

Pedal Power: Designing effective cycling infrastructure in  
Winnipeg with lessons from Minneapolis

Submitted by

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September 18, 2013

A practicum submitted to the Faculty of Graduate Studies of  
The University of Manitoba  
In partial fulfillment of the requirements for the degree of

MASTER OF CITY PLANNING

Department of City Planning

University of Manitoba

Winnipeg

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**ABSTRACT:**

The amount of cycling infrastructure in Winnipeg has drastically increased in recent years, yet network fragmentation and winter weather prevent many from considering cycling as a year round transportation option. This project explores what design characteristics exist in safe, efficient, accessible and resilient cycling networks in winter cities. This study conducted comparative analysis between Winnipeg and Minneapolis, Minnesota; another cold weather city, which has been recognized as one of the most bike friendly cities in the United States. Through key informant interviews, ethnography and visual analysis, recommendations have been developed which emphasize the importance of quality, connected infrastructure and consistent political support in improving the cycling network in Winnipeg. The research concludes successful cycling networks require context specific approaches to the physical, political and social landscapes in which they exist. Further, the research suggests engagement with network users is an effective way to improve cycling infrastructure design.

Keywords: City planning, cycling, design, winter, active transportation, sustainable development, Winnipeg, Minneapolis

## **ACKNOWLEDGEMENTS:**

The completion of this Major Degree Project has been the result of the collaborative effort by many people. I thank Dr. David van Vliet for his constructive and insightful guidance which has been instrumental in the completion of this document. I would also like to thank committee members Dr. Rae Bridgeman and Susanne Dewey-Povoledo, whose feedback, insights and experiences greatly improved this research project.

I would also like to thank the Faculty of Graduate Studies (Faculty of Graduate Studies Special Award), contributors to the MPPI Tom Yauk Scholarship and contributors to the Dean David Witty Scholarship. The support provided in receiving these awards played a significant role in funding the field research conducted in this study, and for that I am grateful.

The experience of being part of the City Planning program at the University of Manitoba is one I will value for the rest of my days. I would like to thank all faculty members including Dr. Richard Milgrom, Dr. Ian Wight, Dr. Sheri Blake, Dr. Ian Skelton and Erin Huck whose courses expanded my mind and furthered my passion for planning. I would also like to thank my exceptional class mates, whose support and collaboration made me better.

This project benefitted greatly from the voluntary participation of numerous research participants, whom without this project would not be possible. I would like to thank all of those people, whether passive or active, for their contributions to this project.

Special thanks go to my loving and supportive family for their encouragement and support over these last two years. To my mom Jan, whose care packages, words of encouragement, proof reading and research travel companionship meant the world. Thanks to Pam, for understanding my two wheeled obsession and loving me none the less. You are the best! And thanks to Dad, for looking out for me wherever my two wheeled adventures take me and keeping me company on the open road.

Lastly, I would like to thank the bicycle. As the years pass and the miles roll by, I am continually amazed at how this simple machine polishes my soul. The bike has been the source of many lessons, and answered many of my life's problems, and I believe it can do the same for others.

Thanks and happy trails,

Dylan

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## KEY TERMINOLOGY:

**Active transportation:** A term which is used frequently in planning policy to describe transportation modes which are human powered. Active transportation or AT is often used in Winnipeg as an umbrella term which includes cycling. Active transportation seems to be used commonly in Winnipeg in large part due to the City's propensity to build shared use pathways, resulting in the term active transportation frequently being used to describe cycling infrastructure. Facilities referred to as AT facilities in Winnipeg include off-street pathways such as the Bishop Grandin Greenway and bridges such as the Pioneers Pass and the near completed Disraeli AT Bridge.

**Winter city:** For the purposes of this study, the designation of a winter city is used to describe an urban environment where there are 4 distinct seasons, one of which includes a long and snowy winter. Examples of winter cities mentioned in this report include Winnipeg, Manitoba; Minneapolis, Minnesota and Oulu, Finland.

**Cycling infrastructure:** In this document cycling infrastructure is used to describe interconnected, cycling specific routes and facilities.

**Cycling facility:** Cycling facilities are used to describe specific pieces of cycling infrastructure such as a bike specific crossing signals, sections of a cycle track or a pedestrian / bike bridge.

**Cycling routes:** A road, street or pathway which has been marked as a "cycling route" on the City of Winnipeg bike map.

**Off-street pathway:** Off-street pathways, sometimes referred to as trails, are completely separated from roadways. Examples of off-street pathways in Winnipeg include the Bishop Grandin Greenway, the North East Pioneers Greenway, the Chief Peguis Greenway, the Niakwa Trail and the Thundering Bison Trail.

**On-street cycling infrastructure:** On-street cycling infrastructure is an umbrella term which includes all types of cycling infrastructure that are on road surfaces, which operated in the mixed company of motor vehicles. On-street infrastructure includes cycle tracks, bike boulevards, buffered bike lanes and bike lanes.

**Bike lane:** On-street cycling routes that are demarcated by painted lines, sharrows and stencils. Examples of bike lanes can be found on many downtown streets in Winnipeg including Gary Street and Fort Street.

**Buffered bike lane:** Similar to a cycle track, a buffered bike lane is an on-street cycling facility which is physically separated from traffic by removable barriers such as poly

posts, jersey barriers or bollards or parked cars. An example of a buffered bike lane in Winnipeg is the recently completed Pembina Highway buffered bike lane.

Cycle track: An on-street cycling facility that is physically separated from motor vehicle traffic by a permanent barrier. An example of a cycle track in Winnipeg can be found on Assiniboine Avenue.

Multi-use pathway: Off-street pathways which accommodate a number of active transportation modes including pedestrians, cyclists, people of skateboards and roller blades. Multi-use pathways are not separated by type of transportation mode. These are the most common form of off-street pathway in Winnipeg.

## **Chapter 1: Introduction**

The City of Winnipeg has significantly expanded its cycling infrastructure in recent years. There has also been investment and support of cycling programming and resources by the City including the redevelopment of the City of Winnipeg Bike Map, support and endorsement of Bike to Work Day and the Ciclovia festival. Although positive steps are being made, continuing and increased support are important for a number of reasons. Given traffic congestion, a large infrastructure deficit and GHG emissions targets needing to be met, cycling provides an efficient and emission free form of transportation. Cycling requires much lower cost infrastructure in comparison with public transit and private automobile use and cycling has the potential to reduce health care costs associated with sedentary lifestyles. Cycling is a highly accessible form of transportation, allowing people from diverse social, age and economic classes to ride bikes for transportation and recreation. This is facilitated by the support of cycling advocacy groups in Winnipeg including The Bike Dump, W.R.E.N.C.H, Bike Winnipeg (formerly Bike to the Future) and One Green City. Cycling can also provide a smaller scale transportation option which is beneficial in dense urban environments. The slower speed and open air of travelling a city by bike can provide a transportation experience which feels more intimate and connected with urban environments, city building which aims to achieve such experiences can contribute to a more cohesive and human scaled urban setting.



## **1.1 Problem Statement**

The expansion of Winnipeg's cycling network has resulted in significantly more cycling infrastructure in Winnipeg over the past four years. Despite these positive steps there are specific design considerations, if incorporated could make Winnipeg's cycling network transition from good to great. Of these design considerations, there needs to be closer attention paid to developing cycling infrastructure which as well in winter as it does in summer. There are a number of cities having cycling infrastructure superior to Winnipeg from which we can learn. Of particular interest are cities having comparable winter conditions. In 2010 Minneapolis, Minnesota was voted the most bike friendly city in North America (Bicycling, 2010) despite sharing similar geo-climatic characteristics to Winnipeg. This research aims to better understand how Minneapolis planned, designed and implemented an acclaimed network of off-street pathways and on-street bike lanes, considering their harsh four season climate, with the intention of providing examples and inspiration in furthering the success of Winnipeg's cycling network. By using Minneapolis, Minnesota as a tangible example of how a city of similar population, geography and climate has undertaken a similarly successful project, there is an opportunity to generate usable and comparable information for the City of Winnipeg and local organizations, further encouraging participation in the planning and design processes of cycling infrastructure in Winnipeg.

## 1.2 Research Objectives and Questions

This practicum's research objectives are to:

- Provide practical recommendations on design characteristics that could improve Winnipeg's cycling network
- Generate visual material which identifies and illustrates effective cycling infrastructure designs
- Emphasize the importance of the user experience in the design process
- Identify characteristics of cycling facilities that function in environments which experience heavy snowfalls

The key research questions driving this inquiry are:

- How has adopting extensive cycling infrastructure in Minneapolis been successful despite their four-season climate? What can be learned from their experience to better equip the City of Winnipeg and local organizations?
- What are the specific design elements that facilitate the development of safe and convenient cycling infrastructure in cold weather cities?
- What are Winnipeg's strengths which can be used to create a more connected and efficient cycling network in the city? What are Winnipeg's specific barriers to increasing the success and use of its cycling network?

### **1.3 Research Significance**

The majority of this research process has occurred in Winnipeg. The primary focus of the study was to evaluate the state of the cycling network in Winnipeg and how improvements to the network could improve/increase connectivity, convenience and safety when cycling in Winnipeg. This study relied on key informant interviews to better understand the perspective of planners, politicians and advocates in relation to the further development of cycling networks in Winnipeg and Minneapolis. This research process also involved an ethnographic analysis of the cycling networks in Minneapolis in an attempt to better understand some of the ways another cold weather city has succeeded in becoming one of the most bike friendly cities in North America (Bicycling, 2010).

This project provides an informed argument addressing how and in what ways the City of Winnipeg can support and improve its cycling network. The recommendations made in this report are the result of a synthesis of information from politicians, planners and cycling advocates, partnered with the experiential lessons learned in Minneapolis, to provide context specific recommendations, contributing to a more successful cycling network in Winnipeg.

The findings and recommendations this practicum can make to scholarly planning knowledge include the examination of cycling infrastructure and planning in a colder weather city such as Winnipeg. An abundance of information is available on established cycling cities in coastal or temperate settings; however, this study

contributes new knowledge on cycling as a mode of transportation in colder, seasonal cities. More specifically, this research will attempt to provide practical examples of safe and appealing cycling infrastructure, which is easy to maintain, allowing for efficient use twelve months of the year. The recommendations of this study will offer planners, urban designers, engineers, cycling advocates and politicians another resource when considering future implementation of active transportation in Winnipeg.

#### **1.4 Biases and Limitations**

As a passionate cyclist myself, I have connections with many people in Winnipeg who share a similar enthusiasm. I have served in a volunteer position on the Manitoba Cycling Association executive board, am a current member of the Olympia Cycling Club and participate in numerous bicycle races and events each year. In addition to recreational cycling interests, I commute by bicycle year round and am an advocate for the benefits of cycling. In past academic projects I have assisted with initiatives associated with Resource Conservation Manitoba and One Green City, as well as conducted an interview with a board member of the Bike to the Future organization. My role in these projects was minor, primarily consisting of acting in a short film used by Resource Conservation Manitoba (now Green Action Centre) as an educational resource on setting up a bicycle for winter commuting. Although I have acquaintances with these organizations, I have no relationships with these groups which could compromise the rigour of this research.

As a former employee of the City of Winnipeg in the Planning and Land Use Division, I have acquaintances with staff who have been valuable participants in this process. Despite knowing these individuals, our relationships have been professional and have not influenced the outcomes of this research process.

As for personal biases, it has been noted I am actively involved in the cycling community and advocate for the benefits of bicycles as an efficient and enjoyable form of transportation and recreation.

The use of key informant interviews required the targeting of specific individuals with a representative mix of opinions on cycling issues in Winnipeg and Minneapolis. The selection of these participants involved my personal discretion as well as suggestions from other research participants and could represent some degree of bias in the interview participant selection process.

The use of ethnography and visual analysis represent two experiential and highly subjective research methodologies, which demand I offer neutral and representative accounts of observations and experiences. Although visual analysis techniques were used to offer a more rigorous and objective supporting methodology to written ethnographic notes, this type of research could be biased due my own personal lens through which I conducted my analysis.

The primary limitation experienced throughout this research process was the challenges in contacting and interviewing participants in Minneapolis. Despite

numerous outreach efforts, many of the scheduled participants in Minneapolis were unable to be interviewed; resulting is a less balanced representation for the Minneapolis situation during the interview process.

On two occasions, technical difficulties with the helmet mounted video camera resulted in inconsistent data generation during the ethnographic analysis. This required a greater reliance on the use of a digital camera than anticipated. The inability to have a complete and comparable video log of all days spent conducting the ethnography research could also be deemed as a limitation of this study.

## **1.5 Document Organization**

This document is organized into four chapters. In Chapter One the research topic is introduced with attention to the general details of research significance, as well as research questions, biases and limitations. In Chapter Two, a synthesis of literature on sustainable development and active transportation has been conducted to provide the contextual foundation upon which this project is built. Specific topics covered in chapter two include the history of sustainable development in planning, precedents of cycling infrastructure from abroad, the specific role of cycling infrastructure in increasing bicycle ridership and a review of some of the contemporary approaches to bicycle planning. In Chapter Three, the details of the project's research methods and analysis are discussed. The analysis is divided into sub-headings based on the research methods of key informant interviews, ethnography and visual analysis. In the fourth chapter, findings are discussed as a result of synthesizing the information reviewed and

generated in the previous chapters. Chapter Four also focuses the research findings into nine recommendations which could significantly improve the cycling environment in Winnipeg. All supporting information including interview questions and references can be found in the appendices.

## **Chapter 2 History and Precedents in Bicycle Planning**

This research is informed by five primary areas of literature. The theoretical paradigm which grounds this research is the concept of sustainable development and its influence in planning. The literature reviewed focuses on cycling specific research in four themes. The second theme explores the importance of cycling specific infrastructure. The third theme examines what other cities and countries do to create supportive cycling environments. The fourth theme researches how behaviour affects transportation mode choice and how to promote cycling as a viable mode of transportation. The fifth and final theme of the literature review looks at new and progressive approaches to bicycle planning.

### **2.1 Sustainable Development in Planning**

Sustainable Development is built on the foundation of a three tiered approach considering the three E's of environment, economy and equitable society (Nasser, 2003) which serve as a guide when addressing the global challenges of population growth, poverty and increasingly complex economies. In recent years numerous theorists including Berke, Jepsom, Cambell, Beatley and Manning have suggested sustainable development as a new planning paradigm for the 21<sup>st</sup> century (Saha and Peterson, 2008). This literature review will examine the potential for meaningful contributions of the sustainable development paradigm in planning, trying to understand the concepts and proposals for a more successful application to planning contexts. A primary issue to



be examined will be an attempt to understand competing interests of expansionist economic principles and ecological preservationist ideals as a barrier to successful application of sustainable development in planning (Jepsom, 2004).

In 1972 the United Nations Conference on the Human Environment also known as the Stockholm Conference, established the beginnings of the United Nations' involvement in environmental and development issues (Macdonald, 1996). As a product of this new focus, in 1983 the World Commission on Environment and Development (WCED) was established (Macdonald, 1996). The emergence of sustainability as a broad concept could be used to enact global change when dealing with issues of resource consumption, economic development and social inequality emerged from the landmark report by the WCED's document entitled "Our Common Future." The WCED also referred to as the Bruntland Commission, defined sustainable development as "...development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p.354). Although this vague definition lacks operational criteria as to the specifics of what sustainable development is, it is viewed as the true definition of sustainable development, with its application being open for interpretation (Jepsom, 2004). Building on the foundation set by the Bruntland Commission, academics have utilized these perspectives in their application to planning contexts. Beatley and Manning state sustainability and its principles of equity are not solely related to resource distribution, but are components of maintaining quality of life, community participation and representative decision

making (Nasser, 2003). The idea of sustainability as a method of intergenerational equity which determines the state of future generation's natural capital (Macdonald 1996, Berke and Conroy, 2000) is an important dynamic in viewing sustainability as a holistic paradigm. Berke and Conroy describe sustainable development as a balance amongst environmental, economic and equity concerns, connecting local issues to the global context, describing the process of accomplishing sustainability as dynamic (Berke and Conroy, 2000). Environmental consideration, specifically in the urban context has traditionally been managed through the regulation of emissions and quality of water, air and soils in a fashion which limits economic activity of industries like transportation and manufacturing (Simenova and van der Valk, 2009). When applying sustainable development to urban contexts, holistic principles have been emergent for many years. Although contemporary foundations of sustainable development were established by the Bruntland Commission in 1987, early planning theorists influenced holistic concepts of environmental, social and economic preservation many years earlier. Patrick Geddes was instrumental in offering "a philosophical and practical understanding of the totality of modern city life in all its complexity" (Mellor, 1980, p.203).

Despite the belief sustainable development offers positive ideas to global challenges, the definition offers little direction on agreement of how to apply the concept of sustainability (Berke and Conroy, 2000). This problem translates to its application in planning contexts as there is little evidence of how sustainability principles have been applied to planning documents, or how well plans incorporate

sustainable development in practice (Berke and Conroy, 2000). Some have described sustainability as a catchphrase due to its lack of clarity, specifically around the changing ideas of what is defined as sustainable (Nasser, 2003). In addition to examining the preliminary questions of implementing sustainable development, such as “should we” or “can we”, people are questioning the method of applying these concepts (Chifos, 2007). A succinct summary of the issue is provided by Godschalk:

*“Like acrobats without a net, land use planners are working on the frontiers of sustainability and livability practice without benefit of a profession wide consensus on standards and methods.” --Godschalk, 2004, p.5*

According to Friedmann, principles of sustainable development are similar to good planning processes, specifically, their interventions are most effective at the local or regional level (Jepsom, 2001). This sentiment is shared by Godschalk who says land use planning is one of the most important professional environments where issues related to sustainable development arise (2004). White describes planning as the profession most closely related to sustainable development in theory and in practice (in Jepsom, 2004, Chifos, 2007, Berke and Conroy, 2000).

Planning has traditionally managed environmental issues on the criteria of specific physical aspects such as forests, water, sensitive habitats, agricultural land and designation of locations where industrial, commercial, or residential developments can occur (MacDonald, 1996). The consideration by planners of these issues leads many to

believe planning has traditionally considered the pillars of sustainable development in practice before this new paradigm was created, with planners stating sustainable development is synonymous with good planning (MacDonald, 1996).

Perhaps the greatest asset of planners in relation to sustainable development is the ability to work in a holistic manner outside the clearly defined boundaries of some professional environments. This can be especially useful when dealing with interdisciplinary, multi-jurisdictional issues inherently associated with sustainable development. Planners have the potential to help not only in implementing sustainable development initiatives, but more importantly have political and community influence to develop governance models that help the publics to understand and participate in the complexities and global context of sustainable development(Wheeler, 2011). The context and tools in which planners are involved makes them good candidates for implementing sustainability principles that are especially relevant in urban environments, where highly concentrated populations and consumptive processes can create economic instability, social inequality and environmental degradation (Jepsom, 2001).

A final component linking the relationship of planning and sustainable development is the ability to engage with communities in meaningful interaction which can facilitate sustainable development processes. Beatley says planning and sustainable development are bound by principle and they understand the symbiotic relationship of human well-being and ecological preservation (2003). This understanding sets the

foundation for collaborative processes by planners, to ensure when sustainable development initiatives are being undertaken, they are in collaboration with the communities that are involved (Jepsom, 2004).

Sustainable development has been incorporated into emerging design principles that have influenced community and regional implementation of sustainable development. Individual projects have the ability to progress sustainable development; improve residential quality of life, lower transportation costs, lower traffic volume and their associated emissions while creating neighbourhoods of mixed income (Saha and Peterson, 2008). Jan Gehl said good environments provide the opportunity to expand human possibility (Gehl, 1987). This is not to say built form directly influences quality of environments, but planners and architects can use physical structures and their placement to influence how people experience built environments, even promoting new perspectives (Wheeler, 2011). Similar to the understanding that expanding or building new roads leads to increased traffic volume, the same is noticed with people, where welcoming and enjoyable urban spaces generate greater involvement in outdoor activities such as walking (Gehl, 1987) and cycling.

With the rising consciousness in regards to environmental preservation, sustainable development has emerged as an adaptable paradigm with potential for local, national and global influence. The creation of the Bruntland definition of sustainable development led to the creation of an interdisciplinary paradigm that sought to apply holistic perspectives when considering growth, development and action in

general. The emergence of a perspective requiring ecological, economic and social equity be considered with equal weight was viewed as a way forward in addressing increasingly complex global issues such as climate change and globalization. Sustainable development has the potential to emerge as an overarching ideology for professions like planning, where social dynamics, ecological consideration and economic viability define the scope and feasibility of their work.

Sustainable development presents criteria which validates and advocates for ecological preservation and social equity on equal footing with economic interests. This paradigm has become increasingly useful in planning and policy making in general. The creation of the *Our Winnipeg* development plan envisions Winnipeg's evolution into a more sustainable city. The principles of sustainable development along with a development plan encouraging sustainable development in Winnipeg creates a supportive policy environment, providing diverse transportation options which have the potential to contribute to the further support of the cycling network in Winnipeg.

## **2.2 The Role of Cycling Infrastructure**

Cycling specific infrastructure seems to be one of the most commonly discussed factors which influences bicycle ridership in cities. Whether developing adequate bicycle paths, lanes, boulevards, modified traffic signals, traffic calming techniques or adequate signage, building bicycle specific facilities is viewed by many as necessity if a city is going to improve its cycling environment. In *Bridging the Gap* (2005), Mia Birk and Roger Geller advocate the importance of having a high quality and connected

bicycle network. Their study reports on the significant increase in bicycle ridership in the city of Portland, Oregon following an overhaul of the city's bike network saw increases in the amount of bike paths in the city by 210% (Birk Geller, 2005). One of the challenges in trying to advocate for the development of bike specific infrastructure is a lack of data which illustrates a need or demand for new bike facilities, especially in comparison to sophisticated traffic data used by the automotive industries when assessing demand for new roads and bridges (Birk and Geller, 2005). In Portland, conducting bicycle counts has been a useful tool in providing bicycle ridership data and is an effective bargaining tool in rationalizing the expenditures required to build new facilities (Birk and Geller, 2005). The authors found upgrades in Portland seemed to target physical barriers such as bridge crossings, which can be "choke points" between cyclists and motorists. These upgrades were often part of roadway improvements (Birk and Geller, 2005) making for more efficient and cost effective infrastructure upgrades. Another important attribute of Portland's bicycle network is their insistence on developing high quality infrastructure (Birk and Geller, 2005). The improvements made in Portland over a 13 year period focused special attention on making bridges easily passable by bike and resulted in increasing ridership by 213% (Birk and Geller, 2005). The attention to traffic counts and identifying the four primary bridges in Portland as being essential in connecting the city's bicycle network illustrates how Portland's integrated approach has helped them progress as a cycling city. Portland also has a number of other existing factors which encourage bike travel such a grid street pattern and a mixed use approach to land development (2005). In closing, the authors stress

the importance of providing abundant, connected and well thought-out bicycle infrastructure as ways to increase bicycle ridership in urban environments.

In *The impact of bicycle facilities on commute mode share* (Cleaveland and Douma, 2008) the authors build on an existing research methodology developed by Barnes, Thompson and Krizek, who studied the impacts of increased bicycle infrastructure in Minneapolis and St. Paul, Minnesota throughout the 1990's. By applying the research techniques developed by Barnes et al. to other American cities, the intention of this research paper is to determine whether increases in cyclist mode share in the Twin cities, was the result of cycling infrastructure increases, or the result of other outside factors. This study examines the "contextual factors" (Cleaveland and Douma, 2008, p.1) which can influence bicycle ridership, and how the presence of certain factors can lead to larger increases in bicycle ridership despite similar changes to infrastructure in comparable cities. The authors are trying to find whether there is a causal relationship between development of new bike facilities and the development of a more prominent and vibrant cycling cultures (2008). It seems this article is attempting to understand whether built facilities can foster a change in behaviour leading to more supportive cycling cultures, trying to empirically prove cycling success in urban environments requires more than physical manipulations of streets, pathways and bridges. The use of the research methodology of Barnes et al. was applied to six other cities, identified as bike able communities by *Bicycling Magazine*. The cities chosen were Austin, Texas; Chicago, Illinois; Colorado Springs, Colorado; Madison, Wisconsin



and Orlando, Florida (Cleaveland and Douma, 2008). Data was collected from the cities listed above where statistical and qualitative analysis was conducted. Findings indicated construction of new bicycle infrastructure did not always produce increases in bicycle ridership (Cleaveland and Douma, 2008). In Chicago infrastructure expansion and a supportive political environment showed how an integrated approach resulted in higher ridership (Cleaveland and Douma, 2008). In cities such as Colorado Springs and Madison, where established cycling cultures exists, changes to infrastructure did not produce significant changes to mode share (Cleaveland and Douma, 2008). In Orlando, implementation of a number of new bicycle facilities did not result in the increase of bicycle ridership that was hoped for. This has been attributed to a lack of cycling advocates / political support and poorly placed facilities that are not inclusive or representative of the needs of commuter cyclists in Orlando (Cleaveland and Douma, 2008). The authors conclude their article with three main points:

- Cities such as Chicago and Austin, who used commonly travelled roads and routes to connect outskirt areas to the downtown and employment centres, were most effective in seeing the benefits of new bicycle infrastructure.
- Connectivity of bicycle networks is essential in creating an efficient transportation system.
- Communication with the public is very important, and informing users of their options is essential to attain increases in bicycle ridership.

This builds on the success experienced in Chicago, where a combination of new infrastructure, public education, political support and passionate advocates was most effective in increasing bicycle mode share in a large city (Cleaveland and Douma, 2008).

Pucher, Dill and Handy (2010) conducted an in depth, international review of infrastructure and its ability to influence cycling ridership reported in their article *Infrastructure, programs and policies to increase bicycling: An international review*. They provide a synopsis of case studies about progressive cycling cities. The authors conduct in depth analysis of physical techniques used to promote cycling such as bike lanes, paths, parking, transit integration, while acknowledging the importance of policies and political support in getting more people on their bikes. Building on the idea that creating an appealing and efficient cycling environment requires more than physical infrastructure, the author's research also addresses barriers and incentives to cycling. Despite the perception by many that cycling is unsafe, research suggests health benefits associated with regular cycling more than offset the actual risks of riding a bicycle on city streets (Pucher, Dill and Handy, 2010). Much of the literature reviewed by Pucher, Dill and Handy suggests that due to the real health benefits of cycling, many governments and institutions are actively endorsing cycling as a way to promote active lifestyles, as well as a means to offset the negative health effects which can result from the emissions of widespread automobile use (Pucher, Dill and Handy, 2010). Research also suggests successful cycling environments often require abundant and connected infrastructure in conjunction with supportive policy and political leadership (Pucher, Dill

and Handy, 2010). The importance of an integrated approach to increasing bicycle ridership through policy, physical infrastructure and land use planning techniques such as higher density / grid style development is emerging as a primary theme in the literature thus far. Although policy is very important in supporting funding and building of new infrastructure, the type and quality of bicycle facilities is important too. Studies have shown cyclists prefer to be separated from traffic, either by the use of cycle tracks or off-street pathways (Pucher, Dill and Handy, 2010). One area often overlooked is the importance of quality bike parking. Workplaces that offer secure bike parking have noted real increases in employees who ride to work (Pucher, Dill and Handy, 2010). Bicycle parking is also an important tool which can be used to create more integrated transit systems. Providing abundant bicycle parking at train stations in Europe and Japan has resulted in symbiotic benefits for both transit and bicycle use (Pucher, Dill and Handy, 2010). In addition to infrastructure and policy, public events which endorse active transportation such as Ciclovía's are effective at raising awareness and support for bicycle use (Pucher, Dill and Handy, 2010). Bike sharing programs have also been found to increase ridership significantly in European cities (Pucher, Dill and Handy, 2010) and are becoming increasingly popular in many North American cities. A final point made by Pucher, Dill and Handy is creating a supportive cycling environment is possible, but it takes time. Berlin, Germany and Portland, Oregon are examples of cities where significant increases in bicycle ridership and large reductions in cyclist vehicle collisions have occurred, (Pucher, Dill and Handy, 2010) but these transformations required integrated approaches of infrastructure expansion, supportive planning policy and

effective public education over 10 to 30 years. As with many planning initiatives, accepting long time horizons while implementing continuous short term action is key.

### **2.3 Examples from Abroad**

The use of case studies and review of best practices is surely one of the most effective methods in understanding planning initiatives. Although the findings of case studies are highly subjective, they offer real world examples of successes and failure. In Pucher and Buehler's article *Cycling trends and policies in Canadian cities* (2005) a comprehensive review of cycling policy is established. The study focuses on six Canadian cities including Victoria, Vancouver, Ottawa, Toronto, Quebec City and Montreal. The primary challenge to cycling in many large Canadian cities has been the explosion of low density sprawling development (Pucher and Buehler, 2005). Not only do low density environments provide for longer trip distances believed to deter cycling, a higher volume of cycling infrastructure is required to serve these developments, stretching the already meagre budgets allocated for cycling and active transportation infrastructure (Pucher and Buehler, 2005). As a result of Canada ratifying the Kyoto Accord in 2002, cycling was widely viewed as an effective tool for reducing emissions, contributing to the reductions required by the accord (Pucher and Buehler, 2005). Urban transportation policy in Canada is managed at a provincial and local level, which can result in significant disparity between cycling network success in Canada (Pucher and Buehler, 2005). Despite the prevalence of sprawl, Pucher and Buehler list over one quarter of trips made by Canadians in urban centres is less than two miles (2005) which

can facilitate bicycle use. Research findings show Canadian provinces have significantly different rates of cycling, with the highest participation rates being in British Columbia and the Yukon Territory (Pucher and Buehler, 2005). It is encouraging to see such high proportions of cyclists in a cold weather environment such as the Yukon.

An aspect which seems influential of Canadian cycling infrastructure and programming is which government jurisdiction allocates funding and resources to project development. With little federal involvement in cycling related infrastructure, the quality of cycling facilities lies with provincial and municipal governments (Pucher and Buehler, 2005). This has resulted in the emergence of provinces such as Quebec who have developed progressive programs and infrastructure networks leading to higher degrees of ridership in their province (Pucher and Buehler, 2005). Examples of Quebec's commitment to encouraging bicycle use include the development of an official bicycle policy aiming to "increase bicycles for transport, while improving cycling safety" (Pucher and Buehler, 2005, p.8). This policy requires the consideration of the needs of cyclists in all new infrastructure projects in the province (Pucher and Buehler, 2005). Quebec's cycling network totals 7,000 kilometres of pathways, with cities like Montreal having 210 kilometres of separated bikeways (Pucher and Buehler, 2005). Ridership has increased 50% from 1987 to 2000 in Quebec whereas the incidence of serious injuries while cycling has decreased by 56% (Pucher and Buehler, 2005). In addition to political support, there are other stewardship groups and promoters in Quebec that contribute to making Quebec a cycling hotspot. Velo Quebec, a partially subsidized private

company organizes numerous bike rides and races in Quebec for all ages and abilities (Pucher and Buehler, 2005) and is another example of how strong the emerging cycling culture in Quebec is becoming. In Ontario, both Ottawa and Toronto have implemented supportive bike policies in recent years. The focus in Ontario seems to be on improving safety through educational programs and regular traffic enforcement (Pucher and Buehler, 2005). Toronto has also emerged as the city with the most bike parking in North America as well as developing zoning regulations that require new buildings to accommodate shower facilities and bike parking, to provide amenities required to make cycling to work easier (Pucher and Buehler, 2005). Toronto also provides “Bike Friendly Business Awards” (Pucher and Buehler, 2005) as a way of recognizing and encouraging a positive corporate image of companies who are accommodating the needs of cyclists.

In British Columbia, the proportion of those who ride bikes is significantly higher than both Ontario and Quebec, which has been attributed to their temperate climates (Pucher and Buehler, 2005). An interesting finding when studying both Victoria and Vancouver is despite the ongoing expansion of their bicycle networks, they do not have nearly as much bike specific infrastructure as Ontario or Quebec (Pucher and Buehler, 2005). This is particularly interesting and makes the argument infrastructure projects are not the most effective way for municipalities to spend their dollars when trying to increase bicycle ridership in their city. Victoria has consistently demonstrated the highest percentage of work trips by bike of any large Canadian city (Pucher and Buehler, 2005). Approaches to promoting cycling in BC have been the development of

educational programs for kids such as *Can Bike* and Victoria's *Bike Smart*, which inform people of proper and safe bicycle etiquette (Pucher and Buehler, 2005). Another approach to promoting cycling in the Victoria area is the development of regional pathway systems. The Galloping Goose trail in Victoria is a regional bicycle pathway, successfully connecting a number of communities on Vancouver Island. Victoria's regional bicycle network seems to be an effective approach to earning the higher ridership they demonstrate.

In conclusion despite Canada's progress the number one barrier to increasing Canada's cycling capacity is sprawling suburban development which extends trip distances and raises the costs of infrastructure required to service them (Pucher and Buehler 2005). The authors recommend progressive land use planning is needed to promote compact mixed-use development as the way forward (2005).

In *A Longitudinal analysis of the effect of bicycle facilities on commute mode share* (2005), Barnes, Thompson and Krizek explore how the implementation of new bicycle infrastructure in the 1990's changed bicycle ridership in the Minneapolis / St. Paul region of Minnesota. The study takes a before and after approach, with special attention to the influences that resulted in the location and type of facility implemented. The study tries to assess whether new facilities play a causal role in the increase of bicycle ridership (Barnes, Thompson and Krizek, 2005). This study capitalizes on an opportunity presented by the US census which counted commuter cyclists in both 1990 and 2000. Their study found the increases in bicycle infrastructure in the twin

cities area focused on the University of Minnesota campus and did not necessarily facilitate increases in mode share for cyclists as a whole in the twin cities (Barnes, Thompson and Krizek, 2005). Perhaps due to where the new infrastructure was implemented, the city of Minneapolis hadn't experienced significant increases in ridership in the 1990's (Barnes, Thompson and Krizek, 2005). The authors conducted analysis focused on how mode share was influenced within a distance or "buffer" from new or existing bicycle facilities. Census counts did show within a certain buffer zone of bike facilities, there were fairly substantial increases in ridership, especially downtown, but increases in ridership were less where counts were taken farther away from bicycle infrastructure (Barnes, Thompson and Krizek, 2005). The study mentioned upgrades to a bridge crossing the Mississippi river, resulted in far more people saying they would consider crossing the bridge by bike (Barnes, Thompson and Krizek, 2005). This was also a common finding in Portland where upgrades making bridges safer for cyclists were particularly effective at reducing choke points that cause apprehension when considering cycling as a viable transportation option. In conclusion the authors did find the addition of new bike infrastructure did result in more people riding bikes in the Twin Cities, with significant increases in the downtown regions of Minneapolis and trips crossing the Mississippi river (Barnes, Thompson and Krizek, 2005).

In *Making cycling and walking safer: Lessons from Europe*, Pucher and Dijstra (2000) conduct an in depth review of successful European cycling policies and programs. The Netherlands and Germany have long been recognized as being at the forefront of



planning cities which are more supportive of non-motorized transportation. By using urban design guidelines and implementing policies that restrict automobile use, cyclist fatalities per 1 billion kilometres ridden in Germany and the Netherlands are 75% less than in the United States (Pucher and Dijstra, 2000). The bicycle is a highly efficient form of transportation, producing virtually no emissions and offering their riders a low impact, cardiovascular form of exercise (Pucher and Dijstra, 2000). Although improvements in funding and new infrastructure have increased in the United States, low density sprawling development continues to do more to discourage cycling than promote it (Pucher and Dijstra, 2000). Long trips created by low density housing and building patterns in the United States are viewed as the largest barrier to making cycling appealing to the masses, with the other North American country of Canada producing twice as many non-motorized trips than the U.S. (Pucher and Dijstra, 2000). When making comparisons to the leaders in national cycling trips, over 40% of trips in Denmark and the Netherlands are by non-motorized modes (Pucher and Dijstra, 2000). A factor in contributing to less car-dependence in Germany and the Netherlands is their dense urban form (Pucher and Dijstra, 2000). Urban sprawl is attributed to be one of the root causes of low cycling and walking mode splits in North America. Although many Canadian and US cities have far lower urban density than their European counterparts, almost half of all trips taken by families in these lower density cities are shorter than three miles (Pucher and Dijstra, 2000).

Pucher and Dijstra (2000) list several common barriers which could contribute to lower cycling rates in North America including: the low cost of car ownership, the relative ease of obtaining a driver's license, the cultural ties to the car, and the perceived fear of riding a bicycle in traffic.

The age range of cyclists can be a useful indicator of a healthy cycling environment. In the US cycling is most common among younger age groups, whereas in the Netherlands it was found one quarter of all trips made by older adults were by bicycle (Pucher and Dijstra, 2000). As Pucher and Dijstra mention, cycling in the US is viewed primarily as a recreational activity and not as a viable mode of transportation. This is supported by statistics which found fatal collisions with cyclists are three times more likely in the U.S than in Germany and the Netherlands (Pucher and Dijstra, 2000). In the US there has been a decline in children who cycle, which is attributed to parents' aversion to cycling, as they feel cycling to school is dangerous (Pucher and Dijstra, 2000). This is particularly challenging as children who don't experience bike riding will carry their apprehension of cycling throughout their lifetime.

Infrastructure implemented in European cities tends to be more pedestrian and cyclist oriented when compared to the U.S. Some interventions used in Germany and in the Netherlands include separated bike paths, modified intersections with cycling specific signals and the development of car free pedestrian zones (Pucher and Dijstra, 2000). Bike path networks in Europe place heavy emphasis on connectivity, with destinations in urban and rural settings being serviced by quality bike lanes and paths

(Pucher and Dijstra, 2000). The built form in these countries also facilitates walking and cycling by placing buildings close to the street, shortening distances from roadways and improving access to amenities (Pucher and Dijstra, 2000).

One final strategy used in Europe to support non-motorized transportation is the use of restrictions or disincentives to automobile use. These can include lower speed limits in residential areas, less availability of parking spaces, more time and cost intensive processes to obtain a driver's license and traffic regulations placing motorists responsible for the majority of collisions with pedestrians or cyclists (Pucher and Dijstra, 2000).

Pucher and Dijstra provide the following six key lessons that can be learned from European cities in making cycling more popular in the U.S. and Canada.

- Support on-going improvements to cycling infrastructure
- Implement urban design principles which prioritize people
- Work towards calming traffic in residential areas
- Promote the further education of drivers
- Develop disincentives which restrict automobile use and
- Advocate for more stringent enforcement of traffic laws (2000)

Despite these recommendations, any policy limiting automobile use may be challenging in what is widely accepted as a car culture here in North America.

## 2.4 Fostering a Cycling Culture

In *Making Transit Fun: How to entice motorists from their cars and onto their feet, a bike or bus*, Darrin Nordahl explores the idea that in order for transit to be effective, it needs to be fun. Nordahl quotes the former Mayor of Bogota, Enrique Penalosa, as saying “transportation is not an end—it is a means to having a better life, a more enjoyable life” (Nordahl, 2012, p. 1). Transportation is a major aspect of our lives, and the methods we choose to move about will undoubtedly influence our quality of life. Nordahl describes the joy of riding a bicycle, walking, or bussing, that one does not experience while driving a car (2012). In many cities, alternative transportation methods are the most efficient, cost effective and enjoyable ways to travel, yet car use remains entrenched in many cultures. Nordahl says a way to change people’s transportation behavior is by communicating the joy of using active modes such as cycling. The first chapter of this book describes our current transportation habits and the changes that need to be made as a “mission impossible” (Nordahl, 2012, p.2). Nordahl says having transportation systems which are nice to look at and comfortable to use are the best ways to make people change their ways. By incorporating influences from a number of professions such as architects, designers, musicians, artists and planners, there is an opportunity to create far more appealing transportation alternatives to the car (Nordahl, 2012). Although this argument may not carry weight with some, Nordahl’s assertion automobile use is a non-rational way to get around, may be more effective. Statistics show transit is safer in terms of collisions, requires some

level of physical activity to use and it costs far less than personal automobile use (Nordahl, 2012). A columnist at the New Yorker, David Owen, is cited as saying Americans will make a tremendous amount of concessions in their lives in order to own, operate and maintain their cars (Nordahl, 2012). Owen says the key to changing attitudes around transportation modes is to exploit the illogical nature of the automobile and make inefficient car use very inconvenient, especially in cities (Nordahl, 2012). Owen gives numerous examples of cities like New York, whose subway system's success is largely attributed to the madness associated with driving in New York City. Another example is the recent barrage of stop light installations and low speed limits in Zurich that deter motor vehicle use in urban centres (Nordahl, 2012). Changing travel behavior through policy and infrastructure implementation has been effective in many cities. The continuing challenge lies in implementing these policies in car centric communities (Nordahl, 2012). Despite the challenges in changing these norms, Nordahl returns to his theory that emotions are stronger than reason and fun and enjoyment have underappreciated value in influencing transportation mode choices. Nordahl refers to the popular web site "thefuntheory.com", which examines whether a sense of fun is an effective way to influence people's behavior in positive ways (Nordahl, 2012). The site shows video of people using trash bins far more frequently, if the bins have funny sound effects when garbage is deposited (Nordahl, 2012). The fun theory is an idea which could be very powerful in influencing more sustainable and healthy mode choices. These clever marketing techniques have been used by the auto industry for years and it is no surprise the fun theory's origin can be traced back to car company

Volkswagen (Nordahl, 2012). More specifically Nordahl talks of how car companies advertise the joy of using their products. The typical transit description usually focuses on convenience, cost efficiency or greenhouse gas reductions with fun nowhere in sight. Perhaps Nordahl is on to a key motivator for successful behaviour change campaigns, using fun to get people out of their cars and onto bikes, buses and their feet.

## **2.5 Contemporary Transportation Systems and the Bicycle**

The article *Transportation and the new generation: why young people are driving less and what it means for transportation policy* takes a contemporary look at the changing transportation patterns of generation Y, with the hope of developing transportation policy reflective of changing technology, values and pricing (Davis, Dutzik and Baxandall, 2012). From 2001-2009, peoples aged 16-34 in the U.S. have decreased their vehicle miles travelled by 23% (Davis, Dutzik and Baxandall, 2012). The overall reduction in miles travelled indicates a reduction in demand, which is a promising trend for planners, policy makers and environmental advocates. This decrease could be explained by this generation's propensity towards higher density living as they transition from their parent's typically suburban households (Davis, Dutzik and Baxandall, 2012). The choices made by young people to live in centrally located, higher density environments require a different type of transportation system. Public or alternative transportation systems are better equipped to serve the demands of this demographic (Davis, Dutzik and Baxandall, 2012). In addition to lifestyle changes, more challenging protocol to attain a driver's license is contributing to young people driving less (Davis,

Dutzik and Baxandall, 2012). Rising costs associated with car ownership and operation is also influencing transportation choice. Research shows significant increases in fuel costs with an average annual fuel budget of \$1100 in 2001, costing more than \$2300 in 2009 (Davis, Dutzik and Baxandall, 2012). Decreases in car ownership and operation by young people are not just a cost issue. There are many young people in higher income brackets choosing not to drive (Davis, Dutzik and Baxandall, 2012). The authors make a strong case that current transportation policies and initiatives do not reflect the changing demands of transportation systems in the U.S. (Davis, Dutzik and Baxandall, 2012). The idea automobiles are the ticket to freedom no longer applies. The efforts and funds previously used to build and maintain massive projects such as the interstate highway system will need to be adapted to meet changing demands (Davis, Dutzik and Baxandall, 2012). The decrease in vehicle miles travelled among young people is not only an American phenomenon (Davis, Dutzik and Baxandall, 2012). Young people around the globe are practicing more sustainable transportation habits, which could suggest a paradigm shift, with young people putting conservation values into practice. The overall decrease in vehicle miles travelled could also reflect changes in communication technology that results from many people communicating via social media, Skype and other mediums which don't require face-to-face interaction (Davis, Dutzik and Baxandall, 2012). In addition to reducing miles travelled, mobile technology such as smart phone apps make using public transit and bike sharing easier (Davis, Dutzik and Baxandall, 2012). The widespread use of cell phones by the younger demographic has been suggested as an influence for young people driving less. Strict

restrictions on talking and texting while driving are contributing to people choosing modes where their communication habits won't be restricted, such as transit (Davis, Dutzik and Baxandall, 2012).

Todd Littman presents findings from an extensive cost benefit analysis of non-motorized transportation options in his report *Evaluating Non-motorized transportation benefits and costs* (2011). This author takes an innovative approach in advocating for non-motorized transportation options by identifying their undervalued societal benefits (Littman, 2011). The proportion of non-motorized transportation trips is highly underreported due to the shorter trip distances routinely overlooked when researchers use survey instruments to generate transportation data (Littman, 2011). This underrepresentation downplays the positive impacts and value non-motorized transportation has. Littman claims 20% of trips made are by non-motorized means with many motorized trips requiring an active transportation component (2011). The underrepresentation of non-motorized modes also fails to acknowledge the accessible nature of non-motorized transport due to its affordability (Littman, 2011). Perhaps the greatest strength identified by Littman is non-motorized transportation is a highly accessible mode of transportation, yet its evaluation scores low on many transportation efficiency scales because of the manner in which transportation systems are measured. Mobility refers to the number of people moved, and the distance they cover (Littman, 2011). Accessibility refers to a person's ability to reach and use a given service or amenity (Littman, 2011). Because most transportation systems are measured on a



mobility continuum they are viewed as superior forms of transportation, yet Littman says the ultimate goal of all transportation systems should be accessibility (2011). By shedding light on how transportation systems are evaluated, Littman has exposed an opportunity for researchers to better represent the value of non-motorized transportation, which can potentially result in greater accounted value and increased support of non-motorized transportation systems.

In a presentation by the head of Copenhagen's bicycle program entitled *The Stick, the Carrot and the Tambourine*, Andreas Rohl explains a pragmatic approach has led to Copenhagen becoming recognized as the most bike friendly city in the world. In Penticton B.C. on May 31, 2012, Rohl explained one of the most important components of their success is although people in Copenhagen ride bikes with regularity, they do not regard themselves as "cyclists" (Rohl, 2012). With a population of approximately 600 000 people and a metro area of 1.5 million, Copenhagen is comparable in size to Vancouver, with the population being largely middle class (Rohl, 2012). Despite common arguments that cycling can't work in cold weather cities (such as Winnipeg), Copenhagen has cold, snowy and wet winters yet bicycle ridership level remains very high. Remarkably the bicycle accounts for the highest percentage mode share at 36%, compared to 28% for public transit and 29% for the personal automobile (Rohl, 2012). Cycling has become ingrained in the Danish culture, with voters and taxpayers being supportive of increases in funding for bicycle related infrastructure and programming (Rohl, 2012). Cycling infrastructure in Copenhagen is highly used, with some streets in

the City seeing 30,000 cyclists per day (Rohl, 2012). In total, 32% of all trips in Copenhagen are by bicycle (Rohl, 2012). Two interesting characteristics which seem contrary to the cycling culture of Copenhagen are the average commute distances and car ownership levels. The average one-way bicycle commute in Copenhagen is 5km (Rohl, 2012), which if applied to many North American cities would provide access to a large proportion of the city. Despite the popularity of cycling in Copenhagen car ownership is on the rise, and is a common form of secondary transportation (Rohl, 2012).

In Copenhagen cycling specific infrastructure such as dedicated lanes were first installed in the 1980's, with improvements to cycling networks working out to \$25 per person, per year (Rohl, 2012). The city is continuously maintaining their cycling infrastructure and has recently begun widening certain cycle lanes to facilitate the use of cargo bikes as they increase in popularity (Rohl 2012). Perhaps one of the greatest successes of Copenhagen's marketing of cycling as an efficient mode of transportation is their ability to evaluate cycling on a total cost basis. Research conducted by the City of Copenhagen calculated for every kilometer driven in a car, there is a net cost to the people of Copenhagen of 16 cents, while for every kilometer traveled by bike results in a 22 cent saving (Rohl, 2012). This measure uses full cost accounting to explain how lower infrastructure cost and health benefits associated with cycling can have large social benefits for a city. By positioning cycling as cost efficient, people are more supportive of this mode of transport and investment in the system. Cycling has become such an

integrated mod, developers often use connectivity to bike routes and bicycle facilities on site as selling features (Rohl, 2012). Rohl also described what he says is a key difference between North American and European approaches to cycling. He described the approach to encouraging cycling in North America as militant, implying incentives focus on doing good for the environment and that people should cycle. The European model referred to as 'civil cycling', describes how convenient cycling is for the individual traveller. This seems far more effective, as people are more responsive to a campaign encouraging a mode of transportation for its personal benefits rather than making people feel guilty or pressured to ride bikes as a way of saving the planet. In Copenhagen, 58% of people who cycle indicate they do so because cycling is quick, while 21% say it is good exercise, 12% say it is cheap, and only 1% say they choose to cycle for its positive environmental impacts (Rohl, 2012). Regulators and planners take advantage of the importance of convenience by supporting cycling through synchronization of lights to average cycling speeds (25 km/h), providing separate bike lanes from traffic, integrating cycling with transit buses, requiring ample bike parking with new development and generally providing easy access to destination by bike (Rohl, 2012). Recent innovations in Copenhagen's cycling network include developing special routes wide enough for two bicycles to travel in one direction, in hopes of creating "conversational" cycling environments that encourage social interaction and community building which occur on public transit or in car pools (Rohl, 2012). Regulations, or sticks, are also an important factor in the success of Copenhagen's cycling network. Very expensive parking charges in urban areas at peak times are used to deter people from

driving cars in central urban locations (Rohl, 2012). Rohl outlined the essential criteria needed to develop a successful cycling environment. One requirement is users of cycling infrastructure must feel safe. If cycling is not perceived as safe there will be a reluctance to participate. Second is the development of a cycling network is not a goal or project that can be completed, but a continual means to achieve a more sustainable, convenient transportation system. In other words, it must be continually improved upon for it to function well. In closing, Rohl outlined the following three pillars to success:

- 1.) “Do not think of the elephant”: Safety talks seem to dominate the North American discourse around cycling. The way to address safety is by building good quality infrastructure and developing supportive policies which get more people riding. The more people on bikes the safer cycling becomes (Rohl, 2012).
- 2.) “Go all the way A-B, even if it hurts”: A –B implies destinations are connected by complete and quality infrastructure. An integrated, high quality network is essential for success and it must occur even if it costs more. Developing lower quality infrastructure or facilities that are poorly maintained won’t encourage people to ride. If short cuts are taken and lower quality networks are developed it will be money poorly spent (Rohl, 2012).

3.) “Market it”: In order for cycling to be a successful mode, people need to know what exists, how to use it and what are the benefits (Rohl, 2012).

Copenhagen has developed public awareness campaigns portraying cycling as cool and fun and distributes informational material to individual households to encourage people to ride.

## **2.6 Summary**

The findings from the literature reviewed were organized into four primary themes:

- the role of infrastructure in bicycle planning
- examples from abroad
- fostering a cycling culture
- contemporary transportation systems and the bicycle

These four themes inform the approach used in the methodologies employed in the research undertaken.

The use of ethnography and visual analysis were in response to findings in the literature that cycling infrastructure must be connected and of high quality to be effective. The ethnographic and visual analysis methodologies were chosen for their ability to qualitatively analyze the cycling networks in Minneapolis and Winnipeg, with the specific intention of understanding what features of cycling infrastructure contribute

to the most effective and inclusive cycling experience. In Chapter 4, recommendations two, four, five and six call for improved quality and connectivity of cycling facilities.

Key informant interviews were used to foster open dialogue with planners, politicians and advocates to better understand the interdisciplinary nature of designing and implementing cycling infrastructure. These interviews paint a picture of the specific contexts in which the cycling networks in Winnipeg and Minneapolis exist. By interviewing a cross section of participants from political, professional and advocacy backgrounds, a holistic understanding of the cycling networks in the research areas was achieved. Key informant interview data was instrumental in developing recommendations one, three and seven which emphasize the importance of an integrated approach to cycling infrastructure development.

The third key theme identified in the literature states transportation behavior is evolving and a more complete evaluation of the costs and benefits of transportation modes must occur. One of the greatest challenges in the development of cycling infrastructure is achieving support from citizens and politicians to endorse transportation systems other than those catering to personal automobile use. Throughout this research process, numerous interview participants stressed the importance of establishing linkages between active transportation modes and their positive health effects. Making the case that supporting active transportation is an effective way to increase public health and reduce chronic disease was identified as the

greatest opportunity for increasing the support of cycling as a transportation mode.

This theme has informed the eighth recommendation provided in this study.

After reviewing the literature, it became apparent there was little research examining cycling infrastructure in winter cities. Research on winter cycling, particularly in North America appeared to be missing from the research materials I encountered. In addition to winter cycling, the use of experiential, qualitative research methods such as ethnography to understand design characteristics of cycling infrastructure was also found to be an area yet to be addressed. By identifying these gaps within the research, I feel this practicum contributes new knowledge to the field of active transportation planning.

### **Chapter 3: Research Methods and Findings**

This study has assumed that improving sections and features of Winnipeg's cycling network, offers the potential for increases in bicycle ridership and the subsequent benefits associated with cycling in Winnipeg. This research followed a general progression of reviewing the literature, conducting field research, conducting interviews, generating visual data and completing the analysis. The literature review was the initial research method employed in this study providing a theoretical foundation in sustainable development and active transportation planning. The literature review was divided into the four general themes of; the role of infrastructure, examples from other cycling cities, how to foster a cycling culture and the contemporary approaches to active transportation planning. Three research methods were used to better understand the specific contexts in which planning for bicycle occurs in Minneapolis and Winnipeg. This research sought to understand opinions, perceptions and conditions of planners, politicians and cycling advocates in Minneapolis and Winnipeg, with the intention of communicating further development of specific considerations in regards to cycling infrastructure is required in Winnipeg to make cycling a successful year round form of transportation. .

The majority of this research was conducted in the Winnipeg, Manitoba given the focus of this study is on improving Winnipeg's cycling network. While developing a research proposal for this project, the search began for a city comparable to Winnipeg in climate, geography and population that has successfully accommodated cycling as a



year round transportation alternative. This led to the discovery *Bicycling Magazine* had voted Minneapolis, Minnesota as the most bike-friendly city in the U.S. (Bicycling, 2010). Once deciding on Minneapolis as a fitting precedent for comparison, a research trip to Minneapolis was conducted in February of 2013, where I investigated the City by bike, in an attempt to understand firsthand, the intricacies of their cycling network. This initial trip brought many issues to the fore, resulting in a re-focusing of the project. Upon returning, a meeting with my research committee helped to formalize this practicum's research focus, targeting the specific design features of cycling facilities that work best in cities with harsh four-season climates, such as Minneapolis and Winnipeg. Full project proposal approval was obtained in March of 2013.

Ethnography of Minneapolis was conducted on two occasions, with the intention to provide potentially comparable data on the cycling networks in winter and summer conditions. This method required inserting myself into the research environment using a field journal, camera and video camera to record my observations and experiences in relation to the cycling networks being analyzed in this study. Over the course of the ethnography I rode my bicycle throughout Minneapolis and Winnipeg using a Go Pro Hero 2 high definition helmet camera, an Olympus waterproof digital camera and written journal to record the experience as accurately as possible. Field research days which generated visual and ethnographic data began with general route selection from the city cycling maps of Minneapolis or Winnipeg. Major cycling routes, with designated cycling infrastructure were the focus of the ethnographic process with a particular

emphasis on off street, separated cycling pathways. Once routes were selected, I rode my bicycle along these routes, stopping at areas of interest and taking still photographs with the digital camera. During field research, the helmet mounted video camera was continuously recording and generating visual data, which served as a visual field journal. Regular stops were made at various locations to record written observations in a field journal. When conducting the second phase of ethnography in May 2013, routes chosen in the winter visits were retraced, to generate comparable data, illustrating changes in the effectiveness of cycling infrastructure from winter to spring conditions. The abundance of visual data produced including video and digital photographs in addition to comprehensive field journals during each of the two four-day periods (February 19-22 and May 14-17, 2013). In total 14 hours and 15 minutes of video, 936 digital photographs and 36 pages of field notes were generated over the course of this research project. An important note that accounts for the high number of digital photographs is technical difficulties with the video camera occurred during the spring research trip to Minneapolis, preventing video recording on two days of the research trip. The video camera was unable to record video, but was able to record continuous still images on a five second time interval. This adaptation resulted in an extremely long photo sequence which served as the next best alternative to a video stream. For this reason, there is a disproportionate number of digital photographs, and less video data produced during the second research trip to Minneapolis. The camera challenges did influence my ability to have complete and comparable video data sets and has been listed as a limitation of this practicum.

Key informant interviews were conducted in Winnipeg during the period May 9-31, 2013. Interview participants were selected based on their experience and diversity of perspectives on cycling as a form of transportation. Selected individuals represent a mix of planners, engineers, politicians and advocates / activists who have abundant experience and historical knowledge of cycling and active transportation policy and project implementation in Winnipeg. A total of seven interviews were conducted in Winnipeg. Key informant interviews were scheduled to be conducted in Minneapolis during the May research visit, but attempts at recruiting participants failed. One interview in Minneapolis was conducted with an employee of the City of Minneapolis Department of Public Works. . I attempted to contact informants in Minneapolis by email upon returning to Winnipeg. A response was received from the office of Minneapolis Mayor, R.T. Rybak in early July, but did not include the informed consent required to use the data. Despite a low response rate for key informant interviews in Minneapolis, I believe the data generated through ethnography, visual analysis and literature review provides an accurate description and context of Minneapolis' cycling network. The low interview response rate in Minneapolis is also listed as a limitation of this practicum.

Key informant Interviews proved to be a flexible instrument with which to discuss general themes, including the history of the study city's cycling networks, challenges and opportunities in growing cycling networks, cycling as a year-round

transportation alternative and initiatives / conditions of successful cycling networks (see Appendix A for complete interview guide).

The analysis of the interviews, ethnographic and visual data was completed through a process of data reduction known as coding. Multiple rounds of coding were performed for each approach, whether key informant interviews, ethnography and visual data. This process distilled the information into key themes generated by each method. These themes provide the structure in which the findings have been organized and they provide the basis for the recommendations made in Chapter Four's Synthesis and Recommendations.

### **3.1 The Minneapolis Cycling Network: A Case Study**

Research revealed in 2010, Minneapolis was voted the most bike-friendly city the United States (Bicycling, 2010), in large part due to its extensive network of off-street bike paths. Of the nearly 130 miles of bike routes in Minneapolis, 83 miles of those routes take the form of off-street bike paths (City of Minneapolis, 2013). In addition to this extensive pathway system, a number of other initiatives make Minneapolis a leader in planning for bikes, such as providing the greatest number of per capita bike parking spots in North America (Buehler and Pucher, 2012) and launching the largest bike-sharing program in the country (City of Minneapolis, 2013). Together, these initiatives have resulted in Minneapolis being second only to Portland, Oregon in percentage of bicycle commuters of all large U.S. cities (City of Minneapolis, 2013). Roughly 4% of work trips and 10% of all trips are made by bicycle in Minneapolis

(Bicycling, 2010). The routes in the cycling network are anchored by the abundant park space, river banks, lake shores and old rail lines (Streetfilms, 2011).

### **The History of Cycling in Minneapolis**

Perhaps one of the greatest assets Minneapolis has in its journey to becoming one the greatest cycling cities in North America is its storied history of passion for the bicycle. It is said the first bicycles, referred to as ‘boneshakers’, were raced in St. Paul, Minnesota in the late 1860s, roughly 10 years after Minnesota’s establishment as a state (Arey, 1995). Bicycle clubs began to form in the 1880s and quickly became advocates in support of cycling initiatives in the Twin Cities. In 1881, the 12-member Minneapolis Cycling Club was established. Four years later another 65-member, all-women cycling club was established by the YWCA (Arey, 1995). A few years later in the 1890s, due to the efforts of cycling advocates, the national “Good Roads” campaign was started (Arey, 1995). This resulted in Summit Avenue in St. Paul Minnesota being the first paved street in the region, an initiative supported by local bicycle racers wanting better road surfaces to ride on (Arey, 1995). Many of Minneapolis’ earliest paved streets were the first to become bike routes, some of which are still in effect today (Pflaum, 2011).

The first bicycle paths were built along Lake Harriet and the Kenwood Parkway by the Minneapolis Parks Board in 1896 (Arey, 1995; Pflaum, 2011). This inspired the neighbouring city of St. Paul to build a bike path along Como Avenue, complete with bike parking for 1500 bicycles at Como Park (Arey, 1995). These developments in cycling infrastructure excited the cycling community and proposals were made by area cycling

clubs to build a bike path linking Minneapolis and St. Paul, which would be paid for by user fees from the estimated 25,000 cyclists in the Twin Cities area (Arey, 1995). In 1897 the Minnehaha Creek Trail was constructed, which led the way for further trail expansion through 1898 (Pflaum, 2011). The rich cycling tradition in the Twin Cities even applied to winter riding, where an annual tradition saw cyclists race from Minneapolis to St. Paul at the stroke of midnight on New Year's Eve, in a contest to see who could complete the year's first 100 mile ride (Arey, 1995). An empowering fact about these rides was they were often well attended by women. It was said "women were at the forefront of the turn of the century cycling craze in Minneapolis (Pflaum, 2011, p.13). At this time cycling had become so popular a pump company decided to place air pumps on street corners, allowing cyclists to inflate their tires for the price of a penny (Pflaum, 2011). In 1902 the first extensive guide to the Minneapolis cycling network was published. Written by Rev. Isaac Houlgate, the book mapped the 57 miles of paths in Minneapolis (Arey, 1995). During this time, there was a bicycle tag program in place in Minneapolis, which required all bicycle owners to license their bikes (Pflaum, 2011). The cost of buying a tag was 50 cents, which in turn helped to fund future cycling infrastructure (Pflaum, 2011). In 1903, approximately 30,000 bicycle tags were sold, (Pflaum, 2011).

Unfortunately this marked the beginning of the end for the first bicycle renaissance in Minneapolis. In 1904, with the popularity of the automobile on the rise and the implementation of a city trolley network, several bike paths were removed

(Arey, 1995). Despite these setbacks, it was said the bicycle maintained its place amongst the working class as a reliable form of transportation (Arey, 1995). It wasn't until the 1940's, when fuel rationing due to the war effort saw resurgence in the popularity of the bicycle in the Twin Cities. Indeed the darkest period for the bicycle in Minneapolis was from 1920-1960, when roadways underwent rapid expansion and the interstate highway system facilitated the growth of suburban development. (Pflaum, 2011).

In the 1970's separated bike paths began to make a resurgence in Minneapolis, nearly 80 years after the first bicycle paths were built around Lake Harriet and on Como Avenue (Arey, 1995). One of the most influential events in shaping the successful development of Minneapolis' off street cycling network is the result of an unfortunate accident. On April 18, 1972, a pedestrian was struck and killed by a cyclist on a combined pathway around Lake Harriet, resulting in a decision by the Minneapolis Parks Board to clearly separate all walking and bicycle paths (Arey, 1995). The evolution of cycling infrastructure continued in the Twin Cities, with the first on-street bike lanes were built in 1974 by the Minneapolis Public Works Department along University Avenue and 4<sup>th</sup> Street, near the University of Minnesota Campus (Arey, 1995).

The next major step in the progression of cycling in Minneapolis came in the early 1990's, when Minnesota Congressman Martin Olav Sabo convinced congress and the Department of Transportation to focus on developing the bicycle as an accepted mode of transportation. This resulted in a D.O.T. report entitled the *National Bicycling*

*and Walking Study* (Arey, 1995). In 1991, the Intermodal Surface Transportation Equity Act was passed in congress, paving the way for federal bicycling infrastructure funding (Pflaum, 2011). In 1994, Minneapolis stepped into uncharted waters, developing an extensive system of downtown on-street bicycle lanes (Arey, 1995). The Cedar Lake Trail became “America’s first bicycle freeway” (Arey, 1995, p.17), complete with two divided one way lanes into downtown Minneapolis at one end, and a connection with some of the city’s most used recreational trails at the other. The development of the Cedar Lake Trail not only demonstrates an early commitment to the development of quality, precedent setting infrastructure, it shows a priority for regional integration of transportation and recreationally oriented cycling routes. Funding sources for a number of these projects including the Stone Arch Bridge rehabilitation and the construction of the Cedar Lake and Kenilworth Trails came as a result of increased federal funding from the National *Bicycling and Walking Study* (Pflaum, 2011).

### **Parks and Open Spaces:**

A major asset in the development of the Minneapolis cycling network was the availability of land due to the abundance of park space in the city. The river parkways alone provide long, uninterrupted naturalized corridors, complete with walking and cycling paths on both sides of the Mississippi River. These corridors link to a number of other park systems including the Grand Rounds, which circles the entire city.

The foresight of city founders nearly 100 years ago, has resulted in Minneapolis developing one of the most extensive urban park systems in the U.S. (Pflaum, 2011). As



part of a mandate by the legislature, the Minneapolis Board of Park Commissioners was created to develop a park system for the city (Pflaum, 2011). Over an 11 year period, the park commissioners acquired and built parks in Minnehaha Falls, Saratoga Springs-Glenwood, Powderhorn Lake, Minnehaha Parkway, Chain of Lakes, East River Road, Columbian Parkway and the Parade regions (Pflaum, 2011). The Grand Rounds is one of the most comprehensive parks in the Minneapolis area. This scenic by-way which links numerous trails and paths, forms a continuous 50 mile parkway system around Minneapolis (Minneapolis Park and Recreation Board, n.d-b.). The Grand Rounds presents a number of recreational and educational opportunities along its route (Minneapolis Park and Recreation Board, n.d.) and is a major asset in linking active transportation routes in the city. During the 1930's, despite the Great Depression, the development of parks in Minneapolis continued through the use of federal grant money, helping expand the park system while preserving employment for many workers (Pflaum, 2011). As indicated in the *Minneapolis Bicycle Master Plan*:

*"...the original Minneapolis park system laid the foundation for today's trail system. Without the investment and foresight of past commissioners and superintendents, the park and trails system would not be as vast as it is today."*

-Pflaum, 2011, p.14

### **Connecting the Missing Links:**

The rich history of cycling in Minneapolis and the abundant park space were primary factors in establishing a strong foundation for a connected city wide cycling network. Despite these assets, there were missing links when evaluating the networks function for transportation purposes.

A research paper written by Barnes, Thompson and Krizek examined how cycling infrastructure built in the 1990's in Minneapolis affected cycling mode share over the next 10 years. The study found infrastructure built in the 1990's focused heavily on the University of Minnesota Campus and didn't necessarily contribute to mode share changes in Minneapolis as a whole (Barnes, Thompson and Krizek, 2005). Although the upgrades to cycling infrastructure did not necessarily reach a broader group of cyclists in the greater Twin Cities region, the authors did find people who lived within a certain buffer zone of new infrastructure were showing higher levels of travelling by bike (Barnes, Thompson and Krizek, 2005). The study also found upgrades made to the many bridges that cross the Mississippi River in Minneapolis greatly increased the likelihood these bridges would be crossed by cyclists (Barnes, Thompson and Krizek, 2005). This reflects similar findings in Portland, Oregon which found in cities divided by rivers, bridges act as choke points for cyclists and by making bridges easily passable by bike there can be significant increases in bicycle ridership (Birk and Geller, 2005). In the case of Minneapolis, making their numerous bridges easily passable by bike was extremely successful in connecting the University of Minnesota's east and west bank campuses

and the downtown (Barnes, Thompson and Krizek, 2005). Upgrades were made to a number of bridges in Minneapolis throughout the 1990's. In 1994 the iconic Stone Arch Bridge was refurbished using federal "inter modal" funding (Pflaum, 2011). The bridge is now a major commuter route and now sees approximately 1300 cyclists a day (Pflaum, 2011). In 1989 the City of Minneapolis purchased an old rail bridge for \$1 which was transformed into a multi-level bike / pedestrian bridge, connecting the two river banks of the University of Minnesota Campus (Pflaum, 2011), which is now referred to as the Washington Bridge. The Hennepin Bridge is another important linkage, complete with bike lanes in both directions that connect to trail networks at the ends of the bridge (Pflaum, 2011). In addition to bridge upgrades, historical trails such as the Lake Harriet and Lake Nokomis trails have been widened and resurfaced (Pflaum, 2011). These upgrades to existing infrastructure were crucial in further connecting the cycling network.

Two marquis projects built in recent years that further connect the existing cycling network in Minneapolis are the Martin Olav Sabo Bridge and the Midtown Greenway. The Martin Olav Sabo bridge was built in 2007 and sees an average of 2500 cyclists each day, and as many as 6000 at its summer time peak (Streetfilms, 2011-b). The bridge is named after a congressman who was instrumental in bringing the term inter-modal transportation to congress, resulting in large influxes of federal funding for cycling infrastructure in the U.S. (Streetfilms, 2011-b) The bridge is located at 28<sup>th</sup> Street and Hiawatha Avenue and was once the sight of a large rail yard (Pflaum, 2011). The

Sabo Bridge was built to prevent cyclists from crossing the busy seven lane Hiawatha Avenue at grade (Streetfilms, 2011-b). The bridge which cost five million dollars to build is a key feature in connecting the Midtown Greenway (Streetfilms, 2011-b). Mayor R.T. Rybak explained the Sabo Bridge did not need to be as elaborate and visually appealing as it is, but in Minneapolis they want to build beautiful infrastructure people can be proud of (Streetfilms, 2011-b). The bridge required an innovative design to accommodate power lines, an LRT line and a major highway. Since the Sabo Bridge was built in 2007, there has been a 148% increase in bike trips along the corridor over a three year period (Streetfilms, 2011-b).

The Midtown Greenway is perhaps the most popular pieces of cycling infrastructure in Minneapolis. The Midtown Greenway was built on an old, trenched, industrial rail line running through the center of Minneapolis (Midtown Greenway Coalition, 2013; Pflaum, 2011). A decrease in the frequency of train trips resulted in the line being removed, making way for the Greenway to be built (Streetfilms, 2011-b). Constructed in three phases, the 5.5 mile Midtown Greenway connects the Mississippi River with the Chain of Lakes trail network and was completed in 2006 (Pflaum, 2011). The Greenway was the result of cooperation between a number of partners, including Hennepin County, the City of Minneapolis and the federal government (Pflaum, 2011). The project required the purchase of railway land from Canadian Pacific railways and the remediation of contaminants in order to build the pathway (Pflaum, 2011). A major asset of the greenway is it sits 20 feet below grade, which allows bicycle traffic to run

under all the major north / south avenues, making it one of the quickest, uninterrupted ways to cross the city (Midtown Greenway Coalition, 2013, Streetfilms, 2011). Another positive outcome of the development of the Midtown Greenway has been the commercial and residential development occurring along the corridor. This could be an early example of cycling-oriented development.

Although there are many “good news stories” coming out of Minneapolis regarding the progress they have made in building their cycling network, this process has not been without its challenges. There has been some opposition to the expense of some of the separated cycling facilities (Streetfilms, 2011), as well as some instances of violence occurring on the Midtown Greenway (Metcalf, 2013; Bicycling, 2010). In response to these criticisms, local organizations continue to advocate for the benefits of cycling as transportation and volunteer trail watch groups have been formed to patrol the Greenway and make bike routes safer places (Bicycling, 2010).

The most recent initiative that has helped to advance the status of cycling in Minneapolis is the launch of their Nice Ride bike-sharing program. First unveiled in 2010, with a total of 700 bikes at 65 stations around the city, the program has grown to include a total of 170 self-service docking stations with approximately 1200 bikes in the Twin Cities region (City of Minneapolis, 2013, Street Films, 2011-c). The program has been declared a remarkable success, and has now expanded into neighbouring St. Paul, Minnesota (Nice Ride, 2013). The implementation of the bike sharing program further increases access to the cycling infrastructure built in Minneapolis, providing a

convenient and enjoyable transportation alternative to the car. The most recent counts conducted in the summer of 2013 reveal over 700,000 trips have been made on *Nice Ride* bikes in the Twin Cities area (Nice Ride, 2013). Although not a traditional form of infrastructure, the bike-share program is a good example of the progressive steps Minneapolis is taking to support the cycling as a desirable mode of transportation.

### **How did Minneapolis do it?**

Numerous contributing factors have created today's cycling network in Minneapolis. In addition to the extensive built features, a distinctly proud cycling culture exists in Minneapolis. The citizens of Minneapolis contribute greatly in furthering the support of cycling in their city.

The municipal government continues to respond to citizens who choose to bike year-round, with bike paths often being plowed before city streets are cleared of snow (Bicycling, 2010). Internet forums such as Minneapolis Bike Love encourage a greater level of citizen engagement by connecting area cyclists, providing a venue for dialogue on all things cycling in the Twin Cities region (Streetfilms, 2010). Another asset the City of Minneapolis has in furthering their progressive planning agenda is their mayor, R.T. Rybak, who has been an ambassador for cycling in the city since being elected as mayor in 2001 (City of Minneapolis, 2011). In a recent Streetfilms documentary, mayor Rybak explains the old way of building cities is no more and there is a need to develop processes where everyone can be heard (2010). This perspective held by elected

officials in Minneapolis goes a long way in establishing the political will needed to make real changes.

Although resolve and cultural identity are essential components in the success of Minneapolis as a cycling city, there are a number of government funding initiatives that provide the resources for project implementation. As part of a federal initiative, Minneapolis was one of four counties to secure \$25 million dollars over a ten year period to be used to get more people riding bicycles (Bicycling, 2010). In addition to their rapidly expanding physical infrastructure projects, the City is integrating transportation modes by ensuring every city bus has the ability to carry bicycles (Bicycling, 2010). There are also by-laws which require office buildings provide bicycle storage space as well as policies which guarantee the City will pay for half the cost of every bicycle rack installed at a local business (Bicycling, 2010). In an interview conducted by Bicycling Magazine, a local cycling advocate is adamant the key to Minneapolis' cycling success lies in the historical congressional movement by Martin Sabo which introduced the term "inter-modal" transportation into the national transportation planning discussion (Bicycling, 2010). This provided an opportunity for municipalities everywhere to have access to large amounts of federal funding for cycling initiatives, and has been instrumental in funding the growth of the network in Minneapolis. As a result of congress passing a federal transportation bill called the *Safe, Accountable, Flexible, Efficient, Transportation, Equity Act: A Legacy for Users*, four counties were chosen to receive funding for a "non-motorized pilot project" (Walk Bike

Twin Cities, 2013). This project aimed to expand cycling infrastructure, improve planning resources and increase education while studying the subsequent results of these investments on traffic congestion, public health and the condition of the environment (Bike, Walk Twin Cities, 2013). In addition to Sonoma County, California; Sheboygan, Wisconsin, and Columbia, Missouri; Minneapolis was chosen to receive \$22 million dollars in federal funding (Bike, Walk Twin Cities, 2013). In Minneapolis, the non-motorized pilot project was named *Bike Walk Twin Cities* and is administered by a local non-profit organization, Transit for Livable Cities. Transit for Livable Cities is the largest transportation advocacy group in Minnesota, with close to 10,000 volunteer members and 13 full time staff, working to shape a transportation system in Minnesota that makes better use of walking, cycling and transit while promoting “thoughtful development” (Transit for Livable Cities, n.d.). Initiatives of Bike Walk Twin Cities build on the mandate of providing an “all-out effort to increase biking and walking and decrease driving” with a focus on improving the health and safety of their communities (Bike Walk Twin Cities, 2013).

In recent years the Bike Walk Twin Cities pilot project has provided partial funding for large scale projects such as the *Nice Ride* bike share and the Olav Sabo Bridge (Streetfilms, 2011). Funding from Bike Walk Twin Cities is also being used to expand the existing trails network by an anticipated 40 miles, while closing some of the existing gaps in the current trail network (Streetfilms, 2011-a).



In 2008 the mayor and city council of Minneapolis directed the public service to create a bicycle master plan as part of a larger city wide transportation master plan (Pflaum, 2011). The plan was developed with the help of the city's Bicycle Advisory Council, a group that informs the mayor on current urban cycling practices. This plan was designed to go above and beyond a traditional cycling transportation plan. In addition to providing future bike routes, the Minneapolis Bicycle Plan is far more comprehensive. The eight chapter, 226 page document covers everything from the history of cycling in Minneapolis, to policy implications, current cycling network conditions, a needs analysis, the goals and objectives for future development as well as funding and implementation strategies (Pflaum, 2011). An extensive consultation process occurred over a two year period in developing the plan, with a number of community meetings held prior to, and following the development of a draft document (Pflaum, 2011). Once the draft plan had been completed there was a 45 day period for comment followed by a full chapter by chapter review of the draft plan by the Bicycle Advisory Committee. The plan's vision statement is to build a better city where cycling is supported and encouraged (Pflaum, 2011). The Minneapolis Bicycle Plan is another effective tool the City of Minneapolis has created in assuring continued support and development of their cycling network in the future.

### **3.2 Interview Results: Key Informant Interviews**

Key informant interviews were conducted with planners, politicians and cycling advocates / activists in Minneapolis, Minnesota and Winnipeg, Manitoba in an attempt to better understand the specific context in which their cycling networks exist, as well as fill gaps found in the literature review. Three similar series of questions were developed and posed to participants based on their role (planner, politician or advocate) in developing or contributing to the evolution of their respective cycling networks. The intentions of the questions were to better understand how the evolution of their cycling network has occurred, what are the barriers and opportunities to continued improvement of their respective cycling networks and how do planners, politicians and advocates contribute to the evolution / expansion of their respective cycling networks. In addition to these questions two general themes emerged during the interview process. The first was to understand what approaches were taken in designing cycling infrastructure in Minneapolis and Winnipeg and what design characteristics are most effective in the development of their cycling networks despite their harsh four season climates.

In general, the semi-structured interview questions revolved around understanding the history of cycling in Winnipeg and Minneapolis, what initiatives have been most effective in progressing the development of these networks and what is required in the future to develop exceptional cycling networks in Winnipeg and Minneapolis (Please see Appendix A for complete interview guide).

Interview results were distilled into nine codes:

- The network approach
- Physical infrastructure
- Design
- Winter
- Challenges
- Opportunities
- Political influence
- Funding
- Allies

**Scope of Interviews:**

A total of eight semi structured interviews were conducted in May of 2013, with targeted participants including government staff, politicians and local bicycle advocates. Participant groups included The City of Winnipeg, Winnipeg Transit, Bike Winnipeg, The Green Action Centre, The Manitoba Trails Association, the City of Minneapolis as well as an independent bicycle advocate.

Key Informant	Acronym used in reporting
City of Winnipeg Public Works Department	CWPW
Winnipeg Transit	WT
Bike Winnipeg	BW
Green Action Centre	GAC
Manitoba Trails Association	MTA
City of Minneapolis Department of Public Works	CMPW
Manitoba Member of the Legislative Assembly	MMLA
Independent Bicycle Advocate	IBA

Table 1: Key informant interview respondents and acronyms

Several attempts were made to increase the representation of participants in Minneapolis but this proved challenging. Given the relatively tight time frames and busy schedules of participants, political and advocate representation in Minneapolis was not possible despite repeated efforts to schedule interviews in a number of mediums. Input from a greater number of politicians and advocates in Minneapolis would have added a more in depth and complete analysis of the cycling network in Minneapolis. Despite this limitation, it is my opinion that data generated through ethnography and visual analysis provide a fair and representative picture of their cycling network in Minneapolis.

The data generated through the interview process produced rich and detailed descriptions, opinions and perceptions which could not have been achieved through other forms of research. The ability to discuss the multitude of complex issues associated with the planning and implementation of the participants' cycling networks provided a more holistic and realistic depiction of the realities associated with developing bike-friendly cities.

Generalizations drawn from the analysis of key informant interviews include the importance of incremental improvement and the acceptance of long time frames required in changing large scale transportation systems. The planning of "alternative transportation" methods requires cooperation and support from a number of sectors, with the physical construction of cycling facilities often being the least complicated part of the planning process. Planners stressed that significant progress has been made in both Winnipeg and Minneapolis over a relatively short period of time (10 years) while

politicians view changes in what is politically palpable, especially with the increased support of active forms of transportation by the health sector. Advocates generally communicated a need for placing non-motorized transportation higher on the transportation hierarchy, which requires politicians to support the development of new active transportation projects.

### **A Network Approach:**

In recent years there has been significant improvement in the number of cycling facilities implemented in Winnipeg, in large part thanks to the hard work of local advocacy groups as well as a 20 million dollar, three tiered government grant in 2009 (City of Winnipeg, 2011) to support the building of active transportation facilities in Winnipeg. Despite these improvements there has been some criticism the new facilities lack a connected and integrated network. Advocates have been particularly vocal about this issue.

*“Right now our biggest issue in my opinion is connectivity, a lack of connectivity of the network because we have nice chunks that have been added, but if you can’t get from one chunk to the other chunk or you have to go through a crossing, you know it dumps you at this crossing and there is six lanes of traffic...”—GAC*

These criticisms stem from a belief cycling infrastructure in Winnipeg is often built in an opportunistic fashion, putting in facilities where construction is least expensive and less contentious.

*“We’re still at that point, needing to deal with infrastructure gaps, specifically connectivity, but they don’t want to deal with that*

*because those are often the most complex and expensive, and you can't cut a ribbon on them and every politician wants a ribbon-cutting opportunity."*—**GAC**

These comments represent an emerging theme in the discussion around how the cycling network in Winnipeg is approached. The idea the current network is not being built to address barriers or areas of contention seems to be one of the major criticisms by the advocacy community.

*"We don't treat the connectivity, we kind of build on a haphazard methodology. There is a lot of political influence back and forth, that sort of decides, there is not necessarily building the infrastructure where the most people are going to get use of it...its sort of where we're going to get the easiest ride through on creating the infrastructure and we're also going to sort of be in a politically safe zone"* —**BW**

The need to take a more holistic and city-wide approach to developing cycling infrastructure in Winnipeg emerged as an important theme, particularly amongst the advocacy informants. Within the theme of network connectivity, another key message was the need to address barriers that exist within the network, regardless of the challenges associated with costs or political climate, as these barriers are what prevent a broader spectrum of people from riding their bikes.

### **Physical Infrastructure:**

Dedicated cycling infrastructure receives significant attention in the discussion around building bike friendly cities and is viewed by many as being one of, if not the primary component in increasing the mode share of cycling. Participants in this study

seemed to share these opinions, often emphasizing the need for quality facilities in Winnipeg.

*“I think without question the most effective initiatives that we have seen are, are infrastructure changes. So for instance um, we’ve put in the Assiniboine Bike Way, so um certainly we know from the numbers we’ve done, counting bikes, along that roadway, along that path that it has taken a lot of people off the sidewalks for one thing, but it has also really, tremendously increased the number of cyclists going up and down that.”—  
**CWPW***

These opinions were held by the advocacy community as well, but there was also a need for communicating to users where these facilities are located and how to use them.

*“By far the most effective initiative is concrete on the ground. The second is knowing where that concrete is”. —**IBA***

Winnipeg respondents often emphasized building and implementing new cycling facilities should be the primary focus if the city wants to become a bicycle friendly city. Despite consensus on the need to develop new facilities, there are little to go on in terms of standards and guidelines. When interviewing informants from Minneapolis, there was an opportunity to hear about their evolution into developing their acclaimed network.

*“When they first started street striping, there wasn’t much to go on, they just established their methods and standards as they went and learned from their mistakes”. —**CMPW***

The modest description of the methods in developing the cycling network in Minneapolis indicates a willing and supportive political climate is required when transitioning into new and progressive transportation systems. Informants in Minneapolis also indicated they have been opportunistic in expanding their cycling network when surplus land becomes available.

*“They also make good use of old railroads to build new bike paths as they are established right of ways and they have few intersections”. —CMPW*

#### **Design:**

Design emerged as one of the most discussed issues over the course of the interview process. Respondents didn’t necessarily discuss the engineering details of cycling infrastructure, nor was that the intention. Discussions revolved around the design characteristics which seemed to be most effective in terms of increasing ridership.

*“When we do get separated from traffic, something like the Yellow Ribbon trail or the Northeast Pioneers Greenway, if we look at those ones, we do see an encouraging of a pretty diverse group to get out on bikes, but because we are not connecting those through, we are not really encouraging them to bike in a utilitarian standpoint, it’s really sort of a recreational kind of thing they are looking at.” —BW*

Physical separation from motor vehicles is frequently mentioned throughout these interviews as being an ideal design characteristic that is encouraging of a diversity of riders, and is perceived as being safe. Encouraging a diversity of people to choose



their bicycles as transportation was mentioned by participants as an important component to increasing ridership.

*“The diverse crowd will be on a facility that is what the people want, when they are not right next to a car or a bus...”—IBA*

A term used in a few instances by informants was “alpha cyclist”, referring to the demographic of cyclists who will ride regardless of facility or traffic condition. Respondents indicated designing facilities that cater to the needs of “alphas” such as on street painted lanes did little to encourage cycling in a broader context.

*“... a lot of the facilities that we put in place, especially bike lanes on major road ways, those are still for the alpha cyclists”.—WT*

*“So it addresses their needs and maybe gets a few people who wouldn’t have been comfortable biking on a major road to switch over and the people, who would never ride on Pembina Hwy, would never ride on Portage Avenue, putting a bike lane on Portage or on Pembina doesn’t help them. You need other things to address those needs.”—WT*

Despite many respondents indicating their preference for physically separated cycling facilities, the financial and space limitations continue to be a challenge when realistic implementation is considered. An informant from Winnipeg Transit explains:

*“There is no single solution that is right for every single situation or neighbourhood situation. Obviously there is a demonstrated [preference] for separated facilities, whether that is on road like a buffered bike lane or a segregated pathway, but there is a clear preference for that and I think we would get the biggest increase in participation with it, but is it financially realistic and in many cases, it’s not even physically possible”—WT*

Creative design approaches will be required in order to produce the kind of facilities respondents have indicated would be most helpful in growing support and bicycle ridership in Winnipeg.

**Winter:**

Winter has emerged throughout this research process as one of the most discussed factors that dictate the success or failure of cycling in Winnipeg.

Winter has often been cited as reason for which cycling is inherently challenged in Winnipeg, yet a positive example has been set by cities like Minneapolis, Minnesota. Informants in this study did acknowledge winter poses some challenge to cycling but insisted it is not as prohibitive as some would think:

*“To be honest, cycling in -15, - 20 degree weather is probably easier than cycling in say Seattle or Portland in winter. Or even Vancouver in winter. If you don’t have the rain, it doesn’t take much to keep you warm on the bike. What it does require is a decent surface to ride on which is quite doable”. --BW*

*“Seasonal variability is not an issue if there is quality infrastructure”. --IBA*

As stated above, informants have indicated if safe, quality facilities are in place, that are maintained and cleared of snow in the winter, there would be far more cyclists willing to brave the cold weather. Climate conscious design has been described as an important factor in growing Winnipeg’s cycling network. It seems many informants felt

separated and ideally off-street pathways are most effective from both a rider safety and municipal maintenance point of view.

*“Existing infrastructure is very influenced by our climate. There is very little safe four season infrastructure in Winnipeg. If dedicated bike lanes people would use them all year. These facilities need to be cleared / maintained in winter, riding wouldn’t be so dramatic if we had the infrastructure”—MTA*

*“...for winter cycling, a non-separated facility if it’s going to be on-street works better. So to take that one step further, the ideal scenario is something that is completely off street, not adjacent to a sidewalk, not adjacent to a roadway, but is well separated so, examples of that are the North East Pioneers Greenway along Gateway and Raleigh and the pathway along Bishop Grandin, and there is no conflict at all because there is so much separation and that is ideal as long as we can plow it.—WT*

A complementary issue that was raised to the importance of the type of cycling facility when factoring in Winnipeg’s winter climate is the requirement of consistent snow removal.

*“Winter [As a barrier]. And by that I don’t mean cold weather deterring people. I think its snow clearing and maintenance. They need to know it’s [paths] always going to be cleared, or that its going to be cleared within two days of a major snowfall, that type of thing. Until we get to that point I think we are going to see a lot of people who aren’t willing to ride in the winter” --WT*

*“Personally I think the more you separate cyclists from vehicles, especially in winter time, the better you are but there are so many places in Winnipeg where that is not possible. Ahh, we’re still learning. Certainly our maintenance practices aren’t at the stage where we can encourage cyclists in the winter time. We’re not there yet, although I see progress every day.” --CWPW*

One informant stated designing cycling infrastructure that functions well in winter climates is not only a functional argument but an economical argument. If cities such as Winnipeg are going to build cycling facilities it is in their best interest to build ones that are useable for 12 months per year.

*“There is also a huge opportunity with winter to maximize our investment (that is that we should design stuff that works year round because why pay for something that you can’t use all the time”.—IBA*

In Minneapolis, informants stated their commitment to ensuring their off-street pathways are cleared of snow has been successful in encouraging cycling year round. They also indicated there on-street lanes receive no special attention in winter months in terms of snow removal.

*“Clearing paths is [a] really effective thing to do in winter to ensure people will ride (guaranteed path clearing within 24 hours of end of snowfall). On-street stuff gets no special winter attention, they plow the streets as normal but they don’t have the means to specifically address on-street bike facilities in the winter, although they would like to. It is more work”.—CMPW*

### **Challenges:**

One of the most common challenges cited by informants revolved around dealing with car culture and the mentality cars are the primary concern when planning transportation systems in Winnipeg. The transition from a car oriented transportation

system to a system where a multitude of options are supported, including cycling will take time.

*“The only thing is, part of the difficulty is getting everyone on the same page. So when you are talking about a traffic engineer, they are used to being a traffic engineer and they have done traffic flows of cars, not bikes, cars for years and you get them to change their brain, that’s hard.”—MMLA*

Respondents indicated there still needs to be a shift and a commitment to support cycling and implement projects despite some opposition.

*“The City had been focused up to that point, pretty much primarily on recreational cycling so that continues to be a challenge, it’s really just accommodating cycling but not giving any priority to it. So it’s always if any type of infrastructure or change will inconvenience drivers and slow down drivers at all, then it’s in jeopardy or if it’s even going to take just one parking spot, even if there is alternate parking available on an adjacent side street, that can kill a project, so it’s still very susceptible to any negative...”--GAC*

*“...their priorities are still vehicles so, the first priority still really remains vehicles whether it’s at a traffic light, or, or your requesting a crossing, um the effect something will have on traffic I think is you know, the key concern, um rather than on the effect of what it will have on the promotion of cycling.” —CWPW*

*“Right now cars still rule the roost and until there is higher density and mobility impairments the changes will be slow.” --MTA*

One respondent provided a more abstract but insightful synopsis of how transportation hierarchy can be approached, by viewing roadways as space that is used in the way society dictates, and we have the power to change uses in these spaces.

*“How roads function in society: There are just spaces in between houses. We choose how we use them. One group in Winnipeg is*

*planned and coddled for and that's largely single occupant car users. Don't look at it as an off- street / on-street issue because eventually that won't work. Downtown there will need to be on-street stuff. Eventually a design solution won't work. Take a more holistic approach to planning in the sense that: what do these spaces mean and how do you prioritize the uses / users?"—IBA*

## **Opportunities:**

Opportunities and strengths discussed by interview informants were numerous and often focused on the changes that have occurred in Winnipeg in recent years, primarily in terms of perception and acceptance of cycling as a viable mode of transportation. In somewhat contradictory statements to those above, cycling in Winnipeg has transitioned from unacceptable to acceptable, but we have yet to achieve a status where cycling is encouraged.

*"It used to be a why issue, now it's a how issue. Cycling is no longer a fringe activity"—IBA*

*"There's been a great evolution in that we are actually talking about other things than cars, finally. Now it's part of a discussion which is a nice ongoing dialogue and discussion." —MMLA*

*"I think we're seeing a ton of people getting out and doing it too, so it's been a huge change in the last 5-10 years."--BW*

The sentiment that there has been a transition in our cultural perception of cycling was described by one informant as occurring amongst planning professionals as well.

*"How politicians and how city administration, meaning people like me, planners, engineers, view cycling and it's not just a fringe activity, it's not just something for leisure and it's not just*

*something for kids to do, it's a legitimate way to get around the city"—WT*

In Minneapolis, major changes to the cycling network have occurred over a relatively short period of time, primarily between the period of 2001 and 2011. These changes have been the result of some larger, federal government funded pilot projects, which have initiated monitoring programs to assess the effectiveness of their infrastructure upgrades.

*"Significant changes have occurred between 2001 and 2011. Currently they are doing evaluation of the new stuff they put in, lots of video and photo analysis. The Pilot project really helped the city try new things."—CMPW*

Pilot projects have been described by other informants as opportunities for experimentation and learning by the City.

*"Opportunities such as pilot projects are really good way to try stuff out and get people thinking about it".—IBA*

There have been numerous initiatives and programs which have contributed to the expansion of the cycling network in Minneapolis. Despite these efforts one of the major assets of the city is their long standing urban city park system.

*"[The] park system is viewed as the greatest asset in establishing the cycling network in Minneapolis. Really truly incredible the amount of land and paths that it facilitates". —CMPW*

Interview informants were optimistic when discussing Winnipeg's potential in growing the cycling network. Several informants indicated Winnipeg is capable of being one of the great Canadian cycling cities.

*"Winnipeg has some of the greatest potential of any city in Canada. The two things that are major barriers to city cycling are steep hills and hot heat. Our weather and topography are ideal"—IBA*

The building of cycling infrastructure has been described as an essential component in increasing cycling in Winnipeg. In addition to these facilities, informants emphasized the importance of education and encouragement.

*"..one thing that we do in Winnipeg is we'll build the infrastructure, it doesn't matter if its rapid transit infrastructure or a bike lane or a cycle track but we don't actually encourage people to get out there and make sure they know, that they are aware of it, so that's an issue that could definitely improve on" —BW*

*"So I think that's part of it that people cling to existing habits because its easiest, but I think there is a lot of low hanging fruit out there, who with the right incentives and that's what we found with this project is that with just a little bit of support and knowledge, they change their behavior and I think that is possible and it's exciting to know that is possible but it takes attention and it doesn't necessarily happen organically..." —GAC*

### **Political Influence:**

Informants did frequently mention how influential political climate, policy documents and the public's perceptions of cycling influenced the building of cycling infrastructure in Winnipeg. Informants indicated significant progress has been made in



establishing a more supportive policy context in which to encourage active transportation and cycling in Winnipeg.

*“The City has really changed its focus from being auto centric to being more modal choice. With “Our Winnipeg, Complete Communities, A Sustainable Transportation”, kind of policy stuff coming out of the planning department, and the planners now are becoming very active in making sure things work out that way. Under that I would also talk about the transportation master plan which has been recently approved. And that is significant for a lot of reasons, one of which is we haven’t had a Council approved transportation master plan for decades, literally decades, which is a huge problem”—CWPW*

One policy listed as being especially influential in supporting the building and expansion of Winnipeg’s cycling network is a requirement that upgrading of road surfaces on the Winnipeg bike map must include upgrades to cycling facilities on that street.

*“Probably the biggest, the most significant one was the policy whereby we will add active transportation facilities to any road or rehab of roads on the AT network”—CWPW*

Although there seems to have been an increase in high level policy support for active transportation in Winnipeg, some informants feel there is a need for greater specificity and operational detail needed for the ground level support required for implementation of infrastructure projects.

*“I think when you look at a lot of the smaller projects and some of the property design and some of the planning documents and that, as you sort of get down on the size and the scale, it becomes a lot more evident that not everyone is really thinking through active transportation”.—CWPW*

Policy changes are one step identified in improving cycling culture in Winnipeg but the specific actions of elected officials is said to be a key factor as well.

*“Politically, I think, I think there is a change in awareness, but not necessarily a change in action at the higher level... people like to talk about AT but when it comes to alternatives being made, and if it has to be a choice between a parked car and a bike lane, a parked car generally wins.” —CWPW*

*“People won’t bike where they don’t feel safe. To feel safe there needs to be adequate facilities. These need money to be built. We need political will to get money allocated”. —MTA*

Planners who were interviewed during this research process indicated political support goes a long way in providing a foundation for implementing plans which support new cycling facilities.

*“I think when you speak to the planners, when you speak to a lot of those decision makers, there’s a will, so if they see that political leadership they can really move forward on it, without the political leadership they can put a lot of effort in and get nowhere”—BW*

An interesting result occurred when a local politician and informant in this study stated building new cycling facilities is not a political issue.

*“It’s not a political decision. I don’t think growing the cycling network wins you votes or costs you votes. I think it’s a net zero. But it’s one of those things you do because it’s the right thing to do...”MMLA*

## **Funding:**

Building infrastructure was mentioned by many participants as one of the most effective measures to increasing bicycle ridership in their cities. Funding is a necessary component in establishing these new facilities. Active transportation budgets have increased in recent years but informants indicated a need for continued monetary support in order to build safe and effective cycling facilities in the future.

*“...it’s been more specifically in the last 6 six years since the Active Transportation Study that was done in 05. Ah, we basically doubled the size of the network, and I think we spent something like 50 million dollars in the last 6 years... we also got that 20 million injection of cash from three levels of government as well. Ah there has never before been a dedicated position for it and an advisory committee which are two very key things. There’s certainly never been a dedicated AT budget with the amount of funding we’ve had in the last 6 years, it’s been around 1.75 or 1.25, ah which is certainly a huge increase” --CWPW*

One interview informant stressed the importance of financial commitment in getting new cycling facilities built.

*“Always follow the money, that is what speaks, promises are feeble, there needs to be action and that comes with money”—*  
**MTA**

In Minneapolis, consistent and adequate levels of funding have been a fundamental aspect of their ability to build their cycling network to the level it’s at.

*“Federal funding for non-motorized transportation (Bike Walk Twin Cities project) has been very influential in getting these larger scale projects done. The counties and municipalities have continually funded cycling related projects which helps a great deal”—CMPW*

Accounting was a common theme that emerged from the interview data with informants describing a need for a more holistic or integrated approach to allocating funding and accounting for benefits across sectors and levels of government.

*“Accounting is another huge opportunity, to include health, tourism etc. If only we could count our beans in a more holistic way, we would be golden.”—IBA*

*“Bicycles and feet are far less hard on infrastructure, they’re safe and much better for your health, better for the community, all these intangibles are not factored into this at all. It’s about how much does the pavement cost, how much parking you’ll lose”—CWPW*

*“I think also within levels of government they don’t look at the whole scenario so they are not looking at the savings to the provincial government if the City is paying for something that say the provincial government health care money, I don’t think they really view it as a benefit to the City of Winnipeg”—BW*

### **Allies:**

The last theme that emerged from the interview data generated in this study discussed the emergence of allies who can aid in the cultivation of support for active modes of transportation, including cycling. The most prominent ally mentioned by informants was the health sector.

*“The other thing that is really important is the health benefits of active transportation are becoming better known, gathering momentum... I think that whole health issue is huge, to a large*

*extent that has been driving and will be the biggest force driving this.” –CWPW*

*“If we look at our population, the biggest item in the provincial budget is health care. It’s also one of the fastest growing items in the provincial budget. We are seeing an epidemic of disease like diabetes heart and stroke, these are all thing that have huge [influence]... one of the largest modifiable factors is physical inactivity” --BW*

*“There has also been a huge cross sectorial push in driving cycling initiatives. Winnipeg has done well with partners such as: health organizations, tourism organizations and economic development.”  
–IBA*

In summary key informant interviews provided a flexible, qualitative methodology which proved effective in identifying key, high level conditions of cycling facilities in Winnipeg. The ability to foster open dialogue with the experienced participants from a diversity of backgrounds was an invaluable addition to this research.

### **3.3 Ethnography: Researcher Perceptions**

Ethnography of Minneapolis and Winnipeg was conducted in an attempt to capture the lived experience of using the cycling networks in these respective cities. Below are selected excerpts taken from the research field journals. These excerpts are the impressions of the researcher and, although there has been an attempt to remain neutral, these excerpts may include inherent biases associated with personal

observations. The use of video data generated from a helmet mounted video camera during the ethnography of Minneapolis and Winnipeg was used to preserve and document the researcher's experiences, and provided a visual reference when expanding written field notes into more comprehensive descriptions of these experiences. Analysis of the ethnography has been categorized by the season and location in which they were conducted.

### **Minneapolis in winter:**

The first research trip to Minneapolis occurred February 19-23 of 2013. The intention was to explore the cycling network in Minneapolis during winter months. The initial field research experience was an exploratory endeavor that would go on to influence and modify many facets of this research process.

"So we are in Minneapolis and it is cold, Winnipeg cold. The landscape here seems very similar to Winnipeg as well, with the downtown area being divided by a major river. Even though it is cold, I saw cyclists about to cross the bridge. Then while driving down University Avenue my mom said that it sure felt like a Winnipeg road (bumpy, rough). There was a cyclist riding down this street, and once we got closer to the University Campus I saw my first bike lane. Then as we got onto campus I noticed how packed full the bike racks are at campus buildings."

During this research trip there was a natural tendency to do initial comparing and contrasting between Winnipeg and Minneapolis. While in Minneapolis there were several observations made of conditions very similar to Winnipeg.

“While driving around one thing that was noticeable was that Minneapolis has an abundance of surface parking lots, just like Winnipeg. It was also pretty incredible that when parking, hourly rates were very inexpensive, with close, on-street parking wherever you wanted to go. The use of sticks to dis-incentivise car use in the urban parts of the city was not visible. In regards to rapid transit, they do have an LRT system but it is still in its initial phase, with a second line under construction that will service the University. It seems the City is more interested in actively promoting cycling as opposed to restricting the car / promoting rapid transit.”

Some initial research objectives of this project were to understand what cultural / social influences cycling in Minneapolis. The presence of a large urban university campus, a vibrant music and arts scene and a Nordic heritage were all prominent cultural characteristics in Minneapolis. These characteristics seemed to foster a rebel, counter culture which extended to the bicycle culture in Minneapolis. Several bicycle shops such as “One on One Bikes”, “Handsome Cycles”, “the Angry Catfish” and “the Hub Bike Co-op” exude a feeling of defiance. A strong cycling community that is resilient and persistent when encountering the barriers associated with expanding urban cycling networks can be extremely influential. The cultural landscape of cycling in Minneapolis plays a significant role in garnering a support base for the growth of cycling as a transportation mode in Minneapolis. This resolve was noticed on several occasions during field research.

“There is grittiness, punk rock, art culture here.”

**The Snow Storm:**

On the third day of the research trip, there was a large snow storm rolling through the Midwest U.S. Close to 20 cm of snow fell on the Twin Cities region presenting an excellent opportunity to ride and experience winter cycling in Minneapolis during a winter storm.

“This snowfall reveals a lot about design in cold weather cities. On-street networks in adverse weather have many barriers to deal with [mix with traffic, curb lane accumulation of snow in curb lane, left turns, transit stops etc.]. While riding on-street bike lanes after the snowfall, I was forced onto the sidewalk on several occasions.”

**Diversity:**

One of the most interesting observations about Minneapolis was the diversity of people who were riding their bicycles. In Winnipeg, it seems there is a perception special equipment is needed and that cycling is only for the committed. This was not the case in Minneapolis.

“While walking to dinner it was very cold but there were cyclists riding around. Some were riding on the sidewalk and some on the streets. What was interesting is that some folks looked the part of seasoned cyclists, while others did not.”

**Details:**

While conducting this study, there has been abundant research and discussion about the importance of large-scale cycling infrastructure but little on the small features



which contribute to the success of cycling networks. In Minneapolis, bike racks and rider amenities add value to their large scale facilities.

“On my way there I passed the LRT expansion to campus. There were many bike racks jammed full. They also had a bike stand with a pump, tools to fix your bike, right next to the racks.”

“It seems they make a real effort to make cycling hospitable. There are many bike racks that have been designed as pieces of public art like bike racks.”

## **Pathways**

Prior to visiting Minneapolis, I was unaware of the types of infrastructure that make up the majority of their cycling network. The use of off-street pathways or “trails” seemed to be the primary design type and proved to be extremely effective in the context of Minneapolis.

“There are really nice winding paths, separated from traffic along the river. Very well signed with intermittent boards with maps on them.”

The amount of off-street pathways in Minneapolis was remarkable. These pathways can be used as commuter / transportation facilities but they also present an opportunity to get out of urban environments and experience nature.

“The network of off-street pathways and trails is vast and extensive. It felt at times like I was in the middle of nowhere. It seems at first glance that their real assets are their separated pathways which travel great distances of the City, in relative “wilderness”.

One negative side effect of the wild and secluded feel of some off-street pathways in Minneapolis is their reduced visibility. Some sections of off-street pathways have fewer eyes on the path which could result in a less comfortable environment for certain users.

“I did see a couple of safety phones along the greenway, which could indicate these paths may have had some instances on violence on them. They appeared well lit, and there were houses along them with “eyes on the street”.

There have been some instances of violence on certain off street cycling facilities in Minneapolis, most notably the Midtown Greenway. (Metcalf, 2013) The design of the Midtown Greenway puts cyclists on an old sunken rail line and although it is very effective at moving cyclists efficiently, it does have some drawbacks.

“The greenway does not feel vibrant or urban. It does feel low and a little secluded, and can impair your perception of space. It is a little eerie being so low down, as it is on a sunken rail line”

### **Car Culture:**

Car culture was a reoccurring theme during the interview process of this research project. Minneapolis seemed to experience a similar condition, where driving does not appear to be restricted or “dis-incentivised.”

“Once we turned onto the 35W it was multiple levels of freeways, going very fast, with tons of exits, 6-8 lanes of traffic out to a never-ending number of other municipalities and suburbs. Despite Minneapolis being so bike-friendly, there is a very prevalent car culture in the Metro Area. Everyone drives and they drive on what appears to be massively expensive freeways.”

**Bridges:**

In the literature, bridges have been described as important linkages in building effective cycling networks. Minneapolis is intersected by the Mississippi river and has a multitude of bridges connecting the east and west banks. The effort to build cycling specific infrastructure on bridges, creating linkages between the east and west sides of the Mississippi River is an essential component in connecting east and west Minneapolis, making a connected cycling network.

“I think one key to cycling success in the urban centre of Minneapolis is the quality cycling infrastructure on their bridges. There are so many bridges in this city that cross the Mississippi, and it is essential that these bridges are not choke points but linkages, and they are. The Washington Ave Bridge and the Stone Arch Bridge are particularly good which have entirely non-motorized levels.”

**Minneapolis in spring:**

The second research trip to Minneapolis in May of 2013 was conducted under sunny spring conditions, with temperatures consistently near 20 degrees Celsius. During this visit there was a greater focus by the researcher on the off-street pathway system, as this type of facility appeared to be most effective during the winter research visit.

**Off-Street Paths:**

During the second research trip to Minneapolis, careful attention was made to retrace many of the routes taken during the winter visit to generate comparable data of winter and summer conditions. The second visit resulted in a more impartial

observational experience due to the familiarity of the network. This allowed for greater critical analysis of the pathway system in Minneapolis.

“I rode on the west river parkway going north, towards the Cedar Lake Trail. Really nice route, great signs but there are still the usual challenges of shared / mixed trails. Despite being signed, conflicts exist between dog walkers and pedestrians.”

“...on to the Cedar Lake Trail that goes along the rail line which is one of the first “bicycle freeways.” It’s not the prettiest now, and is worn in spots, but it still does function well.”

Spring conditions, with temperatures near 20 degrees Celsius resulted in a greater number of users of the cycling network. This allowed for more participant analysis of people using the cycling facilities.

“I did notice that people tend to choose off-street infrastructure when there is a choice between the two.” (Example of what could be developed later – evidenced by what, to what affect)

Although there was increased attention given to off-street pathways on the second visit, on-street facilities were also observed. On-street lanes are a necessity in certain urban environments but there are challenges associated with these facilities, regardless of their location.

“The on-street lanes are just like Winnipeg’s, they work to the same degree. Users still battle with buses and right turns. Lots of broken pavement, cracks, silt, grit and debris in them.”

**Details:**

Similar to experiences and impressions during the winter research trip to Minneapolis the small details of quality signage, line painting and rider amenities such as mobile repair stations on the larger scale cycling facilities, contribute to making cycling a more convenient form of transportation.

“There were a number of mobile bike repair stations, which were really cool.”

One feature of the Minneapolis cycling network that was unable to be observed during the first visit was the *Nice Ride* bike share, as it does not operate during the winter. *The Nice Ride* stations were very accessible and many people were observed riding the yellow *Nice Ride* bikes. This program definitely raises the profile of cycling in Minneapolis.

“The Nice Ride system is really well used by all walks of life.”

A particularly interesting Observation occurred on the second research trip when crossing the municipal boundaries of Minneapolis, entering St. Paul on the East River Parkway. Despite this pathway continuing through both jurisdictions, the section of trail in St. Paul lacked the line painting and signage present on the Minneapolis side of the parkway. This greatly reduced the feel and flow of the facility despite the physical surface being largely the same. The off-street pathways in St. Paul felt very similar to several of the new off-street pathways that have been constructed in Winnipeg.

“Once I crossed the municipal lines into St. Paul, the cycling infrastructure was of lower quality.”

### **Night Ride:**

In April of 2013, an article written by John Metcalfe of the Atlantic Cities (2013) discussed the history of violence on the Midtown Greenway. Despite efforts by area advocates and volunteers to patrol the Greenway, there have continued to be conflicts on the Midtown Greenway, particularly at night. Exploring concerns that off-street pathways are more secluded, and therefore more likely to be unsafe, was an essential requirement of this research. While riding the off-street pathways at night, it became apparent security and safety, not from motor vehicles but from crime, is a real challenge for off-street cycling facilities such as the Midtown Greenway.

“My intention was to ride the Greenway at night, to address the criticisms that it is scary to ride when it’s dark. I was going to take the West River Parkway, but the Parkway was dark, secluded and definitely felt eerie, so I opted to go downtown and pick up the Hiawatha Trail.”

These observations noted by the researcher do support some of the criticisms, with regards to the perceived safety of the Midtown Greenway. It is important to note, as a young male, over six feet tall, I personally felt uncomfortable using off street pathways at night in Minneapolis. For certain users, such as older adults or young children, these conditions could be a major barrier to choosing cycling as a viable, primary mode of transportation at night.

**Network Integration:**

Cycling facilities in Minneapolis do serve as effective transportation arterials, while also linking these arterials to recreational and regional trail systems.

“A big asset is how the pathways link to recreational hubs such as lakes and parks in Minneapolis.”

**Diversity:**

As the process of this research evolved, it became apparent effective cycling infrastructure encourages a diversity of users to participate. The wide range of people observed riding bikes in Minneapolis is an indicator of the existence of a safe, enjoyable and efficient network.

“There were lots of older people out riding. There were also a number of young people, in what looked like a rolling classroom on their bikes, with their teacher, going places.”

“Saw lots of family fun on the paths and in the parks. There were many people pulling carriers with kids in them, older ladies out for a cruise and lots of “urban hipsters.”

The following excerpts have been selected from my ethnography journals generated in Winnipeg. Ethnography in Winnipeg followed the same protocol as used in Minneapolis.

## **Winnipeg in winter:**

Ethnography of Winnipeg was conducted shortly after returning from Minneapolis in both winter and spring, in an attempt to generate the most comparable data possible. The winter ethnography of Winnipeg was conducted beginning on March 1, 2013.

### **Heavy Snow:**

The first day of field research followed a heavy snowfall, similar in magnitude to the storm observed in Minneapolis. The snowfall showcased the resiliency of the bicycle.

“Wow lots of snow. The plows are out and the conditions seem much better than last night. Rode down Grosvenor and helped a lady get her car unstuck.”

### **On- Street:**

On- street cycling facilities in Winnipeg have become more popular in Winnipeg in recent years. The Assiniboine cycle track is a popular facility and its separation from vehicle traffic provides added comfort, even if its surface is snow covered.

“...turned left down Assiniboine. Even in winter, with lots of snow it was comfortable. It wasn’t plowed but was hospitable.”

Although some on-street facilities such as the cycle track still provide for a comfortable experience, non-separated on-street facilities did struggle.



The on-street facilities were a challenge when snowy / winter conditions exist. They “become really salty, sloppy, wet and it’s hard to see where the actual lane is.”

### **Network Fragmentation:**

In Winnipeg there seems to be an abundance of quality facilities that exist in relative isolation to one another. It appears the causes of broken linkages are barriers which are expensive or laborious to address when building active transportation facilities.

“I rode the bus rapid transit active transportation corridor along Stradbrook. This was really awkward. Once the path meets Donald St, the path becomes a sidewalk, and then joins with a shared pathway which ends as you approach the main BRT station located above the Osborne Underpass. The rider is now on the wrong side of the road at a major choke point.”

### **Off-Street:**

In recent years the expansion of Winnipeg’s off-street pathways system has gradually expanded. In order for these facilities to become high quality facilities, there must be greater attention to the details such as signage and paint.

“Winnipeg has lots of great off-street paths that have great potential, but good signage is essential to make the pathways in Winnipeg into marquis facilities.

In winter, an important detail which must be addressed in order for Winnipeg to have a usable year round cycling network, is a commitment to clear pathways of snow.

Consistent and timely plowing of off-street pathways demonstrates a commitment to supporting cycling as a year round activity.

“Off-street pathways do require a municipal commitment of maintenance and snow removal in order for them to be effective.”

### **Design Challenges:**

Harsh winter climates do pose restrictions on what design types can be effective in promoting year round cycling. New facilities in Winnipeg, such as the buffered bike lane on Pembina Highway, represents considerable progress but will need to evolve to be usable year round. Through much of the winter months, the buffered bike lane was blocked with snow.

“Today I rode to school on Pembina. The buffered bike lane from Plaza to Chevrier is still unusable.”

During winter research periods in both Minneapolis and Winnipeg, the on-street bike lanes were challenging to use. Regardless of the diversity of design approaches, riders using on-street facilities where there are heavy snowfalls are inherently challenged, due to the collection of snow, ice, water and grit in the curb lane, where on-street cycling facilities are typically located.

“In inclement weather, on-street lanes / cycle tracks aren’t great.”

In Winnipeg there are specific characteristics of roads and intersections that reduce the effectiveness of cycling infrastructure.

“There are many- awkward crossings on many of the new off-street greenways, dealing with yield islands and wide, high speed roads.”

### **Winnipeg in Spring:**

The intention of the ethnographic study conducted in Winnipeg during spring (May 23-24) was to travel and video-record the same routes covered in winter, to provide comparative data. The research focused heavily on travelling the off-street pathways, as these types of facilities became a research interest . Given the summer conditions allow for faster travel, I was able to cover approximately 120 km of pathways, lanes and other active transportation facilities over two full days of research.

### **Details:**

Separation of pedestrian and cyclist’s space through line painting or signage is an important requirement of shared use pathways, which maximizes efficiency and safety for pathway users. The majority of the shared facilities in Winnipeg do not adequately address this issue.

“I went down to the BDI (a local ice cream shop) and over the newly renovated pedestrian / bike bridge. There are numerous signs warning about pedestrian and cyclist interaction, but the lack of clear delineation seems to be problematic.”

Several of the new off-street pathways in Winnipeg are of high quality but lack the softer details which could elevate their effectiveness.

“The Bishop Grandin Greenway is a good facility but it could be excellent with some modest upgrades such as more frequent and visible signs, paint at intersections and consistent, direct, at grade crossings.”

### **Crossings:**

Intersections seem to be one of the most challenging aspects of designing effective cycling infrastructure. Intersections can become barriers to connectivity and do require careful attention to detail to do correctly.

“There needs to be a serious consideration for how they are going to deal with crossings at major roads when there are yields, especially at busy streets such as Pembina, Bishop Grandin and Fermor.”

In Winnipeg, there are several instances, where major off-street pathways parallel and intersect with busy high volume streets such as Bishop Grandin, Kenaston, Fermor, Lagimodière, Chief Peguis. Off-street pathway crossings at these major arterials are disjointed and require multiple roadway crossings to make the connections (Appendix B)

“Once making four crossings to connect the McGillivray bike path with Kenaston portion to the Bishop Grandin Greenway, the trail continues to a dead end.”

In addition to the physical design characteristics of intersections, lights and crossing signals need to be adjusted (Appendix B) to support cycling facilities that cross major roadways.

“High speed limits, long crossing distances and short crossing signals make it scary”

Crossings on some of Winnipeg’s off-street pathways also suffer from a lack of detail or prioritization of the transportation hierarchy of pedestrians, then cyclists, then motor vehicles.

“The North East Pioneers Greenway is a great facility. It is long at 5 km of paved surface (Winnipeg Trails Association, 2013) and direct, except the crossings are inconvenient and cater to motorists by deviating away from the direct line. There are no markings on the street to indicate that these crossings are heavily trafficked bike walk intersections. Drivers really didn’t seem to know this, turning right on greens or reds, they were oblivious to the path.”

#### **On-street facilities:**

On-street facilities in Winnipeg are comparable to those found in other cities. On-street facilities do provide some degree of raised awareness for cyclists but lack the ideal situation of physical separation from motor vehicle traffic.

“The on-street bike lanes are really nothing to write home about. They are very similar to what I experienced in Minneapolis.”

On-street facilities did seem to show signs of heavier wear than off-street facilities when compared with off-street facilities that are not shared with motor vehicles.

“There are a good number of downtown lanes, but many are quite worn, with markings and lines that can be hard to see.”

In dense urban environments, on-street cycling infrastructure seems necessary. The ideal situation would be an on-street facility which physically separates cyclists from motor vehicle traffic that is conscious of our winter climate. Cycle tracks could be the solution but do require the appropriate snow removal equipment (narrow plows), snow hauling and storage capacity and a commitment by municipalities to regular and consistent maintenance.

“Downtown only has so much space to work with, therefore bike lanes are a reality. Buffered lanes could be an effective upgrade, but are challenging to clear snow from in the winter.”

The effectiveness of Winnipeg’s first cycle track on Assiniboine Avenue is an example of a progressive on-street cycling facility.

“The Assiniboine Avenue cycle track is a good facility, especially with the recently completed separated and signaled cyclist and pedestrian crossing that feeds the downtown network.”

Perhaps one of the most encouraging observations during the Winnipeg ethnography was the construction and subsequent use of the separated and signaled crossing bicycle and pedestrian crossing at the Assiniboine and Osborne Street intersection.

“There were numerous people on bikes on the Assiniboine cycle track at the workday’s end, using the new bicycle interchange at Assiniboine and Osborne. The challenge is motorists still don’t know it’s there and they sit blocking the

crossing. On a positive note, the cyclist light at this intersection is an example of installing a piece of infrastructure that addresses a particular barrier.”

**Off-street facilities:**

Since 2009, there have been several off-street pathways built in Winnipeg that have the potential to be major active transportation arterials.

“...these are definitely exemplary pieces of infrastructure in Winnipeg that are really good for the city, and do serve as potential arterial, high volume off street pathways that have been so effective in Minneapolis.”

It seems off-street pathways, that serve both transportation and recreational functions, are least contentious amongst politicians and the public's perception. Newly constructed greenways such as the Chief Peguis Greenway are effective at providing access to naturalized space in urban environments.

“After riding the east / west direction of the Chief Peguis Greenway, I sat on a bench and learned of the native plant restoration initiatives from an informational sign on a billboard.”

The Thundering Bison trail in south west Winnipeg links both the Assiniboine Forest and *Fort White Alive!* allows cyclists to travel out of the city on separated pathways to popular recreational areas.

“The Thundering Bison trail near the Ikea store connects to the Harte trail, linking recreational facilities like the Assiniboine Forest and Fort Whyte Alive!”

Off-street pathways in certain areas of the city can function as an interconnected network if the initiative is taken by keen cyclists, but this process is far from intuitive.

“...this was a testament to the degree of connectivity of the network in the North East of the city. I could ride for so long and be on bike paths the majority of the time. The major criticism would be that there was not a single indicator, other than doing extensive consultation with the bike map, that any of these routes were intended to work together. The linking of these pieces through directional signs would go a long way in making these facilities more effective.”

### **Network Expansion:**

In areas of Winnipeg having significant commercial and residential development, there has been significant expansion of off-street pathways.

“...here the idea was to tackle the South West of the City where new development has occurred. As a result of this development, there has been a significant expansion of the cycling infrastructure in these areas.

### **Challenges:**

One of the most frustrating challenges when using the cycling network in Winnipeg is being directed to a cycling facility by the Winnipeg bike map which is inadequate or unsafe.

“It is really frustrating when regular sidewalks are called bike paths.”

“I rode down Waverley which has a fairly new off-street pathway. The facility is high quality initially. The pathway then transitions to a regular sidewalk with numerous approaches.”



### **3.4 Visual Analysis: Video and Film in Ethnography**

The objective of the visual analysis conducted in Winnipeg and Minneapolis was to illustrate the features of the cycling networks in these two cities in an authentic, visual medium which complements the researcher's ethnographic observations. Visual data was generated over the course of four field research sessions, during winter and spring in Minneapolis and Winnipeg. Digital photographs have been used as the primary data source for the visual analysis. Visual analysis followed a similar analysis methodology to coding of interview data with three rounds of sorting and reduction. The analysis of the visual data identified nine key themes, which have been illustrated and discussed in the following section:

- Awareness
- Bicycle economic development
- Bridges
- Progressive infrastructure
- Challenges
- Crossings
- Off-street cycling facilities
- On-street cycling facilities
- Signs

## 1.) Awareness:

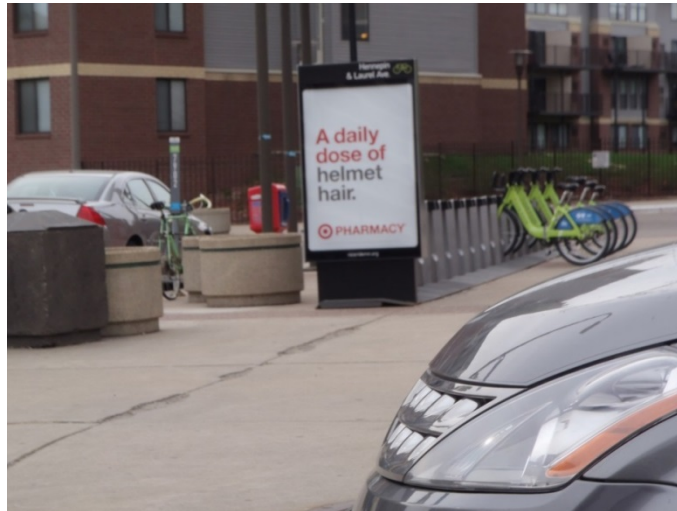


Image 1: This image illustrates the clever details the City of Minneapolis does to encourage people to consider cycling as a mode of transportation. This promotional sign is part of a *Nice Ride* bike share docking station uses humour to convey riding a bicycle is a good for a person's health. Pairing advertising that is encouraging of cycling with visible and accessible cycling infrastructure seems like an effective tool in promoting cycling in Minneapolis.



Image 2: Currie Park is a higher density residential neighbourhood in Minneapolis home to a large immigrant population. While riding through the neighbourhood there were a number of youth and an instructor conducting bicycle drills. It seems education and awareness are an important part in the promotion of cycling in Minneapolis.

## 2.) Bicycle Economic Development:



Image 3: The cycling culture is alive and well in Minneapolis. There a number of unconventional cycling based businesses which support

cyclists in the area. Cycling maps of Minneapolis clearly show where these businesses are located, in relation to cycling infrastructure. These businesses seem to be intentionally serviced by bike infrastructure, whether through on street lanes, paths, Nice Ride stations and bike parking.



Image 4: This bike-based business is located on the Midtown Greenway to serve the users of one of Minneapolis's most used pieces of cycling infrastructure. The Freewheel Bike centre is a combined café / restaurant, full service bicycle repair shop, retail outlet with products oriented to urban commuters as well as providing locker space and secure bike parking for rent.



Image 5: Inside the Freewheel Bike Centre there are lockers and shower space for commuters who need to change from their cycling attire to work attire. By addressing the practical needs associated with commuting by bike, it becomes more convenient and easier for people to choose cycling as a mode of transportation. (Minneapolis)



Image 6: Cycling infrastructure seems to be an appealing amenity in new housing options in Minneapolis. Along primary cycling facilities such as the Midtown Greenway there are several new higher density residential buildings with several more under construction. This could be an example of cycling oriented development.

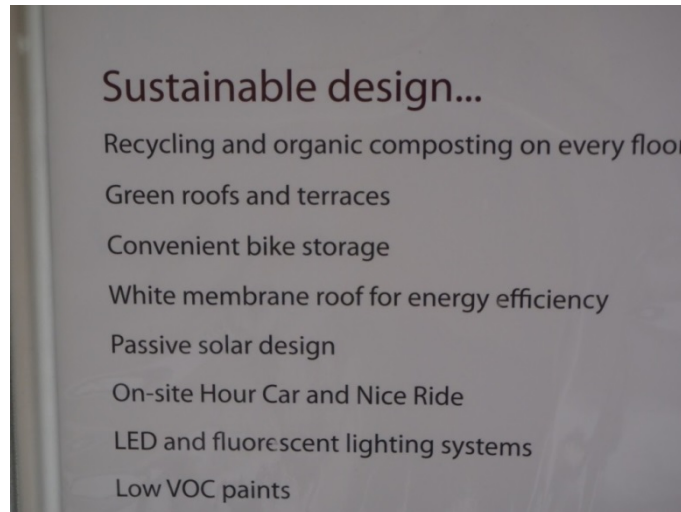


Image 7: These new condominium developments also list bike friendly features as assets that contribute to a more sustainable housing option. Of these sustainable features convenient bike storage and on-site *Nice Ride* bike sharing stations are listed. This photo suggests new urban, residential housing options are using cycling facilities to create more desirable living environments, illustrates how accepted and supported cycling is in Minneapolis.



Image 8: In vibrant neighbourhoods such as Up-Town, businesses seem to cater to pedestrians and cyclists, putting easily accessible bike parking at the front of business entrances. (Minneapolis)



### 3.) Bridges:



Image 9: While riding the cycling network in Minneapolis it became apparent there are many bridges in the city. Bridges can often be choke points for cyclists, acting as barriers and fragmenting cycling networks. In Minneapolis it seems there has been special attention to making their numerous bridges easily passable by bike, with trail connections at both ends of these bridges. This is an example of addressing physical barriers and investing in cycling infrastructure where it will be most effective, as opposed to building infrastructure where it is easiest to do.



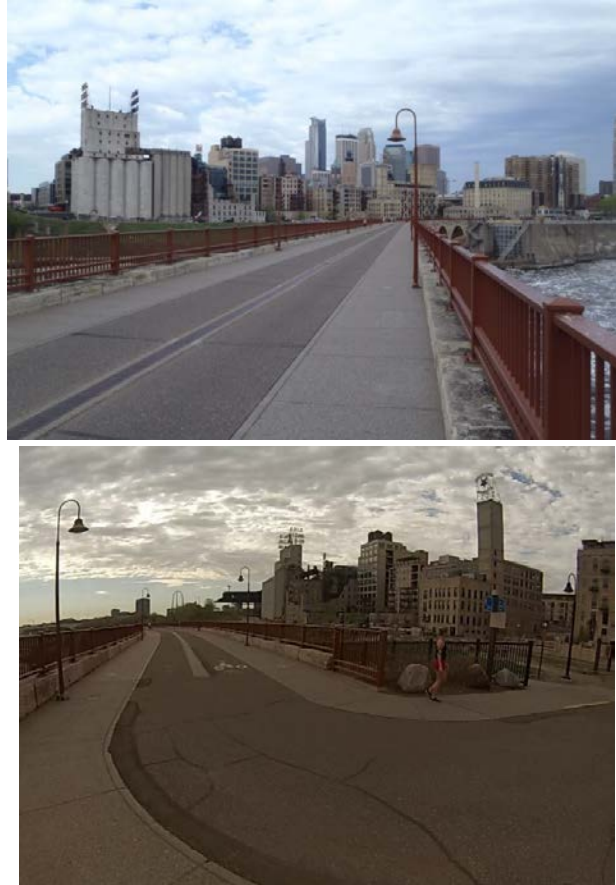
Image 10: The Washington Avenue Bridge connects the west and east campus' of the University of Minnesota. This two level bridge has a pedestrian / bike level having a covered tunnel on the upper level, with an automobile level on the lower level. This bridge is a strategic connection in the cycling network being used by numerous residents (and especially students) to cross the Mississippi river while being completely separated from traffic.



Image 11: On the upper level the directional bike lanes are clearly marked on the pavement of the Washington Ave. Bridge. Other key features are abundant lighting and a covered pedestrian tunnel in the middle for those cold, windy winter days. This bridge sees a lot of use



and despite being multi modal, the clear delineation of bike space and pedestrian space makes for primarily conflict free use. (Minneapolis)



Images 12: The historic Stone Arch bridge built in 1883 (Minneapolis Park and Recreation Board, n.d-c.), is an iconic piece of infrastructure in Minneapolis and is the second bridge in the city to have pedestrian and bike only surface. Adaptive re-use of old infrastructure to expand the cycling network is an effective practice in Minneapolis.



Images 13: The Sabo Bridge is an iconic piece of Minneapolis cycling infrastructure providing a key connection for the Midtown Greenway. The bridge is over the busy Hiawatha Street as well as an LRT line. This bridge was funded in part by a federal grant for non-motorized transportation. The bridge is an example of the commitment to addressing barriers that have the potential to fragment and discourage cycling, by avoiding the crossing of a busy high speed freeway. The Hiawatha Trail connects with the Sabo Bridge, making this a very well used part of the Minneapolis network.

The clear separation of cyclists and pedestrians (above right) reduces the conflicts between cyclists and pedestrians and benches encourage users to stop and take in the views of the Minneapolis skyline. The bridge has a striking design and demonstrates form and function are important to the City when building cycling facilities in Minneapolis.



Image 14: The Sabo Bridge is well maintained in the winter being regularly plowed as part of the Midtown Greenway. The off-street pathways in Minneapolis are guaranteed to be plowed within 24 hours of a snowfall. Separated facilities tend to do well during Minneapolis’ winter months.



Image 15: In Winnipeg, the Fort Gary Bridge connects the east and west sections of the Bishop Grandin Greenway. Bridges which accommodate active transportation infrastructure are becoming increasingly popular in Winnipeg with the Fort Gary Bridge, Provencher Bridge, Osborne Bridge and

Disraeli Bridge having active transportation facilities. Although this is a step forward in Winnipeg, by providing a plowed, widened and signed lane, there is no demarcation of the pedestrian and cyclist realm. This connection would significantly benefit from paint and signage separating cyclists from pedestrians making for a safer and more efficient crossing.

#### 4.) Progressive Infrastructure:



Image 16: The *Nice Ride* bike share is an example of progressive cycling infrastructure that seems to be effective at getting more people cycling in Minneapolis. Despite Minneapolis being a relatively small city (382,000 residents) the abundant number of docking stations is quite extraordinary and appears to be essential to its success. During the winter the *Nice Ride* program does not run, but in summer time there were a remarkable number of people on the yellow *Nice Ride* bikes.



Image 17: The dots on this map illustrate all the *Nice Ride* bike sharing stations in Minneapolis. As with any bike share, the key is easy access to docking stations in all parts of a city. The *Nice Ride* system seems very well used, with the highly visible yellow bikes being ridden by many people during the course of this visit.





Images 18: The traffic counters in the photos above were spotted in two locations in Minneapolis. A planner interviewed in Minneapolis indicated they are in a data gathering phase, with intention to provide abundant quantitative data on how well-used some of their cycling facilities are. The ability to obtain quantitative data on users is described in the literature as a major asset in gaining support for increased development of cycling infrastructure.



Images 19: There was an abundance of bike parking in Minneapolis, especially in areas with especially high cycling rates. The University of Minneapolis has several bike parking areas that were full at numerous times of day in both winter and summer.



Image 20: This stair track makes it easier to bring a bicycle up or down steps connecting an on-campus bike lane to the river parkways below. Such practical provisions show the level of commitment to making Minneapolis more bike friendly.



Image 21: At the edge of the University of Minnesota campus, this intersection uses a bike box to place cyclists ahead at intersections. This particular intersection also has a bike-only traffic signal giving cyclists a head start on vehicle traffic. This intersection was very busy, with students crossing to get to Dinkytown, the historic and popular university district.





Image 22: In Minneapolis there appears to be an effort to design cycling infrastructure in a visually appealing way. One example is this bike parking having interesting and artistic form. Such commitments to making pieces that are appealing in form as well as function help strengthen the cycling culture.



Image 23: On the Midtown Greenway there are a number of posts with various quotes and questions on them. Combining public art with active transportation infrastructure is effective in making these facilities becoming 'places', where people feel comfortable. These are examples of the smaller details which can elevate a facility from being good to great. (Minneapolis)

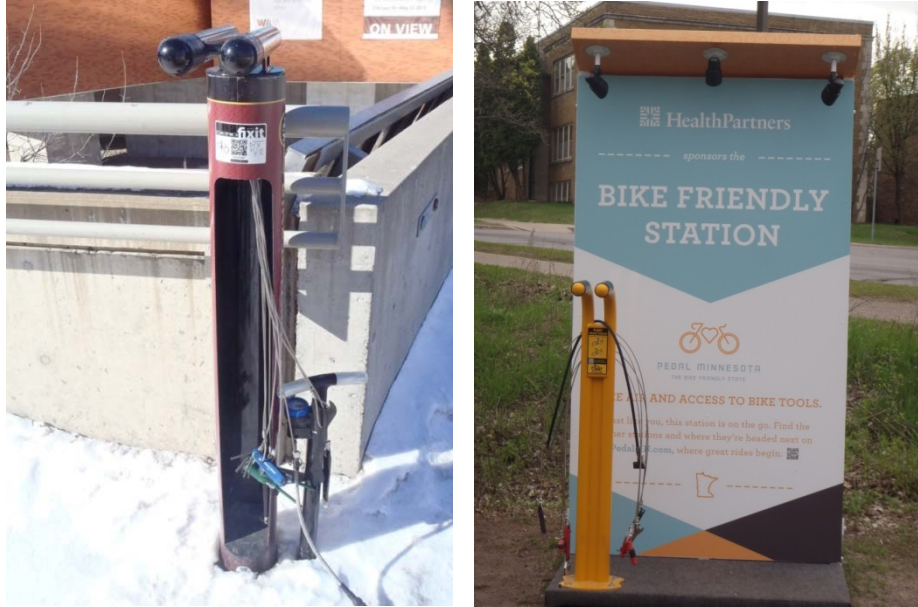


Image 24: There were many examples of features in Minneapolis that could be called “light infrastructure” which support users of the cycling network in Minneapolis. The repair stand on the right, complete with tools and an air pump was located on the University of Minnesota campus next to a large bike parking facility. There were several other stands as shown in the image on the left along various greenway and trails. I personally used the stand on the left on a number of occasions.



Image 25: Transit integration seemed to be done well in Minneapolis. The majority of transit buses were equipped with front mounted bike racks, many of which had bikes on them. Bike storage pods were located at many light rail stations, especially those in more suburban locations of the city where bikes would be more likely to stay locked up for longer periods of time by 9-5 commuters taking the LRT system to downtown.

## 5.) Challenges:



Images 26: Similar to Winnipeg, the burden of a long cold winter weighs heavy on infrastructure in Minneapolis. The section of road illustrated here is along one of the river parkways, a popular bike route. The marking of this pothole demonstrates the commitment by City departments to the details that make or break a cycling network. This is an example of the shared challenges of Winnipeg and Minneapolis in building cycling infrastructure.





Image 27: Despite efforts to provide continuous and connected off-street paths, there were examples of locations where continuity is challenged. In this instance, the pathway crosses the street due to a physical barrier (power line and trees) in the right of way. A clear desire line of an unofficial continuation of the pathway shows a better design alternative should have been considered.



Image 28: The complete separation of bicycles and automobiles on the Midtown Greenway makes for a safe and efficient cycling facility. Despite these advantages there are other challenges in this type of design. There were numerous emergency help phones along many of the off street paths that passed through more secluded sections of trail. There have been a number of documented instances of violence on the

Midtown Greenway despite such efforts to make it as safe as possible. Isolation and perceived safety against crime seems to be a major trade-off between off-street and on-street cycling facilities. Off-street pathways have fewer eyes on the trail but are separated from traffic, while on-street is better from a Crime Prevention Through Environmental Design (CPTED) perspective but forces cyclists to be in closer contact with automobiles. (Minneapolis)



Images 29: The East River Parkway runs along the Mississippi River flowing through Minneapolis and St. Paul Minnesota. The sign on the right hand side of the image is the city limits sign, here marking the end of the municipality of Minneapolis and the start of the municipality of St. Paul. Despite the path continuing from jurisdiction to jurisdiction, once a user crosses into St. Paul the painted lines and regular signage stop. Although the facility is still of high quality in terms of surface and

separation from the road, the marked separation of users are no longer a priority, resulting in a less desirable and functional trail. While riding this trail, once crossing into St. Paul, the trail felt very similar to some of Winnipeg's off- street pathways. The surface is of high quality with significant potential; it lacks important details such as signage and line painting.



Image 30: In Winnipeg the photo above shows an example of infrastructure being built where it is convenient while ignoring the barrier which fragments the piece of infrastructure. The off-street bike path completed as part of the first phase of the rapid transit route, directs cyclists from an off-street pathway onto a standard width sidewalk. Cyclists are then forced to walk their bicycles through a narrow underpass only to emerge on the opposite side, where the cycling path continues (see Appendix B).



Image 31: Regardless of signs and paint, there are inherent limitations associated with shared, off-street pathways. In this image a pedestrian is walking in the bike lane despite having a designated pedestrian space a few feet over. Although there is room for cyclists to pass the pedestrian, it requires those passing to ride into oncoming bicycle traffic. Pedestrians walking in bike lanes also increase the risk of being startled by faster moving cyclists, which could result in a collision. (Minneapolis)



Image 32: In Winnipeg, despite major progress in recent years, there are major gaps in some of the city's off-street pathway networks. The gap illustrated is particularly challenging (at Bishop Grandin and



McGillvray), where the Bishop Grandin Greenway ends providing few options other than to backtrack to Pembina Highway. Given this gap is located along roadways with high speed limits, and high traffic counts, the funnelling of cyclists to this area could be dangerous.



Images 33: Off- street pathways in Winnipeg are becoming increasingly popular and represent a paradigm shift taken by decision makers in the city, with off-street facilities being incorporated into most new large scale residential developments. A challenge these facilities share is their complicated crossings due to yield islands and other engineering standards. Cyclist / pedestrian oriented crossings would greatly improve the connectivity, efficiency and safety of these facilities.

## 6.) Crossings



Image 34: These push button activated crossings are common in Minneapolis providing opportunity for cyclists to activate crossing signals without long wait times at intersections.



Image 35: At this particularly high traffic intersection there is a signaled crossing that is activated by a push button. Paint on the pavement as well as clearly visible signs make for a safe and functional crossing. Other nice details include a bicycle oriented stop sign and way finding signs. (Minneapolis)



Image 36: At this crossing along the Midtown Greenway, the right of way is given to cyclists and pedestrians, with stop signs for motorists only. This intersection has highly visible signs and warnings to both cyclists and motorists. (Minneapolis)



Image 37: At-grade crossings are a key feature of good cycling networks. Here, the design has incorporated a textured pavement at the intersection to bring greater attention to an area of potential conflict between cyclists and motorists. These facilities tend to also work well in winter time, and appear relatively easy to plow due to their at-grade design. (Minneapolis)



Image 38: This bike path intersection is designed very similarly to a standard road way intersection. The stop signs, directional signs and pavement markings make this intersection easy and safe and efficient. (Minneapolis)





Image 39: This Winnipeg crossing is an example where design which prioritizes efficient automobile movement presents substantial challenges to cycling infrastructure. In order to connect the east and west sides of the Bishop Grandin Greenway on either side of Pembina highway, a cyclist must make four busy high speed road crossings (above left). An especially challenging feature is the yield islands common on many higher volume Winnipeg roads. If high speed roadways are to be crossed as part of a cycling network there needs to be special attention to making these crossings as safe as possible. This crossing as part of the Bishop Grandin Greenway (above right) crosses the high volume / high speed Waverley Ave, with no special markings, signage or even adequate crossing signal durations. In this particular instance, there were bags covering the crossing signals.



Image 40: This is perhaps one of the most blatant examples of low quality design of a cycling facility in the Winnipeg cycling network. This high median fragments the Niakwa Trail, and requires cyclists and pedestrians to take substantial detours to connect to the other side. This is an example of a design that does little to support or incentivise cycling and presents danger to any cyclist attempting to make the crossing.

## 7.) Off Street Facilities:



Images 41: Prior to visiting Minneapolis I had been primarily focused on how to address the challenges of on-street cycling infrastructure and it wasn't until the first research visit to Minneapolis it became apparent how reliant they are on off-street pathways. Off-street pathways seem to be far more effective in winter months than the on-street infrastructure in place. There also seemed to be far more users on the off-street paths, and far more diversity amongst those users (men, women, children). Off-street paths seem to comprise the main arterials of the Minneapolis bicycle network. The river parkways travel through linear park space which runs along the north / south banks of the Mississippi River. The West River Parkway is approximately 14 km in length and is a major section of the Grand Rounds scenic by-way (Rails to Trails Conservancy, 2012). At numerous points along the river parkways, there is easily accessible bike parking (above left). Often these parking spots are at lookout points or nature trails along the river



banks. These pathways do function well as transportation arterials but also accommodate recreational cyclists, seeking a casual ride in a naturalized space. Cycling facilities which accommodate mothers and their children are a good indicator of an effective and accessible cycling facility (above right).



Images 42: These pathways not only separate motorized and non-motorized modes of transportation; they also clearly separate pedestrians and cyclists. Over the course of this research physical separation of transportation modes has become an increasingly important topic in understanding effective cycling infrastructure design. (Minneapolis)



Image 43: The Hiawatha Trail is an example of a high quality arterial cycling route in Minneapolis. It seems the City invests significant funding and effort into developing several high capacity, high efficiency, quality routes in an attempt to develop a type of bicycle freeway. These routes are off-street and separated from traffic, with on-street facilities used as connectors, or in areas where density is prohibitive of off-street facilities.



Images 44: Despite cold and snowy conditions in Minneapolis, there were cyclists of all types using the Midtown Greenway during the winter research trip.



Image 45: Plow tracks on the bike path indicate regular winter maintenance / snow removal on these facilities. It seems off-street infrastructure is easier to plow with standard equipment than on-street infrastructure such as bike lanes and cycle tracks. (Minneapolis)



Images 46: Arterial cycling routes are quite wide and easily accommodate passing room in both direction of traffic. During the spring research visit there was far more walkers, rollerblades, dog walkers, scooter riders etc. on the pathways. Despite the mix of greenway users, there was relatively little conflict amongst these users. (Minneapolis)





Images 47: The Cedar Lake Trail in Minneapolis was described as being one of America's first bicycle super highways (top left and right). The Cedar Lake Trail connects the West River Parkway with the Midtown Greenway, and runs parallel to a large railway track (bottom left). In addition to providing connection to larger commuter routes, the Cedar Lake trail connects to a number of naturalized spaces and regional trail systems that can provide access to beautiful natural spaces, here crossing a stream (bottom right).



Images 48: In Winnipeg, shortly after a heavy snowfall, the off-street pathways have yet to be plowed. This section of pathway is one of the few in Winnipeg that establishes cyclists as having the right of way as indicated in this sign. Challenges do exist in using off-street infrastructure, as they do require dedicated and specific maintenance schedules. Following this heavy snowfall, this trail is virtually impassable.



Images 49: Despite having little funding available for Active Transportation infrastructure maintenance, this section of the Bishop Grandin Greenway (above left) was plowed within 24 hours of a major snowfall. The equipment used to plow this section appeared to be a standard front end loader. The quality of Winnipeg's off-street pathways is very good and comparable to those built in Minneapolis. On this particular day, following a heavy snowfall many of the off-street

pathways I used had been cleared (above right) and were in far better condition than neighbouring residential streets.



Image 50: The Niakwa Trail pictured here represents another example of a quality off-street pathway built in recent years in Winnipeg. There is a remarkable amount of new pathways built in the southern portion of the city. These facilities are of high quality but do lack small details such as clear signage and thoughtful crossing design preventing them from being evaluated as “great.”



Image 51: Above illustrates an example where a standard width sidewalk has been deemed a bicycle path, to connect cyclists to the Bishop Grandin



Greenway. The use of sidewalks as bike paths can present serious problems for cyclist / pedestrian conflicts. This can be particularly problematic when cyclists are directed towards these facilities by City bike maps, funnelling cyclists into potential conflict zones. (Winnipeg)

#### 8.) On-Street Facilities:



Images 52: Above is an example of a piece of quality on-street cycling infrastructure in Minneapolis. This painted green lane begins (above left) after crossing one of the busier intersections at the University of Minnesota Campus. The lane does transition between painted white lines and solid green sections located at key intersections. Despite heavy bus and pedestrian traffic, this lane guides cyclists through campus effectively. The above lane connects with other quality cycling facilities including a bike box and cyclist signalled intersection at

University Avenue, connecting to the Washington Avenue pedestrian and Bike Bridge.



Image 53: In the photo above, where dense urban spaces, on-street painted lanes are often the best possible options for accommodating cyclists. Similar to Winnipeg, the painted lanes in Minneapolis take serious wear in winter months and do require regular maintenance in order to be visible and effective.



Image 54: Paint is used very effectively in Minneapolis on both on-street and off-street facilities. Line painting and signage is used to

clearly demarcate pedestrian and cyclist realms. Stencils are used effectively in Minneapolis, helping with way-finding as well as identifying potential areas of conflict with pedestrians or motor vehicles.



Image 55: This digital sign on Hennepin Avenue offers an example of effective signage. Bringing attention to the bike lane on a busy street makes this particular facility feel much more comfortable. (Minneapolis)



Image 56: Despite being a well-designed cycle track, during periods of heavy snowfall, on-street facilities are challenging to clear snow from.

This facility was more comfortable to ride on than with vehicles on a roadway that had been cleared of snow, but it was much harder to pedal and stay upright. (Minneapolis)



Images 57: The Assiniboine Cycle Track in Winnipeg is another example of a high quality facility which functions well in summer months but with heavy snowfall becomes challenging to clear snow from (above left). The physical separation makes this style of facility more hospitable for cyclists in all conditions, but when snow covered, it is challenging to use. Narrow on street infrastructure can be challenging in summer months as well, with debris collecting in the narrowing used to create bicycle boulevards (above right).





Image 58: In Winnipeg, on-street cycling infrastructure remains a contentious issue. The political commitment to these facilities seems inconsistent, with cycling facilities often taking a lesser priority to other infrastructure projects. The Assiniboine cycle track is one of Winnipeg's most prominent cycling facilities but has been partially closed for three years due to adjacent condominium construction.

## 9.) Signs:



Image 59: Clear delineation between the pedestrian and cyclist realm is a very important feature of the off-street pathways in Minneapolis.

Along the river parkways these signs help to ensure both pedestrians and cyclists have conflict free use of space.



Image 60: Signs on the pavement were common in Minneapolis. This sign on the Washington pedestrian bridge continually reminds users how to avoid conflict.



Image 61: Similar to a freeway system, signs are used along arterial pathways such as the Cedar Lake Trail and the Midtown Greenway to direct users to prominent streets or destinations. These way finding

details are helpful in orienting pathway users on facilities removed from signed streets. (Minneapolis)



Image 62: Pathway use in Minneapolis serves both transportation and recreational purposes. City staff has taken special attention to mark trails that service downtown locations as commuter routes. These routes are direct and efficient rather than meandering and scenic.



Image 63: These signs emphasize cyclists as having a priority on pathways along one section of the chain of lakes trails. Minneapolis does a great job of providing visible and prominent signage that clearly indicates where cyclists have right of way.



Image 64: This intersection provides detailed signs for cyclists and motorists. This is one of the few crossings required on the Midtown Greenway, with cyclists being given right of way. Clearly signing this



intersection shows the attention to detail that makes this cycling facility safe and functional. (Minneapolis)



Image 65: This sign brings attention to a head start green box at an intersection close to the University of Minnesota. Effective signs inform all road users including motorists and cyclists.



Image 66: It was exciting to see such crowded bicycle path signs. Directions and distances are helpful in the way-finding process for cyclists. (Minneapolis)



Image 67: The signs along the Assiniboine cycle track in Winnipeg are quite small and can be a challenge to read. Although they do differentiate uses, it is not uncommon to see automobiles driving down this cycle-track.



Image 68: There are many signs along active transportation routes in Winnipeg that indicate cyclists are to dismount and walk across intersections. This is very inconvenient for users, requiring dismounts on a block by block basis. These signs reinforce cycling as a subordinate form of transportation to the automobile.



Image 69: The signs on Winnipeg's active transportation pathway adjacent to the bus rapid transit line are small and difficult to see. While riding this facility, if it weren't for these small signs, it would be very hard to know this corridor is intended to be a multi-use path as it appears to be a wide sidewalk.



Image 70: This sign on Winnipeg's Niakwa Trail, adjacent to Fermor Avenue does many things right. While being visually appealing and listing distance travelled, it is small and low making it challenging to read at cruising speeds.

The above format in the visual analysis has been adopted to provide detailed captions which accompany the visual data. This required a necessary adaptation in format to allow commentary to be provided in context of the images.

## **Chapter 4: Synthesis and Recommendations**

Recommendations provided in this document could contribute to designing and implementing a higher quality cycling network in Winnipeg. This research project has aimed to better understand what design characteristics of cycling infrastructure are most effective in cities with harsh four season climates, as in Minneapolis and Winnipeg. By conducting field research and interviews with a variety of stakeholders, research findings are synthesized into nine recommendations that could contribute to the improvement of the cycling environment in Winnipeg, as well as provide usable recommendations for other budding cycling cities with similar climates. Although this research has focused largely on infrastructure design, it is important to acknowledge there are numerous nonphysical influences required in developing safe, efficient and inclusive cycling networks. In order for cycling to become a viable form of transportation in any city, a holistic approach must be taken, factoring in physical infrastructure, citizen engagement and political support. This research project has focused on delivering pragmatic and applicable recommendations for improving Winnipeg's cycling network and has been guided by three primary research questions as indicated in section 4.1.

### **4.1 Responding to Research Questions**

By addressing the themes in the research questions throughout the course of this project, a number of focused recommendations were developed that can be used

by planners, politicians and advocates in developing safe, efficient, accessible and resilient cycling networks. Below, a general response to each research question is provided, explaining how the key lines of inquiry used in this practicum have addressed the questions

**Research Question 1:** How has adopting extensive cycling infrastructure in Minneapolis been successful despite their four-season climate? What can be learned from their experience to better equip the City of Winnipeg and local organizations?

The opportunity to conduct research on a high quality cycling network as found in Minneapolis was a key factor in formulating many of the recommendations in this practicum. The lessons learned in Minneapolis are particularly valuable given their geo-climatic similarities to Winnipeg. By conducting ethnography and visual analysis in Minneapolis, it became apparent they have developed a network of off-street pathways which provide a resilient and year round cycling network. The context specific approach employed in Minneapolis, which utilizes their abundant park space and reclaimed rail corridors, illustrates the development of a cycling network must be tailored to the opportunities and challenges of each individual city. In addition to the traits of physical infrastructure utilized in Minneapolis, their experiences have also demonstrated the importance of dedicating consistent funding toward the development and maintenance of active transportation facilities. Minneapolis has also demonstrated political support and a commitment to developing effective cycling facilities through experimentation, is a contributing factor in the development and success of their cycling network.

**Research Question 2:** What are the specific design elements that facilitate the development of safe and convenient cycling infrastructure in cold weather cities?

By experiencing different cycling environments in different climates over the course of this research process, it became apparent certain types of cycling facilities are more effective in winter conditions. Off street pathways were identified as being the most feasible in regards to snow removal, requiring no special equipment to maintain during winter months. Off-street pathways were also favoured amongst cyclists as their complete separation from motor vehicle traffic offers a safer cycling environment. On-street pathways were acknowledged as necessary in certain environments such as high density urban spaces, but were found to be inherently challenged due to the accumulation of water, grit, snow and ice that occurs in curb lanes where on-street bike lanes are often located. Cycle tracks and buffered bike lanes were also identified as being safe and effective cycling facilities in summer conditions, but they posed challenges for snow removal. The fixed on-street barriers which characterize cycle tracks are challenging to maintain in winter months as they are inaccessible by traditional snow removal equipment. This challenge often results in cycle tracks being obstructed with snow during winter months or being damaged due to attempts to clear snow using the equipment that is available. When exploring the question of what types of cycling infrastructure is most effective in winter months, the most important characteristic seemed to be physical separation of cycling facilities from motor vehicles.

**Research Question 3:** What are Winnipeg's strengths that can be used to create a more connected and efficient cycling network in the city? What are Winnipeg's specific barriers to increasing the success and use of its cycling network?

Over the course of the research process a number of strengths and weaknesses surfaced in relation to Winnipeg's current cycling climate. Common challenges listed included a strong car culture, reluctant political commitment and low connectivity of cycling facilities. Contrary to popular belief, winter was viewed by many participants as a minor inconvenience that can be addressed through proper infrastructure design and clothing choices. Many participants indicated if quality separated cycling facilities were built and cleared of snow on a regular basis; winter cycling in Winnipeg would be far more common. In terms of strengths and opportunities, Winnipeg has demonstrated significant progress in expanding its cycling network during the last eight years. Research participants from all three professional categories (planners, politicians and advocates) indicated the progress made in recent history has been excellent, but momentum needs to be continued in order to develop an effective cycling network.

## **4.2 Recommendations:**

Based on findings guided by the above research questions, nine recommendations follow to aid the development of a more connected, safe, efficient, resilient and accessible cycling network in Winnipeg. The nine recommendations include:



- Effective cycling infrastructure requires a context specific approach.
- Always plan with the network in mind.
- Design for diversity and inclusion.
- Build new facilities to address gaps and barriers.
- Details matter! Do sweat the small stuff.
- Physically separate transportation modes wherever possible.
- Foster a supportive political climate for active transportation projects.
- Seek out allies and work towards the goals of health, happiness and good government.
- Actively engage citizen cyclists and advocacy groups in designing and improving cycling facilities.

The recommendations put forward in this practicum build upon previously established recommendations established from the literature reviewed including:

- Bicycle infrastructure needs to be connected and of high quality.
- Changes to transportation systems need to take a holistic approach integrating education, quality infrastructure, incentives, disincentives and political leadership.
- Transportation policy needs to reflect the changes in transportation habits of the next generation, while finding better ways to evaluate the net benefits of alternative transportation methods in North America.

## **Recommendation 1: Effective cycling infrastructure requires a context specific approach**

When considering what type of facilities will be used to expand a cycling network, design solutions must take into account the specific context in which they are going to be built. In active transportation literature, examples of design approaches used in Denmark, the Netherlands and Germany are often described as “gold standards” from which cities who wish to expand their cycling networks should draw inspiration. Although the extensive cycle track systems in places like Amsterdam, Copenhagen and Berlin are undoubtedly effective, they have been products of their specific environments, taking into account density, climate and other land use constraints. Minneapolis capitalized on abundant park space to anchor a network of off-street pathways physically separated from automobiles and easily maintained in winter and summer, featuring a tailor-made solution that works in that city, based on its strengths and weaknesses. If Winnipeg is to succeed in creating a safe, connected and efficient cycling network, there needs to be careful evaluation of strengths, weaknesses, challenges and opportunities to understand what type of facilities are most effective in our climate and where are the most effective places to locate arterial cycling routes. This will require collaborative planning amongst a number of City departments, local advocacy groups, politicians and citizens, but is essential in establishing the foundation from which the network can prosper.

Comprehensive and consultative planning process which assesses the specific active transportation considerations of Winnipeg must occur to guide the long-term development of Winnipeg's cycling network. The facilitation of such a process would benefit greatly from the skills of professional planners. A recent *Winnipeg Free Press* article (Kives, 2013) announced the cancellation of the City's recently initiated *Pedestrian and Cycling Study*. The article states the \$400,000 dollars previously allocated to hire active transportation consultants will instead be used to build new cycling facilities. This is a prime example of the City's apparently directionless approach to planning for active transportation. Prior to the cancellation of the *Pedestrian and Cycling Study*, the City had demonstrated significant progress in the support of active transportation by committing to a long-term planning effort to guide the development of walking and cycling in Winnipeg. The cancellation of the *Pedestrian and Cycling Study* is the latest example of inconsistent political support for long term planning in Winnipeg. During the review process of this practicum, it was announced the *Pedestrian and cycling study* has been resurrected, with a reduced budget of \$330 000 (Kives, 2013). The return of the *Pedestrian and Cycling Study* is a positive development in the support of cycling and walking in Winnipeg, but will require a careful examination of Winnipeg's active transportation network and a supportive political environment to address the recommendations it puts forward. The development of supportive planning policy in Winnipeg, as a result of *Our Winnipeg* and the *Transportation Master Plan*, a strong cycling advocacy community and citizen demand for more cycling infrastructure in Winnipeg strongly supports the further development of the cycling

network in Winnipeg. A rigorous, long term active transportation study could be the missing piece in the establishment of Winnipeg as a bike-friendly city. For this reason it is essential the *Pedestrian and Cycling Study* be developed with the utmost care.

- Requires a comprehensive assessment of the cycling network in Winnipeg
- Requires involvement by City of Winnipeg staff and Council, active transportation specialists and citizens of Winnipeg
- This is a long term initiative

#### **Recommendation 2: Always plan with the network in mind**

Feedback from a number of interview participants stated a major weakness of Winnipeg's cycling network is its lack of connectivity. Although there have been significant increases in the volume of cycling infrastructure in the city in recent years, these new facilities do not mesh into a complete and cohesive network. An important characteristic in effective cycling networks is the ability to go from destination to destination in a quick, convenient and safe manner. Effective cycling infrastructure closes gaps, reduces risks and addresses barriers thereby encouraging people to use bicycles as a mode of transportation. Disjointed cycling routes, funneling cyclists from quality pieces of infrastructure into dangerous choke points, are stressful and hazardous. Investing in quality pieces of cycling infrastructure not connected to one another does little to encourage people to ride their bikes. Quality facilities leading to dangerous bridges, intersections or underpasses have the potential to be even riskier

than routes without cycling infrastructure, as they are directing cyclists in high volume from quality facilities to potential conflict areas. Effective cycling infrastructure must connect destinations, be convenient and be of high quality (Rohl, 2012). When new facilities are being built in Winnipeg, it is my opinion the priority should be less on volume and more on quality. Attention should be paid to closing gaps, crossing bridges and underpasses and retrofitting intersections to provide a few key continuous, quality, connected routes, as opposed to uncoordinated expansion, in an attempt to increase linear totals of active transportation infrastructure.

Similar to the first recommendation, developing a quality, connected cycling network requires detailed and consultative planning. Developing a connected cycling network requires gaps be identified and addressed. In order for these gaps to be addressed, a planning process led by City staff and active transportation consultants which effectively engages the advocacy community, as well as citizens, is the only way to develop ground level improvements to Winnipeg's cycling network. Consultation could take the form of design charrettes, open houses, focus groups or any other methodology that allows for qualitative assessment of cycling facilities. Network connectivity is an issue of quality rather than quantity. Improving connectivity requires attention to details that are important to ground level users. For this reason meaningful consultation, which encourages all potential users of cycling infrastructure to provide qualitative feedback on the routes they use on a regular basis would be the most effective component in improving network connectivity in Winnipeg.

- Prioritize infrastructure projects that close gaps in the existing cycling network
- Involves the City of Winnipeg staff and Council, active transportation specialists and the citizens of Winnipeg
- Long term initiative

### **Recommendation 3: Design for diversity and inclusion**

Effective cycling infrastructure should encourage a diversity of individuals to ride bicycles as transportation. In many cases, on-street cycling infrastructure without physical separation from motor vehicle traffic, such as bike lanes, do little to encourage new or potential cyclists. These facilities were described as being catered to committed and experienced cyclists by participants in this research process. In order for cycling to become an accepted and viable transportation option, it should be encouraging and appealing to all walks of life. When I attended the Bicycle and Urbanism Symposium in Seattle, Washington in June of 2013, there were numerous discussions around “indicator species” which can be monitored to assess the health and accessibility of a cycling environment. Individuals at the symposium stated the healthiest cycling environments will be used comfortably by a mother with her young children. By changing our perspective on who should be able to safely travel through urban environments by bicycle, there is an opportunity to greatly increase the inclusivity, and thereby mode share of cycling in Winnipeg. In order to increase ridership amongst a wide variety of individuals, facilities need to be safe, convenient and consistent. One of

the most effective ways to create facilities which encourage diversity is to physically separate cyclist space from motor vehicles. A concentrated effort to enact a paradigm shift in the transportation consciousness of Winnipeggers, calls for cycling facilities to be safe enough for grandmothers and young children. This would significantly elevate the quality of cycling facilities in Winnipeg.

Consultation and engagement has emerged as an essential component of many of the recommendations in this practicum. Many of these recommendations offer suggestions on how to improve the quality of cycling facilities in Winnipeg. The ethnographic and visual analysis methodologies were employed in this practicum to better understand and communicate ground level conditions of cycling networks in Winnipeg and Minneapolis. Understanding the user experience is an essential component in the development of accessible and effective cycling infrastructure. Over the course of this project, research revealed design characteristics of cycling facilities greatly influence the demographic of cyclists who use them. Several interview participants also stated cycling facilities such as on-street bike lanes are viewed as adequate for a very small portion of the cycling community and do little to encourage new users. Research also indicated the most basic feature of inclusive cycling infrastructure was physical separation from motor vehicle traffic. A planning process built upon meaningful engagement with a broad cross section of cycling network users would provide the basis for cycling facilities attractive to all users. In addition to in-depth consultation with a diverse group of cyclists, consultation with non-cyclists could

also be a valuable experience. Talking to non-cyclists could inform planners and designers about the factors preventing people from choosing cycling as a transportation mode and could further inform the development of inclusive cycling infrastructure design. Focus groups could be a useful tool for generating dialogue amongst a diverse group of participants.

- Target outreach to older adults, women and children
- City of Winnipeg staff, citizens of Winnipeg and cycling advocacy community
- Long term initiative

#### **Recommendation 4: Build new facilities to address gaps and barriers**

Similar to an earlier recommendation emphasizing the importance of network connectivity, building cycling infrastructure that reduces conflict in hazardous areas, is an effective way to increase the quality of a cycling network. Physical features such as bridges, underpasses, high volume / high speed arterial streets and rapid transit corridors all have the ability to fragment or connect cycling routes. Similar to Winnipeg, Minneapolis is intersected by a large river. The numerous bridges in Minneapolis have been adapted to accommodate cyclists, including two bike / pedestrian-only facilities. These bridges are key linkages in the Minneapolis cycling network and represent an efficient use of resources in making Minneapolis more bike-friendly. Strategic investment in cycling infrastructure that addresses potentially dangerous and divisive



physical features is another example where money spent on quality is more effective than increasing the volume of the network.

In addition to the aforementioned physical barriers, climatic challenges must also be considered when developing and designing new cycling facilities in Winnipeg. Cold winter weather and heavy snowfalls are often mentioned as barriers to cycling in Winnipeg. Despite these statements, many participants stated more people would cycle year-round in Winnipeg if there were adequate cycling infrastructure consistently maintained throughout the winter months. Advancements in clothing and winter cycling equipment, as well as increased awareness and education by numerous local advocacy groups about winter cycling, have made choosing a bicycle as a year round transportation mode significantly more feasible. Regardless of knowledge and equipment choice, winter cycling does require a decent surface to ride on. Physical separation of cars and bicycles that is cleared of snow is the ideal form of cycling infrastructure for winter climates as demonstrated in cities such as Minneapolis, Minnesota and Oulu, Finland, which both rely heavily on off-street pathways (Swanson, 2013). Developing cycling infrastructure usable 12 months per year is not only a more effective form of service delivery; it also maximizes the investments made in active transportation infrastructure. Building climate conscious cycling infrastructure which effectively addresses weather -related challenges represents another step for increasing the usability of the cycling network in Winnipeg.

- Identify and address gaps and barriers in the current cycling network

- Involves City of Winnipeg Staff, citizens and advocacy community
- Intermediate term initiative

**Recommendation 5: Details matter! Do sweat the small stuff.**

In many instances, municipalities measure and researchers compare the success of their cycling networks based on the number of kilometres of cycling or active transportation infrastructure in their cities. Although linear totals of cycling infrastructure are important, the quality of these facilities is more influential to their success. Two of the most important yet often neglected details include good signage and effective paint.

The use of signs to indicate exits, trail connections and prominent locations is extremely important in providing way finding, particularly on separated off-street pathways or trails. Signs and pavement markings also highlight areas of potential conflict among cyclists, pedestrians and motorists. Intersections benefit greatly from prominent and highly visible signs at high-volume cycling facility intersections. Signs are also effectively used to demarcate transportation realms on off-street pathways. Clearly separating pedestrian and cycling space on pathways greatly increases the efficiency and safety of all forms of active transportation. Regular and consistent use of signs and pavement markings greatly increases the profile and user experience of cycling infrastructure. Effective signs must be visible from a distance and at users riding speeds. An example which illustrates the influence signage can have on the quality of cycling facilities in St. Paul Minnesota has been described in greater detail on page 119 of this

practicum. Attention to detail in the form of consistent and visible signage has the potential to elevate many of the off-street cycling facilities in Winnipeg from good to great.

Paint is another small detail that represents the difference between excellence and mediocrity. Line painting separates transportation realms, such as pedestrian space and cyclist space. Line painting also establishes direction of travel, contributing to a more orderly and efficient use of these facilities. In several instances during field research in Winnipeg, the lack of line painting on off-street pathways led to a “free for all” use of pathways, often resulting in conflicts between cyclists, pedestrians, dog walkers and other active modes. Paint, similar to signs, needs to be highly visible by cyclists, pedestrians and motorists. Painted pavement at prominent intersections where there is transportation modal mixing, is a good way to avoid conflict between facility users. In Winnipeg, an example of a situation that could be greatly improved by the use of paint is the recently completed buffered bike lane on Pembina Highway. This new cycling facility uses a creative bus stop detour (see Appendix B) to reduce the conflict between frequent transit service and cyclists along Pembina Highway. These detours direct cyclists onto what has traditionally been a pedestrian realm behind bus shelters, and then back onto the road surface. On several occasions while using this facility, I encountered pedestrians waiting for the bus, standing directly in the cyclist lane. Painting these detour routes bright green could improve the facilities effectiveness

through a relatively inexpensive and easy to implement upgrade, increasing the safety and efficiency of an otherwise quality, innovative piece of infrastructure.

A final recommendation regarding the need for attention to detail is developing thoughtful solutions to intersections between off-street cycling pathways with arterial streets. There are several examples in Winnipeg where quality active transportation facilities have been built that are fragmented by thoughtless crossing design. Conflicts include placing extremely high medians between connecting ends of the Niakwa Trail, the repeated indirect, car-oriented crossings of the North East Pioneers Greenway and the multi-step crossings of the Bishop Grandin, McGillivray, Lagimodière and Chief Peguis active transportation corridors (Appendix B).

The aforementioned facilities are examples where “near greatness” was achieved, but a careless or cost-averse approach was taken in places where thoughtful design and implementation were most important. Developing a standardized active transportation crossing for situations where off-street pathways intersect with major arterials, where yield islands are present, would greatly improve the effectiveness of these otherwise quality active transportation facilities.

- Install consistent and visible signs and paint
- City of Winnipeg Department of Public Works and Urban Planning
- Immediate term initiative

## **Recommendation 6: Physically separate transportation modes wherever possible**

The separation of motor vehicles and cyclists was described by many participants as one of the most effective design characteristics for encouraging greater participation in cycling as transportation. As recommended earlier, in order for cycling to become a more accepted and successful transportation mode, accessibility and inclusivity need to be emphasized. Many new to cycling or those interested who are considering cycling for transportation are apprehensive about cycling in mixed traffic along with automobiles. This is especially relevant in Winnipeg where speed limits on arterial streets are quite high, even residential streets have speed limits of 50 km/h, a speed very dangerous to non-motorized transportation users. Providing a physical barrier between automobiles and cyclists creates significantly lower stress, and a safer cycling environment. Low-stress cycling environments are far more likely to appeal to a broader range of current and potential cyclists. Therefore developing separated cycling facilities should be a priority. In Winnipeg, a major asset is our climate being well-suited to the use of off-street pathways, given their ease of maintenance in winter months. Identifying and supporting mutually beneficial infrastructure designs, such as off-street pathways, which offer four-season usability in a safe and inclusive package, could well be an area of focus for the City of Winnipeg and their partners.

- Emphasize the importance of physical separation from motor vehicles
- City of Winnipeg Urban Planning and Public Works Departments
- Intermediate term initiative

## **Recommendation 7: Foster a supportive political climate for active transportation projects**

In order to develop an effective cycling network there needs to be a consistent and adequate level of support from politicians. Without a realistic active transportation budget, active transportation, including cycling, will continue to be a “transportation alternative.” In addition to funding, expanding the number of policy tools supportive of active transportation projects is essential. Despite increasingly supportive planning policy during the creation of the *Our Winnipeg* development plan, there is a lack of operational policy for implementing active transportation projects. A policy which requires that upgrades to roadways listed as bike routes also include upgrades to active transportation facilities on those roads, has been identified as one of the most effective initiatives in leveraging new cycling facilities in Winnipeg (Nixon, 2013). This illustrates the importance of good operational policies. Although education and awareness of our elected officials regarding the merits of active transportation is important, the development of policy instruments immune to political unpredictability should be a priority of planners and policy analysts at the City.

- Communicate the holistic benefits of cycling to elected officials
- City of Winnipeg Staff and Council, provincial and federal politicians and cycling advocacy community
- Immediate term initiative

**Recommendation 8: Seek out allies and work towards the common goals of health, happiness and good government.**

Despite this research project's focus on the design characteristics associated with creating successful cycling networks in cities with harsh four- season climates, the acceptance and ultimate support of cycling as a transportation mode requires a far broader and holistic analysis. The benefits of a greater number of people choosing to ride their bicycles as transportation especially if transitioning from single occupancy automobile use, are numerous and expand far beyond issues of transportation efficiency. In a time when the impacts of climate change are impossible to ignore, some major municipalities are declaring bankruptcy (CBC, 2013) faced with the overwhelming fiscal costs of infrastructure. Further when chronic disease associated with inactivity is often described as an epidemic, cycling as transportation has the potential to be marketed as far more than simply a transportation mode. The holistic benefits of choosing an active mode of transportation, such as cycling, have potential to mitigate of these pressing challenges. In recent years a shift in consciousness highlights the unavoidable changes required in our diets, activity levels, settlement patterns and transportation habits. As a result, an increasing number of governments, non-government organizations, advocacy groups and health organizations have launched progressive campaigns encouraging citizens to lead more healthy, active and sustainable lifestyles. These organizations present tremendous opportunities to garner support, increase the awareness, education and benefits of cycling as a mode of transportation.

By identifying and working with allies in neighbouring sectors, proponents of cycling and active transportation have access to the tremendous influence, and potential critical mass required to bring cycling as a means of transportation, into the mainstream. An excellent example of such partnerships occurring in Winnipeg includes the Winnipeg Regional Health Authority as part of the CLASP (Coalitions Linking Action and Science for Prevention) initiative, becoming a member of the *Our Winnipeg* implementation strategies (Healthy Canada by Design CLASP, 2013).

- Develop relationships with supportive allies such as health agencies
- City of Winnipeg and Council, Regional Health Authorities
- Immediate term initiative

**Recommendation 9: Actively engage and encourage participation of citizens, cyclists and advocacy groups in designing and improving cycling facilities.**

In earlier versions of this practicum, I had aspirations of incorporating research methods such as focus groups to engage citizen cyclists, and non-cyclists, with the intention of encouraging participation in the discussion of what makes effective cycling infrastructure. In previous recommendations it is mentioned that consultative planning processes, which engage citizen cyclists in developing effective cycling infrastructure designs is essential, but this could be expanded further. Participation in the development of cycling infrastructure in Winnipeg could benefit greatly from input from a broad range of individuals, particularly potential and non-cyclists. Using interactive and engaging methods such as focus groups that seek input from citizens should be used



in current and future planning of active transportation facilities, and is an essential component in developing the type of cycling network citizens will enjoy using.

- Develop educational programs and planning processes to encourage citizen participation
- City of Winnipeg, active transportation consultants, citizens
- Immediate term initiative

In summary, the table found in Appendix C distills the information provided in the above recommendations into operational detail. The table included describes what is required in moving forward on each recommendation, who will play a role and over what time frame these recommendations can be completed.

### **4.3 Assessment of the Interview process**

The key informant interviews proved to be an informative and stimulating research method, generating high quality data that would be challenging to attain using a comparable methodology. One of the most valuable aspects of the interview process was the ability to have relaxed discussions, which generated colorful and candid responses to the questions asked. Interviews consisted of six questions which varied slightly depending on the respondent's role of planner, politician or advocate. Interviews lasted approximately 20-30 minutes, a time frame which seemed to be well received by participants. Interviews in Winnipeg were effective and relatively easy to schedule due to connections established through previous work and educational

experiences. Interviews in Minneapolis proved far more challenging, resulting in a significantly lower participation rate. Despite numerous attempts to schedule interviews, only one interview was conducted with a participant in Minneapolis.

In reflecting on the effectiveness of choosing an interview method for this research process, I feel interviews provided an exceptional amount of working knowledge about the intricacies and history of cycling networks in the research areas. Although representation was a challenge in Minneapolis, the interview conducted with a City of Minneapolis planner was extremely informative and helpful in providing a firsthand context to other research methods, contributing to a better understanding of the Minneapolis cycling environment. Despite interviews generating high quality information, the questions asked were formulated with the intention of fostering open dialogue, which in some cases resulted in deviation from key areas of interest in relation to the research questions. In the three sets of questions posed (planners, politicians and advocates), questions progressed from high level to more focused and precise lines of inquiry. This progression seemed to work well and allowed rapport to be built before getting into more focused and specific questions. Overall, the interview methodology, proved to be the most effective method in this study at providing a holistic representation of the cycling networks in the study areas.

#### **4.4 Assessment of the Ethnography and Visual Analysis**

The intention of using an ethnographic methodology was to understand on the ground intricacies of effective cycling infrastructure design in four season cities, through the lived experience. Conducting ethnography was an enjoyable and engaging research method, supporting a greater level of enthusiasm and commitment to this research process. Ethnography fulfilled a key objective of this research process; to understand what types of cycling infrastructure are most effective in the real world. Given this research project takes the form of a practicum, ethnography supported the applied and pragmatic approach in developing working recommendations on how to improve Winnipeg's cycling network. Despite ethnography being a highly subjective methodology, placing a great deal of trust in the hands of one researcher's observations and perceptions, pairing these observations with photo, video and documentation data helped to provide a more rigorous representation of the cycling environment in Winnipeg and Minneapolis. By personally experiencing the positive and negative aspects of the cycling networks of the study areas, a richer understanding of key strengths and weaknesses was achieved, which helped to inform and complement the other research instrument of key informant interview questions. Conducting the fieldwork associated with ethnography helped to focus this research project and was an effective tool in putting previously learned concepts into a real world context.

Although ethnography was an effective tool in bringing research concepts to life, there were several challenges encountered. Given the highly subjective nature of

ethnography, this type of research required constant diligence to remain grounded and focused in making observations and recordings. Despite efforts to conduct the same level of analysis in Minneapolis and Winnipeg, the realities of being in a new city, with an abundance of new and exciting experiences, novelty may have resulted in fresher and more observant eyes while conducting analysis in Minneapolis.

Another challenge with this approach became apparent during the analysis phase, where the sheer volume of the visual data became difficult to sort and organize into manageable and coherent themes. Pairing field notes, digital photographs and a continuously recording video camera generated daunting amounts of data, which was not able to be used to its fullest, given the time constraints of this research process. The video material was used as a digital ethnographic journal, which was consulted while writing the expanded ethnography notes, but previous aspirations of incorporating video data in a more meaningful way was not possible. A number of video screen captures with captions have been included in Appendix B from video data generated during the research process, in an attempt to include more of the rich data which was not fully integrated into the formal analysis of this document. Another challenge associated with reliance on technological devices, especially during winter field work, was inconsistent data generation due to equipment failures. The incomplete set of video data did make for less precise comparative data, but is accepted as a limitation associated with this type of research methodology. I do intend to show some key video clips during the defense of this practicum as the video data is a powerful tool in

“bringing” the audience into the research environment. Intentions to use the video data in a more complete manner will be discussed in the future research section of this practicum.

## **4.5 Further Research**

This practicum focused on the design characteristics of cycling infrastructure that are most effective in cities with harsh four season climates such as Winnipeg and Minneapolis. Although this project revolved around infrastructure design, it did not offer specific, engineering based recommendations to address some of the criticisms made of Winnipeg’s cycling network. This study did not identify specific locations for network expansion in Winnipeg, nor did it give specific examples of design solutions for off-street pathways, intersections, on-street lanes or solutions to some of the city’s prominent gaps. Future research that provides recommendations in the form of specific design guidelines would be an asset in helping the City develop a consistent and usable toolkit for improving the quality and effectiveness of Winnipeg’s cycling network.

Another area that could be increasingly focused on in future research is winter cycling. There has been a slow increase in awareness around winter cycling, particularly in the northern regions of Scandinavia, with the first World Winter Cycling Congress being held on February 13-14, 2013 in Oulu, Finland. Despite progress being made in Nordic regions of Europe, Winnipeg and the surrounding area has the potential to capitalize on our unique climate and become North American leaders in winter cycling.

In anticipation of the 2014 Winter Cycling Congress, which is scheduled to be located in Winnipeg from February 12-13, 2014, a more comprehensive exploration of cycling facilities in snowy climates would contribute greatly to the growing body of knowledge around winter cycling, and further make the case that year round cycling is possible and increasingly common. The Winter Cycling Congress provides a timely forum to report on the dissemination of findings from the current research and its impact in Winnipeg.

A third general recommendation for future research is to conduct macro-level research which explores the societal benefits of cycling for transportation. During this research process the most commonly mentioned challenge to growing the cycling network in Winnipeg was inconsistent political support for active transportation projects. Participants in this study indicated a worthwhile research effort would be to use methods to quantify and then communicate the holistic value of cycling, specifically in relation to health and well-being. Numerous participants indicated partnerships among health organizations, economic development agencies, tourism groups and environmental organizations would be essential in garnering the political support required to build new cycling infrastructure. A research project quantifying the costs and benefits of supporting cycling as a key form of transportation, specifically in relation to health care costs and general well-being, would be a valuable tool in communicating the benefits of cycling to politicians and decision-makers, who still view cycling as a form of *“alternative transportation.”*

Another key element that was not discussed in this practicum is the role of education and awareness of active transportation. Any programs which further disseminate information about the cycling network in Winnipeg including the positive effects associated with cycling for transportation are helpful in establishing cycling as a legitimate transportation mode. In addition to educational programs that inform cyclists and potential cyclists of resources, programs which inform road users of proper etiquette when encountering cyclists on the road could improve the cycling network's safety and accessibility in Winnipeg.

Opportunities to expand this practicum's research significance would be to synthesize and edit the video data generated from this research, into a short film to be shared online. The intention of this research project was to provide pragmatic recommendations on how to improve the cycling network in Winnipeg. Many of the recommendations made in this practicum revolve around greater citizen engagement and feedback in improving the quality of Winnipeg's cycling network. A short video, posted on-line would provide a readily accessible synopsis of research findings and potentially serve as resource material for cycling advocates, citizens and even City of Winnipeg staff. This video could be used as a discussion tool, which could be screened at a public event, fostering further dialogue and recommendations around improving the cycling environment in Winnipeg.

## 4.6 Conclusion

This study has been the culmination of many interviews, field research and literature review. Over the course of this process, it has become apparent planning and developing a cycling network is similar in nature to many long range planning initiatives; it requires commitment and patience. The development of an effective cycling network requires essential ingredients such as quality infrastructure and strong political support. Although these components are necessary, the success of a cycling network requires a tailor made approach to each city's physical, political and cultural landscape in order to be effective. This project has been guided by the premise that design is a process of creation which is constantly mindful of the end user. Understanding how cycling infrastructure operates on the ground level, from a multitude of perspectives is the most effective requirement in designing safe, efficient, accessible and resilient cycling networks, and should be the cornerstone of future active transportation planning initiatives in Winnipeg.

It is my opinion this research is significant for its contribution expanding knowledge about the specific design considerations of effective cycling infrastructure in winter cities. Another contribution of this research is the use of experiential methodologies which emphasize the importance of the user experience in developing effective cycling infrastructure designs.



This research concludes through consistent long term planning, which actively engages citizens in the development of a connected and context specific approach to cycling, Winnipeg has an opportunity to become an exceptional cycling city, and a leader in cold weather urban cycling. The recommendations and information provided in this practicum should serve as a practical resource to planners, politicians and advocates in supporting the further development of cycling and its associated benefits, in Winnipeg.

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## **Appendix A: Interview Questions / Lines of Inquiry**

### **With Planners:**

- 1.) In what ways has the cycling network in Winnipeg / Minneapolis changed over the last 15 years?
- 2.) What has contributed to these changes? How has/have planning and planners contributed?
- 3.) Are there specific mechanisms / tools that exist to support or leverage new bicycle infrastructure?
- 4.) By what ways and means are new cycling related projects funded?
- 5.) What do you consider to be Winnipeg's / Minneapolis' greatest asset / strength in becoming a "cycling city?"
- 6.) What do you consider is Winnipeg's / Minneapolis' greatest challenge to becoming a "cycling city?"

### **With Politicians:**

- 1.) In your political career, have you witnessed an evolution of transportation systems in Winnipeg / Minneapolis?
- 2.) What is your opinion regarding cycling as a viable, year-round mode of transportation in Winnipeg / Minneapolis?
- 3.) What would you identify as the primary challenges that exist in making cycling a more used mode of transportation in Winnipeg / Minneapolis?
- 4.) What do you consider the opportunities or strengths possessed by Winnipeg/ Minneapolis in increasing bicycle ridership in the City?
- 5.) In your opinion do you consider growing the cycling network a politically palpable topic in Winnipeg / Minneapolis?
- 6.) Today's cities are experiencing numerous pressures that include large infrastructure deficits, emissions reductions targets and sprawling development that are in part the result of car dependency. Do you think increasing cycling infrastructure is an effective tool in addressing these concerns?

**With Activists / Advocates:**

- 1.) As an advocate for increasing the support of cycling in your city, how have things changed in recent years?
- 2.) What are the most effective initiatives that result in increased bicycle ridership in your city?
- 3.) What are the most significant challenges that exist in getting more people on bikes in your city? What are the greatest opportunities?
- 4.) How do weather / climate influence the effectiveness cycling infrastructure in your city?
- 5.) Does the current cycling network in your city support or encourage a diversity of people to ride bikes?
- 6.) Other cities with similar climates and populations have created thriving cycling environments. Can Winnipeg do the same? Why / why not? What needs to change?



## Appendix B: Video Captures and Further Visual Analysis



Images 1: The two screen captures above illustrate the challenges that exist with on-street cycling infrastructure in cold weather cities. Despite recent renovations to the Osborne Bridge (above) which give more room to cyclists on-street, snow accumulates in this space, making this improvement less effective.



Images 2: The Assiniboine Avenue cycle track is one of Winnipeg's most prominent cycling facilities. This cycle track is an excellent example of a committed, permanently separated cycling facility that connects to a number of on-street downtown bike lanes. In the summer, this facility functions exceptionally well, yet in winter its narrow, fixed barrier construction prevents the clearing of snow and debris.



Images 3: On-street bike lanes are often the most economical and feasible type of cycling infrastructure in urban environments. This bike lane on Fort Street is connected to the Assiniboine Cycle track and several other bike lanes in the Exchange District. Although easier to clear of snow in winter, bike lanes are covered with snow, slush and grit. Another challenge with on-street lanes in Winnipeg is their placement on the left side of parked cars. European designs of on-street lanes are shifting parking lanes to the left, placing bike lanes between the curb and parked cars. This simple solution uses parked cars as a physical barrier between cyclists and motor vehicle traffic and could be implemented in Winnipeg.



Image 4: Here is an example (above) of an on-street bike lane in winter conditions. This section of Gary Street has a prominently striped bike lane on the pavement in summer. During winter, without clearly visible signs, there is no clear indication cycling infrastructure is present on this street.





Images 5: The recently completed buffered bike lane on Pembina Highway is another attempt at creating a separated on-street cycling facility in Winnipeg. The transit station detours (above) are completely snow covered for most of the winter months. Without these detours clear of snow, users must swerve in and out of the protected cycling lane.



Image 6: On-street cycling infrastructure with fixed physical separation can experience maintenance challenges in spring months too. In the above image, this narrowing on the Nassau bike boulevard is obstructed by mud and debris. Southbound cyclists using this facility would have to ride into oncoming traffic to avoid this blockage. Fixed narrow cycling facilities can pose challenges for street cleaning equipment as well as snow plows.



Image 7: This narrowing and cyclist activated signal at Harrow St. and Academy Rd. connects the Harrow bike lane and Wellington Crescent. Bike boulevards or greenways (as referred to in

the U.S.) are becoming increasingly popular forms of cycling infrastructure. Bike boulevards are traffic calmed residential streets designated as cycling routes. Bike boulevards often use traffic barriers (above left), speed bumps and traffic circles to prevent, discourage or slow traffic from motor vehicles. Bike boulevards can be effective, low cost cycling infrastructure with mutually beneficial consequences in the creation of complete streets such as lower speed limits and less motor vehicle traffic. In winter cities, the challenge of snow removal on streets with fixed barriers remains a challenge of bicycle boulevards.



Images 8: The above image was captured while riding through one of the most prominent active transportation gaps in Winnipeg. The Osborne Street underpass is at the top of many cyclists lists as the scariest feature of Winnipeg's cycling network. Despite the recent upgrades to this bridge to accommodate the Bus Rapid Transit station, there were no improvements to active transportation at this location. There are active transportation connections at either end of the underpass, but cyclists must choose between riding at street level through the underpass (top) or walking their bikes on the narrow sidewalk that is shared with pedestrians (bottom). Addressing this choke point (and others at Jubilee and Archibald) should be a top priority in improving the cycling network in Winnipeg.





Images 9: Off-street pathways have been adopted in Minneapolis as a favored type of cycling infrastructure for their physical separation from motor vehicles and ease of maintenance in winter. Above are examples of off-street pathways in Winnipeg. The image of the Dunkirk AT trail (top) was taken shortly after a heavy snowfall. The image of the Bishop Grandin Greenway (bottom) was taken on the same day, shortly after it was cleared of snow using a front end loader. The ease of maintenance with standard snow removal equipment makes off-street pathways a viable, four season cycling infrastructure design.

Images 10: Intersections between off-street pathways and major arterial roadways (below on page 195 and 196) pose one of the most common, reoccurring barriers to users of Winnipeg's cycling network. Yield islands, long crossing distances, short cyclist / pedestrian signals and high motor vehicle speed limits makes for inhospitable cycling environments. The following images are of Winnipeg intersection between off-street pathways and major arterial roadways.



Bishop Grandin Greenway at McGillivray and Kenaston



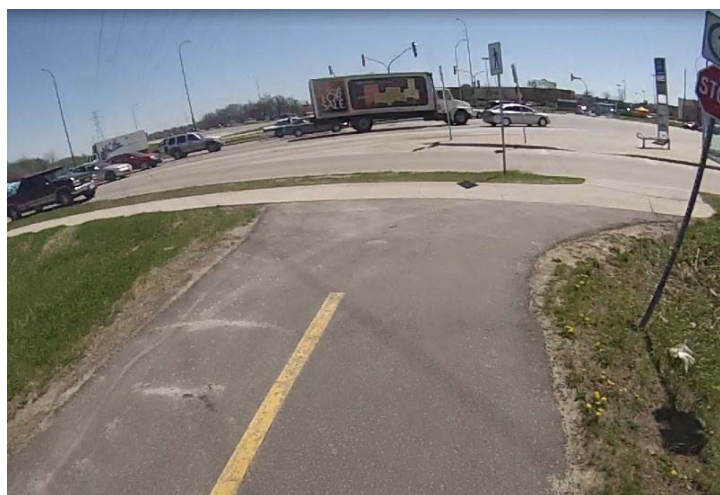
Thundering Bison Trail at Sterling Lyon and Kenaston



Lagimodière Trail at Lagimodière and Fermor



Chief Peguis Greenway at Chief Peguis and Gateway



Bishop Grandin Greenway at St. Mary's and Bishop Grandin.



Image 11: Intersections of off-street pathways and smaller roads have proven problematic in Winnipeg as well. Here is an intersection on the Niakwa Trail in which the trail intersects with a residential street and is obstructed by a large concrete median (above). The pathway is routed left and right of centre, both of which require detours by pathway users to cross the street. Quality crossings for active transportation pathways included at-grade surfaces and take the most direct route, neither of which occur here.



Image 12: Similar to the previously discussed crossing on the Niakwa Trail, this photo (above) illustrates the crossing design used at all intersections along the North East Pioneers Greenway.

The pathway is directed towards lighted crossings at Raleigh and Gateway Streets. The continuously deviating pathway is more oriented to motor vehicles than cyclists or pedestrians. These crossings are examples of how concessions during the design process greatly reduce the effectiveness and quality of an otherwise, high quality off-street pathway.



Image 13: The crossing above marks the beginning of the North East Pioneers Greenway. This crossing directs pathway users across a four lane street without any clear demarcation to automobile drivers of a prominent active transportation crossing. What makes this example particularly frustrating is the pedestrian corridor (controlled pedestrian crossing) located approximately 40 metres from this crossing. Directing pathway users to the signalled crossing would provide a safer and more efficient location to cross the street. An even better solution would be to move the crossing signal to the pathway crossing, raising the quality and safety of one of Winnipeg's longest off-street pathways.





Images 14: In Minneapolis, off-street pathways that cross roads are direct, at-grade and clearly marked with signs. The two images above are examples of crossings along the Midtown Greenway. Although these images are two of the best examples of crossings observed in Minneapolis, at-grade crossings with signs and paint were used at most pathway intersections.



Image 15: Off-street pathways seem to be less contentious than on-street cycling facilities due to their ability to serve recreational and transportation purposes. This section of the Thundering Bison trail connects the cycling network to two of Winnipeg's most prominent naturalized spaces: Fort White Alive! and the Assiniboine Forest.



Image 16: In Minneapolis, off-street pathways connect to the Chain of Lakes, a park network which links many of the city's urban lakes. These lakes are popular recreation destinations and are very accessible by bike. Connecting desirable destinations with quality cycling infrastructure is an effective way to promote cycling as an appealing transportation mode.



Image 17: Many of the recommendations made in the formal sections of this document emphasize the importance of quality in the success of the cycling network in Winnipeg. This section of off-street pathway on Waverly (above) bears no indication it is a cycling facility. Confusion between pedestrians and cyclists is bound to occur on a facility such as this.



Image 18: This off-street pathway on Taylor St. is another example of a low quality, poorly signed piece of cycling infrastructure. While riding this section of pathway, the cyclist in the picture above yelled at the researcher to try using the road, despite it being a busy street.





Images 19: Although there are examples of low quality cycling facilities in Winnipeg, there are also numerous instances where quality, efficient and accessible cycling facilities have been implemented. The off-street pathways farther south on Waverly (top) and the newly constructed Chief Peguis Greenway (bottom) are continuous, direct and complete with painted lines. This is representative of the state of Winnipeg's cycling network; there are numerous examples of promising, quality cycling facilities that don't adequately function as one interconnected piece.



Images 20: The Pioneers Pass Bridge which crosses the recently extended Chief Peguis Trail is another example of the City of Winnipeg's capacity to design and implement high quality cycling facilities. This cycling / pedestrian bridge has many high quality features including multiple trail connections to the bridge, line painting, seating areas and aesthetically pleasing lighting and signage. Trying to understand the range in quality amongst cycling facilities in Winnipeg would be a highly beneficial contribution to cycling research in the city.

## Appendix C: Operational Recommendations

Recommendation:	What is required	Who is involved	When can it be done
<b>1.) Develop a context specific approach to cycling in Winnipeg.</b>	<p>A comprehensive assessment of the cycling network in Winnipeg.</p> <p>Development and implement the <i>Pedestrian and Cycling Study</i>.</p>	<p>The City of Winnipeg</p> <p>Winnipeg City Council</p> <p>Active transportation specialists (consultants)</p> <p>Citizens of Winnipeg</p>	<b>Long term initiative.</b>
<b>2.) Plan with the network in mind.</b>	<p>Develop and implement a comprehensive Active Transportation Strategy.</p> <p>Prioritize infrastructure projects that close gaps in the existing cycling network.</p>	<p>The City of Winnipeg</p> <p>Winnipeg City Council</p> <p>Active transportation specialists (consultants)</p> <p>Citizens of Winnipeg</p>	<p>This is a 25 year commitment, which requires continuous review consistent with other long range planning processes.</p> <p><b>Long term initiative.</b></p>
<b>3.) Design for diversity and inclusion.</b>	<p>Target outreach to older adults, women and children.</p> <p>Conduct focus groups with cyclists and non-cyclists of all ages and abilities to better understand</p>	<p>The City of Winnipeg.</p> <p>Citizens of Winnipeg.</p> <p>Cycling advocacy community.</p>	<p>This should be a process of continual improvement and adaptation.</p> <p>The ultimate goal should be to provide a cycling network which can</p>

	<p>perceptions around cycling infrastructure in Winnipeg.</p> <p>Physically separate bicycles from motor vehicle traffic as much as possible.</p> <p>Develop design guidelines for cycling infrastructure which emphasizes accessibility and inclusion.</p>		<p>be safely used by older adults, young children and everyone in between.</p> <p><b>Long term initiative.</b></p>
<b>4.) Build new facilities that address gaps and barriers.</b>	<p>Identify gaps and barriers that exist in the current cycling network in Winnipeg.</p> <p>Prioritize spending on addressing gaps and barriers present in the existing cycling network</p> <p>Pay specific attention to bridges, underpasses and prominent intersections.</p> <p>Factor Winnipeg's extreme climate into infrastructure design, building facilities that are adaptive to heavy snowfalls.</p>	<p>The City of Winnipeg.</p> <p>Citizens of Winnipeg.</p> <p>Cycling advocacy community.</p> <p>Active transportation consultants.</p> <p><b>Note:</b> Building new facilities that address gaps, barriers and challenges requires a close working relationship between planners, designers and engineers. Public works, AT consultants and planners must work</p>	<p>Closing gaps should be an ongoing effort in improving the cycling network in Winnipeg.</p> <p><b>Intermediate term initiative.</b></p>

		in close collaboration for functional design solutions to occur.	
<b>5.) Details matter! Do sweat the small stuff.</b>	<p>Install consistent and visible signage on all cycling routes.</p> <p>Install way finding signs, with distances to key destinations on off-street pathways.</p> <p>Use paint to clearly differentiate cyclist and pedestrian realms on off-street pathways and AT bridges.</p> <p>Bring attention to key intersections of streets that have been designated as cycling routes (green bike boxes, green right turn lanes etc).</p>	City of Winnipeg (Public Works Department, Urban Planning Department).	<p><b>Immediate term initiative.</b></p> <p>The improvement of line painting and signage represents a relatively low cost, easy to implement upgrade of Winnipeg's cycling network.</p> <p>Improve signage and paint could be adequately funded by the City's current AT budget.</p>
<b>6.) Physically separate wherever possible</b>	<p>When planning new cycling facilities, emphasize the importance of physical separation from motor vehicle traffic.</p> <p>Identify and assess the feasibility of unused urban land tracks such as hydro corridors or rail lines for future AT route development.</p>	<p>City of Winnipeg (Department of Urban Planning, Department of Public Works).</p> <p>Active Transportation experts (Design Firms).</p> <p>Manitoba Hydro.</p> <p>Various railway owners.</p>	<b>Intermediate term initiative.</b>

	<p>Continue to refine the design and implementation of separated on-street cycling facilities in Winnipeg.</p> <p>Explore the feasibility of purchasing snow removal equipment capable of clearing separated on-street cycling facilities.</p>		
<b>7.) Foster a supportive political climate for active transportation</b>	<p>Educate and communicate the holistic benefits of AT investment to elected officials.</p> <p>Emphasize the importance of thoughtful, long term planning of AT facilities.</p> <p>Use established planning policy to leverage / hold council accountable to their commitment to support active transportation projects.</p>	<p>City of Winnipeg Staff.</p> <p>Winnipeg City Council</p> <p>Members of the Legislative Assembly</p> <p>Members of Parliament.</p> <p>Cycling activists and advocacy groups.</p> <p>Vocal citizens</p>	<b>Immediate term initiative.</b>
<b>8.) Seek out allies and work towards the common goals of health, happiness and good government.</b>	<p>Coordinate interdisciplinary relationships between health agencies and urban planning initiatives.</p> <p>Support health</p>	<p>City of Winnipeg Staff.</p> <p>Winnipeg City Council</p> <p>Members of the Legislative</p>	<b>Immediate term initiative.</b>

	<p>organizations in lobbying politicians for increased and consistent funding of public health initiatives which encourage active lifestyles.</p> <p>Consider funding alternatives in the development of AT facilities in Winnipeg (Private investment etc).</p>	<p>Assembly</p> <p>Regional health authorities</p> <p>Private businesses</p> <p>Tourism organizations</p> <p>Cycling advocacy groups</p>	
<p><b>9.) Actively engage and encourage participation of citizens, cyclists and advocacy groups in designing and improving cycling facilities.</b></p>	<p>Hold focus groups, open houses, design charettes or any event to encourage participation in the planning of active transportation projects.</p>	<p>City of Winnipeg</p> <p>Hired consultants</p> <p>The citizens of Winnipeg</p> <p>Advocacy groups</p>	<p><b>Immediate term.</b></p> <p>The perfect opportunity awaits in the development of the <i>Pedestrian and Cycling study</i>.</p>



UNIVERSITY  
OF MANITOBA

Department of City Planning

Dylan Harris



## **Informed Consent Form**

**Study Title:** Pedal Power: Designing effective cycling infrastructure in Winnipeg with lessons from Minneapolis.

**Principal Investigator:** Dylan Harris

**Sponsor:** Dr. David van Vliet, Department of City Planning

This consent form, a copy of which I will leave with you for your records and reference, is only part of the process of informed consent. It should give you the basic idea of what the research is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take the time to read this carefully.

## **Project Description:**

The expansion of Winnipeg's cycling network has resulted in significantly more cycling facilities in Winnipeg over the past four years. Despite these positive steps there are specific design considerations, that if incorporated could make Winnipeg's cycling network transition from good to great. Of these design considerations, there needs to be closer attention paid to the requirements of developing cycling infrastructure that functions equally well in winter as it does in summer. There are a number of cities having cycling infrastructure well beyond that in Winnipeg from which we can learn. Of particular interest are cities having comparable winter conditions. In 2010 Minneapolis, Minnesota was voted the most bike friendly city in North America (Bicycling, 2010) despite sharing similar geo-climatic characteristics to Winnipeg. This research aims to better understand how Minneapolis planned, designed and implemented an acclaimed



network of off street pathways and on street bike lanes considering their harsh four season climate, with the intention of providing examples and inspiration in furthering the success of Winnipeg's cycling network.

In the course of the interview, I will ask questions about your experiences related to cycling and planning in Winnipeg / Minneapolis.

Although this research is primarily directed toward the production of an academic report, I hope that it will also provide practical suggestions for various levels of government about the importance of active transportation and the techniques required to make active transportation infrastructure effective.

**Location and Time Requirement:**

Participation will require approximately 30 minutes of your time and would take place on \_\_\_\_\_ at \_\_\_\_\_, in Winnipeg, Manitoba / Minneapolis, Minnesota. I will request that you permit me to digitally record our conversation, but if you object I will transcribe it by hand.

Participation in this project is voluntary and you may decline to answer any question or withdraw from the study without any negative consequences. The research process will conclude in July of 2013, and participants are free to withdraw at any time throughout the course of this research project.

**Confidentiality:**

I will keep any information gathered in this research strictly confidential. Only the researcher will have access to the data. You will not be named or identifiable in any reports of this study. If any statement you made during this interview is used in a research report it will be attributed to an anonymous source. Information containing personal identifiers (e.g., this consent form) will be destroyed as soon as it is no longer necessary for scientific purposes, approximately October 2013. Interview transcripts will be deleted and/or destroyed by shredding once the project reaches its conclusion, approximately October/2013.

**Dissemination:**

A summary of the research process will be provided to all those who participated in the study. The completed practicum will be made available in PDF format to all those who are interested in accessing the finished product. Following completion of the practicum and graduation from the program, the finished practicum will be available online through the Mspace function on the University of Manitoba Libraries website. Details of the dissemination process will be provided in as part of the informed consent process.

**Risks and Benefits:**

There are no explicit risks to participants in this study. Subject matter is not controversial and does not deal with sensitive subject matter. Information will be kept confidential and names will not be used in the finished research paper. The potential benefits to this study could further identify behavioural, political and institutional barriers to choosing cycling as a mode of transportation, and consequently opportunities to overcome these identified barriers.

**Consent:**

Your signature on this form indicates that you have understood to your satisfaction the information regarding participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the researchers, sponsors, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time, and /or refrain from answering any questions you prefer to omit, without prejudice or consequence. Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification or new information throughout your participation.

The University of Manitoba may look at your research records to see that the research is being done in a safe and proper way.

This research has been approved by the Human Ethics Board at the University of Manitoba. If you have any concerns or complaints about this project you may contact any of the above-named persons or the Human Ethics Secretariat at 474-7122, or e-mail [REDACTED]. A copy of this consent form has been given to you to keep for your records and reference.

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Participant's Signature

Date

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Researcher

Date

Email or surface mail address to which a summary of findings and written reports (at your option) should be sent:

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