalities and regions throughout the country benefit from strong national support for cycling infrastructure development, policy, funding and implementation. Today among OCED countries, Amsterdam registers one of the highest percentages of utility cycling, an impressive feat taking into consideration the transportation barriers and challenges of a municipality of its size. (Pucher, Buehler, 2008) Amsterdam has approximately 760,000 inhabitants (Municipality) and as of 2006 counted a total of 600,000 bicycles - that's about 0.75 bicycles per person. The number of bicycles reflects the effectiveness of bicycle as a mechanism of urban transportation. According to Pucher, Buehler (2008) in Amsterdam 27% of all trips are made by use of the bicycle. The relevance of the bicycle is attributed to a bike-friendly culture, strong national support, and long-term comprehensive planning.

4.1.1.1. *Review of Pertinent Municipal Data*

Municipal Population:	762,057
Metropolitan Population:	2,158,372
Geographic Area:	219 km2
Density:	4,459/km2
Median Temperature:	13.4 (56)

4.1.2. *History of Cycling Development*

In 1955 bicycle use within Amsterdam registered an all time high at 75%. In the period afterwards between 1955 and 1975 bicycle use fell slowly as automobile use increased. As Rietveld, Daniel (2004) remark; "in order to face the oil crisis in 1975, the Dutch Ministry of Transport and Public Works implemented a policy in favor of the use of he bicycle in the form of the National Bicycle Tracks Act." (Rietveld, Daniel, 2004;531-550) The international oil crisis of 1975 occurred around the same time that bicycle advocates and environmentalists started campaigning for bicycle usage in the city as a means of addressing pollution and congestion. Since the beginning of the 1970's "bicycle use has been slowly

increasing. It reached 31% of all vehicle trips in the mid 1980's, and was 37% of all vehicle trips in 2005." (City of Amsterdam, 2007) (Pucher, Buehler, 2007) The case of Amsterdam demonstrates of the effectiveness of an incremental long-term strategy. Today some regions in Amsterdam and the Netherlands host rates of bicycle use nearing 55% of all trips. (Pucher, Buehler, 2007)

4.1.3. *Cycling Programs*

Amsterdam has been able to implement cycling from a variety of institutional programs and practices. As noted, the lasting impact the oil crisis of the mid 1975's coupled with strong bottom-up cycling advocacy, prompted strong institutional development of cycling networks and cycling development programs in the Netherlands. While there exists institutional capacity for cycling development at a municipal level, cycling development and network expansion policy stems from the Dutch Ministry of Transport, Public Works and Water Management (DMTPWWM, 2009). The Ministry refers to this strategy as a "decentralized approach" requiring implementation capacity from a variety of other national agencies. The Dutch bicycle framework is conceptualized and administered by six organizations; Fietsberaad, KpVV [Transport and Traffic Knowledge Platform], CROW, Fietsersbond, Stichting Landelijk Fietsplatform and SebterNovem "all operating nationally to play an important role." (DMTPWWM, 2009)

The first national agency is known as Fietsberaad. Fietsberaad is a bicycle consultancy comprising of approximately 20 individuals that support bicycle policy and make sure that policy reflects current knowledge and information. Another is known as KpVV [Transport and Traffic Knowledge Platform] This organization operates with five themes (policy, mobility, safety, infrastructure, and public transport) to provide practical knowledge. CROW is probably the most innovative national organization. According to the DMTPWWM (2009), CROW is "the national knowledge platform for infrastructure of public places. It makes knowledge applicable in practice – in particular through broadly supported recommendations, guidelines and regulations, established in a large number of publications." (DMTPWWM, 2009). The remaining 3 organizations responsible for cycling development are

Fietsersbond, Stichting Landelijk Fietsplatform and SebterNovem. Fietsersbond is a cycling association that operates in a total of 120 local departments, it is financed by the Ministry of Transport, Public Works and Water Management but is aimed at benchmarking and implementing cycling networks within the municipal organization. This group produces a report that is then given to the municipality with expectations of concrete improvements. The Stichting Landelijk Fietsplatform or "national cycling platform association, is an independent body responsible for the independent implementation of recreational cycling in the Netherlands. The intent of this organization is the expansion of national recreational cycling routes. Finally SenterNovem is agency responsible for "subsidizing innovations aimed at the environment and sustainability." (DMTPWWM, 2009)

Within the Dutch system cycling paths outside municipal bounties are either considered the responsibility of the municipality, the province or in some cases the water boards. Typically speaking intra-municipal cycling paths might run along the same path as water infrastructures. In this case it becomes the responsibility of the water board organization to implement and maintain the necessary infrastructure.

All municipalities in the Netherlands benefit form the decentralized cycling policy and infrastructure instruments. Amsterdam plans and implements cycling infrastructure with the help of two specific municipal administrations; 1) DIVV or the "Traffic and Transport Infrastructure Department, and 2) the Strategy and Policy Department. The subdivision of 15-city areas, each of which is responsible to implement its own cycling policy, further complicate the municipal implementation process. The effect of this structure is a long negotiation process.

4.1.4. Sources of Funding for Cycling Infrastructure

Despite it's decentralized cycling policy and implementation practices, municipalities' benefit from a wide range of funding; both fixed and project specific. According to the Dutch Ministry of Transport, Public Works and Water Management; "to fund bicycle policy, most municipalities have

specific budget allocations. These are used to specifically to ensure continuity in bicycle policy implementation." (DMTPWWM, 2009) Today the norm is for cycling infrastructure money to be attached to large city infrastructure or urban revitalization projects. In some cases, for infrastructure in business parks monies might even be funded by the European Union. A recent example of large scale project-based funding for cycling is for a project referred to as "Hoofdnet Fiets Bicycle Network". Over a period of four years the network is anticipated to cost 43 million Euros, funding for this project was largely from municipal monies and regional subsidies. Total spending on the Amsterdam municipal cycling network between the period of 2007-2010 is 70 million Euros. (DMTPWWM, 2009)

4.1.4. Creative Cycling Initiatives

The strong institutional support and the tradition of cycling in Amsterdam have led to the formation of many innovative strategies. In Amsterdam planners can access the latest of infrastructural standards from CROW. CROW provides a design manual for bicycle facilities, as well as safety infrastructure recommendations for cyclists at intersections. According to Thijssen, (n.d.) and (DMTPWWM), CROW has developed five requirements to guide bicycle friendly infrastructure. They are; safety, direct, comfortable, attractive, cohesion. (Thijssen,(n.d.)) (DMTPWWM, 2009) As DMTPWWM remarks; "

> *"The CROW publication 'Leidraad Fietsparkeren' (or bicycle parking guidelines) from 2001 answers the question of just how many storage places are needed at which facilities, and what must be specially considered. This set of guidelines offers planners and designers the information for setting up, implementing and maintaining good bicycle parking. The guideline first contains policy-oriented information: for example how to get bicycle parking onto the agenda, and how to move from analysis to policy measures. The second part provides information, from market demand to technical aspects and costs."* (DMTPWWM, 2009)

As Puhler and Buehler (2008) remark; "promotional activities tend to be more extensive in Denmark and Germany than in the Netherlands, where cycling levels are already so high that the focus is more on safer cycling than on more cycling, although the two are directly related as noted earlier." (Puhler, Buehler, 2008)

4.1.5. Visual Journal – Cycling Development in Amsterdam

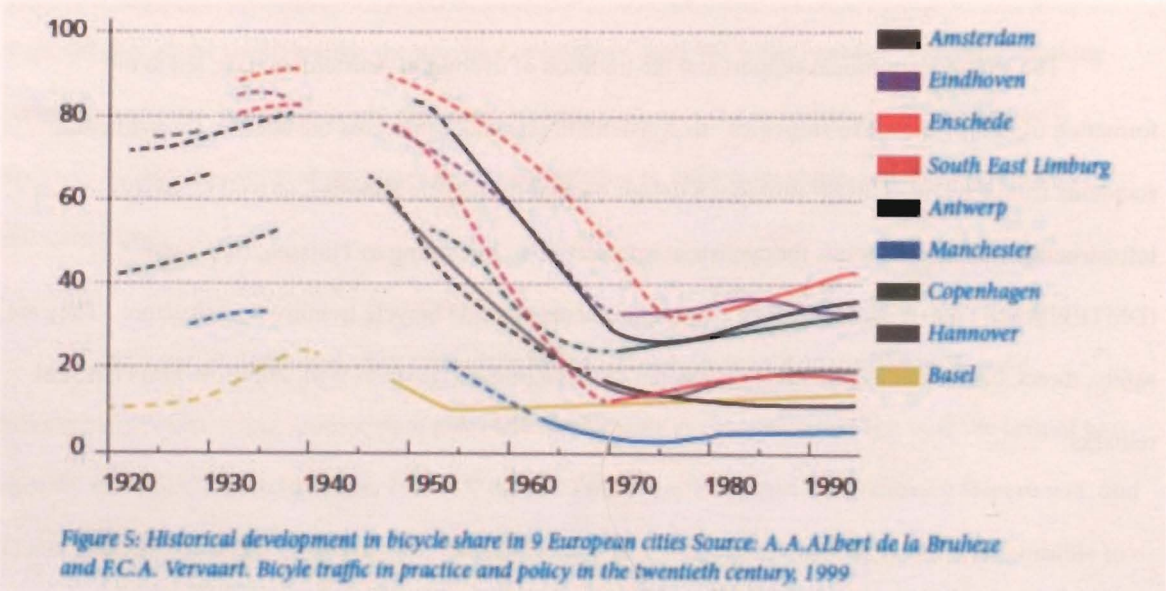


Figure 4.1.5.1. Table from the Ministry of Transportation, Public Works and Water Management demonstrating the historical use of the Bicycle in select European Cities. (Image Retrieved from Ministry of Transport, Public Works and Water Management, 2009)

Figure 4.1.5.2. Demonstrated Success of Cycling Policies, Here the Storeroom in Leiden at the Bicycle Flat in Amsterdam. In Amsterdam the Bicycle Flat is free, covered, and is administered 24 hours a day. However the bicycle flat together with other ungraded sites and the guarded storage still provides too little capacity." (Ministry of Transport, Public Works and Water Management, 2009)

Figure 4.1.5.3. "Innovation in Mobility Management", Here cycling to work is made easier by the wedges alongside the staircase. The wedges are there to support the bicycle as one moves up the staircase. This only but one example of the articulation of infrastructure in Amsterdam to support the expansion of cycling. (Ministry of Transport, Public Works and Water Management, 2009)

Figure 4.1.5.4. More cycling parking facilities located outside office buildings. (Ministry of Transport, Public Works and Water Management, 2009)

Figure 4.1.5.5. Example of Infrastructural Innovation achieved though policy framework. Here a dynamic bridge affectionately known as Palingburng or Eel Bridge in Amsterdam re-enforces a positive cycling image and experience. (Ministry of Transport, Public Works and Water Management, 2009)

Figure 4.1.5.6. Example of Site-specific articulation of urban pathway. Here through the mechanisms of Dutch National Infrastructure Policy, Zwolle has become known as the City of Bicycle Lanes. Unlike urban pathways in North America, here pathways reach are 2 meters in width. Most lanes are 1.75 and 1.5 along boulevards. These pathways almost always reach far into the intersection to warn cars that cycling paths intersect. (Ministry of Transport, Public Works and Water Management, 2009)

Figure 4.1.5.7. Example of innovative CROW Parking Facility for Bicycles. (Ministry of Transport, Public Works and Water Management, 2009)

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Figure 4.1.5.8. Cover of English Language Cycling Strategy in the Netherlands. (Ministry of Transport, Public Works and Water Management, 2009)

Figure 4.1.5.9. Details like the one here are site specific. The careful infrastructural design of these spaces makes them not only safer but more attractive to the cyclist. (This picture is taken from Pucher and Buehler, 2008)

4.1.6. The Culture of Cycling in Amsterdam

The municipality of Amsterdam is a good case study because it demonstrates success with rigorous decentralized top-down and bottom-up implementation strategy. Here not only are the mechanisms of expansion top-down they are also anticipatory. Cycling development in Amsterdam and the Netherlands is associated and reliant on a variety of other initiatives including disincentives for personal vehicle use, regulated urban development patterns and promotion of cycling use among immigrant populations to promote social cohesion.

The most important driving factor for bicycle use in Amsterdam is its strong cultural giving it a raison-d'être. In Amsterdam the cultural importance of cycling has produced several rules and regulations favoring the cyclists over other vehicles. As the DMTPWWM (2009) remarks;

> *"the Dutch philosophy is (...) car drivers should take the responsibility for avoiding collisions with cyclists. This implies that car drivers are almost always liable with a collision with a bicycle occurs and should adapt their speed with bicycle share the roads with cyclists." (DMTPWWM , 2009)*

What might surprise many in North America is the approach to helmet use in the Netherlands. In Amsterdam for example it is rare to see someone with a helmet on because there is little fear of cycling. here it appears that infrastructure and strict policies on the behaviour of urban vehicles create more attractive atmospheres for cyclists. These strategies have created such a favourable environment for cyclists over the past twenty years that in the Netherlands cycling is no longer considered dangerous or unsafe, rather it is regarded as effective and comfortable.

4.2.0. Case Study Region 2 - Copenhagen, Denmark

4.2.1 Municipality Region

Copenhagen today achieves levels of urban cycling ridership nearing 29% of all transportation trips. (Pucher, Buehler, 2008) The City of Copenhagen has often referred to itself as the city of cyclists with a variety of programs and advocacy from national as well as not-for-profit grassroots organizations. While it already boosts high numbers of utilitarian cyclists, the City aims to increase the percentage of all daily transportation trips from the bicycle from 29% to 40% by 2012. (City of Copenhagen, 2010) This region has a long history of comprehensive cycling planning both at the municipal and federal levels. Denmark for example created the first national cycling network and implemented the first pilot bike share program.

4.2.1.1. Review of Pertinent Municipal Data

Municipal Population:	530, 902
Metropolitan Population:	1,899,427
Geographic Area:	88.25km2
Density:	6,016/km2
Median Temperature:	11.1 (52)

4.2.2. *History of Cycling in Copenhagen*

Over the past 100 years Denmark has regarded the bicycle for its tremendous resilience. In fact because of its vital role in the past fifty years, in Denmark the bicycle is considered "a distinct traffic category with its own separate road area – on par with motor traffic and pedestrian traffic."(City of Copenhagen, 2009) Municipal cycling dates to the beginning of the twentieth first century, when the first automobiles were still too expensive for the average city dweller. As the City of Copenhagen remarks; "in the 1940's and 1950's during the Second World War the shortage of petrol and spare parts makes the bicycle a survival tool for Copenhageners." (City of Copenhagen, 2008) The current cycling network is the product of a gradual cycling strategy. In the 1960's and the 1970's many people bought cars which

reduced the number of cyclists in the urban areas but the country managed to keep car ownership relatively low [compared to its southern neighbour Germany] by placing very high taxation rates on cars. The City of Copenhagen remarks; "despite the fact that many people bought cars in the 60's and 70's, Copenhageners continued to cycle." (City of Copenhagen, 2002) Here when the city was faced with either accommodating its city to fit the car or managing car use to suit the city, council made the decision to prioritize the bicycle to promote cycling as an autonomous yet economically resilient method of transportation.

4.2.3. *Cycling Programs*

In Denmark Cycling policies and strategies emerge from the National Bicycle Action Plan. This action plan is divided into three parts.

The first part is described as *Cycling in the 21st Century. This section* "contains the political aims for bicycle traffic in Denmark, formulated jointly by the National Association of Local Authorities, the Country Councils in Denmark and the Ministry of Transport." (Miyake, Crass, 2004;70) The second part of the National Bicycle Action Plan is "Promoting Safer Cycling – A Strategy developed by the Ministry of Transport." This strategy "combines measures for the benefit of all cyclists, with specific campaigns targeting certain groups." (Miyake, Crass, 2004;70) The third part of the plan "Collection of cycle concepts" is a strategy "prepared by the Road Directorate and is aimed at officials in country councils and local authorities." (Miyake, Crass, 2004;70)

The Danish Ministry of Transportation has also established an innovative strategy where new ideas and concerns can be shared about cycling. It refers to this as a "bicycle ideas group". This group is said to be a forum "whose objective is to encourage new cycling research and new initiatives to promote cycling."(Miyake, Crass, 2004;70) The groups is a collection of representatives from the

> *"Ministry of transportation, the Ministry of Environmental Protection, the Road Traffic Board, the Road Directorate, the Danish Cyclists Federation, the Danish*

Tourism Board, the National Association of Local Authorities, and Association of Country Councils in Denmark, the Technical University of Denmark, Aalboarg University and the Danish Cycle Trades Association." (Miyake, Crass, 2004;70)

Together they meet to discuss either new directions in cycling, research, specific projects and programs.

The Ministry of Transportation has used the same infrastructural standard for the bicycle road for the past fifty years. The design standard is unique Denmark and its main characteristic is that it is both separated by a 'kerb' and elevated 10-15 centimetres. (McClintock, 2002;225) In addition to the unique 'kerb' treatment, in Copenhagen there are different types of cycling paths at intersections; one reaches through the intersection, the other stops before it. All the infrastructural standards are assessed by volume and by cycling safety concerns at the particular intersection.

At the level of the municipality and the region, Copenhagen has a number of programs to support cycling recognizing that there are individual and local variations in demand. At a municipal level there is the Copenhagen Cycling Plan 2002-2012, the Cycle Track Priority Plan 2001, and the Traffic Safety Plan 2001. Only recently has there been an initiative to include "green tracks" in the municipal strategy. It has been the long-standing tradition in Copenhagen to have cycling tracks along convenient roads and arterials. Today there is a distinction between three types of cycling tracks in Copenhagen; urban, green, and city center. The green paths are a new option for cyclists, particularly designed for those who have a long way to go, there is a provision for "green surroundings" and designed to have fewer stops at intersection points. (City of Copenhagen, 2002)

4.2.5. Sources of Funding for Cycling Infrastructure

In Denmark the tradition of comprehensive cycling planning has for the past one hundred and fifty years resulted in an extensive network. The Road Directorate, the Danish Ministry of Transport supports cycling infrastructure.

4.2.6. *Visual Journal – Cycling Development in Copenhagen*

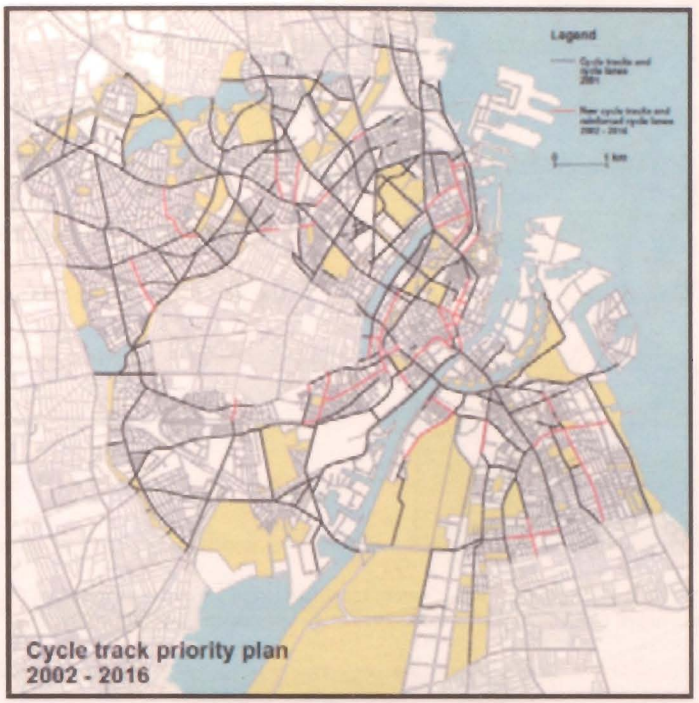

Figure 4.2.6.1. Cycling Map demonstrating the City's Track Priority Plan until 2016. Illustrated in black are the cycling lanes in red are cycling lanes to be implemented by 2016. (Copenhagen Cycle Policy,2002)

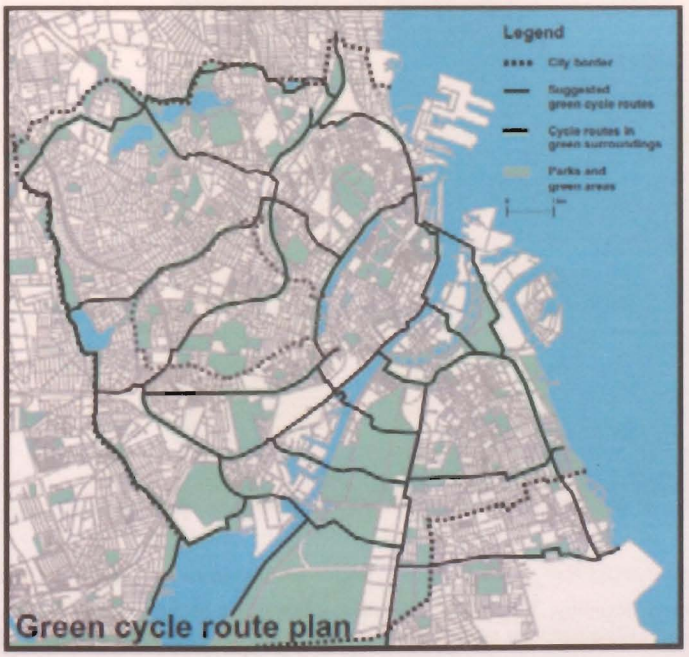

Figure 4.2.6.2. Cycling Map demonstrating the City's Green Cycling Route. The Green Routes are intended both for rapid access to the city as well as recreation. (Copenhagen Cycle Policy,2002)

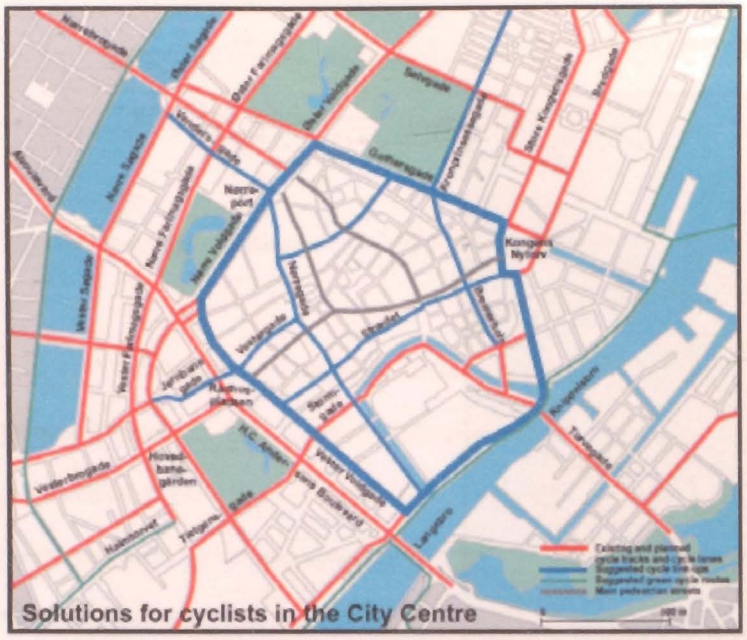

Figure 4.2.6.3. Cycling Map demonstrating the City's Priority Plan for the Urban Center. Identified in red are cycling routes that the City either plans to upgrade or implement with its Copenhagen Cycle Policy Plan, 2002-2012. (Copenhagen Cycle Policy,2002)

Figure 4.2.6.4. Cycling Map demonstrating urban bicycle flexibility. Here bicycles are allowed to travel in both directions whereas the automobile is only allowed to travel in one direction. (This picture is taken from Pucher and Buehler's Making Cycling Irresistible, 2008, Picture by: Jennifer Dill)

(Laforest, 2010)

4.2.7. The Culture of Cycling in Copenhagen

The success of cycling in Copenhagen has been due to the long history of cycling in the metropolitan areas and the cultural regard for cycling as a resilient form of transportation. In the 1970's and the 1980's Copenhagen grew tremendously. At that point in time city council and the Danish National Ministry responsible for Transportation were presented with the opportunity to either transform the city to suit the car or adapt transportation policy to fit the city center. As a result of the choice to plan transportation systems that are compatible to the city, the preference for the bicycle influenced land use planning. As Pucher, Buehler (2007) remark; over the past fifty years "Copenhagen's suburban expansion has been concentrated along radial corridors that focus on the city center. The relatively high residential densities and mixed land uses ensure a high percentage of trips are short enough to cover by bike." (Pucher, Buehler, 2007) In Copenhagen the tradition of comprehensive planning and the ability to integrate and share ideas in a forum (mentioned earlier) has created an effective monitoring culture. Through the measures of monitoring and the openness to feedback and critique the national and the municipal cycling programs have been able to both achieve and maintain high usage of the bicycle the increasing popularity since the 1970's.

4.3.0. Case Study Region 3 - Berlin, Germany

4.3.1. Municipality Region

Berlin hosts one of the largest percentages of utilitarian cycling in Europe with a total of approximately 12% of all trips made. The reason Berlin, Germany was chosen as a case study region is because it has had tremendous success with cycling infrastructure development particularly over the past fifteen years. According to Pucher (1998), despite "the second highest level of car ownership in the world (...) Germany adopted a range of policies to balance the many private benefits of car use with its serious social and environmental problems." (Pucher, 1998) While car ownership rates are exceedingly high in Germany, the country benefits from the highest metropolitan densities in Europe. The high levels of car

affic in such small geographic areas has forced municipalities to be innovative particularly over the past fifteen years to manage the negative effects of automobile use. As Pucher remarks;

> "*the resurgence of the bicycle as a practical mode of urban travel is due almost entirely to public policies that have greatly enhanced the safety, speed and convenience of the bicycle while making auto use more difficult and expensive. The bicycle [here] has triumphed in Germany in spite of rapid suburbanization, rising auto ownership, increasing trip lengths and rising capita incomes.*" (Pucher, 1998)

4.3.1.1. Review of Pertinent Municipal Data

Municipal Population:	3,443,570
Metropolitan Population:	5,000,000
Geographic Area:	841.84km2
Density:	3.861/km2
Median Temperature:	9.6 (49)

4.3.2. History of Cycling Development

The City of Berlin has had a flexuous relationship with the bicycle. Pucher and Buehler reference a study by the City of Berlin (2003) that illustrates between the period of 1950 and 1975 bicycle use dropped 75%. Since the period of 1975 the bicycle has rebounded reaching almost half of its popularity in the 1950's. The origins of a contemporary resurgence of bicycle use can be traced in part to the 1995 Berlin Senate agreement to build a cycling route network. This agreement was drawn form a report prepared by a series of consultant illustrating the financial, social and environmental benefits of the bicycle that have yet to be tapped in urban regions by the expansion of cycling. Both national and municipal department upheld the strategy.

4.3.3. Cycling Programs

The successful expansion of cycling systems in Germany is the result of striking differences in the structure of the planning systems and the interaction between various levels of government. (Schmidt, Buehler, 2007;57) In Germany the Federal Government is not concerned with implementation but rather in managing and updating policy framework "to ensure basic consistency for state, regional, and local planning." (Schmidt, Buehler, 2007;57) As Schmidt, Buehler remark;

> *"Planning is organized as a process of reciprocal influence by federal, state and municipal authorities on each other's proposals, commonly referred to as the 'counter-current principle'. (Gegenstromprinzip). The system is organized around mediation and consensus building and allow for input and participation from lower levels, as long as the plans are consistent with higher-level goals and objectives, once these goals are established." (Schmidt, Buehler, 2007;58)*

The regard for the bicycle by the German Ministry of Transport, Building and Housing (GMTBH), (2002) is that; "the bicycle should be considered a part of an integrated transport policy that is committed to the vision of sustainable mobility." (GMTBH, 2002) As a result of regarding the bicycle as an urban transportation vehicle, it is awarded the same consideration in urban development and regional planning as other transportation typologies.

While the National government of Germany sets out policy framework the implementation of cycling infrastructure is left to state and municipal bodies. In Berlin cycling is regarded in three modules; the Second Level Bicycle Route Network, Bicycle Parking Infrastructure and Public transportation Integration Concept for Bike Sharing." (SpyCyclies, 2008) The municipality is currently experimenting with a pilot project at Pankow borough. Here the Berlin Senate Department of Urban Development is experimenting with a new localized cycling network. It is attempting to locate cycling routes to coordinate

(Laforest, 2010)

with local destinations by monitoring behaviour of cyclists. It is attempting to solidify the local Borough by designing pathway systems that will be attractive to local residents. To obtain this objective stakeholder participation, mapping and engineering staff together discuss what urban routes would be favourable for cycling infrastructure. While the pilot project is still being experimented with currently, the anticipated result is a region-wide secondary cycling network designed to connect to local-inner borough destinations.

SpiCycles, a European Union Consultancy Group for the Planning and Innovation for Bicycles uses the following criteria to expand cycling pathways in the Pankow borough of Berlin;

- *Directness, easy orientation, and plausibility;*
- *Connection of interim destinations;*
- *Bundling of routes, appropriate network density;*
- *Use of attractive and avoidance of unattractive routes;*
- *Stimulating and pleasing environment;*
- *Avoidance of unlighted, less cleared and socially unsafe paths;*
- *Limitation of efforts and expenses to strengthen the route.*(SpyCyclies, 2008)

Municipalities and National Governments in Germany have adopted a wide range of strategies to promote cycling use. Pucher and Buehler describe an interesting program "Call a Bike'. This program permits anyone with a cell phone to rent a bicycle. The Berlin branch of the German Bicycling Federation (AFDC) also holds a cycling rally once year supported by the city government. Other innovative cycling initiatives include the cycling path planning website and cycling tourism in Berlin. Here potential cyclists can enter their destination and choose their path preference. "Choices [of pathways] include; the type of right of way, on street routes, separate bike paths, and lanes or off road trails." (City of Berlin, 2010) (Pucher, 2007) This system is also coordinated with tourism promotion. The city of Berlin makes a concerted effort to get tourists to experience the city at the vantage point of the bicycle.

(Laforest, 2010)

4.3.4. Sources of Funding for Cycling Infrastructure

In Germany only 9 per cent of the municipal revenue is funded through municipal (Gemeinde) tax. As Schmidt, and Buehler remark; German municipalities are in general more dependent on intergovernmental transfers, which account for 41.1 per cent of local revenue." (Schmidt, Buehler, 2007;63) In terms of the financing of cycling infrastructure at the municipal level, Pucher (2007) remarks;

> *"[u]ntil 2000, the city government only funded cycling infrastructure in connection with new road construction projects. This made it nearly impossible to upgrade existing roads to accommodate the needs of bicycle traffic. In 2000, the city established annual funding source for bicycle infrastructure by introducing a bicycle budget of 1.5 million Euros in 2008."*
> *(Pucher, 2007)*

4.3.5. *Visual Journal – Cycling Development in Berlin*

Figure 4.3.6.1. *Cycling Map of Berlin's Secondary Cycling Network Strategy. This network development strategy focuses on connecting localized destinations within Boroughs. Picture courtesy of Spicycles, 2008.*

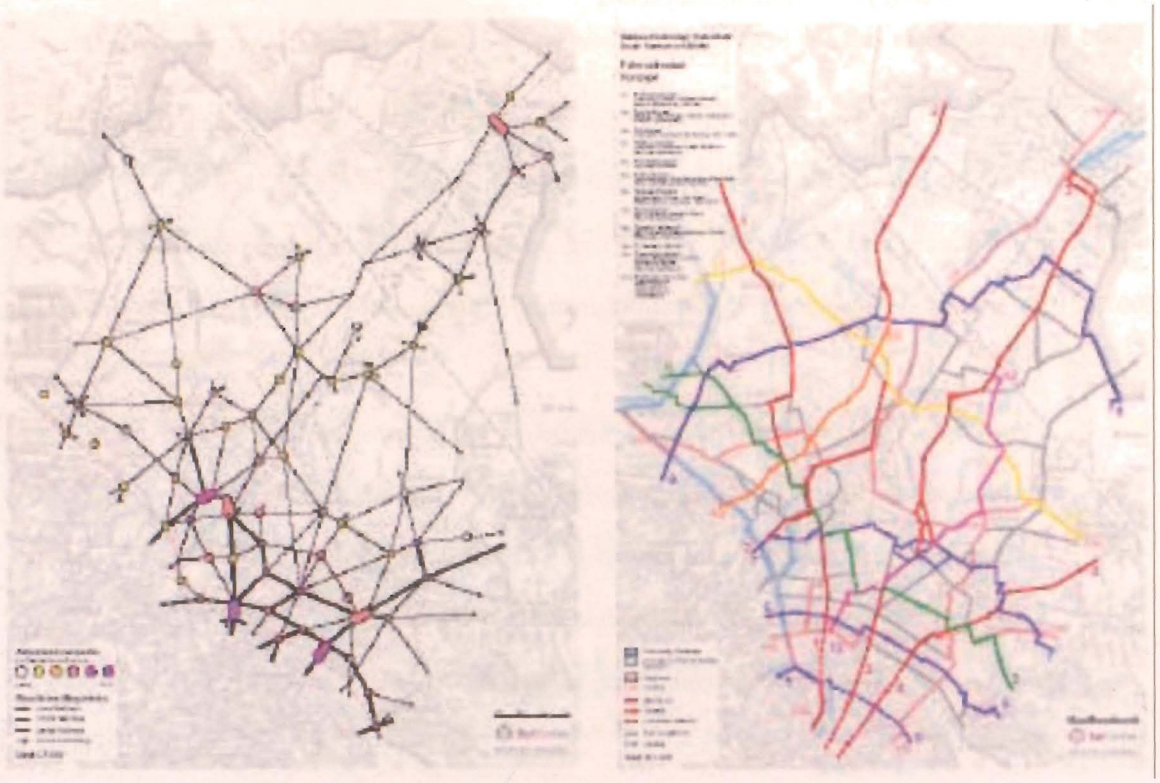

Figure 4.3.6.2. Cycling Map of Berlin's Secondary Cycling Network Strategy. This network development strategy focuses on connecting localized destinations within Boroughs. Picture retrieved of Spicycles, 2008.

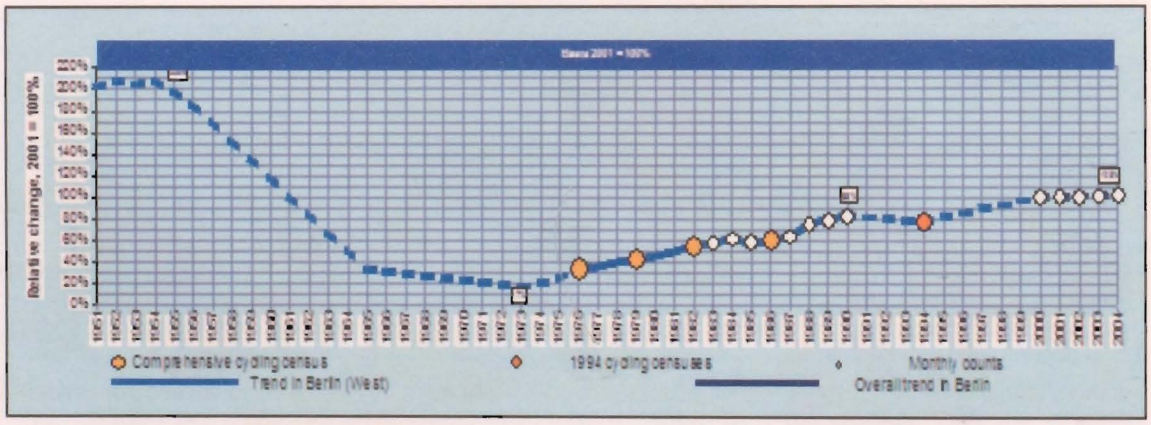

Figure 4.3.6.3. Chart Demonstrating Bicycle Use in Berlin since 1951. (Picture retrieved of Spicycles Online, 2010).

Figure 4.3.6.6. The National "D" Network "comprises 12 inter-regional, long-distance routes that are mainly used by the cycle tourists and which can also be use by everyday traffic if they are integrated into urban traffic. Long distance cycle routes must have certain characteristics. They be guaranteed to be safe to ride and must be located in natural surroundings." (National Ministry oTransport, Building and Housing, 20

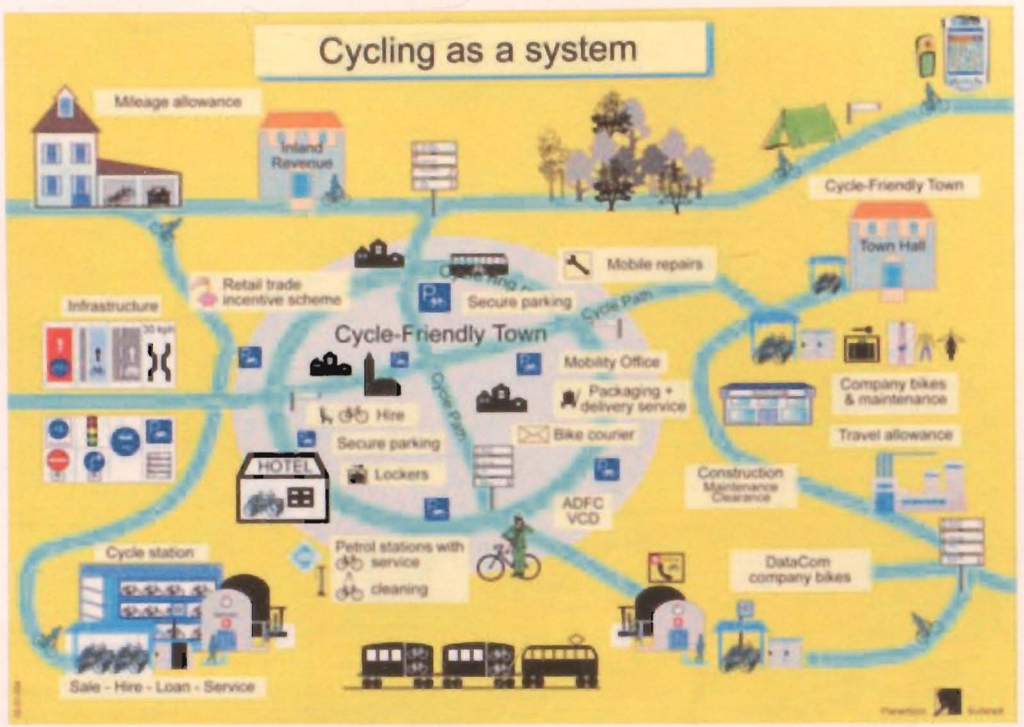

Figure 4.3.6.7. "Cycling as a System" a Diagram in the Cycling Policy Framework for the German National Ministry of Transport, Building, and Housing (2002)

Figure 4.3.6.8. Creating Positive Cycling Environments. (Image retrieved from the German National Ministry of Transport, Building, and Housing, 2002)

Figure4.3.5.9. "Important to cyclists: safe, attractive paths" Demonstrates articulated intersection. (Image courtesy of German National Ministry of Transport, Building, and Housing National Cycling Policy, 2002)

Figure 4.5.6.10. The Bicycle is a flexible urban vehicle. Picture courtesy of German National Ministry of Transport, Building, and Housing National Cycling Policy 2002), demonstrates cyclist on a sidewalk as well as on the street. Cycling areas are clearly visible with red paint.

Figure 4.3.6.11. . The Image demonstrates a covered shopping area. The middle lane is designed for bicycles. (Picture is courtesy of German National Ministry of Transport, Building, and Housing National Cycling Policy, 2002)

(Laforest, 2010)

Figure 4.3.6.12. Image demonstrates integrated parking facilities for bicycles at Deidesheim station. (Picture courtesy of German National Ministry of Transport, Building, and Housing National Cycling Policy, 2002),

4.3.6. The Culture of Cycling in Berlin

With a strong national push for its cycling programs and annual financing mechanisms, the case study of Berlin demonstrates the potential of strong leadership in cycling expansion. Treehugger.com recently commended Berlin on its rapid implementation stating that "the development administration show that the goal of achieving 15% of total traffic by 2010 could be reached early." (Lepisto, 2007) Most relevant to the experience in Toronto is the notion that bicycle use can increase despite exceedingly high levels of automobile ownership by creating disincentives for personal vehicle use. The recent success of Berlin and other German municipalities is due to strong top-down support from the German Ministry of Transport, Building and Housing. The GMTBH acknowledged the complexity of inserting cycling infrastructure into a dense urban environment in a vehicle-centered culture. As the GMTBH remarks; "the promotion of cycling is tied up in the complicated interaction of business, finance, taxation, transport, land management, and tourism policies. Against this backdrop there can be no simple formula to promote cycling." (GMTBH, 2002)

4.4.0. Case Study Region 4 - New York, New York, USA

4.4.1 Municipality Region

As Pucher, Thorwaldson, Buehler, Klein (2010) remark; "trends often start in New York and spread elsewhere. The recent surge in cycling in New York has drawn widespread media attention, with newspapers around the world running stories about the city's innovative cycling policies." (Pucher, Thorwaldson, Buehler, Klein, 2010) With an effective urban cycling monitoring program the City of New York has recorded since 2000 a 116% increase in cycling levels. (New York City Department of Transportation, 2007b) (Pucher, Buehler, 2008) New York is an important case study because it demonstrates increasingly higher levels of utilitarian cycling within the context of a North American city. The effective monitoring program has shown a direct relationship between gentrification in urban areas and the increase of utilitarian cycling. As Pucher, Thorwaldson, Buehler, Klein (2010) remark;

> *Over the past four decades, neighbourhoods such as Booklyn Hieghts, Cobble Hill, Boerum Hill, Carroll Gardens, Park Slope, Williamsburg, and Greenpoint have been experiencing ongoing gentrification which has brought an influx of young professionals, academics, artists, musicians, writers, and 'hipsters' (Curran, 2004, Goworska, 2008, Lees, 2003, Newman and Wyly, 2006; Slater, 2004) In these gentrifying neighbourhoods, bicycling has become the fashionable or 'hip' way to get around. Many residents view bicycling as more than a utilitarian form of transport: it is also part of their lifestyle and personal identity. (Pucher, Thorwaldson, Buehler, Klein, 2010)*

The monitoring of cycling patterns in New York demonstrates a growing popularity of the bicycle for new urban employment cultures namely the Creative Class. These cultures appear to be taking full advantage of the city's recent infrastructure investments, further legitimizing New York's cycling infrastructural expansion.

4.4.1.1. Review of Pertinent Municipality Data

Municipal Population:	8,363,710
Metropolitan Population:	19,006,798
Geographic Area:	8,683km2
Density:	10,606/km2
Median Temperature:	16.5 (61.7)

4.4.2. History of Cycling in New York

While the city had provided recreational pathways for a number of years it did not regarded the utilitarian potential of cycling until the mid 1980s. At the beginning of its monitoring program in 1980 the City of New York recorded approximately 6,000 cyclists. By 1990 the number of cyclists had reached 10,000 and finally in 2002 the number reached 14,000 cyclists. The monitoring approach of the cyclists in New York reflects the city cycling infrastructural strategy. For a period of about twenty years the municipal strategy appears to have been the provision of infrastructure in locations where it was deemed necessary. In 1997 the City of New York Launched the first phase of what it calls The Bicycle Network Development Project titled New York Bicycle Master Plan, 1997. Since 1997 "New York's City's efforts to increase cycling and make it safer have focused on expanding and improving cycling facilities such as bike lands, bike paths, bike boxes roadways marking and traffic signals." (Pucher, Thorwaldson, Buehler, Klein, 2010) Because of the ongoing monitoring of infrastructure use, use network itself increased 5 fold between 1997 and 2009. Today in New York City there are both off-street paths and traffic-protected on-street paths.

4.4.3. Cycling Programs

In New York City, cycling policy framework is generated at the level of the municipality with only limited role of National governments. Here, current plan is a joint effort of the Department of City Planning (DCP) and Department of Transportation (DOT). In the current Municipal Bicycle Plan demonstrates its intentions to influence decisions made by the Board of Education, Department of Transportation, Economic Development Corporation, Department of Environmental Protection, Mayor's

Office, Department of Parks and Recreation, New York City Police Department. (NYC Bicycle Master Plan, 2010)

The objectives of the Bicycle Network Development project are to; "encourage increased use of bicycles as a viable mode of transportation, develop a comprehensive plan for improving bicycle facilities, implement an all-agency bicycle policy for New York City, implement facility improvements and coordination with the plans and programs of advocacy groups, city and state agencies." (NYCDCP,2010)

New York has with the help of federal money developed innovative strategies. One of these innovative strategies is revisiting the current infrastructural standards. Although the current Bicycle Master Plan (1997) demonstrates standardized cycling path widths, Pucher, Thorwaldson, Buehler, Klein, (2010) remark; "New York has been experimenting with new design for physically separate facilities, pioneering [the introduction of dynamic cycling infrastructure] in North America." (Pucher, Thorwaldson, Buehler, Klein, 2010) New infrastructure experiments include on-street bike lanes with delineated barrier, signal protection from turning cars and colour demarcated surface paint for shared lanes. Innovative "European" style infrastructure however currently only represent less than 1 percent of the city's cycling network. (Pucher, Thorwaldson, Buehler, Klein, 2010)

In addition to innovative approaches to infrastructure design, New York City has initiated several events and programs to promote utilitarian cycling. The Department of Transportation operates three events; Summer Streets, Weekend Walks and Bike Month. The Department of Transportation also funds community cycling programs including "Fast and Fabulous the Gay and Lesbian Bicycle Club", the "five Boroughs Bicycle Club", and the "Sierra Club Outings" to promote cycling within different segments of the urban population. (NYCDOT, 2010a)

(Laforest, 2010)

4.4.4. Financing Cycling Network Development

The Bicycle Network Development Program for the New York City is financed jointly by the City of New York and the Federal Congestion Mitigation Air Quality Program. (CMAQP) The CMAQP program is designed to providing national funding "for surface transportation and other related projects that contribute to air quality improvements and congestion mitigation." (CMAQP, 2010) According to the City of New York "this program provides funding for the planning, design and development of bikeways as a means of; improving the air quality, reducing congestion on existing roadways, helping to provide lower transportation costs." (NYCDCP. 2010) The program is part of a New Federal Transportation Equity Act of the 21st century. (TEA-21)

However as Pucher, Thorwaldson, Buehler, Klein, (2010) remark; New York Department of Transport already plans to expand its system of cycling infrastructure but that will take time and might be slowed down by the current fiscal crisis of both the City and the State of New York." (Pucher, Thorwaldson, Buehler, Klein, 2010) In essence the financing structure is not resilient to annual fluctuations or political changes.

4.4.5. Visual Journal – Cycling in New York

Figure 4.4.5.1. Allen Street Cycling Path, New York from **(Pucher, Thorwaldson, Buehler, Klein, 2010,** Picture Source Lewis Thorwaldson,

Figure 4.4.5.2: Allen Street Cycling Path, New York from Pucher, Thorwaldson, Buehler, Klein, 2010, Picture courtesy of Transportation Alternatives.

Figure 4.4.5.3 A View of Allen Street in Manhattan, New York from Pucher, Thorwaldson, Buehler, Klein, 2010, Picture By Nicholas Klein.

(Laforest, 2010)

Figure 4.4.5.4: The Sands Street Cycling Track in Brooklyn, New York from Pucher, Thorwaldson, Buehler, Klein, 2010 Picture by Nicholas Klein.

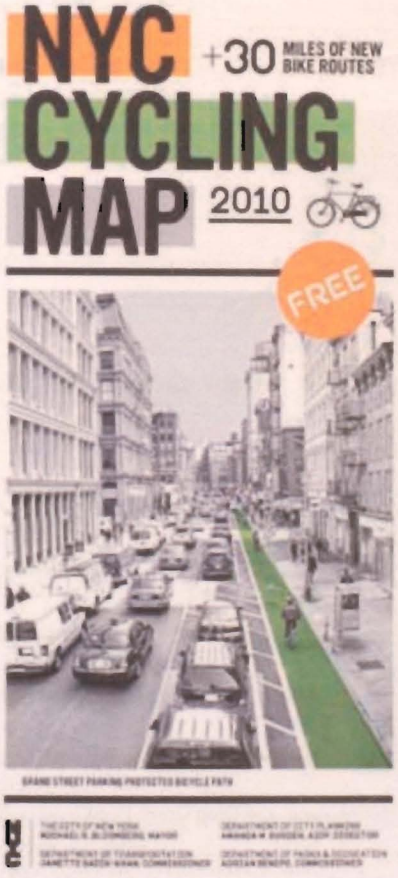

Figure 4.4.5.5. Branding and Promotion of its Cycling Infrastructure. Seen here is the NYC cycling Map for 2010. (Retrieved from New York City Department of City Planning,2010)

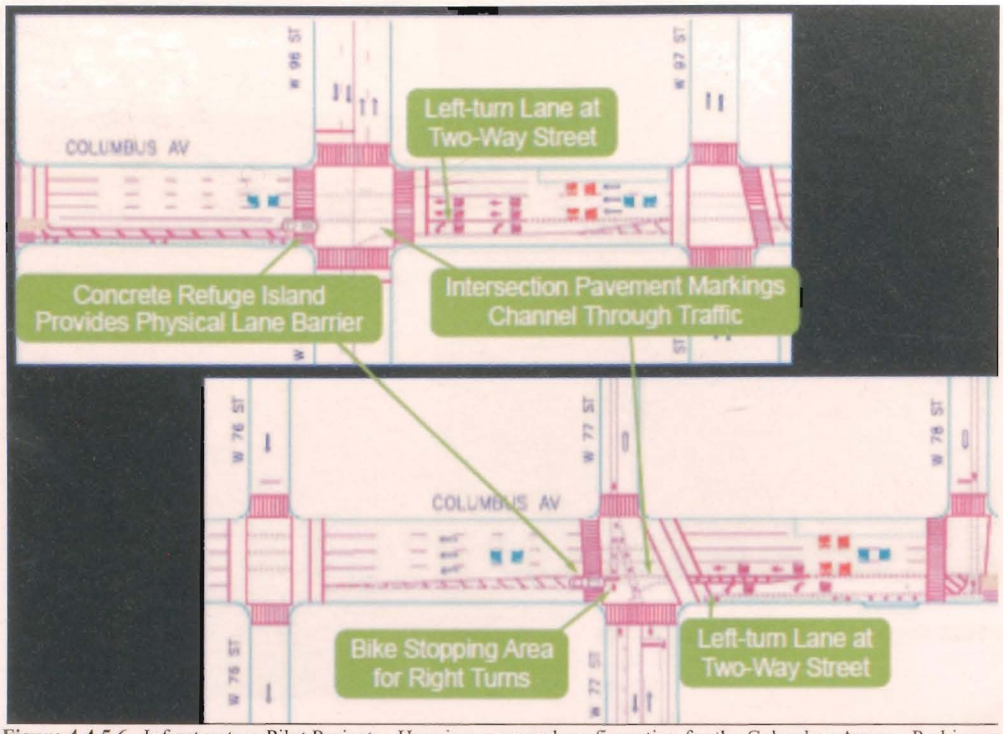

Figure 4.4.5.6. Infrastructure Pilot Projects. Here is a proposed configuration for the Columbus Avenue Parking and Protected Bicycle Path (West 96th to West 77th Street) Image demonstrating Project Transitions. (Retrieved from NYCDCP, May 2010c.)

Figure 4.4.5.7. Safe Intersection Proposal with key elements for "Sight line visibility, Mixing Zone, and Drop Green Paint", (Retrieved from NYCDCP, Community Presentation May, 2010c)

4.4.6. The Culture of Cycling in New York

(Laforest, 2010)

While New York is experimenting with new urban infrastructural standards and promoting cycling to a variety of segments of the urban population, it still has a long way to go to achieve utilitarian ridership levels comparable to some European cities. As Pucher, Thorwaldson, Buehler, Klein (2010) remark "even in a city such as New York, where a majority of residents have not cars, it has been an uphill battle trying to approve the proposed congestion pricing scheme for Manhattan." (Pucher, Thorwaldson, Buehler, Klein, 2010) Another barrier identified to the promotion of cycling use is the lack of traffic-calmed neighbourhoods in New York making cycling more attractive. Some of the greatest barriers to cycling expansion in the city are cultural. Pucher, Thorwaldson, Buehler, Klein (2010) attribute some responsibility to the York City Police Department because they continue to ignore vehicle violations, thus allowing the vehicle to retain its authority on the street. While there is great support for the continued expansion of cycling in New York City the process of attributing more lanes to the cyclist will become more difficult if disincentives for the automobiles do not materialize. The strategy in New York City is also noticeably conservative, where the provision of infrastructure reflects user patterns rather than a strategize wider-regional connectivity.

4.5.0. Case Study Region 5 - Vancouver, British Columbia, Canada

4.5.1. Municipality Region

According to the City of Vancouver cycling page, cycling is the fastest growing mode of transportation in the city. Vancouver is a large municipality in a region of Canada where temperatures are conducive almost year round to for bicycle use. Due to a number of contextual factors, cycling has enormous untapped potential in Vancouver. At the same time Vancouver facing a number of political and cultural challenges to increasing the percentage of trips made via the bicycle. Vancouver is an excellent case study because it demonstrates innovative practices to address these challenges and with careful political support it is in all likelihood that several culminating factors in the region will increase levels of cycling within the next ten years.

(Laforest, 2010)

4.5.1. Review of Pertinent Municipality Data

Municipal Population:	578,041
Metropolitan Population:	2,116,581
Geographic Area:	114,67km2
Density:	5,335/km2
Median Temperature:	13.7 (57)

4.5.2. History of Cycling in Vancouver

Throughout most of its history and in particular the 1980's Vancouver's cycling program was designed and implemented for recreational purposes. From 1986 to 1999 the city completed 16 bikeways with a total length of 133 km. Until 2004 these bike lanes were located along parks and on lightly travelled roads, areas of the urban surface where little conflict ensured the implementation of cycling lanes. With general political support for Gasoline Taxes, the city has been able to secure a portion of these tax revenues for cycling infrastructure. Today within the downtown core as a result of compact urban development, cycling and walking represent 41% of all commutes. Within the context of Vancouver a lot of attention is focused on commuter cycling as oppose to other jurisdictions where the focus is placed overall utility.

4.5.3. Cycling Programs

According to Translink the regional transportation authority in Vancouver, the Provincial Government of British Columbia [through the Ministry of Transportation] administers two programs assist local governments with the implementation of cycling facilities. (Tranlink, 2010b) One of these programs is titled the "*Cycling Infrastructure Partnership Program*" is aimed at reducing traffic congestion and greenhouse gas emissions (GGE). The involvement of the Ministry of Transportation stems from its regulatory practices of managing bicycle use on its infrastructure. The Ministry of Transportation has established a policy framework for cycling and administers various funding programs.

At the municipal level the City of Vancouver has a number of cycling frameworks to guide the development of bicycle infrastructure. According to the City of Vancouver, cycling policies are found in a

variety of documents including; the Community Official Plan, the On-Street Cycling Network, the Bicycle Plan 1999, the City Center Transportation Plan 1995, the Development Permit Guidelines, and the Zoning By-Law. The most detailed of these strategies is the 1999 Bicycle Plan. This Plan focuses on what it reefers to as the four E's of cycling; engineering, education, enforcement and encouragement. (City of Vancouver, 2010a)

The City of Vancouver is experimenting with new cycling infrastructure. As part of its vision for cycling in Vancouver the city re-opened the Dunsmuir Bridge after the Olympics with an entire lane now closed to vehicles. The post-Olympic project is part of an infrastructure pilot for one of the most important urban arteries in Vancouver. As the City of Vancouver remarks;

> *"The current project is pushing the boundaries of urban design for cycling infrastructure. Recently completed Dunsmuir Street Bridge has prompted the transformation of the urban artery "Dunsmuir Street" for shared bicycle lanes."* (City of Vancouver, 2010)

According to the City of Vancouver's website "Phase one [of Dunsmuir Street] a two-way separated bike lane pilot will be implemented on the north side of Dunsmuir Street (...) Three types of physical separation will be used to separate cars form bikes on Dunsmuir Street. Each barrier will be evaluated for its benefits for this and future separated bike lanes." (City of Vancouver, 2009) The city will use the urban artery to experiment with three barrier designs and hope to measure user preferences and solidify a new infrastructural standard for cycling.

Promotional initiatives the City of Vancouver appears to be limited for the time being to providing cycling maps and brochures.

4.5.4. Sources of Funding for Cycling Infrastructure

Until recently the City of Vancouver received very little funding from the Provincial Ministry of Transportation. As Pucher and Buehler remark;

> *"the provincial government of British Columbia provides only very limited funding for improvements in cycling infrastructure. Requiring at least an equal match by local governments, the province provided about $2 million dollars/year from 1995 to 2001, then suspended the program for three years and reinstated the program in 2004 at only half the former level of support. Moreover the province made applications for funding absurdly difficult." (Pucher, Buehler, 2005a)*

Recently cycling infrastructure monies have been derived from a provincial gas tax system. The monies allocated to road improvements from the gas tax are now in part forwarded to municipal cycling infrastructure development.

4.5.6. Visual Journey – Cycling In Vancouver

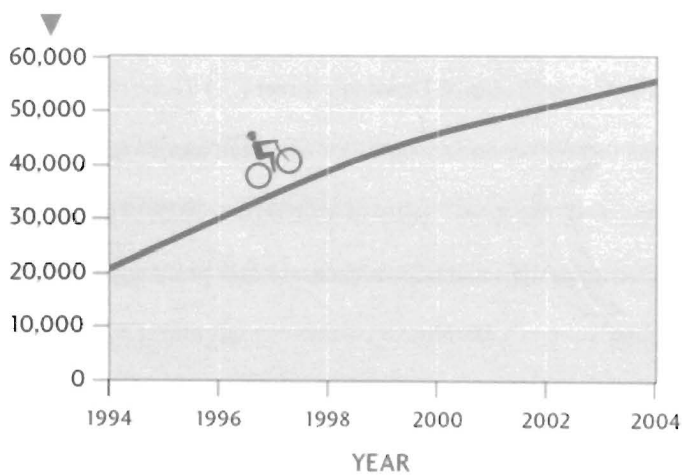

Figure 4.5.6.1. Growth of Cycling in Vancouver. Chart demonstrating the growth in cycling within the City of Vancouver since 1994. (Image Retrieved from City of Vancouver, 2010e)

Figure 4.5.6.2. Cycling Lane along Carrall Streets. Greenway. Image from Translink Regional Transportation Network Plan, 2010b.

Figure 4.5.6.3. Permeable Raised Median. (Image retrieved from Translink Regional Transportation Network Plan, 2010b)

Figure 4.5.6.4. Traffic Calming and Road Closures. Image Retrieved by Translink Regional Transportation Network Plan, 2010b.

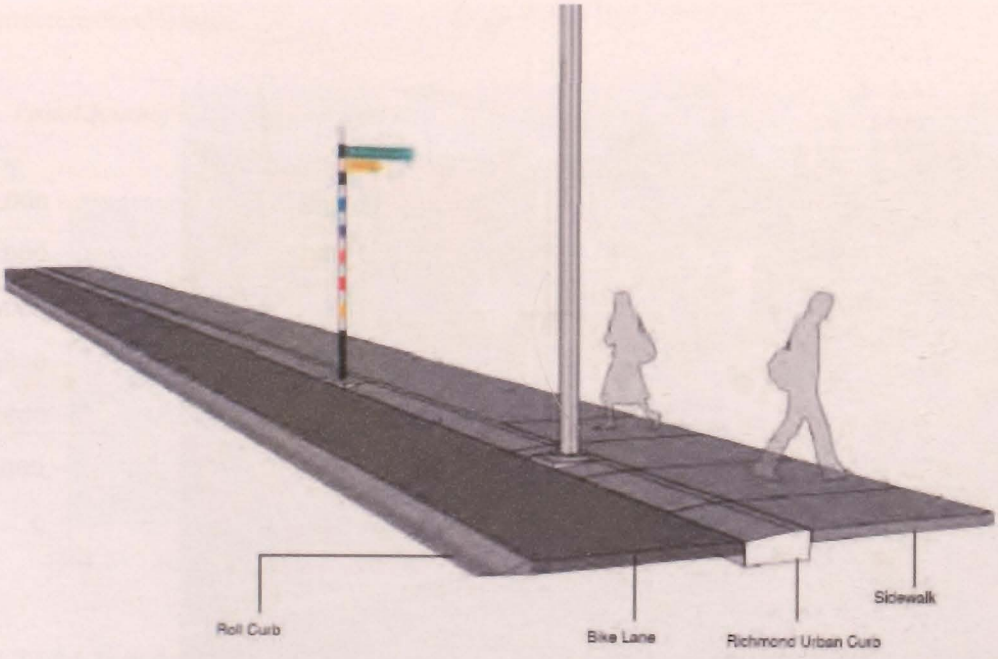

Figure 4.5.6.5. Raised Bicycle Infrastructure Standard. Image retrieved from Translink Regional Transportation Network Plan, 2010b.

(Laforest, 2010)

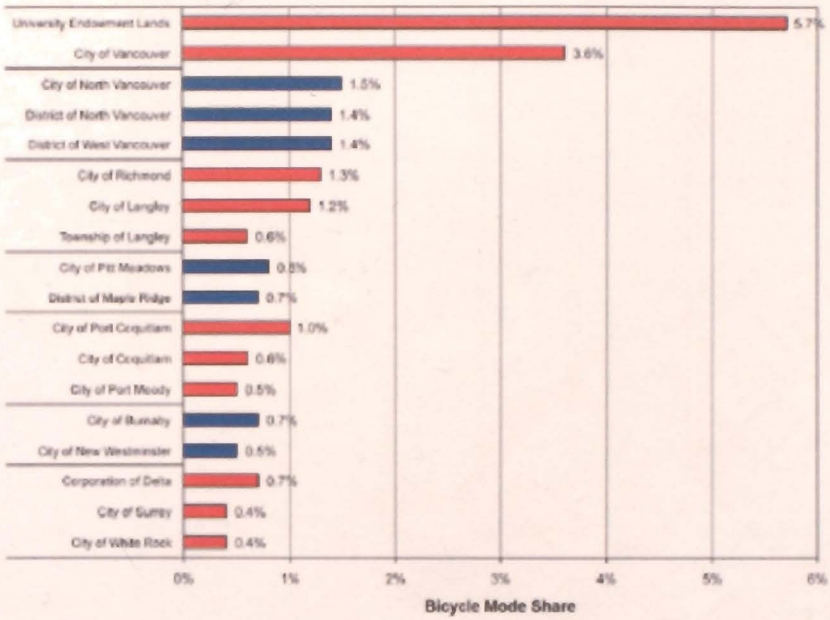

Figure 4.5.6.6. Bicycle Share of Work Trips in Vancouver. (Chart retrieved from Translink Regional Transportation Network Plan, 2010b)

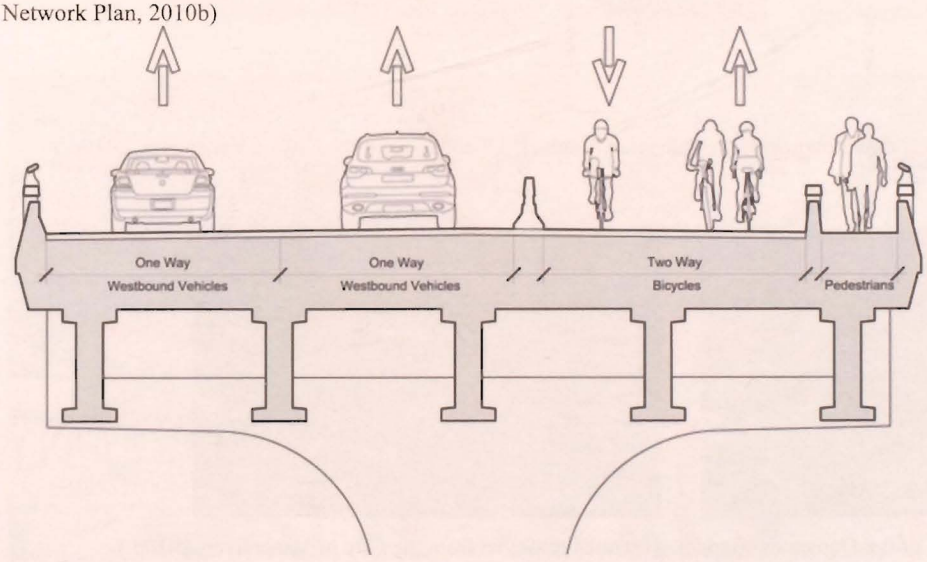

Figure 4.5.6.7. Cross-section of the renovated Dunsmuir Viaduct . Picture Retrieved from City of Vancouver, 2010d. The Dunsmuir Viaduct was closed for the Olympics and re-opened afterwards with a new separated cycling artery.

Figure 4.5.6.9. Connecting downtown with the Dunsmuir Viaduct. (Pictures from the City of Vancouver, 2010d.)

Figure 4.5.6.10. Visions of the Dunsmuir Viaduct. (Pictures retrieved from the City of Vancouver, 2010d.)

(Laforest, 2010)

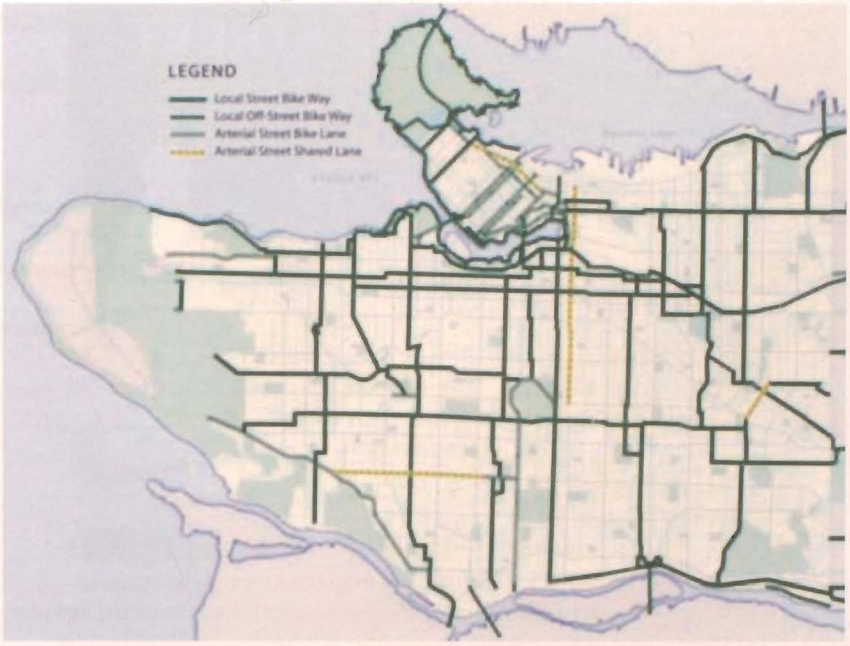

Figure 4.5.6.11. "Vancouver Cycling Route Network." (Picture retrieved from City of Vancouver Staff Report, 2010)

Figure 4.5.6.12. "2008 Peak Bike Count Map." (Picture retrieved from City of Vancouver Staff Report, 2010e)

Figure 4.5.6.13. City of Vancouver Promotion for its new cycling infrastructure project. An entire webpage is dedicated to this pilot on-street project in the City. Here user-friendly links help people understand the merits and use of the new cycling land in Vancouver. It has transformed one of the city's most busy arteries into a shared bicycle street. (Retrieved from City of Vancouver Cycling, 2010d)

4.5.7. Culture of Cycling in Vancouver

Vancouver has recently been experimenting with a variety of new infrastructural standards designed to accommodate and promote cycling in urban areas. The urban arterial project at Dunsmuir Street demonstrates that the municipality is looking for new ways to encourage the cycling to work. The strategy in Vancouver has been to keep cyclists off main roads until recently. Like many Canadian municipalities, the easy pathways have been implemented. Both Pucher and Buehler (2005) remain concern with the lack of Federal involvement in urban cycling initiatives. They remark; "without [an] increase in provincial and federal government involvement it may be that cycling in Canadian cities has now reached a plateau [with regards to their cycling expansion]." (Pucher, Buehler, 2005) Indeed Canada has yet to formalize a cycling strategy or declare its intentions with automobile disincentives.

Generally Vancouver demonstrates cycling success as well as willingness to experiment with new infrastructures. These efforts however appear to be limited to promoting commuter cycling and limit the scope of cycling infrastructure to either commuter or recreational uses. In the future the City of Vancouver will have to overcome its recreational bias and envision a utilitarian network where all nodes and urban travel destinations are linked by cycling pathways. At a time when cycling is becoming increasingly

popular among urban professionals opportunity exists to broaden the cycling priorities to reach all neighbourhoods and population segments.

Review of Findings in Sample Case Study

Sample Municipality	Summary of Findings
Amsterdam	• Disincentives for personal vehicle use • Helmet use not mandatory • Vehicle is liable for all collisions • Cycling plan associated with a variety of other initiatives including water infrastructure management, social integration and reduction of urban pollution • Highest percentage of trips made via the bicycle among surveyed populations • A total of 6 national agencies administering cycling development • Direct funding from the Ministry of Transportation • European union funding for employment clusters • Municipal project financing • Federal agency responsible for the conceptualization innovative cycling infrastructure concepts
Copenhagen	• Cycling is supported by strong institutional culture • Robust restrictions on car usage within urban environment • Heavy Taxes on the automobile • Bicycle ideas group (cycling brainstorming sessions) • Culture of collaboration and compromise among government bodies • Decentralized cycling implementation strategy • Strong tradition and urban cycling culture
Berlin	• Managed to implement a successful urban cycling program despite having the second highest rate of car ownership in the world • A range of disincentives for vehicle use, including taxes and urban areas restricted from vehicle use • High urban densities (even among European standards) • Rigorous top-down cycling strategy • Evidence of two tier urban cycling strategy (both regional commuter designed arteries and local smaller networks within boroughs) • Extensive traffic calming in urban areas • Experimentation with network development strategies
New York City	• New urban cycling program • Federal policy and implementation support • Experimentation with innovative cycling concepts • High density and relatively low levels of car ownership • Evidence of strong statistical monitoring program to survey the success of cycling

	infrastructures • Demonstrated need for automotive disincentives and traffic congestion • Political support is contentious • Cycling infrastructure provided to neighbourhoods that are rapidly gentrifying
Vancouver	• Regional support for cycling program • Provincial government financing • Relationship between land use policies and potential further increases in urban cycling • Commuter-oriented cycling strategy • Experimentation with European-inspired cycling infrastructure standards • Effective monitoring programs to survey the use and user satisfaction with the infrastructure provided

Final Remarks Case Study Review

Each of the reviewed case study municipalities demonstrates unique approaches to increasing utilitarian cycling. As Pucher, Dill and Handy remark;

> *" Designing the appropriate mix of policies for each city's particular situation requires careful planning and ongoing citizen input, especially from bicyclists. Emphasizing the proven health benefits of bicycling will be key to garnering the public and political support necessary to implement a truly comprehensive package of policies. That multifaceted, coordinated approach offers the promise of substantial growth in bicycling, even in cities with low bicycling levels."(Pucher, Dill, Handy, 2010)*

This overview of case study regions demonstrates a variety of implementation policies and strategies for the bicycle. In all reviewed municipalities success can be attributed to national and provincial/state leadership as well as systematic funding. A review of geography and population data demonstrates that density patterns and climate do not necessarily correspond to percentage increases in of trips made via the bicycle. The high number of utilitarian cycling in sample jurisdictions is likely a

reflection of strong institutional capacity, effective monitoring and the alignment of cycling policies with other urban objectives.

The reviewed municipal regions are at various points in the evolution of their cycling strategies. While Amsterdam and Copenhagen have been expanding urban and national cycling networks for the better part of the last century, Berlin demonstrates the merits of top-down strategies in increasing utilitarian cycling in shorter time frame. The case of New York and Vancouver are very similar in their approaches to the expansion of cycling as they both (perhaps intentionally) focus on the provision of cycling infrastructure for commuter use. Both municipalities appear to be at the beginning phases of a comprehensive cycling strategy. New York and Vancouver will most likely continue exploring infrastructure standards and innovative promotional strategies to increase cycling.

	Amsterdam	**Copenhagen**	**Berlin**	**New York**	**Vancouver**
Municipal Population:	762,057	530, 902	3,443,570	8,363,710	578,041
Metropolitan Population:	2,158,372	1,899,427	5,000,000	19,006,798	2,116,581
Geographic Area:	219 km2	88.25km2	841.84km2	8,683km2	114,67km2
Density:	4,459/km2	6,016/km2	3.861/km2	10,606/km2	5,335/km2
Median Temperature:	13.4 (56)	11.1 (52)	9.6 (49)	16.5 (61.7)	13.7 (57)
Percentage of Total trips made via the Bicycle	27-30%	29%	10-12%	1%	1.9%

Figure 4.7.0. Review Case Study Geographic and Population Data

The 'best practice' jurisdiction is Amsterdam. It is characterized as a best practice not because it has the highest utilitarian cycling rates among the surveyed municipalities, but because it has been successful at developing a comprehensive long-term cycling strategies, at decentralizing the implementation of cycling policy and has demonstrated success with monitoring programs and survey projects.

Surveyed municipalities demonstrate a roster of approaches to the development of cycling infrastructure and programs in North America and Europe. Amsterdam, Copenhagen and Demark

demonstrate strategies that regard cycling as its own transportation typology. These European municipalities seem to strategize cycling on multiple levels so that it might perform commuter and recreational functions as well as connect to local urban destinations. For the time being North American municipalities are limited in their strategy, as they appear to weigh heavily the function of commuting as oppose to building routes that connect residential communities to local destinations. As illustrated in the example of New York City, cycling is an increasingly popular activity among the urban chic and generally becoming more popular in urban neighbourhoods that are gentrifying. The new found popularity is an opportunity for urban planners to develop a comprehensive cycling program.

5.0. New Cycling Agenda for the City of Toronto

5.1. Suggested Framework for a Comprehensive Strategy

Together the findings presented in urban design theories and reviews of sample case studies demonstrate the value of a long-term vision and rigorous implementation of innovative infrastructures. This section proposes a framework for a comprehensive cycling strategy in Toronto based on the findings presented in the previous three chapters. Figure 5.1 is a proposed structure for the development of a comprehensive plan. It is also the structure subsequently employed to express recommendations for a renewed comprehensive cycling program in Toronto.

Vision Statement	A brief phrase or two, the vision statement is an attempt to outline the aspiration for the program and an opportunity to express what the strategy aims to achieve.
Guiding Principles	The Guiding Principles are intended to elaborate on the core values of the comprehensive cycling plan. There should be a direct relationship between the architectural, infrastructural and policy directives and the guiding principles for the project. The guiding principles are also an opportunity to capture conceptual directions. Together the principles outlined serve as a reference point for the remainder of the project.
Project Goals	The project goal component of a cycling strategy offers municipalities or regional bodies the opportunity to state the desired outcome of the project. In most cases the project goals are fixed where the author states desired end results. Cycling goals are most often desired percentage increases and decreases in cycling fatalities. These project goals are most often associated with a specific project timeline.
Objectives	The cycling objectives are intended to explain the reason for the adoption of the plan in boarder terms. Cycling infrastructure and policy development in most cases has many primary and secondary objectives spanning from the social, environmental and economic benefits. These objectives might be less quantifiable.
Policies	This section will most likely be the longest component of any comprehensive cycling strategy. Included here are intentions, approaches and ambitions of the cycling program. This section essentially expresses what needs to happen in order to accomplish the goals and the objectives expressed earlier. Here policies might also attempt to reach out to other organizations and gather decentralized support to achieve the objectives and vision for the project.

Procedures	This section is concerned with how to implement the outlined policies. In the case of a comprehensive cycling strategy the procedures component might include strategies to secure financing support from other levels of government, break down the strategy into project phases (Phase I, Phase II, Phase III) as well as other marketing and promotional mechanism to increase utilitarian cycling. This section essentially breaks down the objectives and policies into project milestones and concerns itself with process.
Measuring Instruments	Monitoring and measuring the success of existing cycling infrastructure policies is arguably the most important component of an effective cycling strategy. In the case of municipal funding and leadership with regards to cycling infrastructure the process of implementation is limited by lack of political and/or institutional oversight. A culture of project oversight combined with effective financing ensures that cycling networks are produced according to schedule. An effective monitoring program would also report on the use and success of existing networks and help inform a continuously responsive and evolved comprehensive cycling strategy.

Figure 5.1.0. Suggested Comprehensive Plan Template.

5.2. Suggested Cycling Framework Revisions

This section is presents suggested considerations and frameworks for the conceptualization of a comprehensive cycling strategy in Toronto. Using the format aligned in Figure 5.1.0., this section proposes new revisions for the vision statement, guiding principles, policy and procedures. These new directions are expressed in the effort of shaping a broadened cycling program in Toronto and in no way intended to be finite.

	Revised Strategy/Entry	***Reasoning/Justification***
Vision Statement	***Toronto's cycling strategy aims to create a cycling network that adapts and integrates Toronto's urban surface through the construction of environments conducive to experience and exchange.***	The Vision expressed by the 2001-2010 Toronto Bike Plan is to "create a safe, comfortable and bicycle friendly environment in Toronto". What this statement fails to realize is that adding a new mobility infrastructure might in itself create more attractive environments. This proposed vision statement recognizes the process of adaptation required for the transformation of the urban surface. Recognizing the nature of the transformation makes the project of cycling development more applicable to other urban projects and able to perform as a tool for integrating the urban surface.
Guiding Principles		Guiding principles help further illustrate the intent of the vision. These are intended to guide the development of the network infrastructural standards.
	1. Experience	'As demonstrated in a review of findings, travel experience is highly weighed in cycling surveys and literature review. The experience of cyclists thoroughly determines the attractiveness of a path. Cycling policies should focus special attention on creating dynamic as well as safe environments for the cyclist. For this kind

		of urban mobility value the spaces in-between and transportation is increasingly associated with voyage.
	2. Adaptation	The introduction of cycling infrastructure within an existing urban surface will require the transformation of the urban surface to accommodate the cyclist. The adaptation principle is intended to establish favourable approach of adaptation rather than reconstruction.
	3. Exchange	New post-industrial and post-Fordism landscape theories suggest that urban environments are increasingly attractive to new employment cultures because they are conducive to exchange and nomadic behaviour. This principle recognises the role of the bicycle in fostering nomadic urban behaviour and in promoting exchange.
	4. Integration	Toronto suffers today from a tradition in separating urban space. Cycling networks act as the glue to integrate neighbourhoods. Develop a network which attempts to integrate uses and infuse existing urban parks and squares with new provisions for cycling.
Project Goals		The 2001-2010 Toronto Bike Plan expressed two primary goals; first it expressed a desire to double the number of bicycle trips and secondly to reduce the number of bicycle collisions.
	Cycling will align itself with other urban objectives in decentralized approach.	Municipal case studies demonstrate that cycling policies are most effective when associated with other urban objectives. In most cases these associated land use, zoning and urban tax schemes. It is important that cycling policy documents align themselves with other objectives which can be mutually re-enforcing. These projects include urban revitalization, integration, social cohesion projects and urban sustainability.
	The conceptualization of the cycling strategy will involve multiple stakeholders	A proven strategy in European case studies is multiple government participation in the conceptualization of policy and objectives. The more government stakeholders and interests in the process of cycling expansion the more likely it is for cycling to endure the test of time.
	Attempt Inter and intra-governmental collaboration on cycling development.	An innovative strategy in Europe is brainstorming sessions between multiple levels of government, multiple ministries, cycling associations and design consultants. The idea with these groups is to formulate shared objectives and build consensus.
	Work to change the perception of utilitarian cycling in Toronto	Surveyed municipalities in Europe demonstrate a range of creative marketing strategies to get people to do the 'cool thing' and use their bicycle. Some municipalities in North America have noticed relationships between gentrification and cycling and even illustrate how the bicycle is becoming popular among 'hipsters'. Toronto must take full advantage of this new popularity of cycling to promote it.
	Experiment with innovative cycling infrastructure designs and develop new urban cycling path standards	All reviewed case studies municipalities are exploring new infrastructure standards for cycling. Among these infrastructures are dynamic parking facilities, cycling bridges, coloured pathways, lighting schemes for cycling at night, shared street environments and dynamic parking facilities. Transportation environments can make cycling safer and contribute simultaneously to integrating the urban environment.
Objective	**To increase utility cycling in Toronto by providing attractive infrastructure, innovative strategies and by promoting it as a cool way to get around the city**	The objective of all cycling programs is to increase the number of people that choose to get around with bicycles. This statement demonstrates a willingness to increase utilitarian cycling in Toronto by both creating dynamic cycling environments and making the environments safer.

Policies	**Regard the bicycle as its own urban transportation type complete with its own infrastructure, signage, principles and standards**	There has been some confusion within municipal policies as to regard cycling at the scale of the pedestrian, or to regard it as a vehicle. In Toronto Cycling need be regarded as an urban vehicle and discussed as a new urban transportation typology.
	Embrace the unique characteristics of the bicycle including its flexibility and compatibility with the urban environment	The bicycle is compatible with the existing urban environment. Policies should explore various uses of the bicycle including health benefits, social benefits and environmental benefits.
Procedures	**Strategize multi-level cycling networks**	Berlin is a fascinating example of multi-level urban cycling strategy. In this particular case study region cycling lanes are designed with local traffic, faster commuter traffic or recreation in mind. The effect produces various travel speeds and infrastructure standards.
Measuring Instruments	**Continuous monitoring of infrastructure use**	All municipalities surveyed (including Toronto) have monitoring and surveying programs so the city captures a good understanding of how its infrastructure is being used. There are many benefits to a rigorous measuring of use of infrastructure. First it helps the municipalities understand what aspects of the project are most successful and secondly it helps to determine areas of the plan that might need improvement. The most important part of the monitoring is the ability for the results to influence the project.
	When possible engage with various consultants and transportation agencies	In Europe cycling plans demonstrate a categorized understanding of different cycling activities within the urban environment. This multi-level approach to cycling is supported by different national and local governments. The implementation of recreational urban paths is designated to a different agency then would administer and supper local networks to grocery stores and shopping districts.
	Monitoring of project milestones	The case of Amsterdam illustrates the benefits of institutional oversight, Although the implementation of cycling paths and roads is conducted by a variety of public agencies, they are all monitored by the national department responsible for transportation. It appears that for the majority of the grant monies allocated to cycling development projects are attached to firm project deadlines as well as user satisfaction surveys.
Accountability/Supervision	**Establish or look for a project hierarchy, where the implementation and project milestones are monitored by interested body**	Having an interested authority outside the municipality or the national government responsible for monitoring the implementation of the strategy. This appears to be the success for the Dutch national cycling system. The national government mandates that all scheduled roadway improvements, pathway extensions and infrastructure projects related to cycling materialise. This not only puts pressure on the municipality to perform with regards to its plan but ensures that cycling infrastructures are delivered on time. In the case of Toronto the municipality should look for long-term oversight and support from the Provincial Government to reach the objectives established in the comprehensive cycling strategy.

6.0. Project Limitations

The creation of a comprehensive cycling strategy for Toronto is beyond the limits of this report. Indeed the findings in this review demonstrate the importance of having several organizations, agencies and departments involved with the planning and implementation of a cycling program. The framework presented here is intended to serve as a starting point for the construction of a complete, long-term and well crafted cycling strategy. This review recognizes the need for cycling initiatives to be strategized at multiple levels by agencies, transportation departments and local governments.

The broad scope of this report is formulated intentionally to theorize and review many directions pertinent to the conceptualization of cycling in Toronto. Until recently the marginal infrastructural and cultural status of the bicycle left a void in the study of the potential of cycling within the Canadian context. There remains a immensity of research and conceptualization to take place in order to built a comprehensive cycling program in Toronto.

Toronto has to catch up in terms of the linear quantity of infrastructure and the sophistication of its cycling strategy. The findings reviewed in this report demonstrate new connections between theoretical concepts such as the Creative Class and increased urban cycling. Items such as this have yet to be contextualized in Toronto and require further qualitative and quantitative study.

7.0. Conclusion

This report is an attempt to review theories and strategies pertinent to the construction of a comprehensive cycling program in Toronto. For the time being it appears the strategy has been to provide linear infrastructure in a static and isolated manner. This report demonstrates the benefits of theorizing cycling development and associating it to a variety of other initiatives and programs.

As Toronto struggles to implement the remaining linear pathways illustrated in the Toronto Bike Plan, municipalities in other North American and European jurisdictions are finding innovative ways to implement utilitarian cycling programs. These innovative cycling programs stem from comprehensive long-term strategies, strategies still elusive in Toronto.

In some aspects the cycling debate in Toronto mirrors the dilemmas of the Gardiner Expressway in a kind of urban versus suburban political show down. Surprisingly some answers are provided in new philosophies which argue in favour of an additive process, a process which does not restrict or renew the urban landscape but rather attempt to infuse it with new dimensions.

An increase in utility cycling is dependent on a multitude of initiatives that are part of a holistic municipal planning process. The question then should not be whether Toronto pursues an urban or suburban ideals, or worse yet achieve a reality where it receives neither benefit of both. Toronto should focus rather on how it envisions its future and work to develop a vision that accommodates its dual identities. Landscape urbanism and cycling together provide the basis both functionally and metaphorically for the reconnection of the urban surface. With careful programming and deliberate physical interventions a successful comprehensive cycling program might then succeed twofold; in changing the regard of cycling as well behaviour within the urban environment.

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