



MOVE! TRANSPORTATION CHARRETTE
PARTICIPANT HANDBOOK – 11.10-13/20.11

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EVERGREEN & THE INSTITUTE WITHOUT BOUNDARIES

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WELCOME. AND THANK YOU!

Evergreen and the Institute without Boundaries are thrilled to welcome you to this innovative event: a design charrette tackling some of the most important and fundamental urban transit issues of today and tomorrow. We are enormously grateful for your contribution to this important “brainstorm,” as we embark on a journey that will culminate in MOVE! The Transportation Expo, running from May to October 2012 in the unique kilns building at Evergreen Brick Works. Your creativity, innovation and hard work—your “inspiration and perspiration” —are central to the success of this ambitious undertaking!

It is an exciting time for all of us. This collaboration between Evergreen and the Institute without Boundaries represents a bold direction for both organizations. The vector which we are travelling together carries us forward into the central sustainability challenges facing our planet in the 21st Century, be it Transportation, Shelter, Food, Green Building, or Water management.

We hope and expect that your experience over the course of this charrette will be a rewarding one and we are certainly looking forward to meeting each of you over the course of this remarkable event.

Sincerely,



Geoff Cape
Executive Director
Centre for Green Cities
Evergreen



Luigi Ferrara
Director
Centre for Arts and Design
George Brown College

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EVERGREEN

www.evergreen.ca

Evergreen is working toward a sustainable future where cities—public spaces, buildings, transit systems, energy and water infrastructure—are designed in collaboration with nature and their communities.

By deepening the connection between people and nature, and empowering individuals to take a hands-on approach to their urban environments, we can effect fundamental change, altering the way citizens experience and shape life in cities.

For more than 20 years, Evergreen has been engaging Canadians in creating and sustaining dynamic outdoor spaces—in schools, communities and homes. Through Evergreen Common Grounds and Toyota Evergreen Learning Grounds, Evergreen is a leading national funder and facilitator of local, sustainable greening projects in schoolyards, parks and communities across Canada.

Our work since 1991:

- \$5.5 million in grants
- 200,000 volunteers
- 1,000,000 students reached at more than 3,000 schools
- 4,000 public spaces naturalized across Canada
- 2,500 community events and workshops

Building on the support, passion, energy and commitment of tens of thousands of Canadians over the years, Evergreen has engaged in innovative partnerships with all levels of government while developing dynamic funding relationships with regional, national and multinational corporate partners.





THE BRICK WORKS

ebw.evergreen.ca

Opened in 2010, Evergreen Brick Works is already a globally recognized community environmental centre and social enterprise in the heart of Canada's largest city. Set amid the Don River Valley in central Toronto, this spectacular natural and industrial heritage site offers engaging urban ecology activities for people of all ages.

- Year-round Farmers' Market, local food programming and cooking classes
- Retail sustainable garden centre and demonstration gardens
- Environmental and gardening workshops
- Children's camps and youth leadership training
- Urban Stewardship
- Conference and event facilities

Because of its award-winning adaptive-reuse and the creative repurposing of numerous factory buildings, Evergreen Brick Works is a genuinely unique place for people to learn about sustainability and to share ideas and explore best practices. Evergreen's headquarters are located in the only new building on site, a five-storey LEED platinum office building, which is home to numerous like-minded organizations (for-profits and non-profits alike).



THE CENTRE FOR GREEN CITIES

cgc.evergreen.ca

The Centre for Green Cities is a dynamic venue for the public, companies, researchers and environmental innovators to converge, to collaborate and to showcase emerging products and ideas. Housed in the award-winning adaptive reuse facility Evergreen Brick Works, it encourages and promotes clean technologies both online and on site.

The Centre for Green Cities is a "living lab for sustainability innovation" that, thanks to its unique physical complex and home, is ideally positioned to advance, demonstrate and support innovative clean technologies in

- Transportation
- Water
- Food
- Energy consumption
- Building construction and operation
- Waste management

Join leading innovators, city builders, entrepreneurs, potential investors and prospective customers as we develop the ideas that will create the resilient cities the future will demand.

Learn more about the CGC network and how to be a part of it by contacting Peter McFadzean at pmcfadzean@evergreen.ca.



INSTITUTE WITHOUT BOUNDARIES

www.worldhouse.ca

The Institute without Boundaries (IwB) is a unique academic and research program in the School of Design at George Brown College. IwB seeks to achieve social, ecological and economic innovation through collaborative design work. Founded in 2003, the IwB offers an innovative postgraduate program in interdisciplinary design strategy that emphasizes design thinking and systems design. The Institute without Boundaries is both a school and a design studio. Professionals and students from a wide variety of backgrounds come together to collaborate on projects. The IwB pulls from an extensive group of designers, architects, engineers, educators and experts to form skilled teams that deliver special projects such as charrettes (intensive, collaborative design projects), exhibitions, public programs, and innovation in the design of housing and cities. The IwB is also known for its commitment to co-creation, community engagement and democratic design processes.

WELCOME TO THE
**INSTITUTE WITHOUT
BOUNDARIES**



THE EXPO SERIES

Evergreen's Centre for Green Cities in partnership with the Institute without Boundaries at George Brown College is launching an annual series of five innovative, thought-provoking Public Expositions exploring the major issues affecting cities now and in the future.

Each Expo will be hosted at the award-winning facility, Evergreen Brick Works. The Expo Series will showcase and demonstrate innovative solutions to the profound urban environmental challenges of the 21st century, exploring the interrelationships between environmental, economic and social issues, and fostering and showcasing leadership in business, government and civil society.

The overriding goal is to inspire and inform the general public, and to inspire and motivate everyone to contribute to a sustainable urban future. Evergreen is uniquely positioned to accomplish this. Housed in the spectacular kilns building at Evergreen Brick Works, the Expo series will engage visitors in a lively conversation about the most challenging realities of Urban Sustainability to be confronted over the next 20 years. Not only will the Expos build public awareness of a complex and divisive subject through experiential, provocative and reflective exhibits, they will encourage individuals to adopt more sustainable lifestyle choices.

TARGET PARTICIPANTS AND AUDIENCE

- International leaders and innovators
- Youth (emerging designers and creative thinkers, students and alumni)
- Academics and researchers
- Scientists and engineers
- Municipal authorities and planners
- Green technologies innovators and experts
- Public health and conservation authorities
- Artists and designers

OBJECTIVES

- Foster and encourage discussion and debate among the public, academe and business.
- Partner with leading design and digital communications creators and other creative content providers, forging ongoing alliances and more.
- Convene leading innovators, city builders, entrepreneurs, researchers and others.
- Share information across sectors and regions, on local and global scales, real and virtual spheres.
- Share ways to develop sustainable solutions that contribute to vibrant, healthy communities.
- Pursue/present/discuss innovation in urban thinking and design.
- Enable entrepreneurial and business expertise to interface with engineers, scientists and civic and regional authorities/government.
- Create opportunities to engage and inspire the younger generation who will be living with the decisions of the next decade.

THE TRANSPORTATION EXPO

There are few topics more top-of-mind today among citizens and government, businesses and planners than transportation. There is an ever-growing need for fundamental change, for new technologies, for renewed infrastructure, for massive investment even in this climate of economic uncertainty. More than ever there is a hunger for dynamic and innovative answers to some fundamental transit challenges. These issues affect the day-to-day life of millions of Canadians.

In MOVE! The Transportation Exposition, opening May 2012, visitors will be guided through the past, present and future of transportation amid the spectacular heritage kiln buildings of Evergreen Brick Works. Through an array of large-scale exhibits, multimedia and interactive technologies, and life-size physical displays, visitors will learn about issues facing us today – here in our city and in cities around the world.

The results from MOVE! Transportation Charrette will be featured in the 'future' section of the Exposition. Ten inspiring proposals for the future of the GTHA will be illustrated using graphic panels, models, videos and interactive materials. Following the charrette, the exhibition organizers will select relevant material from the charrette process and consult with the teams to find the most compelling way to exhibit the material to the public. There will be the opportunity to revise and augment proposals, including developing more elaborate models.



CHARRETTE OVERVIEW



WHAT IS A CHARRETTE?

A charrette is an intensive, collaborative process that brings together professionals, community members, developers and government to develop innovative solutions for complex issues. Over a few short days of brainstorming, discussion and expert consultation, teams create a broad range of ideas around a central problem or theme. Because users and/or experts are consulted during the problem-solving process, the results are practical and meet community objectives comprehensively.

Charrettes originated as a design process used by architects and urban planners to bring together stakeholders who often hold competing interests and agendas, to address how best to manage and design complex projects such as neighbourhood planning and urban development. By working together in a charrette, these groups are able to develop feasible solutions that meet everyone's needs.

The term charrette is drawn from the late 1800s, where proctors at the École Des Beaux-Arts in Paris would circulate a cart (charrette) to collect drawing submissions, as students rushed frantically to finish their work.

THE TRANSPORTATION CHARRETTE

Transportation is one of the most important elements of any city's infrastructure: building community, moving goods and materials, growing the economy and linking neighborhoods with the globe. Cities all over the world are recognizing the need to update their transportation systems to accommodate the economic, demographic and environmental demands of the twenty-first century. The most common transportation practices today pollute the air and soil, contributing to a variety of health issues and making cities less livable. Economically, it has been shown that poor transport infrastructure can cost a city billions of dollars in time lost on clogged highways and poorly designed public transportation services. The way forward must involve both updating aging road and rail networks as well as thinking about alternative ways to support mobility. It must involve both big ideas and smaller adjustments in the way we build, maintain and use transport infrastructure.

As part of its aim to stimulate interest and innovation in building services and infrastructure that supports the mobility of people and goods for the 21st century city, MOVE! Transportation Charrette is taking on ten challenges that will address contemporary problems and issues relating to transportation. These challenges focus on five inter-related and overlapping issues of critical importance for the future of transportation: Energy, Land Use, Infrastructure, Health and the Environment. Many of the challenges that follow raise more than one of these issues, a clear indication of the complexity of updating and building future transportation networks that will serve the needs to the future in a scalable and sustainable way. As a basic introduction to the issue of transportation, it is worth considering how each of the above issues relate specifically to transportation.



Greater Toronto Hamilton Area (GTHA) in 2040

Access to affordable and sustainable sources of energy will play a defining role in shaping the future of transportation. The rise in the price of oil over the past decade has already had considerable effects on how people get around and the growth of the economy, not to mention the staggering environmental impact that often accompanies the extraction, processing and transportation of fuel. Indeed, the rising cost of fuel is one of the reasons that the number of car owners has declined in both the United States and the United Kingdom in recent years. Rising energy costs also have a direct impact on the escalating prices of food and other goods, as the transportation costs that facilitate the movement of goods continues to rise. These changes are only the first indications of a trend that will only become more pronounced in the coming years and cause increasingly severe problems for cities that are built around energy-intensive transportation infrastructures. Environmental catastrophes such as the BP oil spill in the Gulf of Mexico are visible reminders of the environmental damage that accompany our reliance on fossil fuels as a primary source of energy.

Yet, in spite of the growing problems caused by our dependence on oil, we continue to rely on fossil fuel dependent forms of transportation and have only begun to develop the technology to support attractive and viable alternatives. Even though there is a growing market for alternative forms of energy, many of the leading transportation reports state that there will not be a major change in the dominance of oil as the primary source for energy before 2030. For this reason, confronting the dilemmas of how to build a sustainable model for fueling transportation must consider this issue from a variety of perspectives including:

- Technological advancement & development of new technologies.
- Alternative energy sources
- Land use and urban design that facilitates increased mobility and reduces the overall energy required for transportation

What are some of the major issues associated with energy and why is energy of the largest concern as we move into the 21st century?

- As we move forward into the 21st century it is becoming more and more apparent that we cannot continue our current patterns of energy consumption and must radically change our over-reliance on fossil fuels as the primary source of energy.
- Oil is finite and its consumption has a variety of associated negative externalities, which impact our environment and health.
- Many believe that we have already reached peak oil (the point in time when the maximum rate of global petroleum extraction is reached, after which the rate of production enters terminal decline). The constantly declining supply and increasing demand has resulted in record highs in the cost of oil and energy, and these costs will only continue to rise as we consume more of our non-renewable resources.
- Ontario's economic growth projection assumes that world oil prices will exceed \$130 per barrel (nominal) by 2030, while natural gas prices are expected to more than double from \$4 US per mmbTU (nominal) in 2009 to almost \$10 US by 2030.¹
- Higher oil and gas prices have a negative impact on Ontario's economy in the short term since the province consumes but does not produce oil or natural gas. As households and businesses switch to more fuel-efficient alternatives due to higher energy prices, the negative impact on the economy subsides in the longer term.

¹ Ontario. Ministry of Finance. Ontario's Long Term Report on the Economy Chapter 2: Long-Term Ontario Economic Projection . Queen's Printer for Ontario, 2010. Web. <<http://www.fin.gov.on.ca/en/economy/ltr/2010/ch2.html>>

What is the role that energy plays in transportation? How is that role projected to transform in the future?

- Increasing cost of energy and oil is already having a major impact on the overall cost of living in our everyday lives. As it becomes increasingly expensive to own a car and transport goods, we must seek alternatives.
- A recent study indicates that approximately 99.98% of transportation in Ontario is dependent on fossil fuels.²
- Transportation accounts for nearly 29% of the total energy use and nearly 70% of oil use in Canada, higher than most other countries.³ These statistics illustrate the energy intensive system we have created and the overwhelming amount of non-renewable energy that is required to sustain our mobility needs.
- It is also essential that we re-evaluate the type of energy that propels us into the future. To create a more sustainable transportation system, we must not only increase efficiency but reduce the overall energy required.
- In a recent Metrolinx document, it was stated that the transportation sector will need to account for at least 19% of the targeted 2020 GHG reductions.⁴
- Ontario is currently taking small steps forward by investing in green energy and providing incentives for reducing overall energy use. In recent years, we have seen the development of new technologies that provide alternatives to the oil dependent vehicles we are accustomed to, as well as the improvements in overall energy efficiency.

² Thompson, David. "Putting Transportation on Tract in the GTHA: A survey of road and rail emissions comparison." Sustainable Prosperity. Sustainable Prosperity and the Pembina Institute, 01 2011. Web. 7 Nov 2011. <<http://www.sustainableprosperity.ca/article699>>.

³ Brooks, David B. and Torrie, Ralph D. "Energy in Society." The Canadian Encyclopedia. Historica-Dominion, Web. <<http://www.thecanadianencyclopedia.com/index.cfm?PgNm=TCE&Params=a1ARTA0002612>>.

⁴ Ontario. Metrolinx. Big Move :Climate Change and Energy Conservation. Toronto. 2008. Web. <http://www.metrolinx.com/thebigmove/Docs/big_move/RTP_Backgrounder_Climate_Change_%20Energy_Conservation.pdf>

- We still have a number of hurdles to overcome before oil is no longer our primary source of energy. For example, even if electric vehicles dominated the market, the energy to power those cars and infrastructure in many cases is still generated by fossil fuels (i.e. energy collection and distribution/charging stations). This indicates the need to shift the focus not only from the modes of transportation, but also the complete system of infrastructure that accompanies it.

How can transportation play a major role in reducing our overall energy demands?

- Transportation accounts for 29% of Canada's total energy use and nearly 70% of our total oil consumption. Keeping these statistics in mind, there is a significant potential for energy conservation and reduced oil dependence if our transportation systems become more efficient and sustainable.
- One significant step to decrease our overall energy use associated with transportation is to reduce our dependence on the automobile as the primary method of transportation and encourage a greater modal split. Public transportation and active transportation methods (walking and cycling), as well as increased density and more compact communities can all contribute to reducing our overall energy use.
- Creating more efficient and coordinated solutions can have a significant impact reducing congestion and our overall energy use.

LAND USE

What is the general cost and source of energy in Ontario? How is this projected to change over the next 50 years?

- Ontario's main source of electricity is still nuclear energy, making up 52%. The following is a breakdown of Ontario's energy use: Hydroelectric and other renewables 22%, Nuclear Energy 52%, Natural Gas and Other 8%, Coal or Oil 18%.⁵
- Premier Dalton McGuinty has pledged to eliminate dirty coal-fired power plants by 2014. The government is hoping that alternative energy sources will fill the gap. Such requirement for "made in Ontario" technologies will help make the province North America's leader in green jobs and manufacturing.⁶
- With the recent re-election of Dalton McGuinty, Ontario will invest more money in Green Energy with plans to deliver 50,000 clean energy jobs over the next four years. The Ontario Green Energy Act introduced in 2009, is also intended to expand renewable energy production, encourage energy conservation and create green jobs.

5 "Ontario's Electricity Future." Canada Energy. Canada Energy, 2011. Web. 9 Nov 2011. <<http://www.canadaenergy.ca/index.php?hydro=future&direct=of&electricity=electricity>>.

6 Ibid.

Over the past century, cities have grown rapidly, as have the sprawling neighbourhoods that surround them. This urban planning and land use approach has resulted in a number of issues including: increased congestion, longer commute times, increased air pollution, and less efficient delivery of goods and services. Trapped in the city's sprawl, a growing sense of discontent with how we get around in the modern city has taken root. It is for this reason that intelligent land use policies and practices are a necessary part of any proposal to reimagine transportation for the 21st century. Land use policy and planning that encourages more compact urban development that supports greater density while reducing sprawl, can help play a major role in transforming the way we mobilize within the urban environment. This type of development has the potential to create urban environments that are less auto dependent and reduce the number of car trips as well as their lengths. We must also consider measures that look to discourage the use of automobiles such as road-use charges or increased parking prices which are important components of a more sustainable urban transportation system. Forward-thinking land-use policies and practices are the most effective way to increase sustainable transportation networks and services by making the use of public transportation more appealing to citizens as well as increasing the use of non-motorized modes of travel. Furthermore, many of the most efficient systems for providing services, from public transport to integrated energy systems, require a high population density in order to make such investments viable.

Why is it essential that we change our current land use and planning patterns?

- Our current patterns of growth have proven to be unsustainable and have resulted in a number of social, economic and environmental concerns.
- It was predicted in 2000 that if a sprawling pattern of growth continued unabated in the Greater Toronto and Hamilton Area (GTHA), an agricultural and natural land area twice the size of Toronto would be urbanized by 2031.¹

1 Ontario. Ministry of Transportation. Sustainability InSight. Queen's Printer for Ontario, 2009. Web.

- If sprawling conditions continue and land use policy and planning do not facilitate more intelligent growth in the future, it is estimated that the hours of delay experienced by auto drivers will increase by 300% over the next 30 years.²
- The vast amount of greenspace consumed by sprawl each year further contributes to issues including:³
 - o Increased traffic and congestion
 - o Increased accidents and fatalities of motorists, pedestrians and cyclists
 - o Increased mental health effects including anxiety and stress
 - o Vast environmental damage to local habitat
 - o Increased risk of additional environmental damage including flooding and water pollution
- Land use patterns have also been linked to a number of transportation issues that facilitate unhealthy lifestyles. Evidence has shown that people who live in car-dependent communities are likely to walk less, weigh more and are at greater risk for health issues including obesity, diabetes and other cardiovascular diseases.⁴
- As urban sprawl continues to be the predominant pattern of development, we must shift our land use policy and planning efforts to create more sustainable communities that support greater density and make better use of existing infrastructure while supporting more sustainable transportation methods.

What is the relationship between land use and transportation?

- The urban form has changed drastically over the past century and many of these changes have occurred as a direct result of our mobility patterns and advancements in transportation systems.

2 Abelson, Alan, Riina Bray, Catherine Vakil, and David Elliot. "Report on Public Health and Urban Sprawl in Ontario: A review of the pertinent literature." Jan (2005): n. page. Print. <<http://www.ocfp.on.ca/docs/publications/urbansprawl.pdf>>.

3 Ibid.

4 Ibid.

- One document notes, “In Canada’s cities, land use and transportation have a celebrated but troublesome marriage. Their offspring—urban sprawl, automobile dependence, congestion and smog—are delinquent children, determined to avoid our plans for rehabilitation.”⁵
- Although the modern availability and reliance on the automobile has facilitated the widespread emergence of urban sprawl, interest and policy changes are shifting towards higher density mixed-use community planning and infill development, which enhance the efficiency and effectiveness of municipal services such as transportation. Terms such as “smart growth” and “transit oriented development” have been used to describe ongoing efforts to transform land use patterns and encourage more compact, pedestrian friendly communities that facilitate a greater modal split.
- While smart growth and transit oriented development projects can increase densities and create a more balanced mix of land uses, they also have the potential to worsen problems of traffic congestion, pollution and noise if designed poorly.⁶
- It is estimated that smart growth and community design can reduce vehicle ownership and travel by between 20-40%, while significantly diversifying the modal split by encouraging walking, cycling and use of public transit.⁷
- Transit Oriented Development (TOD) is an example of urban planning and design that is specifically geared towards increasing mobility in urban environments. This form of development aims to combine higher density, mixed-use communities, with rapid transit to facilitate increased mobility that is less reliant on the automobile.
- In order to successfully implement Transit Oriented Development and ensure that the multitude of benefits associated with this type of planning are achieved, there are a number of essential conditions including:
 - o Proper selection of land use – ensuring a well balanced mix of uses that are transit supportive
 - o Promoting density – establishing minimum residential and employment targets and locating greatest density closest to transit hubs
 - o Creating pedestrian friendly environments – locating key destinations within walking distances from transit and creating clear divisions of space (i.e. separating bicycle lanes, pedestrian walkways and roadways)
 - o Ensuring good urban design – to create interesting, enjoyable and safe streetscapes
 - o Managing parking – limit parking spaces that consume large areas of space at street level while still finding ways to accommodate car users

How can land use play a major role in creating more sustainable transportation systems in the future?

- It is clear that our current urban planning and land use patterns need to change in order to create safer and cleaner, more enjoyable and denser communities that facilitate greater mobility and access while increasing the overall standard of living.

5 Canadian Urban Transit Association, . “Transit-Oriented Development: Smart Growth in Action.” Public Transit. 9 (2004): n. page. Web. 9 Nov. 2011. <http://www.cutaactu.ca/en/publication-sandresearch/resources/IssuePaperNo.9_Transit-OrientedDevelopment_SmartGrowthinAction.pdf>.

6 Ibid.

7 Litman, Todd, Rowan Steele, and Victoria Transport Policy Institute. “Land Use Impacts on Transport: How Land Use Factors Affect Travel Behavior.” Victoria Transport Policy Institute. (2011): n. page. Web. 9 Nov. 2011. <<http://www.vtpi.org/landtravel.pdf>>.

- Increased density has a number of effects on mobility including:
 - o Increased proximity to destinations, amenities and essential needs
 - o Greater mobility options, increasing the modal split and reducing the cost efficiency of transportation infrastructure
 - o Increased driving costs as greater population density tends to increase traffic congestion and parking prices while reducing the speed of travel

How can transit oriented development and smart growth help to create a more sustainable future for Toronto and Ontario?

- Ontario has already made it a clear goal to curb urban sprawl, and to create and encourage communities of increased density through the Places to Grow Act and the Greenbelt Act in 2005.
- The Growth Plan for the Greater Golden Horseshoe (GGH) specifies employment and density targets for cities and towns within a large portion of Ontario while regulating and limiting development on currently undeveloped land.⁸
 - o The intent of the Growth Plan is to ensure that designated but not yet urbanized areas grow at transit supportive densities, with transit supportive street configurations, attractive urban environments, jobs available for new and existing residents and plans to mitigate traffic congestion.⁹
 - o Within the growth plan, a number of growth centres have also been identified. These are seen as important areas for intensification that will form the network of urban centres within the region, which are to be connected through intensification corridors. These intensification areas are intended to be a key focus of transit and infrastructure investment.

8 Ontario. Ministry of Public Infrastructure Renewal. Places to Grow: Better Choices. Brighter Future.. 2006. Web. <http://www.moi.gov.on.ca/pdf/en/GrowthPlan_GGH.pdf>.

9 Ibid.

- The Greenbelt Plan was created in response to growing concerns regarding urban sprawl and the subsequent loss of rural, agricultural and natural resources. The plan aims to:¹⁰
 - o Protect against the loss and fragmentation of the agricultural land base and support agriculture as the predominant land use;
 - o Provide permanent protection to the natural systems that sustain ecological and human health and that form the environmental framework around which major urbanization in south-central Ontario will be organized;
 - o Provide a diverse range of economic and social activities associated with rural communities, agriculture, tourism, recreation and resource uses.
- Both the Growth Plan and the Greenbelt Plan were created to complement one another as is evident in the Growth Plan for the GGH where the protection of the greenbelt is a major concern.
- Recent regional transportation plans also identify the potential that land use planning has in creating more efficient transportation systems in Ontario. Metrolinx’s the Big Move identifies a number of mobility hubs within the GTHA that will facilitate greater local and regional connectivity while driving development and density. These hubs also coincide with the growth centres that are set out in the Growth Plan for the Greater Golden Horseshoe.¹¹
- Matching transit investment and land use is a clear goal of both Move Ontario 2020 and the Ministry of Transportation Ontario (MTO). Move Ontario 2020 initiatives outline 52 potential and comprehensive transportation investments throughout the GTHA, while MTO is currently updating its transit supportive land use planning guidelines.¹²

10 Ibid.

11 Ontario. Metrolinx. Big Move: Transportation in the Greater Toronto and Hamilton Area. Toronto Chapter 2: , 2008. Web. <http://www.metrolinx.com/thebigmove/Docs/big_move/TheBig-Move_020109.pdf>.

12 Ontario. Ministry of Transportation. Sustainability InSight. Queen’s Printer for Ontario, 2009. Web.

INFRASTRUCTURE

Often overlooked, innovative approaches to infrastructure are at the heart of how to re-invent urban transportation. Governments at many levels and in many countries are beginning to acknowledge that investment in infrastructure development has been insufficient in recent decades. The reasons for investing in infrastructure are similar to the motivations for confronting the other issues associated with land use, health and environment and include improved quality of life, economic growth and environmental sustainability.

Insufficient infrastructure development contributes to congestion, lengthening the time spent travelling to work and the inefficient movement of goods. It also encourages the use of capital and resource intensive activities as band-aid solutions for long-term problems (i.e. the creeping expansion of aging highways instead of programs which encourage the use of public transportation).

These issues are particularly pronounced in North American and European cities where an aging transportation system is proving inadequate as they look towards future growth. For example, the failure of the United States to modernize its overloaded freight transportation infrastructure – its rail networks, highways, inland waterways, ports and airports – is a growing source of inefficiency, making the nation less competitive globally. Yet, the question remains how to allocate sufficient resources to build new infrastructure while maintaining the quality of aging transportation networks and services. For this reason, it is important to think of infrastructure as parts of a cohesive system, seeking synergies among rail, water, and road transportation networks in light of their relation to communities, energy provision and the economy.

Why is transportation infrastructure so important?

- Since the 1980's, Ontario's infrastructure has been under stress. Under investment, aging infrastructure and growth have led to a gap between actual and needed infrastructure.¹

- As the population in the GTHA continues to increase, the stresses on our current infrastructure become more evident, costing both time and money. The consequences of inadequate infrastructure can be seen everyday when:
 - o We are stuck on congested roadways and in traffic jams
 - o We spend countless hours at the airport due to flight delays
 - o Public transportation options are too few or too expensive
 - o Our electric grid fails and leaves us without power
 - o Our ports are too small to handle modern cargo ships or cannot handle the capacity required
 - o Our transportation infrastructure is being repaired or closed as a result of structural deficiencies or safety concerns, causing massive delays
- Together these inefficiencies cause great concern to our global competitiveness requiring both investment and innovation to establish transportation networks that meet and exceed the current demand while accommodating for the future.
- In the fall of 2008, the cost of bringing municipal infrastructure into a good state of repair was estimated to be \$22.4 billion, with an additional \$3.7 billion required annually to meet current and future needs.²
- While urban infrastructure is extremely complex and normally has significant capital and maintenance costs, it is seen as an investment. It can also be used to facilitate economic growth, as has been seen in Ontario over the past few years. In 2009, the provincial government included a \$32.5 billion investment in infrastructure that was intended to stimulate economic growth. A portion of that funding was directed towards energy efficiency, and expanding transit.³ This investment in transportation infrastructure not only creates a number of jobs, it also ensures that Ontario remains competitive locally and globally, and can provide future economic development, attracting companies and human resources. A recent report on the future of

² Ibid.
³ Ibid.

infrastructure in the US states “Capital and jobs flow to the most efficient markets, and the most efficient markets are dependent on modern, reliable, high-tech infrastructure.”⁴

- In addition to the benefits mentioned previously, sound infrastructure investment increases human mobility and facilitates efficiency. It can help open new markets to goods and services, reduce the overall costs associated with transportation, speed deliveries, and effectively lower the prices of goods for consumers.⁵

How will future land-use and urban planning patterns influence the design of infrastructure?

- Population growth has increased the demand of infrastructure in urban centres, further aggravating the financial constraints of local governments. As the supply fails to keep pace with the demand, infrastructure systems are forced to accommodate more users than they were originally designed to handle. This overuse combined with a lack of funding results in accelerated asset deterioration and further emphasizes the need to rethink the way we plan our cities and design our infrastructure.
- In Canada it is estimated that approximately 80% of the population currently lives in city centres and that percentage will continue to increase in the future.⁶ This is beneficial to the future of Ontario because it is more efficient and cost effective to provide infrastructure within dense urban environments.
- As Ontario moves towards curbing urban sprawl and creating more dense urban centres, the infrastructure must adapt. To do so, the GTHA has adopted strategic planning visions such as the Growth Plan for the Greater Golden Horseshoe and the Big Move.

⁴ Building America's Future Educational Fund. Transportation Infrastructure Report 2011: Building America's Future, Falling Apart and Falling Behind. Washington: Web. <http://www.bafuture.com/sites/default/files/Report_0.pdf>.

⁵ Ibid.

⁶ Tomalty, Ray, and Kathryn Townshend. “Urban Environmental Issues: A Summary of Issues and Approaches.” Canadian Environmental Grantmakers' Network. N.p., Aug 2005. Web. 9 Nov 2011. <http://www.cegn.org/english/home/documents/urbanbrief_eng.pdf>.

As outlined in these plans, large infrastructure investments such as mobility hubs, growth centres and intensification corridors will play a major role in facilitating mobility within the region while also acting as pillars for dense, mixed-use community development and job creation.

- These regional plans also help to ensure coordination between infrastructure investments on a large scale that crosses municipal boundaries, helping to promote greater efficiency and more seamless mobility within the region.
- Increased coordination is essential as the GTHA aims to diversify the modal split and continues to invest in multiple modes of transportation including plans for subway extensions, bus rapid transit (BRT), enhanced rail networks, and increased investment in roads that facilitate freight, passenger vehicles, bicycles and pedestrians. These public infrastructure investments must also work to complement private endeavours such as car and bicycle sharing networks (i.e. Zipcar, Autoshare, BIXI).

How will infrastructure transform in the future to accommodate new technologies, increasing populations and transforming needs?

- As we move forward, it is essential to encourage synergistic and holistic solutions that solve multiple issues with single infrastructure investment (i.e. the creation of a bridge/highway that also captures and distributes energy).
- We must also utilize and adapt our existing infrastructure to meet our current needs by incorporating new technologies, increasing coordination and effectively reducing the overall congestion that plagues our highways and roads within the GTHA.
- Transportation demand management (TDM) and intelligent transportation systems (ITS) will shape future infrastructure investment as we aim to achieve greater efficiency with limited space and utilize our existing infrastructure more effectively.

¹ Ontario. Ministry of Finance. Ontario's Long Term Report on the Economy. Queen's Printer for Ontario, 2010. Web. <<http://www.fin.gov.on.ca/en/economy/ltr/2010/ltr2010.pdf>>.

HEALTH

- TDM has been gaining momentum in the GTHA over the past few years with the implementation of High Occupancy Vehicle (HOV) lanes on a number of provincial highways.⁷ Additional TDM measures that are being implemented across the GTHA include:⁸
 - o Carpooling and cycling programs
 - o Vanpool assistance
 - o Shuttle and emergency ride home programs
 - o Employee work arrangement solutions, including telework, flexible work hours and compressed work weeks
- As stated by Metrolinx, “The vision for TDM in the GTHA is to establish effective and efficient programs and strategies that will motivate more sustainable transportation decisions by people, businesses and governments. Transportation demand management will have a fundamental role in making the best use of existing facilities and maximizing the return in future investments in public transit, active transportation, and goods movement.”⁹
- The federal government has already recognized the importance of TDM in its role in future infrastructure investment, and has stated that transit and road projects supported by the Building Canada Fund will require complementary TDM initiatives to maximize the return on investment.
- It is estimated that almost 90% of the vehicles leaving Toronto in the evening peak hour have only one occupant. If TDM could increase the number of occupants per car by just 10%, it would eliminate nearly 10,000 cars entering/leaving the city during peak periods.¹⁰
- With the exponential growth of technology, intelligent transportation systems are likely to play a large role in the future of mobility.
- Intelligent transportation systems use information and communication technology to improve transportation outcomes including reliability, productivity and safety, while facilitating more efficient use of space and enabling users to make more informed travel choices.
- Since 1999, Canada has invested in ITS, aiming to maintain its competitiveness in the global marketplace, to improve safety and maximize the use and efficiency of the existing multi modal transportation system.¹¹
- The Ministry of Transportation Ontario (MTO) website regarding ITS states that “Exciting initiatives are being pursued in traffic management and transit operations, in traveller information systems, in trucking, toll roads, automated maintenance and in integrated transportation systems. ITS activities in Ontario are intended to contribute to improved transportation safety in the province, to enable the cost effective and efficient movement of people and goods, to lead to commercial and industrial opportunities, to improve global competitiveness, and to assist with the more efficient construction, acquisition, maintenance and use of the transportation infrastructure and other assets within the province.”¹²
- Ontario’s Intelligent Transportation Systems Strategy has identified four key areas of focus:¹³
 - o Reducing urban congestion and commute times
 - o Making border crossings more effective
 - o Improving vehicle and passenger safety
 - o Delivering ITS services effectively.
 - o ITS can have a major impact on the user experience, providing a more efficient, comfortable and enjoyable travel experience, and while ITS is already becoming a part of transportation infrastructure in many major cities, its potential has yet to be fully realized. Projects such as Google’s driverless car and SFpark as well as forecasts suggesting that cars will communicate with one another to eliminate unnecessary traffic, provide a glimpse of the potential for ITS in the future of our transportation systems

11 Canada. Transport Canada. Intelligent Transportation Systems. 2011. Web. <<http://www.tc.gc.ca/eng/innovation/its-menu.htm>>.

12 Ontario. Ministry of Transportation. Intelligent Transportation Systems. Queen’s Printer for Ontario, 2010. Web. <<http://www.mto.gov.on.ca/english/engineering/its/index.shtml>>.

13 Ontario. Ministry of Transportation. Moving Forward with Intelligence. Queen’s Printer for Ontario, 2010. Web. <<http://www.mto.gov.on.ca/english/engineering/its/strategy.shtml>>.

7 Ontario. Metrolinx. Big Move: Transportation in the Greater Toronto and Hamilton Area Green Paper #4: Transportation Demand Management. Toronto: , 2008. Web. <http://www.metrolinx.com/thebigmove/Docs/big_move/TheBigMove_020109.pdf>.

8 Ibid.

9 Ibid.

10 Ibid.

The contributions that improved transportation can make to the health of a community may be felt most strongly at the level of the individual, yet they may also be the most difficult to measure. When a community turns to alternatives to the private automobile, benefits are experienced at a number of levels. Improved air quality is perhaps the most commonly cited, but where individuals regularly use alternative modes of transport, there are a number of other benefits that should not be forgotten.

Many health benefits can be achieved by encouraging more active lifestyles and promoting active transportation within communities. Furthermore, a high quality public transit system can reduce emotional stress by increasing access to education, employment, social and recreational activities, and improving community cohesion and security. Using public transportation and other modes of transit has been shown to be safer than driving private automobiles, significantly reducing accidents and fatalities. Finally, transportation networks play an essential role in ensuring access to health services for those with limited mobility. Changing the way that people get around their neighborhoods directly contributes to the health of a community while allowing community members to make better use of existing health services.

Why is health a major concern in relation to transportation in Toronto?

- Transportation is one the leading causes of air pollution in the GTHA, resulting in premature deaths, respiratory illness and other health concerns. GHG emissions and other airborne contaminants created by transportation affect the well-being of residents on a daily basis. Pollutants released by vehicles are linked to asthma, leukemia, increased risk of cancer, birth defects and hormonal risks for pregnant women.
- Over the past decade, the number of smog alerts and smog days has grown. In 2005, 53 smog days were recorded, including Canada’s first winter smog advisory.¹

1 Canada. Transport Canada. Links between Public Health and Sustainable and Active Transportation. 2010. Web. <<http://www.tc.gc.ca/eng/programs/environment-utsp-publichealth-995.htm>>.

- In 2005, the Ontario Medical Association estimated that “17,000 Ontarians were admitted to hospitals with health problems related to air pollution exposure—a number that is expected to rise to 24,000 in twenty years.”²
- A recent study indicated that mortality-related costs associated with traffic pollution in Toronto are about \$2.2 billion. A 30% reduction in vehicle emissions in Toronto is projected to save 189 lives and result in \$900 million in health benefits.³
- Toronto Public Health calculated an average of 120 premature deaths every year due to heat-related causes, exacerbated by GHG emissions that contribute to global warming.⁴
- The current dependence on the automobile also has significant health concerns relating to inactivity and obesity. Current mobility patterns indicate our society is less physically active, and certain land use and development patterns actually encourage this lifestyle. According to an article in the American Journal of Preventative Medicine, “each additional hour spent in a car per day was associated with a 6% increase in the likelihood of obesity.”⁵
- The 2001 Canadian Community Health Survey indicated that in Toronto, 52% of males and 57% of females were of an acceptable weight. From 1990 to 2001, the number of older adults (aged 45 – 64) at an acceptable weight improved, but the number of younger adults (aged 20 – 44) of an acceptable weight decreased.⁶

2 Ibid.

3 McKeown, Dr. David. Toronto. Public Health. Air Pollution Burden of Illness from Traffic in Toronto: Problems and Solutions. Toronto:2007. Web. <http://www.toronto.ca/health/hphe/pdf/air_pollution_burden.pdf>.

4 Ibid.

5 Frank, LD, MA Andersen, and TL Schmid. “Obesity relationships with community design, physical activity, and time spent in cars.” Journal of Preventative Medicine. 2.27 (2004): 87-96. Web.

6 Toronto. Toronto Public Health: Health Information and Planning. Toronto Health Status at a glance. Toronto: , 2003. Web. <http://www.toronto.ca/health/hsi/pdf/hsi_aag.pdf>.

- The Heart and Stroke Foundation reported that the number of deaths related to obesity nearly doubled between 1985 and 2000,⁷ and that “in 2005, obesity-related chronic conditions accounted for \$4.3 billion in direct (\$1.8 billion) and indirect (\$2.5 billion) costs – a figure that may be an underestimation of the total costs of excess weight in Canada.”⁸
- According to Health Canada, growing obesity and an aging population will lead to increasing type 2 diabetes and mortality rates. The Canadian Diabetes Association concluded that 30 minutes of daily exercise helped people at risk of type 2 diabetes to cut their risk by 58% and lose weight, while people over 60 years old cut their risk by 71%.⁹

- The impacts of poor air quality and climate change also play a predominant role in health effects within Ontario and are predicted to worsen over the next century.
- The City of Toronto’s 2007 study, “Air Pollution: Burden of Illness from Traffic in Toronto, Problems and Solutions,” forecasts that global warming (and its connection to GHG emissions) may lead to “a doubling of heat-related deaths by 2050, and a tripling by 2080.”¹³

How can transportation and related infrastructure play a role in facilitating more healthy lifestyles and reducing the overall burden on the health system?

- Encouraging active transportation is key to reducing the overall strain on infrastructure and the health care system. Active transportation for everyday activities can help Canadians reach the 30 minutes of daily exercise recommended by the Public Health Agency of Canada.¹⁴
- In 2005, Statistics Canada reported that approximately 86% of Canadians use a car to get to work, even though 57% of those commuters lived within 5 km of their place of work,¹⁵ suggesting that public transit and active transportation might be possible given the right infrastructure.
- Active transportation can significantly reduce negative impacts on the environment and their associated health costs. For example, the Ontario Ministry of Energy reported that, “smog costs about \$9.6 billion each year in health care and environmental damage.” Other estimates suggest that if 2% more Canadians walked or cycled to work instead of driving, they would reduce total vehicle trips by 100 million each year (each vehicle trip produces “26 grams of hydrocarbon, 20 grams of

13 McKeown, Dr. David. Toronto. Public Health. Air Pollution Burden of Illness from Traffic in Toronto: Problems and Solutions. Toronto: , 2007. Web. <http://www.toronto.ca/health/hphe/pdf/air_pollution_burden.pdf>.

14 Canada. Transport Canada. Links between Public Health and Sustainable and Active Transportation. 2010. Web. <http://www.tc.gc.ca/eng/programs/environment-utsp-publichealth-995.htm>.

15 Ibid.

carbon dioxide and 1.6 grams of nitrogen oxides per passenger mile”).¹⁶

- Active transportation can reduce exposure to pollution. Climate Change Connection Manitoba argues that people in cars are exposed to 10 times more pollution than people who walk, bike or take public transit.¹⁷
- The American Public Transportation Association reports “public transit can be as much as 79 times safer than car travel.”¹⁸
- People tend to be discouraged from walking because of physical barriers and concerns about safety. A telephone survey funded by the City of Toronto 2008 reported that 67% of Torontonians feel their neighbourhood is walkable, however they find barriers to walking at certain times, in certain areas or because of inadequate infrastructure such as proper lighting, or personal safety.
- A Walkability Study done for the Province of Ontario in 2000 by York University’s Centre for Sustainability found that children walking to school also experience numerous barriers that discourage them from walking to school, such as safety.
- The Heart and Stroke Foundation’s 2005 Report Card on Canadians’ Health indicated that 37% of children are either overweight or obese, a number three times higher than 20 years ago.¹⁹

What types of plans are already in place to promote active transportation locally?

- The Government of Ontario and the City of Toronto recognize the benefits to walkable, active communities. This recognition is expressed in the form of grants to communities developing walking and cycling paths and other supporting infrastructure. Both the City of Toronto and the Province of Ontario have bikeway networks on their agendas, but implementation is slow.

16 Ibid.

17 Ibid.

18 Ibid.

19 Ibid.

- The Metrolinx plan, The Big Move, includes 7000 km of new infrastructure for walking and cycling to encourage healthier, safer lifestyles and to reduce GHG emissions.²⁰
- The City of Toronto’s Proposed Framework for a Toronto Walking Strategy will promote walking by creating a walking culture, leadership among communities and altering the streetscape to make it more welcoming (adding decoration, monitoring the quality of sidewalks).²¹
- In 2001, the City of Toronto created an extensive Bike Plan that was to be fully implemented by 2011, though work on this plan has been erratic. The chapter of the Bikeway Network Plan entitled “Implementation and Evaluation,” proposed “the completion of Phase 2 [by] 2011... a network of over 1000 km.” The actual number was 109.7km by 2009.
- The City of Toronto, in the Climate Change and Clean Air Action Plan, proposed to:
 - o Reduce GHG emissions from 1990 levels of 6% by 2012, 30% by 2020 and 80% by 2080
 - o Reduce locally-generated smog-causing pollutants from 2004 levels of 20% by 2012
 - o Implement a more sustainable transportation system that included expanding bike lanes and trails from 300 to 1000 km by end of 2012
 - o Create a Sustainable Transportation Implementation Strategy that integrated existing policies and plans (i.e. Official Plan, Bike Plan, Transit City Plan, TTC Ridership Growth Strategy, Walking Strategy)
 - o “green[...]” commercial fleets in the city; shifting taxis and limousines to low emission or hybrid technologies by 2015 or earlier.
 - o Encourage provincial and federal governments to provide policy, program and funding support to Toronto to achieve a sustainable transportation system.²²

20 Metrolinx. “The Big Move: Transforming Transportation in the Greater Toronto and Hamilton Area.” Metrolinx, 28 11 2008. Web. 8 Nov 2011. <http://www.metrolinx.com/thebigmove/en/default.asp&xgt.>

21 Toronto. Transportation Services. Steps towards a Walkable City. Toronto: , Web. <http://www.toronto.ca/transportation/walking/walking_strategy.htm>.

22 Toronto. Energy Efficiency Office. Change is in the Air: Climate Change, Clean Air and Sustainable Energy Action Plan: Moving from Framework to Action Phase 1. Highlights. Toronto: , 2007. Web. <http://www.toronto.ca/changeisintheair/pdf/clean_air_action_plan.pdf>.

ENVIRONMENT

While many of the environmental benefits of renewing urban transportation networks have been mentioned, the environmental consequences of reimagining transportation networks and services are a major area of focus for the MOVE! Expo.

In continuing to consume resources and pollute the air, soil and water around us, it will become increasingly difficult to maintain (let alone grow) transportation infrastructure and services.

Improved and updated public transit, as well as a more developed infrastructure for non-motorized modes of transportation, will play a crucial role in reducing the levels of green-house gases and other toxic materials that result from our dependence on automobiles. It will be important to design and build communities where walking and cycling are a viable alternative to the car; this means that it will be necessary to encourage the construction of denser and more compact urban areas.

This will entail a wide variety of approaches, from changing the raw materials from which road and rail systems are built, to the layout of transportation networks and the habits which shape how people envision their own mobility.

Finally, it will be necessary to change opinions and raise awareness about the environmental realities of transportation and ways that every citizen can participate in making the future green.

How is the environment impacted by transportation?

- Life cycles of transportation products and the industrial processes required to produce and sustain transportation also have negative environmental effects, such as energy intensive manufacturing and resource extraction, as well as the vast amount of waste and the challenges related to disposal.¹
- Key concerns regarding the environmental effects of transportation include:²

1 Rodrigue, Dr. Jean-Paul, Claude Comtois, and Brian Slack. Ch.8 The Issue of Transportation and the Environment from The Environmental Impact of Transportation. 2nd. New York: Routledge, 2009. Print.

2 Ibid.

- o Climate change: the transportation industry releases several million tons of gases each year which include “lead (Pb), carbon monoxide (CO), carbon dioxide (CO₂; not a pollutant), methane (CH₄), nitrogen oxides (NO_x), nitrous oxide (N₂O), chlorofluorocarbons (CFCs), perfluorocarbons (PFCs), silicon tetrafluoride (SF₆), benzene and volatile components (BTX), heavy metals (zinc, chrome, copper and cadmium) and particulate matters (ash, dust)”. These contribute to the increasing levels of GHG gases within the atmosphere, while pollutants such as nitrous oxide and other gases from transportation deplete the ozone layer further exacerbating issues such as global warming.
- o Air quality: Gases and particulate matter from highway vehicles, marine engines, locomotives and aircraft affect air quality, cause acid rain, smog and dust. This type of pollution contributes to the degradation of our natural and built environments, which in turn negatively impacts our overall health.
- o Noise: Noise caused by vehicles and transportation hubs (i.e. airports) impacts human health and can lower land values.
- o Water quality: Fuel and products used for transportation can pollute rivers and lakes (i.e. snow removal in Ontario leads to increased runoff and pollutants, and the salination of rivers and aquifers). Supporting transportation infrastructure such as automotive repair, ships and gas stations are also large sources of soil and groundwater contamination. Furthermore, marine transportation impacts the environment through “dredging, waste, ballast waters and oil spills” that contribute to pollution, the movement of invasive aquatic species, disruption of the sea floor and damage to marine ecosystems.
- o Soil quality: A number of factors contribute to soil quality and contamination including:
 - Shipping – which can alter “wave action” and lead to erosion
 - Construction of roads and ports can lead to loss of fertile soil and also is known to degrade local bodies of water through eutrophication.
 - The transportation industry uses toxic materials that can contaminate soil [i.e. auto-repair facilities and gas stations are largely associated with contaminated sites]

- o Biodiversity: Construction for transportation uses natural resources and land, contributing to deforestation, draining land and reduction of natural habitat for animals and plants.³

How does transportation contribute to Greenhouse Gas (GHG) emissions?

- Despite technological progress and available clean technologies, in recent years we have failed to significantly reduce emissions and the overall impact this has on the environment. Greenhouse gas emissions contribute to climate change, which has been described as the defining challenge of our age, and perhaps the biggest threat to confront the future of humanity. The economic costs of failure to act on climate change have been estimated at 20% of the global GDP, although economist Nicholas Stern recently noted that he had underestimated the threat.⁴
- According to the Ministry of the Environment’s Climate Change Action Plan 2008-9 Annual Report:
 - o In 2007, Ontario was Canada’s second largest producer of GHG emissions after Alberta.⁵
 - o Between 1990 and 2007, Ontario’s total annual GHG emissions rose by 13%, from 175 Mt of CO₂ eq to 197 Mt of CO₂ eq.⁶
 - o Of that increase, the largest contributing sector was transportation which accounted for 34.4% of the increase (GHG emissions from transportation rose from 47.3 Mt CO₂ eq in 1990 to 63.5 Mt CO₂ eq in 2007)⁷
 - o This increase was directly related to population growth, urban sprawl and consumer preferences for SUVs, vans and pickups, as well as the manufacturing sector’s use of trucks for just in time delivery of goods.
- According to a 2011 survey of road and rail emissions in the GTHA by Sustainable Prosperity and the Pembina Institute:
 - o Transportation has been the fastest growing source of GHG emissions in Ontario. Since 1990, emissions in this sector have increased more than 30% (14,900kt of CO₂).

3 Ibid.

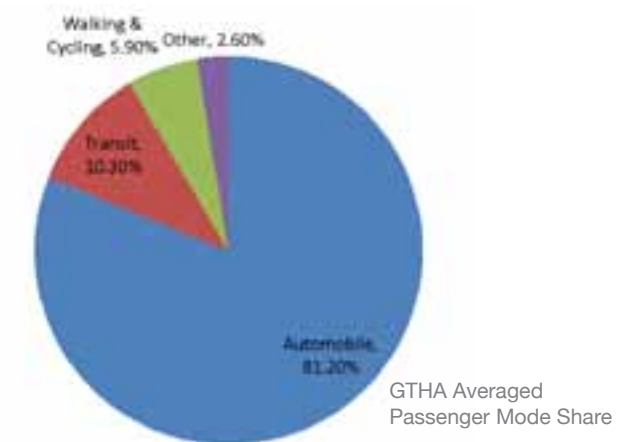
4 Thompson, David. “Putting Transportation on Tract in the GTHA: A survey of road and rail emissions comparison.” Sustainable Prosperity. Sustainable Prosperity and the Pembina Institute, 01 2011. Web. 7 Nov 2011.

5 Ontario. Ministry of the Environment. Climate Change Action Plan Report 2008-2009. 2010. Web. <http://www.ene.gov.on.ca/environment/en/resources/STD01_076569.html>.

6 Ibid.

7 Ibid.

- o In the passenger sector, 99.98% of transportation energy used in Ontario comes from fossil fuel combustion: about 80% from gasoline, 16% from aviation fuels, 3.4% from diesel and 1% from propane and natural gas. 0.02% of transportation energy in Ontario comes from electricity.⁸
- o In the freight sector, 100% is fossil fuelled, with 72% being diesel, 26% gasoline and the remainder a mix of other fossil fuels.⁹
- o In Toronto, automobiles account for about 75% of travel, and in the suburbs and Hamilton they make up to 90% of travel. In more distant centres and rural areas, automobiles account for 95% of travel.
- o Total GHG emissions from personal transportation in the Greater Golden Horseshoe region are substantial, at 16 million tonnes per year.¹⁰
- o Emissions from heavy trucking in Canada are approximately 7 times as high as those from rail.¹¹
- o The number of heavy duty diesel vehicles (HDDVs) on Ontario roads more than doubled between 1990 and 2008.¹²
- o Even small cars are about 4 times as GHG intensive as commuter rail, which in-turn is more intensive than LRT or subway.



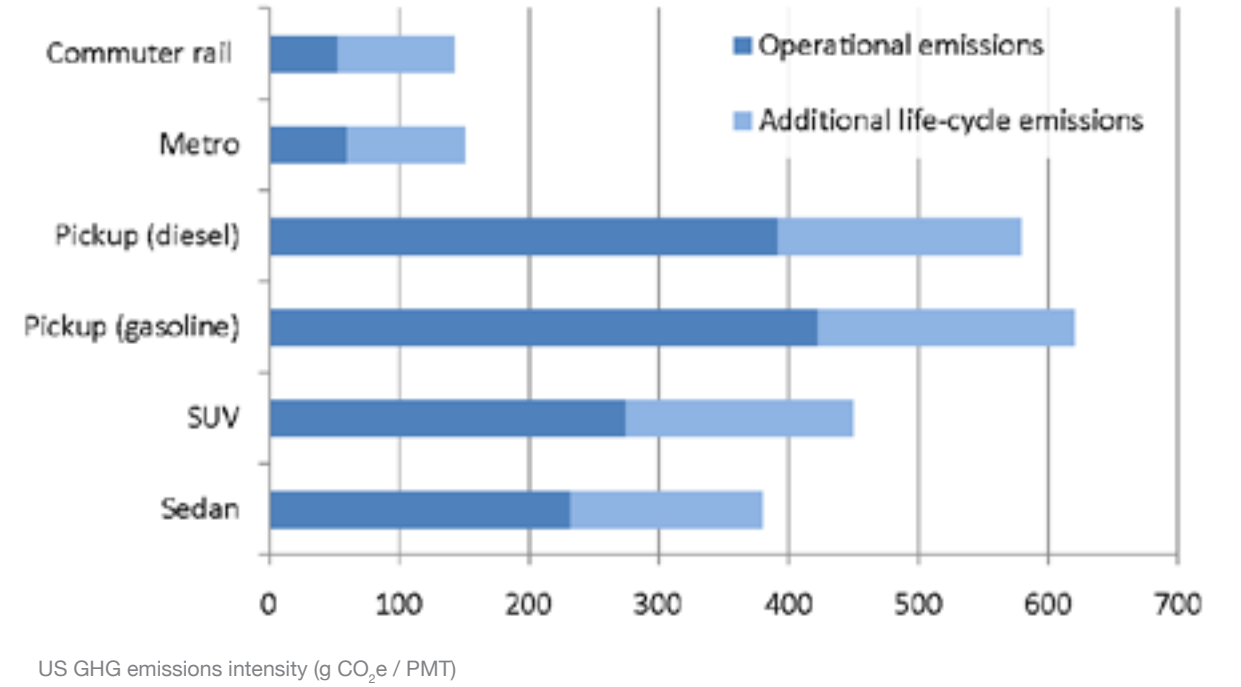
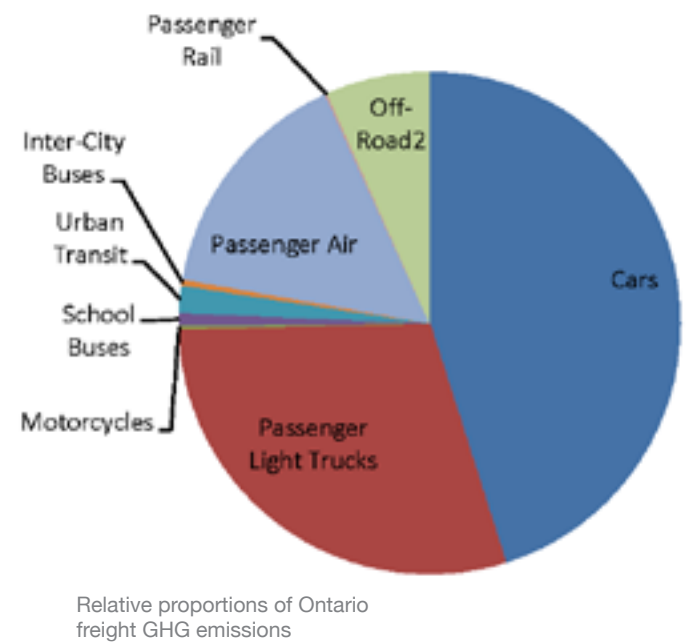
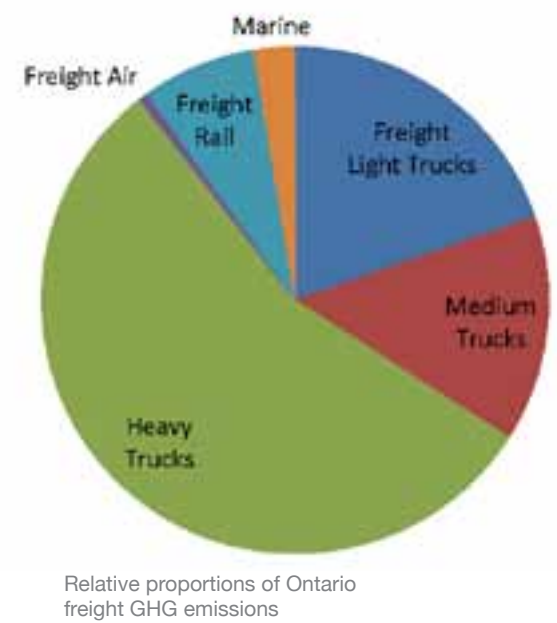
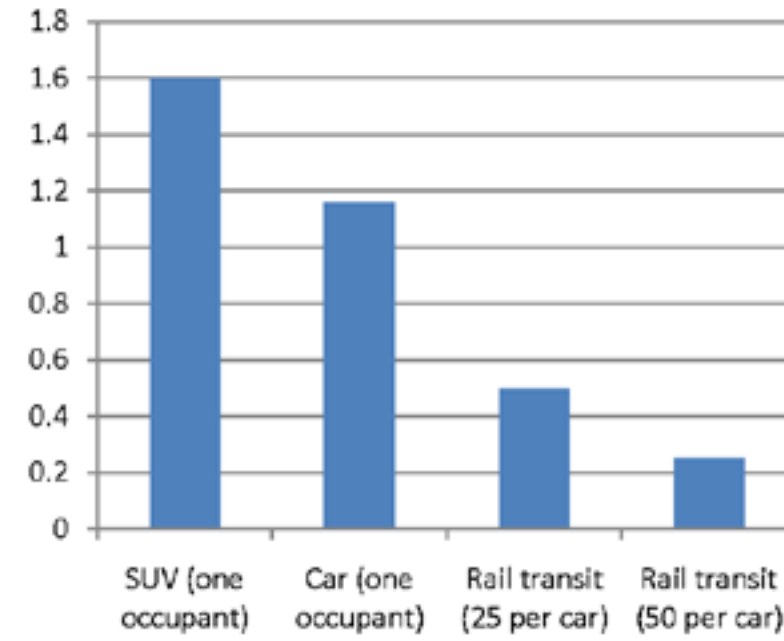
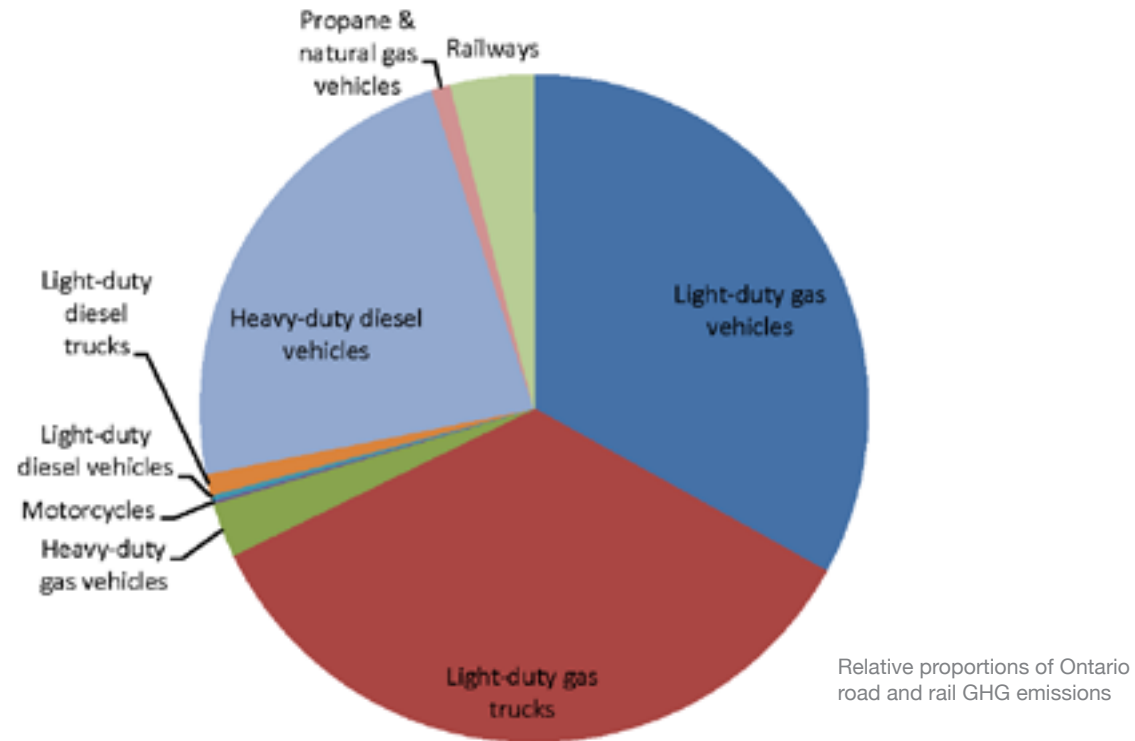
8 Thompson, David. “Putting Transportation on Tract in the GTHA: A survey of road and rail emissions comparison.” Sustainable Prosperity. Sustainable Prosperity and the Pembina Institute, 01 2011. Web. 7 Nov 2011

9 Ibid.

10 Ibid.

11 Ibid.

12 Ibid.



	DMG (Weighted Avg) ⁸²	Toronto City Summit Alliance ⁸³
Automobile	81.2%	78%
Transit	10.3%	15%
Walking & Cycling	5.9%	7%
Other	2.6%	-
TOTAL	100%	100%

GTHA / GTA Transportation Mode Share

	DMG ⁸⁴	City of Toronto ⁸⁵	Toronto City Summit Alliance ⁸⁶	Pembina Insite ⁸⁷
Automobile	67.1%	65%	68%	55%
Transit	23.2%	25%	-	35%
Walking & Cycling	8.2%	9%	-	9%
Other	1.5%	1%	-	1%

City of Toronto Transportation Mode Share - Daily

	City of Toronto ⁸⁸	Toronto Environmental Alliance ⁸⁹	City of Toronto ⁹⁰
Automobile	55%	-	55%
Transit	32%	28%	32%
Walking & Cycling	13%	-	13%
Other	-	-	-

City of Toronto Transportation Mode Share - Peak Hours

	Exports	Import
Air	8.2	6.8
Rail	25.1	8.5
Road	61.1	83.3
Marine	3.6	0.8
Other	2.0	0.6

Ontario / US Exports and Imports Mode Share (% by value), 2001

What have been the global responses to climate change and pollution?

- There have been two main responses to climate change: mitigation and adaptation. Mitigation involves “implementing policies to reduce greenhouse gas (GHG) emissions and enhance sinks,” while adaptation is an “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.”¹³
- Actions toward adaptation are needed now to provide immediate and short-term benefits. Mitigation is equally urgent for the long-term prevention of human impact on the climate, and will only begin to have an effect on global mean surface temperature decades from now.¹⁴
- Because greenhouse gas emissions are not being reduced quickly enough to prevent climate change and its effects, “the world is ‘committed’ to a certain level of global warming and therefore, subject to a degree of impacts that will require adaptive responses by nations and communities.”¹⁵
- Designing for mitigation and adaptation together avoids potential conflicts: “Mitigation measures can increase local vulnerability to climate change, and measures for adaptation can increase the local emissions of GHG. For example, efforts to reduce GHG emissions could include the concentration of housing development with renewable energy close to a town centre, while an adaptation strategy could dictate that if the town centre is located close to a river prone to flooding it would be desirable to locate new housing sufficiently far away from the centre.”¹⁶

¹³ Robinson, Roberts, Jennifer A. Learmouth, Anthony Hutson, Colin D. Macleod, Tim H. Sparks, David L. Leech, Graham Pierce, and ... United Nations. British Trust for Ornithology. Climate Change and Migratory Species. Thetford, Norfolk: , 2005. Web. <http://www.cms.int/bodies/COP/cop8/documents/meeting_docs/en/Inf_19_Climate_Change_Migratory_Species.pdf>.

¹⁴ Rosenweig, Cynthia, and Nicola Tubiello. “Adaptation and mitigation strategies in agriculture: an analysis of potential synergies.” Mitig Adapt Strat Glob Change. 12. (2007): 855-873. Web. 9 Nov. 2011. <<http://ies.lbl.gov/iespubs/12rosenweig.pdf>>.

¹⁵ Ibid.

¹⁶ Ibid.

What is Ontario doing to eliminate and prevent further environmental damage?

- Ontario has taken a number of steps in recent years to reduce the overall GHG emissions and prevent further environmental damage.
- One of the major initiatives is the development and implementation of the climate change action plan, which has set tough GHG reduction targets, aims to enhance the “green” economy in Ontario and is essentially a guideline in reducing our overall carbon footprint.¹⁷ Some of the key GHG reduction targets as set out in Ontario’s Climate Change Action Plan require the province to be:
 - o 6% below 1990 levels by 2014 (Ontario uses a 1990 base year in line with the UN Framework Convention on Climate Change)
 - o 15% below 1990 levels by 2020
 - o 80% per cent below 1990 levels by 2050
- Ontario has already taken considerable steps in reducing its GHG emissions, and by 2007, the CO₂ emissions per capita had decreased 10% from 1990 levels. If future targets are met, we have the potential to significantly reduce our environmental impacts. For example, if we meet our 2020 greenhouse gas emissions, which require us to be 15% below 1990 levels, our per capita emissions will be just over 10 tonnes per person (less than half of today’s national average).¹⁸
- Within the climate change action plan, it is also recognized that road transportation was responsible for the greatest increase in emissions of all Ontario sectors between 1990 and 2007. Recognizing the large percentage of GHG emissions (about 31% of Ontario’s total emissions) and pollution caused by transportation, the province has created a number of initiatives to move towards a greener transportation system. Some examples of these initiatives include:
 - o Greening Ontario’s Transit Fleet - The aim is to increase the efficiency of transportation and ensure that GHG emissions related to

¹⁷ Ontario. Ministry of the Environment. Climate Change Action Plan Report 2008-2009. 2010. Web. <http://www.ene.gov.on.ca/environment/en/resources/STD01_076569.html>.

¹⁸ Ibid.

transportation do not continue to climb as the population within the GTHA increases. Further resources will be allocated to the enhancement of existing transit projects and programs such as GO transit, bicycle and car sharing networks, Smart Commute, transportation demand management etc.¹⁹

- o Streamlined environmental assessment processes for public transportation projects - Placing transit as a high priority to reduce congestion and increase the modal split, the government announced a new, six-month limit on the assessment process for all public transit projects, meaning that more transit projects will be completed sooner. Prior to this initiative, environmental assessment (EA) processes for transit projects had typically taken between two and three years to complete.
- As a result of this initiative, several municipal and regional transit projects are moving forward under the new, streamlined assessment process, including the Georgetown South Service Expansion and Union Pearson Rail Link, and the Yonge Subway North Extension. The Region of Waterloo's Rapid Transit project and the Downtown Ottawa Transit Tunnel project are also currently conducting the streamlined process.²⁰
- While this can help speed improvement to the transportation sector and effectively reduce GHG emissions related to transportation, it is important that the quality and thoroughness of the EA process not be compromised to ensure further environmental damage is not created.
- Incentives for Green Vehicles - In 2009, the government unveiled a plan to assist consumers in switching to greener vehicles. This provided specific incentives to owners of plug-in hybrid electric and battery electric vehicles including:²¹
 - o Rebates of between \$4,000 and \$10,000
 - o Access to HOV lanes for single occupant drivers of electric vehicles
 - o Free charging stations at applicable GO transit parking lots

- In addition to the above incentives, Ontario plans to lead by example, build consumer demand and encourage an overall increase in electric vehicles in the future. By 2020, the Ontario government aims to have 5% of all vehicles driven in the province to be electrically powered.²²
- Greater investment in transportation projects- MoveOntario 2020 launched in June 2007, and has designated government funds toward making the largest transit investment initiative in Canadian history. This historic commitment forms the foundation for the priority projects in Metrolinx's Regional Transportation Plan. Over the next several years, Ontario will invest \$11.5 billion in public transit projects in the GTHA.
- Massive transit expansion plans and improved investment also provide a solid foundation for the long-term transit plans identified in The Big Move. This Regional Transportation Plan was released in 2008 by Metrolinx, the province's regional transportation planning agency for the GTHA. One of the plan's goals is to create a transportation system with a smaller carbon footprint and lower GHG emissions. In fact, Metrolinx estimates that the projects, policies, and programs outlined in the plan, in conjunction with the beneficial effects of the Growth Plan for the Greater Golden Horseshoe, can reduce GHG emissions in Ontario by between 3.3 and 3.7 Mt of CO2 per year by 2031 – equivalent to about 0.7 tonnes of CO2 for every person who lives in the GTHA.²³

19 Ibid.
20 Ibid.
21 Ibid.

22 Ibid.
23 Ibid.



WHAT IS SUSTAINABLE TRANSPORTATION?

Evergreen, the Centre for Green Cities and the Institute without Boundaries at George Brown College are grateful to the Advisory Committee whose expertise helped inform the content of this charrette.

Everyone in the GTHA is focused these days on the issue of congestion, but congestion is as much a symptom of our underlying transportation problems as it is a 'problem' per se. A successful city will always have 'congestion', since the rationale for cities is to bring people together so that they can interact and collectively prosper.

Excessive congestion, however, indicates a failure to properly plan, design, build and operate a system that facilitates these interactions as efficiently and cost-effectively as possible. If left uncorrected it will lead to a decline in the region's economic competitiveness and quality of life, which, if sufficiently severe can be extremely difficult to reverse. Excessive congestion reflects a lack of choice for too many trip-makers: they lack choices in trip routes, timing and, most importantly, travel mode.

A sustainable transportation system:

- has sufficient funds to achieve its service objectives, to renew itself as it ages, and to grow over time as the urban region evolves and grows
- is equitable, in which everyone is able to access jobs, schools, services, etc., regardless of economic or physical capabilities
- requires a sustainable urban form. Urban sprawl is not a sustainable pattern of land use: it consumes too much land, requires excessive investment in infrastructure of all kinds (not just transportation) and makes sustainable transportation impossible to provide
- needs to be as environmentally benign as possible. We must be working to "de-carbonize" the transportation system as soon as it is technologically and economically feasible to do so: the very real threats of climate change make this a non-negotiable goal (and yet this is barely on the GTHA radar screen at the moment).

These various threads of sustainability, of course, all weave together; sustainable urban design permits the development of sustainable modes of travel (i.e. transit, walking, biking), which provide flexible alternatives to the car, which reduce congestion, which improves economic productivity and quality of life, which in turn attracts sustainable financial support for the system.

-- Eric Miller,
Director of Cities Centre, University of Toronto

Future sustainable transportation systems will have to be user-focused, seamless and valued by users. This means that we will have to move from a traditional operational based model to one utilizing retailing principles such as customer relationship management. The reason for this is the coming together of global trends such as personalization of services, the need for more efficient services, the lack of financial resources and the ability of new technology to deliver these personalized services.

So future transportation systems will be completely integrated and mode neutral, every user will have a mobility management plan which will address their needs but also, in aggregate, will meet the city's economic, environmental and social objectives as well. These objectives will set the agenda with respect to agreed economic, environmental and social targets. This will be done through giving users a valued service, generating new funding streams through value added services and achieving behavioural change through incentivisation techniques. If any city wishes to be competitive in the future on the global stage it will have to plan for Complete Mobility.

-- George Hazel,
Chairman of MRC McLean Hazel

Sustainable Transportation could be described as:

"Moving People, Moving Goods, and Moving Less in ways that are green, healthy, safe, just and equitable, connected, convenient, pleasant, innovative, affordable, and highly conducive to vital economies and livable communities".

Transportation is not the ultimate goal, it's a means to an end: meeting people's needs. We can meet people's transportation-related needs more sustainably in at least three ways:

* (NEW) MOBILITY – providing seamlessly connected, multi-mode, multi-service, door-to-door transportation that elegantly combines information technology and social networking, smart spatial and product design, innovative financing and revenue approaches, enlightened policies, and public-private-civic collaboration to make it all happen together as a whole system.

* PROXIMITY – shortening some trips by bringing needs and their satisfaction closer together with things like community planning and design, local agriculture and urban farming, and local production and distribution.

* TECHNOLOGY – eliminating some trips altogether with the help of things like tele-work, tele-commerce, tele-health, and tele-education.

Some people think of the private car as the main form of transportation and everything else as "alternative". This could suggest that the "alternatives" will never connect and evolve to become the next mainstream. It would be a little like saying "women are alternative men". Instead, if we were to borrow from Thomas Friedman we might say "transportation is flat". In other words, transportation is evolving from an increasingly unsustainable mono-culture into an increasingly diverse, sophisticated and sustainable system that will move us into the future in more ways than one."

-- Sue Zielinski,
Director, SMART, University of Michigan

10 CHALLENGES, 10 LOCATIONS



CHALLENGE 01: Beyond the Car

Imagine a new sustainable mobility vehicle and a new future for the automobile manufacturing sector beyond the car.

LOCATION:

Oshawa, Ontario – GM District



CHALLENGE 02: The Energy Way

Create carbon neutral highway networks by building infrastructure that generates renewable energy that can then be used to power vehicles.

LOCATION:

QEW/Gardiner Expressway Between Toronto and Hamilton



CHALLENGE 03: Reconnect

Improve the overall equality of access to transportation infrastructure and investment in an isolated neighbourhood and ensure access to transportation for all.

LOCATION:

Scarborough, Ontario – Kingston Galloway Neighbourhood



CHALLENGE 04: Huburbia

Connect edge cities to downtown and each other by building a network of mobility hubs that allow for seamless transfers between various modes of transportation and create areas of intensified development for working, living, shopping and play.

LOCATION:

Vaughan, Ontario – Primary site at Jane and Highway 7 with a secondary site at Vaughan Mills (Rutherford Road and Highway 400.)



CHALLENGE 05: Shared Spaces

Envision the city's core as a grid built around a dense transportation network made up of interconnecting larger and smaller fibres (such as transit-priority routes, pedestrian plazas, separated bike lanes, and service laneways) to facilitate a spectrum of activities.

LOCATION:

Toronto, Ontario – Downtown Core (Parliament to Spadina, College to Queens Quay)



CHALLENGE 06: The Mega-Metro

Imagine the movement of goods and people within the large, densely populated regions of the future.

LOCATION:

Quebec Ontario Mega region - Quebec City-Windsor Corridor (QWC)



CHALLENGE 07: Low Car^b Diet

Re imagine the transportation infrastructure in a suburban area in order to reduce car dependency while encouraging more active, sustainable and healthy transportation alternatives for residents from ages 8 to 80.

LOCATION:

Markham, Ontario – Markham Rd. – North/South connection from Major Mackenzie to Steeles Ave.



CHALLENGE 08: Booming Around

Provide efficient and accessible transportation networks that respond to an aging demographic.

LOCATION:

Keele and Wilson area around Downsview Park including proposed station at Sheppard Ave.



CHALLENGE 09: Greenways & Waterways

Working with the natural environment, establish and encourage new ways to move through our cities.

LOCATION:

Toronto Ontario – Toronto Waterfront & Don River Tributary Ravine System



CHALLENGE 10: Food Not Crude

Imagine local agriculture integrated into the urban, suburban and regional fabric, increasing food security within cities and raising revenue for local farmers while at the same time reducing the overall cost and distance travelled associated with the transportation of food.

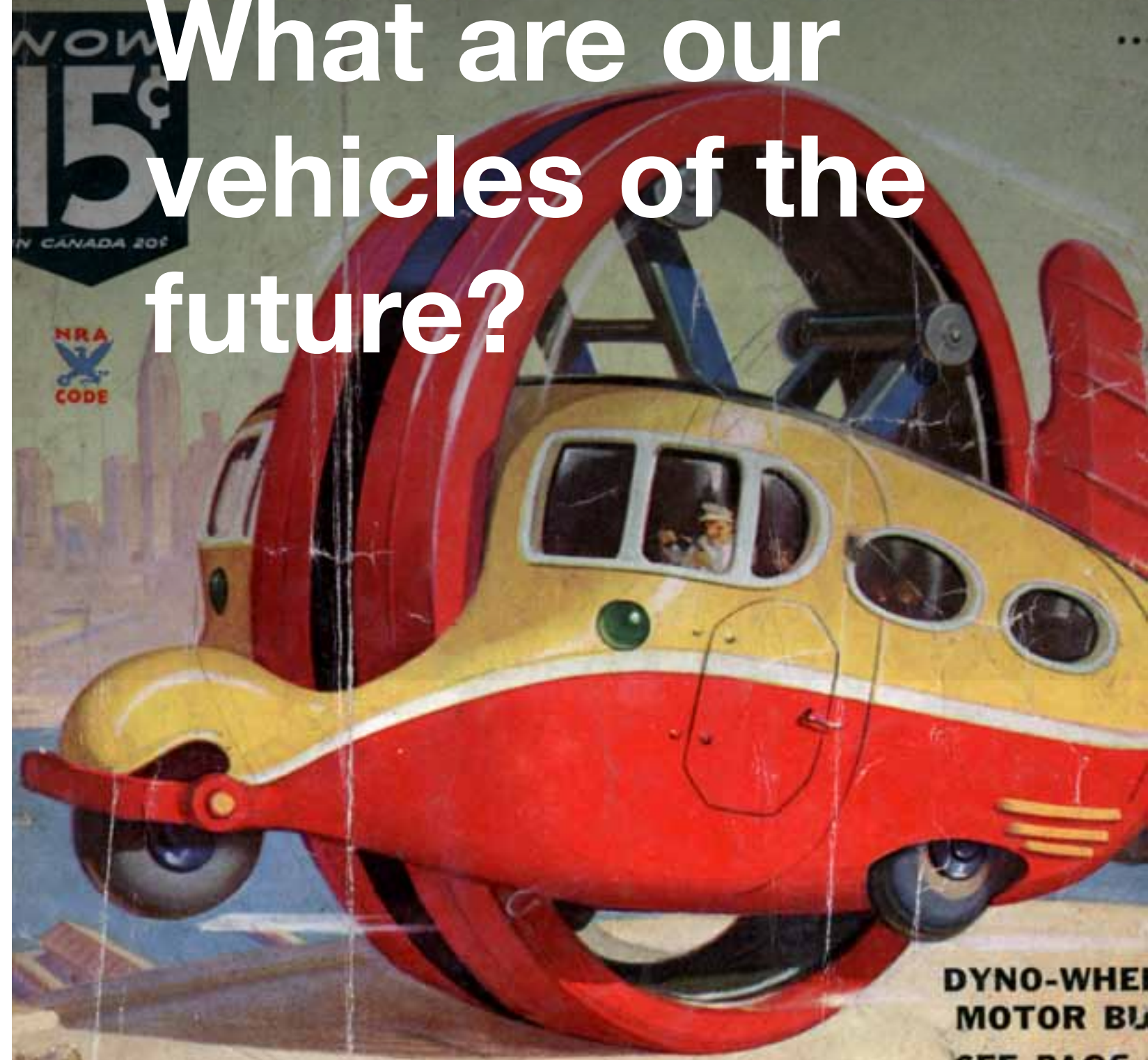
LOCATION:

Port Lands – Toronto, Ontario

MECHANIX

CHALLENGE 01: BEYOND THE CAR

What are our vehicles of the future?



NOW
15¢
IN CANADA 20¢

NRA
CODE

DYNO-WHEEL
MOTOR BU
SEE PAGE

SOURCE: POPULAR SCIENCE, 1933

CHALLENGE 01

BEYOND THE CAR

PROJECT LOCATION

Oshawa, Ontario – GM District

PROJECT VISION

Imagine a new sustainable mobility vehicle and a new future for the automobile-manufacturing sector beyond the car.

PROJECT MISSION

Transform the future of the transportation manufacturing industry in Oshawa by imagining a sustainable mobility vehicle and its green production process.

THE CHALLENGE

We have managed to burn nearly half of all global oil reserves in only 125 years. Since the 1970s, there has been a growing awareness that the global supply of oil is diminishing, causing the cost of petroleum-based fuels to increase and placing pressure on the automobile industry to provide new, innovative solutions that are more efficient and less reliant on fossil fuels as their primary source of energy. The question we now face is: just as the car replaced the horse and carriage, what should replace the car? This is a question whose resolution will have major economic consequences for many Canadians. The automotive industry is the largest manufacturing industry in the nation, accounting for roughly 12% of manufacturing GDP and over 2% of total industrial GDP. However, increased competition and a failure to meet the demands of global markets has witnessed the decline of the US auto manufacturing giants referred to as the Big Three – GM, Ford & Daimler Chrysler. Over the past few years, they have decreased production, greatly affecting communities where the auto industry is the major employer. One such community is Oshawa, Ontario. In the 1980s, Oshawa's GM plant employed 18,000 locals. Today, that number has been significantly reduced to 3,800.

In order to revitalize the economy and give new life to a dated industry, how can personal mobility and the associated manufacturing/production processes be reconsidered? How can new industries take advantage of existing infrastructure, labour and expertise to re-tool the auto industry to meet the future mobility needs of the country? Can the development and manufacture of sustainable personal vehicles be expanded to consider

an entire sustainable transportation system that might include transit vehicles, vehicles geared to small urban freight movement or services such as fractional car use, community car sharing and shuttle vehicles? How can a "door-to-door" solution provide the traveller with efficient transportation choices in the most cost-effective and convenient manner?

OBJECTIVES

- Consider how the City of Oshawa, its automobile industry, residents and labour force can adapt to a future that is less dependent on manufacturing cars and the consumption of fossil fuels.
- Design a new, sustainable vehicle that will meet future requirements for personal mobility by offering an attractive, economic alternative to cars that fosters more sustainable and healthier lifestyles.
- Take a cradle-to-cradle approach, considering the full life-cycle of the product in order to reduce the environmental impact of local and global manufacturing, shipping, emissions during use, and end-use/recycling.
- Adapt the automobile industry in its current form to accommodate an attractive, economic alternative to cars that will ultimately encourage better use of natural resources and foster more sustainable/healthier lifestyles.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- Global automotive supply chain and more specifically, the supply chain associated with General Motors Canada.
- Existing transportation infrastructure within the GTHA and the connecting region, including major highway networks, shipping ports, rail, airports and other infrastructure supporting both personal mobility and the general movement of goods associated with the supply chain.
- Evolving sustainable transportation and manufacturing technologies and trends.

- Future demand for mobility and evolving user expectations.
- Existing personal travel patterns within the GTHA, Canada and North America.
- Current land-use patterns and access.
- Urban planning and environmental restrictions and the influence these will have on the future of vehicle design.
- Increasing market demand and viability of car sharing.
- Government subsidies and incentives available for the development of sustainable vehicles and the creation of green jobs.

PROGRAM REQUIREMENTS

- Develop a more sustainable supply chain for an alternative vehicle that utilizes the existing infrastructure and expertise associated with the auto industry.
- Develop a strategy for the adaptation of current manufacturing facilities, resources and labour.
- Create an alternative vehicle that has the potential to significantly reduce our current dependency on the automobile.
- Create the entire transportation system that supports an alternative vehicle, including infrastructure changes that are required to accommodate and power the proposed vehicle.

CRITERIA

- Promote new, green manufacturing jobs within the automotive industry to build greater economic stability through innovation.
- Create a vehicle that has the potential to alter the modal split within the GTHA and North America.
- Create a transportation system and manufacturing process that produces no waste using cradle-to-cradle principles.

- Better utilize the existing infrastructure in order to significantly reduce the overall congestion on roads and decrease commute times.
- Create a transportation system that is more affordable to the general public.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

- Car owners and drivers: 21 to 60 years of age.
- Local residents: 8 to 80 years of age.
- Local auto sector workers: 21-65 years of age.
- Local auto manufacturing companies and subsidiaries.

DELIVERABLES

The following deliverables are specific to this challenge:

- Design and create detailed renderings and illustrations of a new personal vehicle.
- Create an exploded axonometric of the new proposed vehicle, indicating the material selection of components and assembly requirements.
- Create a detailed manufacturing plan, indicating how the components can be created, assembled and disassembled in a sustainable manner, including the cost and location of parts creation.
- Illustrate how the personal vehicle utilizes the existing infrastructure, or how the infrastructure must be modified to accommodate the proposed vehicle.
- Create user experience scenarios that demonstrate the use of this new vehicle including how it functions within the existing/proposed infrastructure, and the energy system that powers the vehicle.
- Create a marketing and awareness strategy that educates and informs the potential user of its potential benefits.

GENERAL CONTEXT

THE PAST

How has personal mobility evolved?

Prior to the automobile, the horse-drawn carriage and rail were the primary methods of transportation on land. While the horse-drawn carriage played a predominant role in transportation up until the introduction of the automobile, other forms of vehicles were attempted over the course of history. At the beginning of the 17th century, Simon Stevin created a wind-powered vehicle, and more than a century later Nicholas Joseph Cagnot created a steam wagon in 1771.¹ With the creation of the steam engine, which enabled a carriage-type vehicle to be transported without the need for horses, the foundation was laid for the construction of the railroad.²

The roots of the automobile lie in the late 19th century. The major breakthrough came with the invention of the internal combustion engine.³ While François Isaac de Rivaz was the first to attempt to create an internal combustion engine, his design was unsuccessful and it was not until 1885 that Gottlieb Daimler invented what is often recognized as the prototype of the modern gas engine. It was, however, the mass production of these vehicles, pioneered by Henry Ford, which made the automobile a truly personal mode of transportation for the average citizen. During the early 20th century, the amount of cars in North America and around the world multiplied rapidly. For example, in 1900, Americans owned 8 000 cars, and by 1920, that number had grown to nearly 8 million.⁴ Today, the automobile continues to be the primary method of travel, with considerable resources being spent to increase efficiency and comfort.

THE PRESENT

Why is it important that we re-evaluate the auto industry?

The automotive industry designs, develops, manufactures, markets, and sells motor vehicles, and is one of the world's most important economic sectors by revenue.⁵ The US automotive industry, the largest automobile manufacturer in the world, witnessed the downward slide in the market share of the "Big Three" (Ford Motor Company, General Motors Corporation and Daimler Chrysler) over the last 10 years.⁶ While the automotive industry is one of the most profitable industries in the world (as well as being a major

employer), it is not without problems. It is one of the single largest causes of global warming due to emissions related to the manufacture of cars, as well as the pollutants released when gasoline diesel and other fuels are burned. Indeed, the transportation sector is the second largest source of CO2 emissions in the U.S., while global road transport is responsible for about 16% of man-made CO2 emissions.⁷ Despite recent efforts to seek new, cleaner sources of energy to power personal vehicles, most cars are still dependant on fossil fuels – mainly oil, gas and diesel. As the global supply of these fossil fuels continues to decrease and prices continue to increase, there is a growing need to think of creative alternatives to the typical "car" that has been a predominant method of travel for the past 60 years.

In addition to the pollutants produced by their combustion engines, cars are also designed in a way that creates an immense amount of waste. Although some modern vehicles can be up to 80% recycled, the number of cars manufactured is increasing and the life cycle of a typical car still remains relatively short. In fact, it is estimated that the average life cycle of a new vehicle is 8 to 15 years or between 150,000 and 300,000 miles depending on the make and maintenance of the vehicle.

Finally, thinking beyond the car may not only help to transform the way in which we travel, it also has the potential to revitalize a declining economy in parts of the world that have a strong manufacturing history.

Issues contributing to the underlying challenges associated with the automobile as the primary method of transportation

Most North American cities experienced rapid growth in the 20th century, at a time when the car revolutionized transportation. This resulted in most North American cities being designed specifically to cater to the automobile as the primary method of transportation. Roads and highways, cities and suburbs have all been designed with the intention that the car is the predominant method of transportation to and from one's house whether they are travelling to work, school, or local shops.

Today, personal vehicles are still the preferred method of travel for the majority of people in North America. However, road networks can no longer support the increasing number of vehicles that accompanies current population growth in cities. This has resulted in increased congestion and the need to rethink both the infrastructure and the transportation modes that are supported by this infrastructure.

There is no quick fix to today's transportation issues. It is estimated that under current conditions, a minimum of 15–20 years would be required for total fleet replacement of automobiles, buses, and on-road freight vehicles.⁸

THE FUTURE

What is the future of personal transportation?

Just as the car significantly transformed transportation in the 20th century, technological advancements, evolving land use patterns and environmental concerns have the potential to significantly transform personal mobility throughout the world today. A recent study found that vehicle design is increasingly being driven by urban planning, and in contrast to the past where the car has influenced the design of towns, the opposite is now true as city and town planning aims to reduce car use.⁹ While it is difficult to imagine a world without the automobile, emerging trends that focus on smaller, more efficient vehicles, and public demands for faster forms of transportation suggest that there will be significant changes in the near future.

Some possible directions of future development include automobiles that draw on alternative fuel sources or that incorporate information technology to make cars "smarter." The Obama administration has estimated that approximately 1 million plug-in hybrid automobiles fueled by gasoline and electricity will be on the road by 2015. The U.S. government has also mandated that auto manufacturers produce vehicles that get an average of 35.5/MPG (compared to today's 27.5/MPG) by 2016. Major auto manufacturers also envision that information networks will play a large role in the future of transportation by increasing the efficiency and capacity of existing infrastructure while enhancing the integration and transfer between modes. Granted, these are only small steps to a more sustainable transportation network of the future. Regardless of how personal mobility is

transformed over the next few decades, it is evident that there is no single solution to pave the way to a more sustainable future. Instead, there must be a myriad of solutions tailored to meet diverse requirements.

It is estimated that under current conditions, a minimum of 15–20 years would be required for total fleet replacement of automobiles, buses, and on-road freight vehicles.

LOCAL CONTEXT

THE PAST

The history of Oshawa

In the late 18th to mid 19th century, Oshawa was established as a trading post at the mouth of Oshawa Creek. However, it was not until 1850, that Oshawa was incorporated as a village with a population of approximately 2,000.¹⁰ At this time, the port of Oshawa was established as a clearing and warehousing port while Oshawa's industry continued to grow. This growth was further accelerated by the construction of the Grand Trunk Railway, which connected Montreal to Toronto.¹¹

After the end of the Second World War, Oshawa experienced a wave of growth as the city annexed a portion of East Whitby and a major shopping centre was constructed during the 1950s. Additional residential growth was sparked by the creation of Highway 401, which provided greater regional connectivity.¹²

Oshawa's historic role in the automotive sector

Oshawa is known for its strong ties to the automotive industry. It is currently home to General Motors Canadian Headquarters, and GM remains one of the largest employers within the municipality. Oshawa began its ties with the production of personal mobility vehicles in 1876 when Robert McLaughlin relocated the McLaughlin Carriage Company manufacturing plant to Oshawa in order to take advantage of the existing transportation infrastructure including easy access to the harbour and railroad. By 1908, the company was engaged in the manufacture of Buick automobiles under the McLaughlin-Buick name. This led to the firm acquiring the manufacturing rights to the Chevrolet Brand for the Canadian market in 1915.¹³

When Buick, the Chevrolet Motor Car Company of Canada and other car manufacturers merged to create General Motors of Canada in 1918, Robert McLaughlin rapidly expanded operations within Oshawa to cover several blocks. This rapid expansion of the automotive sector contributed to a surge in the population prior to WWI, as the town grew from 4,000 to 16,000 residents. Growth continued through the post-war boom until the late 1970's when a downward trend in the Canadian economy caused a decline in Oshawa's industrial and exporting base. More recently, there have been new concerns about the region's economy in response to the precariousness of the US auto manufacturing industry.

THE PRESENT

What are the current issues associated with Oshawa and how are they tied to the automotive sector?

The City of Oshawa is dependent on the automobile industry in terms of the economy, employment and local transportation. As a suburb of Toronto, Oshawa was designed in a way that made the city rely on the automobile as its primary method of transportation. Additionally, with regard to economic viability, the former Mayor of Oshawa – John Gray – stated that as a city, Oshawa must diversify its employment base and become less dependent on the automotive industry.¹⁴

Plans have been made to address the centrality of the automobile to the city. There is other transportation infrastructure in place that connects the city regionally and helped Oshawa initially to establish itself as an industrial and manufacturing hub. For example, Oshawa is also connected by rail and water to Oshawa station, the Quebec Windsor Corridor, and the Port of Oshawa, which is a major stop for the auto and steel industries. This infrastructure could be used to re-structure regional transportation.

With regard to economic development, Durham College and the University of Ontario Institute of Technology (UOIT) are intended to play major roles in the future of the city according to Oshawa's strategic plan. Oshawa was also named one of the top 10 places to do business by Canadian Business Magazine due to its well-established energy, health care, education and governmental sectors.¹⁵ Such industries might contribute to a reimagined transportation manufacturing sector.

A snapshot of the current industry in Canada & Oshawa

The automotive industry is Canada's largest manufacturing sector, accounting for roughly 12% of manufacturing GDP and over 2% of total industrial GDP.¹⁶ Over \$35 billion annually is sourced from Canadian suppliers by the global auto industry.¹⁷ The auto assembly plant in Oshawa is currently under contract to create the Chevrolet Camaro, Chevrolet Impala and the new 2011 Buick Regal. The plant was also recently awarded a contract to create the new Cadillac XTS, and GM plans to invest approximately \$117 million to prepare the plant for the creation of this

vehicle, creating nearly 400 new jobs.¹⁸ The plant in Oshawa is one of the largest auto plants in the world, with over 10,000,000 square feet of factory floor, and approximately 4,500 employees (although the plant once employed 18, 000 workers).

THE FUTURE

What is the future of Oshawa?

Oshawa has proven to be a national leader in the manufacturing sector, with one of the most outstanding facilities in North America and an intelligent, dedicated labour force that will play a major role in its future. It benefits from a good location in relation to major urban centres, regional connectivity and established infrastructure. All of these characteristics make it attractive for future business endeavors as the region continues to expand. The Municipality has outlined a strategy for the future that includes:

- Developing new job opportunities
- Realizing the potential of the waterfront
- Improving the city's overall image
- Increasing the arts, culture and recreation

Finally, the population of Oshawa is expected to grow from 150,000, to 174,000 by 2021, while the surrounding region is expected to grow at an even faster rate.

What is the future of Oshawa's economy?

According to Oshawa's Corporate Business Plan, the City intends to develop a Corporate Sustainability Plan as a keystone in all City operations and decisions, and provide leadership in environmental stewardship including energy conservation.¹⁹ The city is taking a proactive approach in rethinking, retooling and revitalizing its city. The corporate business plan outlines actions required to strengthen Oshawa's position as a diversified, sustainable and prosperous city. As part of these plans, the future of the automotive manufacturing sector will encompass cleaner, more efficient production that will contribute to a greener and healthier environment and population. Although it will inevitably

be a slow process to transform the auto-industry within Oshawa and Canada, ensuring Oshawa is at the forefront of technological advances today has the ability to attract the knowledge base required to lead the way in future vehicle technologies.

The Oshawa plant is one of the largest auto plants in the world, with over 10 million square feet of factory floor, and about 4,500 employees.

(Although the plant once employed 18,000 workers).

MAPS & SITE IMAGES



The location of the GM assembly and manufacturing plant and the Port of Oshawa



The Port of Oshawa



The GM assembly and manufacturing plant



A number of new Camaro's are seen within the boundaries of the GM manufacturing and assembly plant in Oshawa, Ontario

PRECEDENTS

PROPOSED PERSONAL MOBILITY VEHICLES



Michigan, U.S. – Vehicle Infrastructure Integration

A series of technologies directly linking road vehicles to their physical surroundings, ultimately to improve road safety. Through onboard equipment, an active communication link will connect vehicles with the road infrastructure that they use. The result is a safer, more efficient, and convenient transportation alternative to the existing highway and road infrastructure.

<http://www.vehicle-infrastructure.org/WhatsVII.htm>

CURRENT PRODUCTION “CUTTING EDGE” CARS



VW Polo Bluemotion – BlueMotion 1.2 TDI 75PS

<http://www.volkswagen.co.uk/#/new/polo-v/which-model/engines/fuel-consumption/>



Peugeot Technologies – Hybrid, plus 100% electric (iOn)

<http://www.peugeot.co.uk/environment/>

CURRENT PRODUCTION “CUTTING EDGE” CARS



Electric Cargo Vehicles, Canada Post

Built by American manufacturer Navistar, Inc., the class 2c-3 electric truck has a payload of about two tonnes, as well as a range of about 100 miles on a single charge. Its makers state it can be recharged within six to eight hours, although its cassette-type battery can be changed in 20 minutes, allowing almost round-the-clock operation.

<http://postandparcel.info/37884/news/canada-post-shows-off-first-all-electric-step-van/>
<http://www.vehiclemagz.com/canada-post-the-electric-future-vehicle-concept-which-environmentally/2011/05/>



Berlin, Germany – Cargo Cruiser Bike

The Cargo-Cruiser is a three wheel electric cycle that operates as a heavy goods transporter, carrying up to 250kg loads within the Low Emission Zone of Berlin. With a width of 1.2m the Electro-Cruiser is seen as a legal bicycle, offering the possibility to drive round traffic jams on cycle paths, a big advantage compared to cars and trucks. The Electro-Cruiser has an energy consumption that equals 0.5 litres of gasoline per 100 kilometres. The daily average range of operation in the Low Emission Zone of Berlin is 80 kilometres. Trials of this vehicle are also being carried out in the Netherlands and New York.

<http://www.dw-world.de/dw/article/0,,4541051,00.html>

Institute of Science and Technology. Trips take about 2 and a half minutes (i.e., an average speed of roughly 12mph / 20km/h) and are presently free of charge. Average wait times are expected to be about 30 seconds.

<http://blip.tv/triplepunditcom/personal-rapid-transit-in-masdar-city-4664264>
<http://www.prtconsulting.com/prtprojectvideos.html>



Superbus

A PRT system (by 2getthere) went into operation in Superbus, is a 15 metre long high performance electric bus vehicle, providing seating for 23 passengers. Superbus does not have a fixed schedule and the logistics allow for flexibility in high volume transport on demand, via a central routing optimization system. Thus the vehicle transports passengers from target to destination without the need for changeovers. Superbus is an electrically powered vehicle which uses rechargeable batteries. Due to its lightweight and highly streamlined construction, Superbus has low energy consumption. It is designed as a high speed, sustainable, yet luxury alternative to standard public transport.

<http://www.youtube.com/watch?v=sBQkxIN0EYk&feature=related>
<http://www.superbusproject.com/concept>



Masdar – PRT

A PRT system (by 2getthere) went into operation in Masdar City in the UAE in November 2010. The system has 10 passenger and 3 freight vehicles serving 2 passenger and 3 freight stations connected by 1.2 kilometers of one-way track. The system is in operation 18 hours a day, seven days a week serving the Masdar

YOUR TEAM

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CHALLENGE 01 NOTES & RESOURCES

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ONLINE

Annotated Google Map
<http://g.co/maps/qq888>

CHALLENGE 02: THE ENERGY WAY

How can high-ways generate energy and power transportation?

SOURCE: CALVIN GLUCK

CHALLENGE 02

THE ENERGY WAY

PROJECT LOCATION

QEW/Gardiner Expressway Between Toronto and Hamilton

PROJECT VISION

To create carbon neutral highway networks by building infrastructure that generates renewable energy that can then be used to power vehicles.

PROJECT MISSION

To redesign the QEW and Gardiner Expressway corridor into a smart, energy generating transportation and service corridor that would collect energy from vehicles, generate energy by means of infrastructure installations that draw on sustainable sources (i.e. kinetic or solar), and feed energy back into the transportation system.

THE CHALLENGE

Built in the 1970s and 1980s, much of the transportation infrastructure that defines Canadian cities did not take into account long-term population growth or the resulting urban sprawl. Emphasizing a car-oriented infrastructure rather than mass transit during these years has left the GTHA with some of the longest average commutes among major cities around the world.

Highways will continue to be a crucial part of our transportation system for the foreseeable future. However, as our population continues to grow and infrastructure ages, we will need to develop creative and environmentally sustainable solutions that will move a growing amount of people and products, taking advantage of technological advances, new energy sources and new approaches that increase the efficiencies and effectiveness of the transit system overall. Highways of the future should consider how to integrate multiple modes of transportation, move traffic efficiently, integrate information technologies, collect and generate renewable energy and work to further develop the economy through a “smart” and “light” infrastructure approach.

The challenge is to put these approaches into practice as part of a redesigned QEW/Gardiner Expressway that links Toronto to Hamilton. The Gardiner Expressway spans 18km, while the QEW from Toronto to Niagara is approximately 140km in length. These two stretches of highway have great potential to serve as both

infrastructure for automobiles and as a collector and generator of energy. Highways can be redesigned to maximize space to absorb various forms of energy, for example kinetic, piezo-electric or solar energy, and ultimately deliver it back to power automobiles and the city as a whole.

OBJECTIVES

- To create a carbon neutral, net-zero transportation and service corridor that accommodates multiple modes of transportation and facilitates transfer from one mode to another.
- To explore how this corridor can function as an alternative energy generation and distribution system (e.g. solar panels built into the highway infrastructure, linear induction coils in roadways, piezo-electric energy collection, electric car stations).
- To consider how this corridor can be accessed by multiple stakeholders, ranging from individual users to public transit companies, starting from the commuter’s home in the suburbs and moving to refueling stations, to transportation hubs, to the QEW and Gardiner Expressway, to the downtown business district.
- To address the need to update aging infrastructure through strategic improvements that combine old and new technologies and consider how information technology-driven “virtual infrastructure” can make movement more convenient and efficient.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- The existing zoning and land ownership in proximity to the Gardiner and QEW/Gardiner Expressway.
- The environmental goals and targets for green house gas reduction established within the GTHA and the municipalities of Toronto, Oakville, Mississauga, Hamilton, etc.
- Evolving trends in transportation (i.e smaller, compact vehicles, hybrid/electric vehicles, smart technology) and the increasing demands of users on services and infrastructure.

- Service designs and smart technologies (i.e. designating dedicated bus lanes, converting paved shoulder lanes into bicycle paths, establishing specific schedules for freight, encouraging car pooling) that cut down road congestion, trip length and frequency as well as improve the overall flow of traffic patterns across the GTHA.
- Potential for vehicles to draw from and contribute to intelligent grid energy systems, while in transit or parked at home or elsewhere.
- Potential for information communication technology to shape and streamline user behaviour for more efficient energy consumption with economic, social and environmental targets.
- Approaches that prioritize commuters, allowing them to access up-to-the-minute travel information while in transit (i.e. updates about congestion, construction, bus departures, etc.) in order to help them choose the fastest and most convenient route to their destination.
- Sustainable design and use of local resources and materials.
- A resilient energy solution that can be integrated into the existing infrastructure.
- The long-term operational and lifecycle costs of the system, including any possible return on investment associated with the incorporation of sustainable technologies.
- Symbiotic relationships between vehicles and the vehicle corridors.

PROGRAM REQUIREMENTS

- Evaluate and assess a typical segment of the Gardiner, QEW, and interchange sections of the highway that consider multiple modes of transportation and facilities.
- Create a system of energy collection and distribution to transform the existing transportation infrastructure into a system that has the ability to generate as much energy as is used.

- Create an infrastructure solution that is financially feasible, has an increased life cycle over the existing infrastructure solutions, and has the ability to offset the initial costs.
- Create a system that feeds this energy back to power the infrastructure and the vehicles travelling on it.

CRITERIA

- Reduces CO2 emissions.
- Increases use of vehicles that rely on alternative energies.
- Creates alternative energy sources to offset and contribute to the energy consumed by transportation networks along the Gardiner/QEW expressway.
- Reduces commute times and congestion.
- Increases efficient use of highways by multiple forms of transportation, including improved communication and the use of new technologies.
- Creates a system that provides a possible return on investment.
- Creates a robust design with a life-cycle of at least 50 years.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

- Commuting drivers: 18 to 55 years of age.
- Local residents: 8 to 80 years of age.
- Transit riders: 8 to 80 years of age.

DELIVERABLES

The following deliverables are specific to this challenge:

- Create user experience scenarios that demonstrate the journey and interaction through a typical commute, including driving on the new infrastructure, as well as the refueling process for the personal vehicle.
- Create an exploded axonometric and section diagram to illustrate the systems associated with the proposed highway design. These should include:
 - o Land use
 - o Transportation use and flow
 - o Energy use and flow
 - o Other systems deemed necessary by the team.
- Create a systems diagram showing the complexity of the energy system from absorption to distribution.
- Create a visualization or animation of the traffic flows in relation to energy production, distribution and consumption.



Ontario needs \$22.4 billion to bring its municipal infrastructure into a good state of repair. \$3.7 billion more must be invested each year to meet current and future needs.

SOURCE: 2008 PROVINCIAL-MUNICIPAL FISCAL AND SERVICE DELIVERY REVIEW

GENERAL CONTEXT

THE PAST

What is the history of the highway?

As the automobile gained in popularity in the early 20th century, it became possible for businesses and homes to be built further from urban centres. Modern highway systems were developed to reduce travel times by allowing users to travel at higher speeds. The first highway was constructed in Italy in 1922.¹ In Germany, the Bonn-Cologne autobahn began construction in 1929 and was officially opened in 1932.²

In the early 20th century, the network of paved roads was extended considerably in North America. After World War II, new investment in highways, coupled with the new affordability of automobiles, increased the efficiency of transporting people and goods. Personal vehicles are still the preferred method of travel for the majority of people in North America. Much of our infrastructure has been constructed in a way that is tailored to the personal vehicle. Roads, highways and suburbs have all been designed with the intention that the car is the dominant mode of transportation.

THE PRESENT

Roads have not changed much since the automobile became the dominant mode of personal transportation. They are normally constructed of either concrete or asphalt (or both) and their main purpose is to move people and goods from one place to another. However, existing road networks are increasingly inadequate to current needs and have high environmental costs. A combination of urban sprawl, population growth and an increase in the number of personal vehicles has made roads more congested, causing significant losses in productivity through time spent in gridlock. In fact, it is estimated that today, the average American spends about one week a year stuck in traffic jams which, as Bill Ford explains, is “A huge waste of time and resources!”³

At the same time, the environmental effects of an over-reliance on automobiles, including its contribution to climate change, is a growing matter of public concern. The most significant step a city can take toward sustainability is to focus on improving access to greener forms of transportation: “Vehicle traffic from cars and trucks is a massive source of greenhouse gas (GHG) emissions in cities, accounting for between 20 and 50 percent of the total, depending on the urban area.”⁴

Cities and their residents are realizing that the costs of sprawl both to the environment and themselves outweigh many benefits. Highways take up large amounts of space and are often underutilized. Greenhouse gas emissions from cities are primarily related to transportation, energy use in buildings, electricity supply, and waste.⁵ Transportation emissions per capita are inversely related to urban density; and sprawling, low-density cities designed around automobiles have higher emissions than more compact cities with substantial public transportation. For these reasons, redesigning highway networks to make better use of the infrastructure and space could not only expand essential transportation services, but also give back in the form of energy.

Many different infrastructure strategies can be employed in reducing GHG emissions from cities. These changes range from small-scale upgrades, to large-scale changes in the way cities are built. For example, highways can incorporate high occupancy vehicles as a small-scale change, or instill financial penalties in the form of tolls for carbon emitting vehicles. Large-scale changes come in the form of infrastructure for plug-in electric vehicles, or the introduction of smart technology embedded within road infrastructure. There are a number of new technologies currently in use and in development that allow for solar energy to be collected on cars and trains. Cars, buses and trains can be electrically powered either wirelessly or without overhead wires using technologies such as inductive charging, energy optimization and recovery, and regenerative braking.

THE FUTURE

Building new roads alone does not solve congestion problems. More often than not, new highways simply attract more traffic. The roads of the future will have to be designed to actively improve traffic flow. Intelligent, integrated transportation systems that make new forms of personal mobility more accessible must be developed while new service designs within existing corridors will also be required to solve the current issues and meet the demands of a growing population. These issues must be approached from a number of different perspectives. As Bill Ford reminds us, “Four billion clean cars on the road is still four billion cars, and a traffic jam with no emissions is still a traffic jam.”⁶ Technology will play an important role in these initiatives so there must be a more active attempt to create smart roads. We need to re-evaluate our transportation systems as global gridlock has the

capacity to stifle economic growth and our ability to deliver essential needs such as food and health care particularly to people that live in city centres.

How can we effectively harness energy and use it to power our cities and vehicles?

The roads and highways of tomorrow must utilize nature and its surroundings. Surfaces that produce solar energy can replace current driveways, parking lots and road systems. Such surfaces can be used to transmit power and data signals, effectively becoming an intelligent, decentralized power grid and data network. And, as wireless technology advances, these electric roads could have the potential to wirelessly recharge vehicles anywhere. Such a change would have profound environmental consequences. At present, roughly 25% of greenhouse gases come from internal combustion vehicles, which could be nearly eliminated with the introduction of such a system. Furthermore, solar roadways would allow electronic vehicles to be recharged at rest stops, businesses and parking lots.



Typical highway traffic jam



Aging highway



Collapsed highway in Emeryville, California

LOCAL CONTEXT

THE PAST

Generally speaking, there have been three stages of expressway construction: the 1930s to 1950s saw the construction of inter-city provincial expressways; projects between the 1950s and 1970s consisted of urban expressways; finally, since the 1970s, most major projects have focused on the construction of suburban and bypass freeways.⁷ As an example of the first stage of highway construction, the Queen Elizabeth Way was designed to relieve pressure on existing smaller roadways. While the construction of the Gardiner Expressway, one of the first initiatives of the then newly created council for Metropolitan Toronto, is an example of second stage of highway development in the GTHA.⁸



Historical image of the Gardiner Expressway

It is the oldest inter-city divided highway in Canada and one of the most influential highway developments in Ontario's history.¹³ The QEW leads to border crossings to the United States at Niagara Falls and Fort Erie. It serves the counties of Niagara, Hamilton, Halton and Peel and covers a distance of 137.8km.

THE PRESENT

The Gardiner was originally designed for a maximum capacity of 70,000 vehicles per day, and it is estimated that there are currently more than 200,000 vehicles that use the Gardiner every day.¹⁴ Approximately the same number of vehicles use the QEW each day.¹⁵ As the population within and surrounding major city centres continues to increase, traffic congestion and the associated environmental impacts will also increase. The situation is bad in the Greater Toronto and Hamilton Area (GTHA) and getting worse. A board of trade report estimates gridlock is costing the economy \$6 billion a year from missed delivery deadlines and employees stuck in traffic — not to mention the impact on the environment from idling vehicles. The average commuter in the GTHA spends 82 minutes travelling to and from work each day, longer than in most other North American cities including Los Angeles. By 2031, the economic cost of traffic to the region could be \$15 billion a year.¹⁶

What is the history of the Gardiner Expressway?

The Gardiner Expressway was built in segments between 1955 and 1964. It was constructed in an attempt to alleviate traffic in Toronto that resulted from increased population growth, increased automobile ownership and the expansion of the city's western suburbs.⁹ The Gardiner Expressway was one of the first projects undertaken by the newly formed government of Metro Toronto.¹⁰ The route of the expressway required the paving over of parkland, demolition of residences and a popular amusement park, as well as the construction of an elevated section traversing the city's downtown area.¹¹ The cost to construct the Gardiner was approximately \$110 million (\$754 million in today's currency.) Today the Gardiner Expressway is owned and operated by the City of Toronto.

What is the history of the Queen Elizabeth Way (QEW)?

By the 1930s, inter-city traffic volume between Toronto and Hamilton had begun to overwhelm Highway 2. With little room to widen the Highway, a new highway corridor was planned. Initially called "The Middle Road," construction began in the early 1930s to convert an existing rural road into a four-lane highway. By the summer of 1937, the new highway was completed. The highway was later re-named "Queen Elizabeth Way" to commemorate the first Royal Visit to Canada by King George VI and Queen Elizabeth.¹²

Today, the Queen Elizabeth Way (QEW) follows the Lake Ontario shoreline from Toronto to the Niagara Peninsula.

This increase in traffic has also had an impact on the greenhouse gas (GHG) emissions and environmental issues within the city. It is estimated that in Toronto, automobiles account for about 75% of travel, while in suburbs and Hamilton, automobiles count for up to 90% of travel.¹⁷ Since 1990, transportation has seen the largest increase in GHG emissions, an increase of approximately 34% over twenty years (from 47.3 metric tonnes in 1990 to 63.5 metric tonnes in 2007).¹⁸

Finally, the cost of maintaining the road system is also growing. As our infrastructure continues to age, road construction will account for an increasing amount of municipal and provincial investment. At present, it is estimated that each kilometre of new road costs approximately \$825,000 to construct.¹⁹ In Toronto alone, there is believed to be a backlog of necessary road repairs that would cost over \$300 million dollars. Approximately \$15 million dollars is spent each year to rehabilitate deteriorating sections of the Gardiner Expressway, repairs which are planned for the next 20 years.²⁰ In the fall of 2008, the provincial-municipal fiscal and service delivery review put the cost of bringing Ontario's municipal infrastructure into a good state of repair at \$22.4 billion, with an additional \$3.7 billion investment needed annually to meet current and future needs.²¹

THE FUTURE

What is the future of the Gardiner Expressway?

The Gardiner Expressway currently faces many challenges relating to increasing congestion and demand as well as the deteriorating integrity of the roadway itself over time due to its age. Since the 1990s, multiple proposals have been made to dismantle or replace the elevated section of the Gardiner. In 1991, the Royal Commission on the Future of the Toronto Waterfront released a report evaluating the use of the Gardiner corridor and the negative impacts that it was having on usage in the area.²² In 2004, the Toronto Waterfront Revitalization Task Force issued a report with four possible options for the Gardiner:

- Leave the Gardiner as is, at an annual cost of \$12 million

- Replace the roadway with at-grade or below grade roads at a total cost of \$1.475 billion
- Remove the Lake Shore Boulevard roadway underneath the elevated section and construct buildings at a cost of \$65 million
- Removing the Gardiner east of Spadina, and expanding Lake Shore at a cost of \$758 million.

What is the future of the QEW?

Future plans are to add high-occupancy vehicle lanes.²³

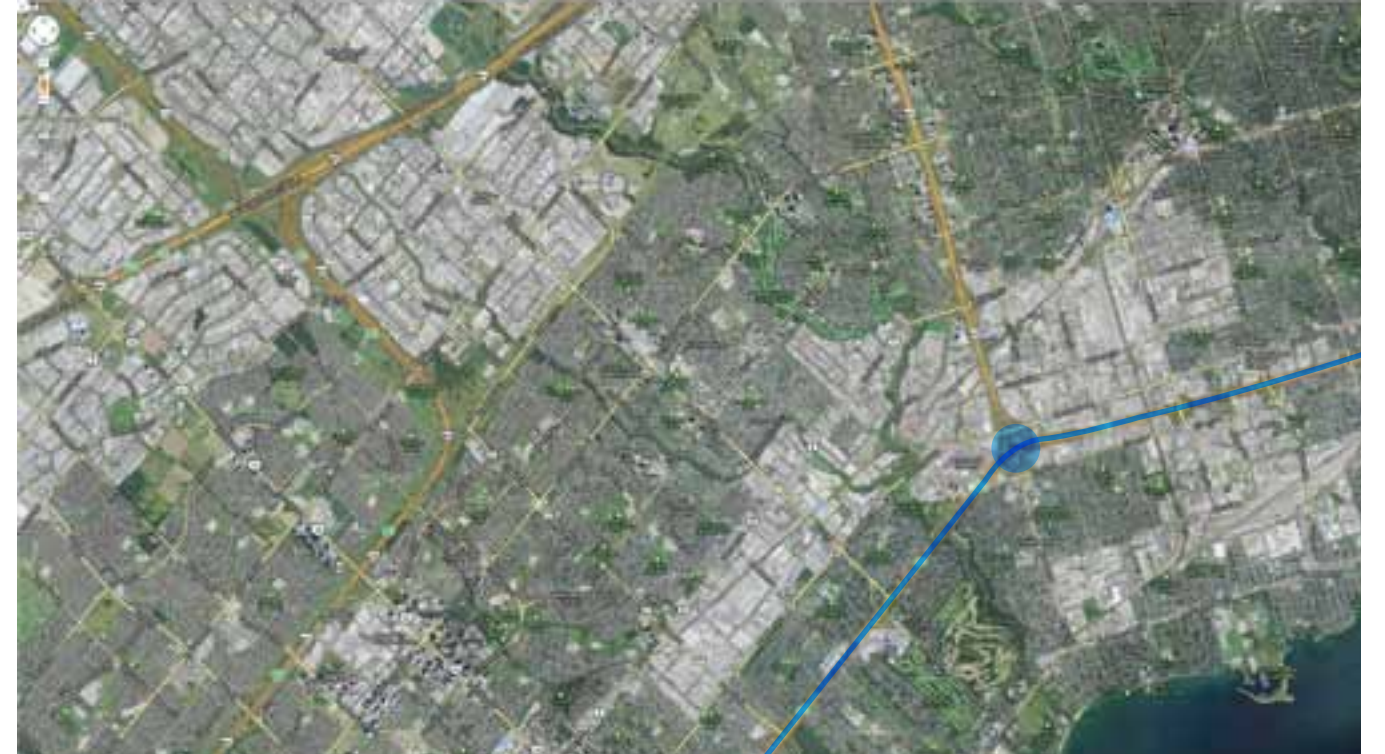
Future GTHA Targets

According to the Ministry of Transportation Ontario (MTO), there are very long lead times needed to build transportation infrastructure, even after all approvals and funding is committed. For this reason it is necessary to develop and commit to a comprehensive plan for Transportation Demand Management (TDM). TDM is an effort to reduce car use, especially during peak hours, by encouraging a wide range of solutions including telecommuting, flexible work hours, and promotion of more active alternatives such as cycling and walking.²⁴ It uses policies, programs, services and products to influence when, where, how, and why people travel on roads.²⁵ The vision for TDM and the future of the GTHA is to establish policies and programs that will motivate more sustainable transportation decisions not only by individuals, but also by businesses and government.²⁶ This includes proposals to reduce emissions by 30% from 1990 levels and reduce emissions by 80% by 2050 across the GTHA.²⁷

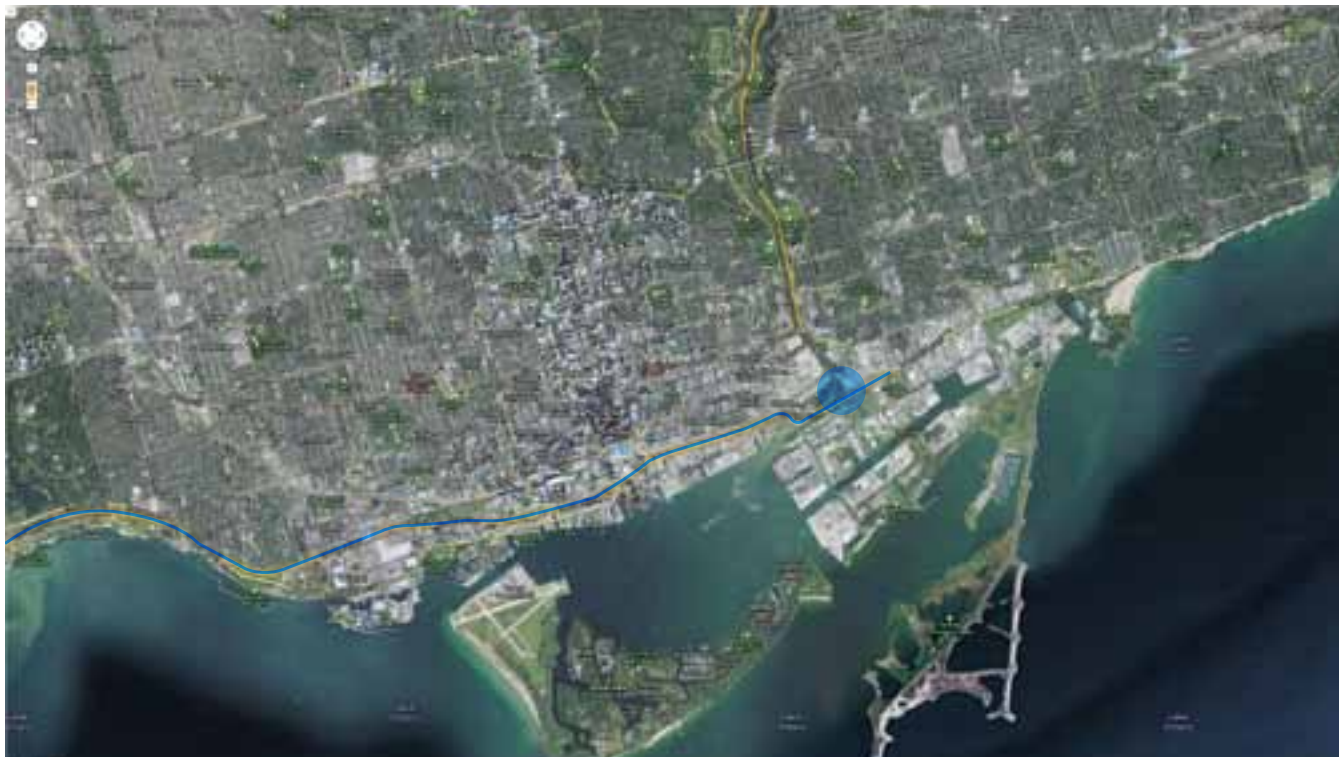
MAPS & SITE IMAGES



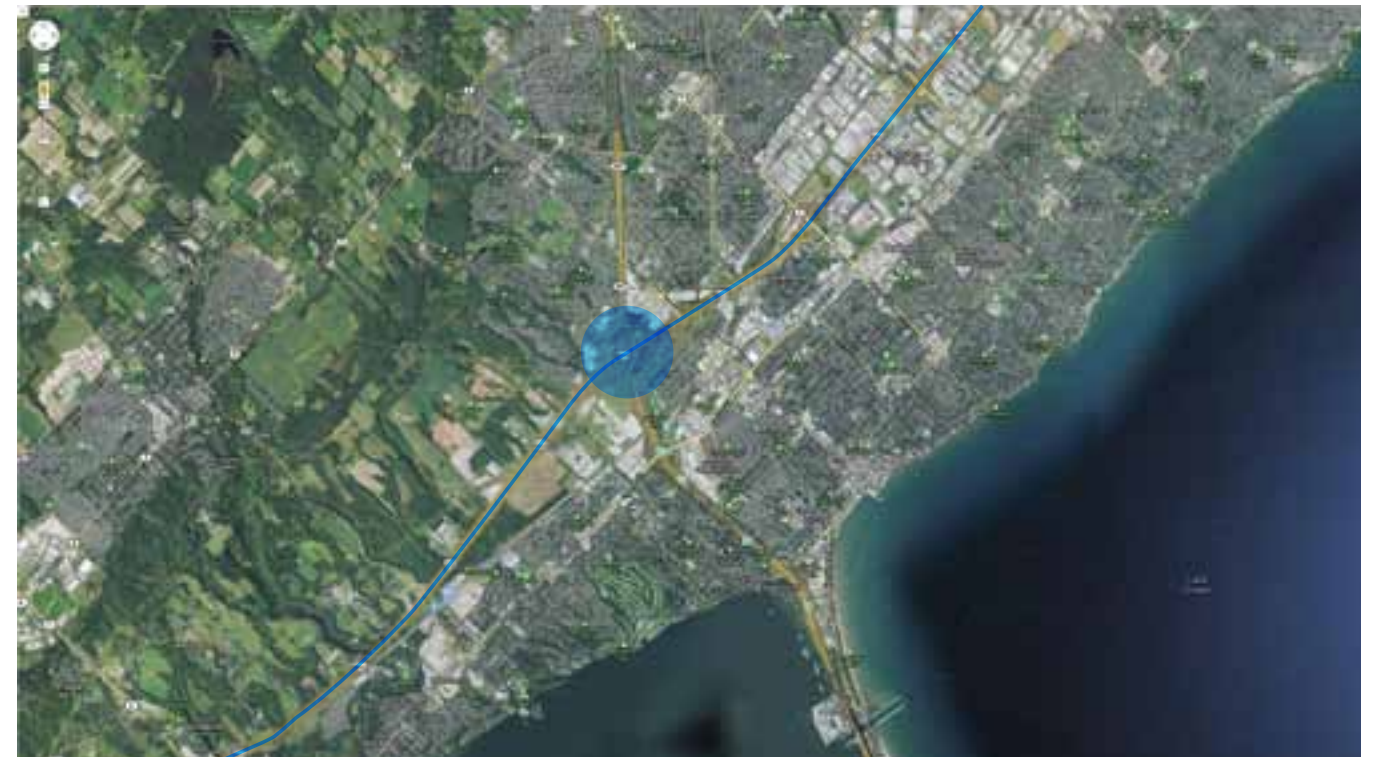
QEW/Gardiner Expressway, stretching from Toronto to Hamilton



The Gardiner Expressway and Highway 427 toward the outer western portion of Toronto

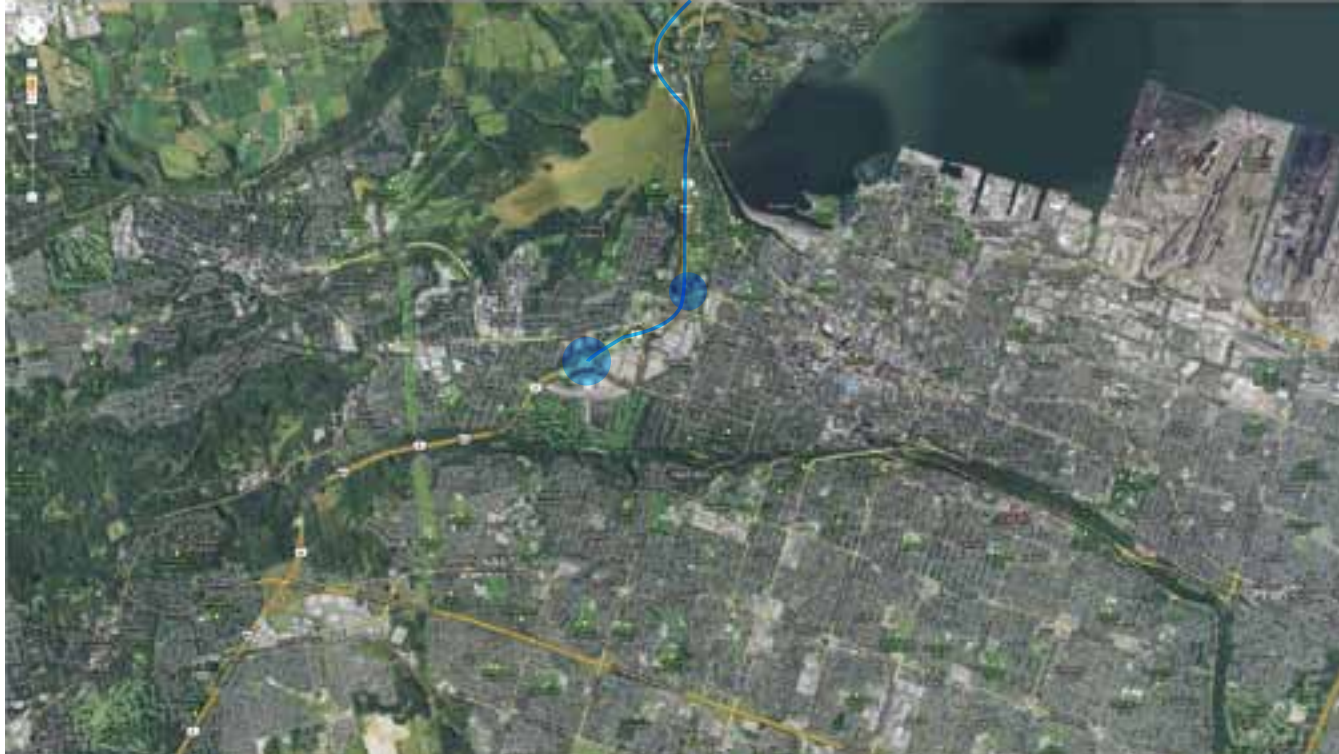


The beginning of the Gardiner Expressway starting off of Lakeshore Blvd. in the south east section of Toronto



The split of the QEW leading to Hamilton and Niagara/St. Catharines

MAPS & SITE IMAGES



QEW entering into Hamilton



The Gardiner Expressway and Highway 427 toward the outer western portion of Toronto



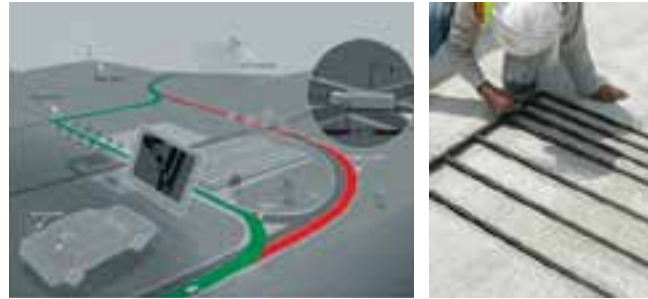
The beginning of the Gardiner Expressway off of Lakeshore Blvd, near the Don Valley Parkway in Toronto



The split of the QEW leading to Hamilton and Niagara/St. Catharines

PRECEDENTS

INFRASTRUCTURE TECHNOLOGY



Michigan, U.S. – Vehicle Infrastructure Integration

A series of technologies directly linking road vehicles to their physical surroundings, ultimately to improve road safety. Through onboard equipment, an active communication link will connect vehicles with the road infrastructure that they use. The result is a safer, more efficient, and convenient transportation alternative to the existing highway and road infrastructure.

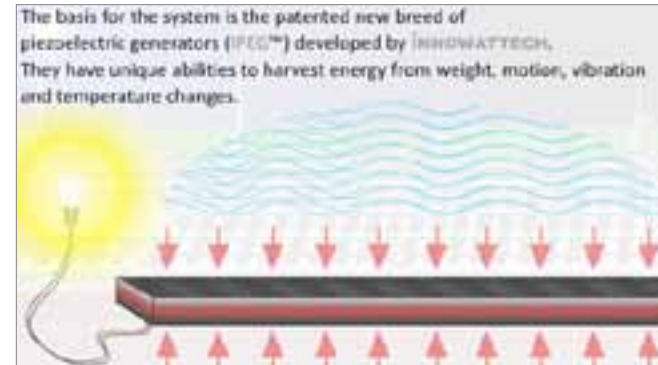
<http://www.vehicle-infrastructure.org/WhatsVII.htm>



Solar Roadways

The solar roadway is a series of panels that cars can drive on. By replacing current asphalt roads, parking lots, and driveways, solar road panels can collect energy that can be used to power our cars and cities.

<http://www.solarroadways.com/main.html>



Highway Energy Systems

Ramps, or speedbumps are integrated into current road infrastructure. When the weight of vehicles is exerted on these plates, a generator is driven, and an AC or DC current can be produced. Requiring very little maintenance, the kinetic energy absorbed can be used to power street lighting, traffic lights, road signs, or even to power the future automobiles themselves.

<http://www.hughesresearch.co.uk>
<http://goo.gl/sk1Lh>
<http://goo.gl/Qf1H7>
<http://www.innowattech.co.il/technology.asp>



Harnessing Wind from Roadways

Japanese company, Ricoh, is harnessing wind (and sunrays) to produce energy lit billboards.

<http://goo.gl/51JZr>

NEW CAR TECHNOLOGIES



Solar Highway

The world's first solar highway in the state of Oregon not only produces energy and looks spectacular, but also serves as a precedent for the world. The project is installed at the Interstate 5 and Interstate 205 interchange in Tualatin, where it covers around 8,000 square feet and produces 112,000 kilowatt hours per year. The total cost for the 104-kilowatt solar photovoltaic system is \$1.3 million.

http://www.oregon.gov/ODOT/HWY/OIPP/inn_solarhighway.shtml



Solar Powered Billboards and Lights

Solar energy can power highway lights, signs and billboards.

<http://www.solarbillboardlights.com/>



California, U.S. - Google Driverless Car

The driverless car system relies on information gathered from Google Street View as well as artificial intelligence software that combines input from video cameras, radio sensors, and gps. As of 2010, over 1,600 km have been driven without human intervention. Google has no immediate plans to commercially develop the system, but plans on marketing the system to automobile manufacturers.

<http://www.nytimes.com/2010/10/10/science/10google.html>
<http://www.smartplanet.com/blog/thinking-tech/googles-self-driving-car/5445>



Electric Car

Electric cars have several potential benefits compared to conventional internal combustion engines including significantly decreased emissions and pollutants. Unfortunately, today's infrastructure has been designed to accommodate the internal combustion engine. Battery life, and adequate charging station infrastructure are ongoing factors that discourage the general adoption of the electric vehicle.

<http://www.auto-bleue.org/index.php?lang=en>

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CHALLENGE 02 NOTES & RESOURCES

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ONLINE

Annotated Google Map
<http://g.co/maps/pk5cc>

CHALLENGE 03: RECONNECT

A photograph of a bridge over a river with green grass in the foreground. The bridge is a multi-lane highway bridge with concrete pillars. The foreground is a lush green field of tall grass. The sky is blue with some clouds.

**How can we
connect isolated
neighbourhoods
through accessi-
ble transportation
networks?**

SOURCE: THEBRIDGINGPROJECT.BLOGSPOT.COM

CHALLENGE 03

RECONNECT

PROJECT LOCATION

Scarborough, Ontario – Kingston Galloway Neighbourhood

PROJECT VISION

Improve the overall equality of access to transportation infrastructure and investment in an isolated neighbourhood and ensure access to transportation for all.

PROJECT MISSION

Reimagine Scarborough Village as an integral, connected neighbourhood with adequate transportation systems.

THE CHALLENGE

As the cost of living in urban centers has become increasingly expensive, lower income families have been driven into less densely populated areas that are often less well served by essential transportation services. Such services can play an important role in guaranteeing full access to all of the amenities, opportunities and services that the city has to offer. Over the past forty years, the proportion of low-income neighborhoods in Toronto has grown from 19% in 1970 to 53% in 2005.¹ Recognizing the new distribution of wealth across the region, it is essential to ensure transportation infrastructure and investment meets the needs of all residents regardless of income. Transportation investment has the potential to play a major role in the transformation of these neighbourhoods, encouraging a more diverse mix of incomes and development, reducing the overall percentage of income spent on transportation, while increasing access to employment, services, and other essential amenities.

The Kingston & Galloway neighborhood is just one of many examples across the GTHA. It illustrates the need for strategies that connect neighbourhoods, and their residents to the rest of the city. The challenge is to enhance the local and regional connectivity of the Kingston Galloway neighbourhood, promote increased economic growth, more diverse land use patterns, while increasing the overall affordability and quality of life within the existing neighbourhood.

OBJECTIVES

- Show how to connect the Kingston Galloway neighbourhood to the rest of the city and GTHA.
- Explore ways to increase mobility, independence, and interaction within the neighbourhood
- Examine ways of making transportation to and within Kingston Galloway safe, accessible and affordable for a range of residents who rely on public transit
- Consider how to put the citizen first through choice, reliability and convenience
- Develop ways to “Complete the Streets” through the development of increasing pedestrian walkways, constructing bicycle paths, and improving transportation access points and intersections.
- Take into account the needs of new immigrants, families and youth, commuters, and their need to access essential services such as schools, hospitals, places of work and grocery stores.
- Provide examples of how innovative service design can reduce the need for cars and parking in the automobile privileged post-war suburbs.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- Current incomes within Kingston Galloway neighbourhood and the percentage of income spent on transportation
- Current transportation services within the area, including the accessibility, frequency and demand of available services.
- User safety and the general well-being of public space.
- Economic security and access to jobs/services required to increase the overall quality of life for residents within the neighbourhood
- Consider if there could be increased subsidies for services to places of employment

- Consider if there is a role for low-income transit concessionary passes (i.e. the basic premise would be that those on low incomes could pay a reduced fare for public transit. This could be kept as wide or narrow as possible – e.g. only reduced fares for their journey to work versus reduced fare all week on all routes.)
- The overall state and design of public space and streetscapes, including walkability, lighting, public space division, wayfinding, street crossings, etc.
- Current land use patterns and the tower renewal plan community improvement initiative.
- Consider the need for policies that ensure the retention of affordable housing near new transit nodes.
- Consider how provisions for broadband to isolated communities increase their access to online e-services and thereby reduce their need to travel.

PROGRAM REQUIREMENTS

- Create a transportation network that increases the overall modal split within the neighbourhood, and increases affordability and mobility options for local residents.
- Create a series of alternative routes that better serve the neighbourhood with transportation, and introduce new stations and stops if necessary.
- Design a transportation system and funding model that significantly reduces the overall costs both for the service provider and the user.
- Develop a process by which transport to this neighbourhood becomes a priority for policy makers.
- Create a universal wayfinding system that caters to the diverse demographic within the Kingston-Galloway neighbourhood.
- Develop a system that has the potential to attract new economic development and enhance connections to other job markets within the region, creating new opportunities for local residents.
- Increase public space connections within the neighbourhood and specifically create more functional spaces that are youth-oriented.

CRITERIA

- Create a range of transportation options that are more accessible, and more affordable to the general public accommodating a number of user needs.
- Enhance the transfer between modes of transportation.
- Improve the overall accessibility, safety and well-being of the neighbourhood through improved urban design.
- Encourage a greater mix of incomes through land use planning and increased transit options.
- Increase the overall reliability of service by reducing wait times as well as commute times.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

- Transit Users: 20 to 65 years of age.
- Local residents: 8 to 80 years of age.
- Low Income Families: At or below the poverty line.

DELIVERABLES

The following deliverables are specific to this challenge:

- Create a master plan that includes the following items:
 - o Existing and proposed transit routes
 - o Existing and proposed land use and development patterns
 - o Enhanced public space connections
- Design typical street sections that coincide with the proposed master plan. Typical streets to be addressed include:
 - o Low flow, residential streets (2 lanes)
 - o Major Arterials (6 lanes)
- Create user experience scenarios that demonstrate a day in the life of a Kingston Galloway resident, and how their overall mobility is improved by the proposed transportation system.

GENERAL CONTEXT

THE PAST

What factors have made these neighbourhoods less connected over time?

Initially, suburban growth took place along major road corridors, leaving plots of vacant or farmland in between residential and commercial developments. An automobile-centered transportation network consisting of highways and ring roads, which circled and radiated out from city centres were constructed over time to accommodate a growing population. However, these forms of infrastructure favored the development of suburbs and the emergence of important sub-centres that were increasingly distant from each other.

As new developments continued to expand outwards from the city, neighbourhoods that once housed affluent families witnessed the out-migration further into the suburbs as families sought more space and newer public facilities. Over time, older suburbs were settled by poorer families who were often struggling to afford an automobile and were much more dependent on public transit, yet found themselves in neighbourhoods where such transportation services were still underdeveloped. Unfortunately, the expansion and investment in public transit in these neighbourhoods is often lacking, resulting in a disconnect between these neighbourhoods and the city.

THE PRESENT

What are the current issues associated with poorly serviced neighbourhoods and why are low-income areas less connected?

By and large “income poor” individuals live in areas that suffer from a lack of adequate access to transportation. Even though wealthier individuals tend to rely on automobiles, there is a relationship between connectivity and the cost of real estate that makes living in well-serviced areas prohibitively expensive. Since accessibility is a desirable trait, areas that are well connected become more expensive to live in and therefore are populated by those who can afford it. This trend puts the income poor at a disadvantage economically by making it harder to access jobs because of their location. The result of this is

twofold: longer commute times that result in a loss of productivity and a loss in income; the need to make use of multiple forms of travel over the course of the commute, thus increasing the cost of transportation itself.

Transit equity issues go beyond disputes over particular differing service levels, and include fundamental questions about the allocation of resources to fund the entire transportation network. Budgets for the construction and maintenance of transportation infrastructure has often been unequal, favoring highways in wealthy suburban districts at the expense of subways or bus improvements in inner-city neighborhoods, or more generally favoring motorists at the expense of non-motorists.² That being said, poor access and the high cost of transportation is a symptom of poverty rather than its cause. However, the system acts as a barrier to disadvantaged people making it harder for them to escape poverty.

Why are improved transportation services needed for priority neighbourhoods?

The transportation needs of disadvantaged areas need to be identified in order to evaluate ways of achieving a more equitable provision of services. Disadvantaged in this context is classified as those areas where inhabitants are restricted in their mobility and have difficulty accessing opportunities. They are therefore blocked from achieving access to employment, household supplies, clothing stores, and healthy food options.³ Many people take the simple act of going to the grocery store for granted, but for those who cannot or do not drive, access to even this basic need may prove to cause considerable difficulties.⁴

Transportation planning has a huge impact on people’s lives, how they interact with one another and even where they choose to live. According to Good Jobs First, access to public transit can expand job opportunities, increase worker satisfaction and productivity by lessening commute times, and cushion the effect of high gasoline costs on working families (United Way, 2004). For this reason, infrastructure investment decisions by regional and municipal governments can result in impacts that will weigh heavily on individuals including an increase in household expenditures as well as limiting access to employment, health care, social services. According to Todd Littman, of the Victoria Transport Policy Institute,

the aim of transportation planning is to achieve some form of equity for individuals that are “transportation disadvantaged”. According to Littman’s study of transportation policy, households with incomes at or below \$30,000 per year spend between 25 – 30% of after-tax income on various modes of transportation. In communities where public transit is poor or non-existent, these costs directly favor personal vehicle ownership.

THE FUTURE

What future projections illustrate the need to assess disadvantaged neighbourhoods? And, what is the future of priority neighbourhoods?

People in disadvantaged neighbourhoods face the unfortunate predicament of having their futures decided by factors that are often out of their control. Public welfare for example and industrial redevelopment occurs outside of the influence of those living in these areas. The long-term effects of this situation could be disastrous. As world population continues to increase and more people move toward urban environments, we can expect the divide between the rich and poor to increase. This will inevitably result in more low-income families. However, if we seek to provide enhanced local and regional connections for these priority neighbourhoods, it is possible to create new opportunities and enhance the overall quality of life for a large number of families living in similar conditions.

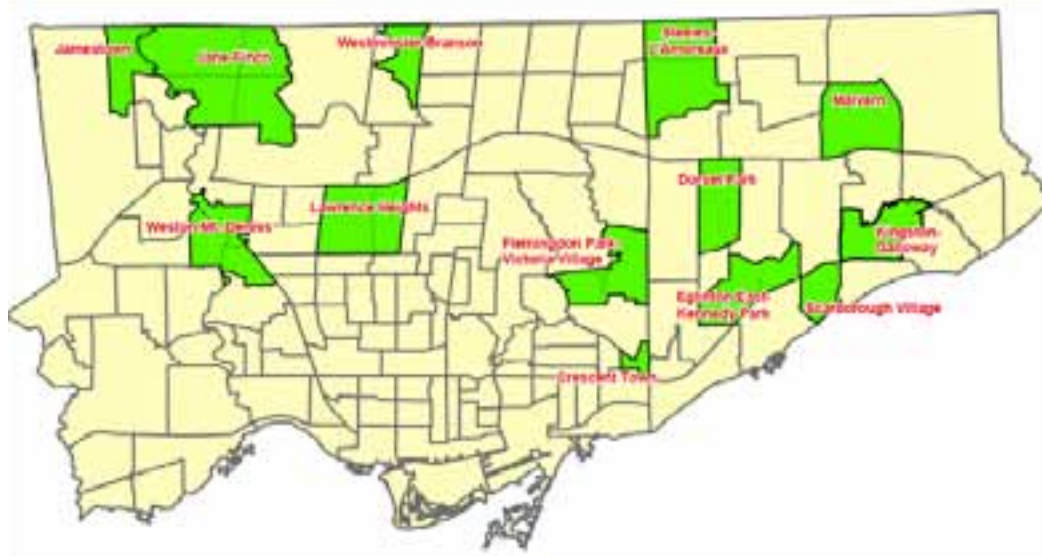
What is the future of priority neighbourhoods and accessibility?

Increased populations and users will require an increase in public transit services. Public transit has increasingly become widely accepted as the future of transportation, and it is imperative that public transportation companies and local governments spike user interests by providing adequate services that not only promote public transit, but also attract users by creating comfortable, accessible, efficient and affordable options for the public. The development of integrated transportation networks can help to reduce the cost of transportation and the percentage of overall earnings that are spent on mobility.

Households with incomes at or below \$30,000 per year spend between 25-30% of after-tax income on various modes of transportation.

LOCAL CONTEXT

THE PAST



What is a priority neighbourhood?

Priority neighbourhoods were identified starting in 2004 by the Toronto city council and the United Way to reduce crime, increase opportunities for young people and improve services for people in underserved areas. These areas were measured for key services, including libraries, schools, community centres, settlement and employment services, as well as for things like median household income, education levels and knowledge of English and French. Priority neighbourhoods were then identified as areas with extensive poverty and without many of the social and community services aforementioned. In total, 13 neighbourhoods were identified: Malvern, Jane-Finch, Jamestown, Kingston-Galloway, Victoria Village, Dorset Park, Eglinton East, Scarborough Village, Black Creek, Westminister-Branson, Crescent Town, Steeles-L'Amoreaux and Kennedy Park.⁵

What is the history of priority neighbourhoods in Toronto, and what factors have contributed to the issues that currently exist?

In the last 30 years the economic landscape of Toronto has changed significantly causing the divide between the rich and poor to increase. This is not simply an issue of the city getting poorer as Toronto's high-income

neighbourhoods have increased since the 1970s, there is also a direct relationship between low-income neighbourhoods and the proximity to public transportation services. The line between the rich and the poor often follows the map of transportation services with many of the higher income neighbourhoods developing along the TTC's subway line while lower-income families live in areas with decreased accessibility and reduced services.

What is the history of the Kingston Galloway neighbourhood?

Kingston-Galloway is bounded by Highland Creek to the west, north, and east, and by Canadian National Railway lines and the Lake Ontario shoreline to the south. It includes the older "Guild" and "West Hill" neighbourhoods characterized by older single family detached housing, as well as a large collection of apartments (high-rise and low-rise) and townhouse clusters in the "Kingston-Galloway" neighbourhood.⁶ First developed as part of the urbanization of Scarborough in the 1950's, when farm fields were replaced by rows of low cost housing for war veterans, urban plans at this time led to the development of multilane arterial roads to service the new neighborhoods, effectively declaring that the automobile was the main mode of transportation.

Much of the infrastructure and residences in the Kingston Galloway neighbourhood were constructed

during the 60's and 70's in response to the growing number of post-war families. Many of the apartment buildings constructed during this time were designed to act as transitional housing for young people without children before they moved on to houses. The area also includes single-family subdivisions designed to have walkable streets, however the tower developments were not designed to allow for this and act as barriers to the main arterial roads.

THE PRESENT

What are the current issues associated with the Toronto's priority neighbourhoods?

According to Dr. David Hulchanski's *The Three Cities within Toronto*, there has been 34% drop in the proportion of neighborhoods with middle incomes between 1970 and 2000. A majority of this loss is due to an increase in low-income neighborhoods. In short, the City of Toronto, over a 30-year period, ceased being a city with a majority of neighbourhoods (66%) in which residents' average incomes were near the middle and very few neighbourhoods (1%) with very poor residents. Middle-income neighbourhoods are now a minority and half of the city's neighbourhoods are low-income.⁷

What are the current issues associated with the Kingston Galloway neighbourhood?

Today, the population living within the Kingston Galloway area consists of families with limited incomes. Approximately 22 percent of individuals in the area earn an income of less than \$20,000 annually, and 29 percent of the area's residents are classified as "low-income", significantly higher than the 19.4 percent of low-income residents of Toronto as a whole. Also compared with the residents of the City as a whole, people living in Kingston-Galloway have a lower employment participation rate and higher unemployment rate.⁸ Poverty in this community is a huge problem making vehicle ownership extremely difficult for most residents. Many families have a budget of \$10,000 to \$15,000 per year – seniors on a limited pension or Ontario Workers Benefits, or families on welfare receiving \$1,030 per month – and rent costs

over \$800 per month on average. This leaves little money leftover for purchasing and maintaining a car. Given that the neighbourhood was designed for cars, numerous problems have emerged now that the area houses people who must rely on walking and transit to carry out their lives.⁹ These reasons often force low-income families to choose between the cost of purchasing and maintaining a car or making use of an inadequate transportation network that takes away from productive working time and limits access to better paying jobs.

With regards to transportation, the challenging economic situation experienced by residents can have a big impact on the quality of life in these neighborhoods. This is particularly true in suburban areas where transportation networks were designed to support the automobile and there is very little infrastructure in place to support public transportation services. Dispersed destinations and complex travel patterns are an inherent problem for transit operators in many suburban settings. One of the main issues for transit users in this neighbourhood is the difficulty in traveling to destinations within the area, rather than traveling downtown. The radial nature of the transit system allows for good service when traveling to downtown (despite potentially long wait times), but getting around the suburbs is an issue. The dispersed nature of suburban Scarborough makes providing efficient service difficult in comparison to providing service to downtown, which has a high concentration of uses and employment making it an easy destination for the TTC to service. In terms of providing transit for low-income riders, the problem is heightened by where they work. Typically low income riders work in service and industry sparsely located in suburban areas that do not have good transit service. Dispersed travel and complex travel patterns complicate providing transportation services, particularly in terms of issues including transfers and frequency of services.¹⁰

Furthermore, the current infrastructure is deteriorating, with a large proportion of low-income residences in the neighborhood currently living in high rise apartments developed in the 1960's and 1970's.



What public transportation systems currently serve Scarborough, and the Kingston Galloway neighbourhood?

The TTC is the main public transportation provider for the Kingston Galloway neighbourhood, providing a number of bus services to the neighbourhood as described on the following page.

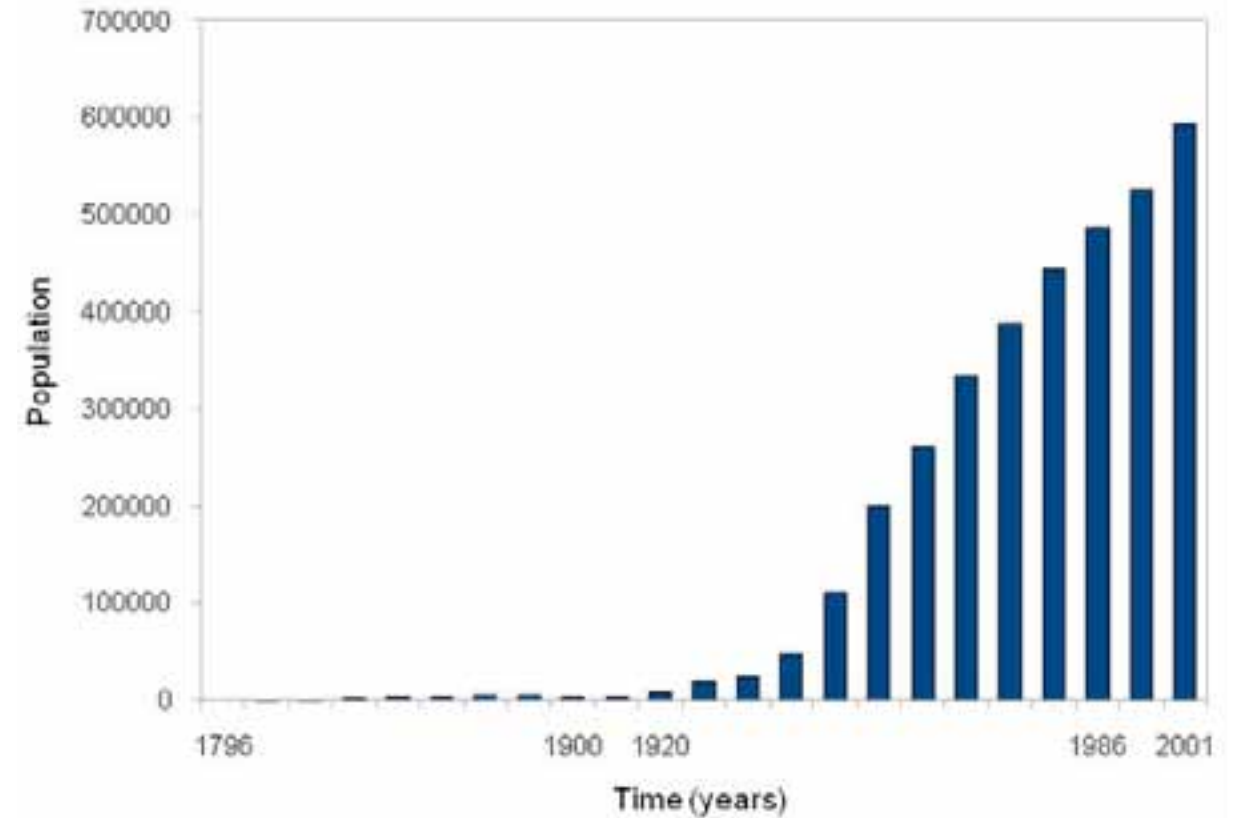
The residents in the Kingston-Galloway neighbourhood are serviced by three bus routes, two of which run in east-west directions and the third north-south. The north-south route is the 116 Morningside bus from Kennedy Station, traveling east and west south of the neighbourhood before reorienting north and south through the area. The 54A Lawrence bus passes through the neighbourhood in an east-west direction and travels from Eglinton Station via Lawrence East Station. The 86 Kingston bus services the neighbourhood. The 86 A and B buses run along Kingston Road through the area, while the 86 D turns east on Lawrence and services a low-density residential and industrial area east of Morningside Avenue and south of Lawrence Avenue, but does not service higher-density residential towers west of Kingston Road.

The TTC terminals in Scarborough are at the eastern terminus of the Bloor-Danforth line. The three stations that currently exist in Scarborough are: Victoria Park, Warden and Kennedy station. A separate line – the Scarborough RT – runs north and east, ending at Scarborough Town Centre at McCowan Rd. and Ellesmere Rd. There are also plans to create a new Scarborough-Malvern LRT. This

new light rapid transit system is intended to originate at Kennedy subway station, travel east along Eglinton Avenue, Kingston Road, Morningside Avenue to Sheppard Avenue, increasing local and regional connections to many of the major institutions in the area.

Go Transit also serves the Kingston Galloway neighbourhood, with Guildwood station providing a train terminal that connects residents directly to the central business district of Toronto.

About 22% of individuals in the Kingston Galloway area earn less than \$20,000 annually, and 29% of the area's residents are classified as "low-income."



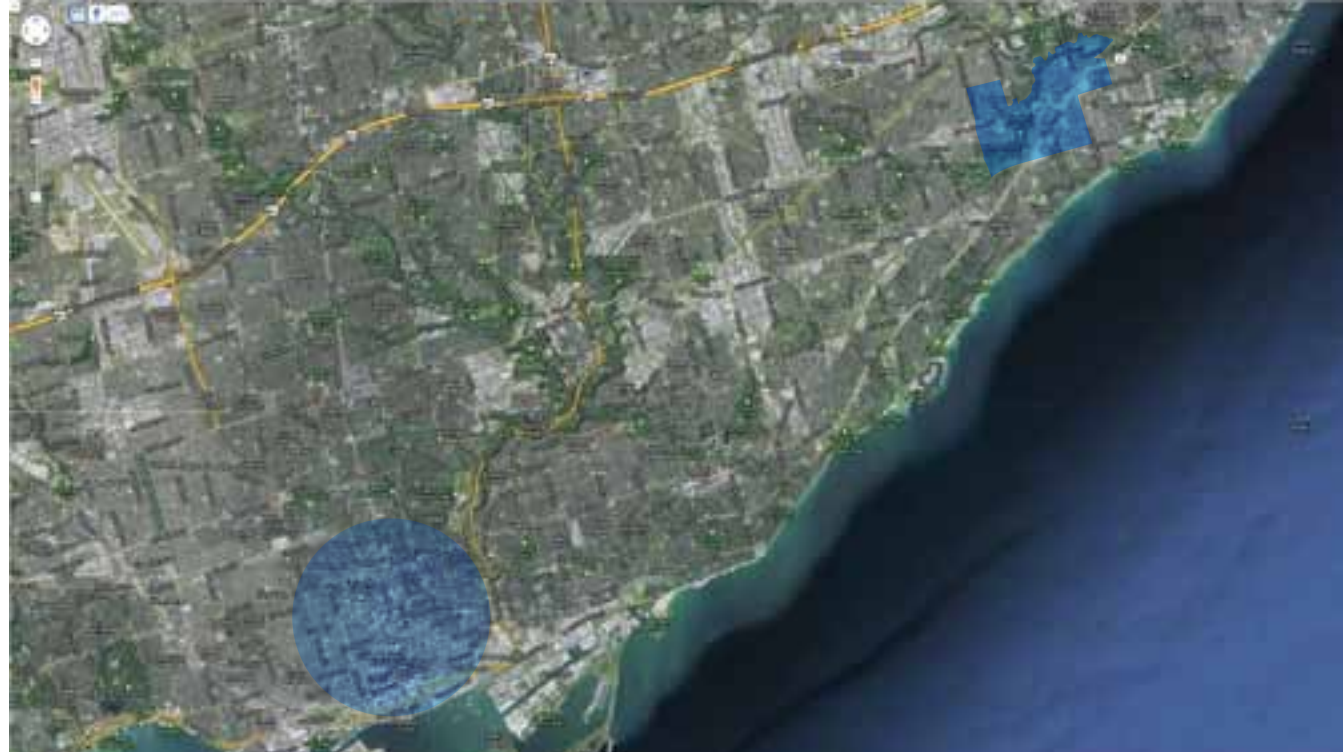
THE FUTURE

What is the future of Toronto's priority neighbourhoods and more specifically, the Kingston Galloway neighbourhood?

The United Way recently released a document entitled "Strong Neighbourhoods" which called for the improvement priority neighbourhoods within Toronto. It recognizes the importance of creating more complete communities that accommodate the needs of existing residents and new arrivals in order to ensure that lower income families can live in safe and welcoming communities that are connected to the community services and facilities that are vital for strong, vibrant neighbourhoods.¹¹ While many recent studies indicate that the middle class is continuing to shrink in cities throughout the world (and the same is true in Ontario and Toronto), it is important to put policies in place that encourage greater cultural

and economic diversity within these communities. One way of doing this is to encourage and create new development and transit opportunities within these areas. Unfortunately, with the recent cancellation of the proposed Transit City, and the associated Scarborough-Malvern LRT, there are currently no future transit plans to enhance the local and regional connectivity of the Kingston-Galloway area.

MAPS & SITE IMAGES



Kingston Galloway in relation to downtown Toronto



Intersection of Kingston Road and Galloway Road



Kingston Galloway: Stretching from Morningside Park and Brimorton Drive to the north, to the train tracks below Lawrence Avenue to the south, to Scarborough Golf Club Road on the west and Morningside Avenue on the east.



Kingston Galloway: various street views



PRECEDENTS

MULTIMODAL TRANSPORTATION



Boulder, Colorado – Multimodal Corridors Prioritization

The municipality of Boulder, Colorado has identified a number of corridors within the city and created a plan for improvement to encourage a greater modal split within the city. In order to prioritize the improvements and ensure that funds were provided to the areas with the greatest need, the city created prioritization criteria. The city now has a list of 41 corridors that are ranked based on the prioritization criteria and the municipality is now implementing the multimodal corridor improvements.

http://www.bouldercolorado.gov/index.php?option=com_content&task=view&id=356&Itemid=1625

LAND USE & COMMUNITY PLANNING



San Diego, California – Transit Accessibility

The City of San Diego, California's Land Use and Community Planning element promotes transit accessibility for specialized populations. Policies include: work with regional transit planners to implement small neighborhood shuttles and local connectors; and increase the supply of housing units that are in close physical proximity to transit and to everyday goods and services, such as grocery stores, medical offices, post offices, and drugstores.



Riverside, California – Land Use Policy

The City of Riverside, California, addresses low-income populations in the air-quality element of the Riverside General Plan 2025. One policy to support this objective is to “ensure that all land-use decisions, including enforcement actions, are made in an equitable fashion to protect residents, regardless of age, culture, ethnicity, gender, race, socioeconomic status or geographic location, from the health effects of air pollution.”

YOUR TEAM

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CHALLENGE 03

NOTES & RESOURCES

NOTES

1. Hulchanski, J. David. "The Three Cities within Toronto: Income polarization among Toronto's neighbourhoods, 1970-2000." Centre for Urban Community Studies. 41. (2007): Web. 8 Nov. 2011. <http://www.urbancentre.utoronto.ca/pdfs/researchbulletins/CUCSRB41_Hulchanski_Three_Cities_Toronto.pdf>.
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ONLINE

Annotated Google Map
<http://g.co/maps/btaet>

CHALLENGE 04: HUBURBIA



How can we create mobility hubs that connect edge cities to the core and to each other?

SOURCE: BP.BLOGSPOT.COM

CHALLENGE 04

HUBURBIA

PROJECT LOCATION

Vaughan, Ontario – Primary site at Jane and Highway 7 with a secondary site at Vaughan Mills (Rutherford Road and Highway 400.)

PROJECT VISION

To connect edge cities to downtown and each other by building a network of mobility hubs that allow for seamless transfers between various modes of transportation and create areas of intensified development for working, living, shopping and play.

PROJECT MISSION

To design a system of scalable mobility hubs that integrate existing roadways with local and regional transportation systems, presenting a plan for one model hub and the development typology that should surround it.

THE CHALLENGE

As suburbs continue to grow, increasing numbers of people will require efficient and sustainable modes of transportation connecting them to the urban core and other suburbs. More commuters on roads highlights the need to transform the existing urban structure, intensifying the density of development and building infrastructure to connect people by means of a variety of transportation systems. Restructuring a city that is car-oriented to one that focuses on public transit is not a simple task. People are often resistant to change established habits. Public transport oriented development (PTOD) is an efficient method for curbing congestion, carbon emission growth as well as increasing the public's mobility and promoting community.

The challenge is to design a PTOD plan that would consist of a network of mobility hubs, each tailored to service its users' transportation needs in distinct ways, for the City of Vaughan (one of the fastest growing municipalities in the Greater Toronto Hamilton Area (GTHA). According to Metrolinx, a mobility hub is "a place of connectivity, where different modes of movement, from walking to high speed rail, come together seamlessly... a place in the urban region where there is an attractive, intensive concentration of

employment, living, shopping and enjoyment around a transit interchange".¹ Constituting a fully integrated transport network, these hubs must allow for easy connections to neighboring suburbs and to the downtown core of Toronto as well as local services. The Vaughan Metropolitan Centre (VMC) (Highway 7 and Jane St), expected to be in service by 2015, will serve as the anchor hub for the entire network with other major hubs proposed on Steeles Avenue West (between Jane and Keele) and Highway 407 (at Jane.) These major hubs will connect smaller hubs throughout the area, serving as the primary transport points across the region.

OBJECTIVES

- Increase connectivity to the rest of the GTHA and neighbouring suburbs like King Township and the towns of Markham, Richmond Hill, and Newmarket.
- Consider how a regional system of scalable "anchor" (central) and "community" (local) mobility hubs can spread out from the proposed Vaughan Metropolitan Centre to create a complete transportation system. (e.g. suburban neighbourhood clusters plug into larger municipal hubs, which then plug into regional hubs)
- Consider how different modes of transportation can accommodate users, significantly reducing dependence on automobiles.
- Consider how mobility hubs can bring together multiple modes and carriers of transportation.
- Consider how mobility hubs can contribute to intensification and improved quality of life through public spaces and private development that accommodate working, living, shopping and playing.
- Consider how the VMC anchor mobility hub and community hubs can be models for the other hub locations identified by Metrolinx across the GTHA.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- The existing zoning and land ownership in proximity to the proposed transportation corridor and propose alternative zoning standards that are more sustainable.
- All planned and proposed developments at the VMC including Expo City, Smart Centres, VIVA Bus Rapid Transit (BRT) terminal, TTC terminal etc.
- All future transportation plans, including those outlined by Metrolinx, GO transit, York Region Transit (YRT), and VIVA.
- The social, environmental and economic goals outlined in Vaughan's official plan, transportation master plan and applicable provincial plans (e.g. Growth Plan for the Greater Golden Horseshoe).
- YRT master plan and associated York Region goals and objectives.
- The overall capital costs, annual operating costs and replacement/lifecycle cost for design elements.
- How the public realm can be designed to create a strong visual identity for the city.
- How to support and enhance the pedestrian, cyclist, transit and motorist access and experience for all ages and abilities.
- How to deliver public transit more efficiently based on need (e.g. using taxis or car share in off peak times rather than buses).
- The future technologies associated with transportation such as hybrid/electric vehicles, smart technologies etc.
- How information and communication technologies can help to connect suburbs and rural areas to services while minimizing travel (e.g. through virtual hubs and community centres that may include retail, government and medical services).
- Future lifestyle patterns associated with evolving demographics including an aging population.

PROGRAM REQUIREMENTS

- VMC Anchor Hub: create a public square that can accommodate the future transportation demands associated with the new VMC, and that aligns with Vaughan's land use policy.
- VMC Anchor Hub: create the urban fabric that connects the new VMC which includes proposed TTC Station, VIVA BRT Terminal, EXPO city and link that to the larger fabric of the suburbs.
- Community Hub: create a mobility hub that consolidates transportation and services in the suburbs and feeds into the Anchor Hub. Consider what services could be delivered locally and virtually to reduce transportation.
- Community Hub: create the transportation systems and services required to support and connect the community hub. Assess how suburban homeowners will travel to and from the VMC and identify major routes while considering how secondary community hubs may feed into the proposed VMC.
- Connecting major transportation routes to the Anchor Hub and beyond: integrate access from the nearby 400 series highways, GO Station and other major transportation infrastructures that currently connect Vaughan to the surrounding cities and regions.
- Connecting pedestrians and cyclists to Hubs: encourage active transportation and preserve environmentally significant land by increasing access to Black Creek, other current trail systems and propose future active transportation networks. Specifically address an east west connection that enables residents to safely cross over the 400.
- Creating a system of Hubs: propose how the Anchor and Community Hub could be used as models for a system of hubs in locations identified by Metrolinx across the GTHA.

CRITERIA

- Increase the overall transit mode share within Vaughan by 10%.
- Align the identity of the proposal with Vaughan and York Region public policy and branding.
- Ensure the proposal is financially feasible and has a return on investment of no longer than 20 years.
- Encourage and increase development within proximity to proposed mobility hubs.
- Create 1000 new jobs through infrastructure investment that facilitates new economic development in proximity to mobility hubs.

TARGET USERS


The following section provides a user profile outlining the targeted demographic:

- Commuting drivers: 18 to 55 years of age.
- Commuting cyclists: 20 to 50 years of age.
- Recreational cyclists: 16 to 65 years of age.
- Local Residents/Pedestrians: 8 to 80 years of age.

DELIVERABLES

The following deliverables are specific to this challenge:

- Create a master plan that identifies the proposed VMC and its relationship to existing and proposed transportation networks including a series of community hubs that feed into the VMC.
- Create plans for a typical community hub that identifies commuter routes for local residents, potential land use density and development patterns, public space, streetscape design and proposed zoning.
- Create a massing model or an aerial view of the proposed mobility hub design and connecting public space.
- Create an exploded axonometric to illustrate the systems associated with the proposed hubs. This axonometric should include:
 - Land use
 - Transportation use and flow
 - Energy use and flow
 - Other systems deemed necessary by the team
- Create user experience scenarios that demonstrate the journey and interaction through the proposed mobility hubs within Vaughan.



Vaughan's population has doubled in the past 10 yrs and is expected to double again, to approximately 416,600, by 2031.

GENERAL CONTEXT

THE PAST

Post-war suburban growth

The North American suburban population exploded during the period of economic expansion that followed the end of World War II. Returning veterans wanted to get back to their normal lives and start families, while mass-produced housing tried to keep up with this demand. Industrial factories that once existed in the heart of the city were abandoned for service sector jobs.² Across Canada, the post-war period saw a steady rise in the rate of suburbanization.

When automobile ownership surged in the 1950s, the edge city became not only a possibility but also a desirable one. Indeed, it is no exaggeration to say that edge cities are impossible without the automobile. Whereas most Central Business Districts were centered around pedestrian and non-motorized transportation, edge cities instead developed around hierarchical street arrangements that presumed driving as the primary mode of transportation. Rather than existing population centres, edge cities are often planned around freeway interchanges.

To change the design and habits that define edge cities to include scalable and sustainable transportation, it is necessary for public transit to be seen as an appealing method for getting around. More often than not, suburban residents choose the private automobile over public transit. The costs incurred by taking the car might be greater in the long run, but it is usually seen as the simplest option available. The private automobile provides personal space and comfort, convenience and freedom to go anywhere without dealing with schedules. To create an increase in the modal split of suburban dwellers, public transit must not only be an alternative to the automobile but a competitive one. Lowering the cost of service, increasing access of service, as well as increasing the connectivity of different services in the form of mobility hubs, are examples of how this can be achieved.

THE PRESENT

Between 1992 and 2005 car dependency rose from 68% to 74%.³ Part of the reason behind this increase is the growing tendency of people being located further from city centres. In sum, the greater the distance from the centre, the higher the proportion of people who use a car for at least one of their daily trips. According to Statistics Canada, 61% of people living in a central neighborhood make at least one car trip a day, compared to 73% for those living between 10 and 14 kilometres from the city centre, and 81% for those living 25 kilometers or more away.⁴ As a result, congestion due to overcrowded roads has become a fact of life in the GTHA. This year, congestion cost commuters in the GTHA \$3.3 billion and the regional economy \$2.7 million in lost productivity. These numbers are expected to skyrocket by 2031 to \$7.8 billion and \$7.2 billion respectively.⁵

In spite of increased congestion, personal vehicles are still the preferred method of travel for the majority of people throughout the world. Unfortunately, there is a spiraling effect whereby traffic congestion produces the demand for larger roads, which in turn calls for the removal of traffic impediments including bike lanes and signalized crossing. For this reason, much of our infrastructure has been constructed in a way that is tailored to the personal vehicle. Roads and highways, cities and suburbs have been designed with the intention that the car is the predominant method of transportation to and from one's house whether they are travelling to work, school, or local shops.

A major challenge in suburban communities is to connect multiple modes of transportation not only within the suburb, but between cities and regions. By creating mobility hubs, these spaces become destinations where people not only use a wide range of transportation options, but shop, eat, work, live and play. If the right services and incentives are in place, users will be eager to use alternate transportation methods. Furthermore, if they are happy with the service, they will disseminate the message and influence others. And, while it might not be possible to eliminate the dependence on the automobile, it is possible to promote shorter car trips by providing parking spaces at mobility hubs where people can carpool and then take public transit for longer trips.

THE FUTURE

How to identify a potential mobility hub?

One possible solution is the construction of mobility hubs. Mobility hubs are major transit station areas where significant levels of transit service can be integrated. For this reason, mobility hubs must host one or more modes of high-order transit. They must also be inter-regional destinations that will attract mixed-use and intensive development. With regard to transportation, they make it easier to move from one mode of transportation to another, anchoring seamless, convenient connections across the region.⁶ However, mobility hubs also improve the relationship between transportation and land use. They are places where transportation comes together seamlessly in a hub and have an intensive concentration of employment, living, shopping and recreation. In order for them to work, they must be located close to many people. They must be livable and attractive places.

Public transit oriented development

There is an ongoing need to address issues like urban sprawl, congestion, accessibility, and climate change in order to achieve a sustainable future. Public transit oriented development (PTOD) is one way of justifying large-scale investments in rapid transit networks.⁷ The dependency on the automobile has resulted in low-density developments spanning large areas. Not having access to an automobile results in a significant disadvantage for users since public transit cannot efficiently service these areas. As a result, public transit has become redundant in most suburban areas.⁸

PTOD is an efficient method for curbing congestion, carbon emission growth, social exclusion and crime. Furthermore, PTOD has the ability to increase the public's accessibility as well as promote community within the area. PTOD offers communities an alternative form of development that can retrofit existing areas, facilitate pedestrian use, and generate improved ridership numbers.⁹ This kind of development has been adopted by many urban leaders as a way of dealing with traffic congestion focused on the automobile. The Greater Toronto Region, like many other global cities, is in need of new and innovative solutions that deal with the issues of urban sprawl and congestion.

Automobile dependency, even if more appealing, cannot continue to be the primary method of transportation for suburban populations. PTOD is above all a tool that can entice a wide range of stakeholders to generate increased ridership, reduce emissions, and ultimately increase transport choices.¹⁰

Statistics Canada states 61% of people living in a central neighborhood make at least one car trip a day, compared to 73% for those living between 10 and 14 km from the city centre, and 81% for those living 25 km or more away.

LOCAL CONTEXT

THE PAST

The history of Vaughan

Following the Humber Trail in 1615, the first European to reach Vaughan was French Explorer Etienne Brule.¹¹ Since the French had no interest in colonizing the region, Vaughan did not see any settlements until after 1792. At this time, dirt roads connected the various counties including Vaughan that surrounded the City of York (now Toronto), but they were rarely used. Due to its remote location and lack of amenities, Vaughan had only 60 inhabitants in 1800. However, by 1840, Vaughan expanded to house 4300 residents.¹² From the 1840s to the 1930s, the Township of Vaughan went very much unchanged with an increase of only 573 people during this period. It was after World War II that the city witnessed rapid growth with a large influx of immigration and the population reaching 15,957 by 1960.¹³

THE PRESENT

Today, Vaughan is a prosperous city and one of southern Ontario's fastest growing communities. According to the 2006 Census, Vaughan's population reached 238,866.¹⁴ Over the past ten years, Vaughan's population has doubled and it is expected to double again, to approximately 416,600, by 2031.¹⁵ The number of jobs in the city is expected to increase 60% from its current level of 159,200 jobs to 266,100 by 2031.¹⁶

York region residents travel to work within regional boundaries (41%), commute to Toronto (51%), or travel to neighbouring regions.¹⁷ According to the data collected by the federation of Canadian Municipalities, the median commuting distance for York region residents is approximately 12 km, which is among the highest in Canada.¹⁸ As a suburb of Toronto, Vaughan has also been designed in a way that is dependent on the automobile as the primary method of transportation. During a typical weekday morning commute, eight-in-ten residents travel by automobile with fewer than one-in-ten commuting by walking or cycling. This is a trend that is common across the GTHA. According to Metrolinx, there will be 2.6 million more people living in the region 25 years from now (2011). In terms of transportation, this will result in 7 million more daily trips, an increase that will increase the average commute time by 27 minutes.¹⁹

Yet almost four-in-ten children walk or cycle to school in York region, more than any other mode of transportation. Programs like the "Walking School Bus" and "Safe Routes to Schools" are proof that walking and cycling are popular among children.²⁰ Based on current morning peak period trips by residents of the region, it is forecast that the morning peak transit modal split will increase to 17% by 2031.²¹

Transportation in Vaughan

Prior to 2001, Vaughan was served by a municipally funded transit system, Vaughan Transit. In 2001, the York Region Government merged this transit system with four other municipally managed transit systems to form the York Region Transit. The York Region Transit operates over 20 routes within Vaughan but currently offers no major terminals. In 2005, VIVA, a Public-Private Partnership that provides users with increased connectivity between major arterial routes, was launched to further connect Vaughan's major centres. Today, the TTC, VIVA, and York Region Transit offer public transit services to local residents within the City of Vaughan. More than 120 YRT/Viva routes keep residents connected within York Region, as well as with connecting services in the City of Toronto and the Region of Peel. From January to April 2011, overall ridership for both York Region Transit (YRT) and York Viva Bus Rapid Transit (BRT) services increased 10.5 per cent when compared to the same period in 2010. If this trend continues, YRT/Viva will surpass 21 million riders in 2011.²² By 2015, Vaughan will be fully integrated with the Yonge-University-Spadina Line with the addition of the Highway 407 Transit way and the VMC subway stops.

Current initiatives and plans in Vaughan

The City of Vaughan has achieved an impressive level of prosperity both economically and with regard to quality of life. In 2010, Vaughan was recognized for having one of the top two performing economies in the country. Vaughan understands the need to be at the forefront of new trends in transportation and sustainability. The city believes in leading by example. In 2011, Vaughan built a new LEED Gold-certified city hall, a commitment to sustainable development.

As a growing city, Vaughan is at the forefront of meeting the transportation needs of its residents and business by supporting the construction of the Toronto-York Spadina Subway Extension. The designs and construction of three stations to be located in Vaughan – Steeles West, Highway 407, and Vaughan Metropolitan Centre – have already commenced.²³ In 2010, Vaughan approved its new official plan that proposes a balanced approach which combines green spaces with urban expansion. Proposed areas of intensification will be centered around the new Vaughan Metropolitan Centre, Weston and Highway 7, Yonge and Steeles, Vaughan Mills Mall, and Steeles West.²⁴

A hub at Yonge and Steeles Avenue West (at the north side of York University between Keele and Jane) has been designated as an intensification area. It is currently undeveloped but envisioned as a high density, mixed-use residential/commercial development. A YRRT bus terminal, TTC subway station and YRRT commuter parking lot are planned by 2015. Working with &Co and Dillon, the City is developing a streetscape and open space master plan for the area.

While the Jane and Hwy 407 subway station is not identified in the Metrolinx guidelines, it also has future, longer-term land development potential to the west and south. No urban design work has been done for this area to date.

... CONTINUED

THE FUTURE

Why Vaughan?

The City of Vaughan has a growing population, expected to reach 416,600 by 2031, with projected employment numbers expected to reach 266,100 by the same year.²⁵ However, there is a lack of efficient public transit solutions for residents of Vaughan seeking to commute within their city, or around the GTHA. For this reason, it is imperative that Vaughan is connected to its adjacent municipalities by means of scalable mobility hubs. These hubs must not only provide residents with multiple transportation options, but also provide streets and neighborhoods where people eat, shop, play, work and live. At the heart of City's vision is the transformation of the proposed Vaughan Metropolitan Centre (VMC) into a more sustainable and attractive downtown area.

By 2031, the VMC is expected to encompass an area of 179 hectares, and will create a minimum of 11,500 jobs. By 2015, the Metropolitan Centre will be fully integrated with the rest of the GTA with the completion of the Toronto-York Spadina Subway line, which will be able to transport customers, clients, and employees to and from the VMC.²⁶ Both the Vaughan Metropolitan Centre Secondary Plan and the City's Transportation Master Plan envision a downtown that is transit-oriented, walkable, accessible, diverse, green and beautiful. The vision includes Travel Demand Management (TDM) measures that will discourage single-occupancy vehicle trips while making alternative modes of travel more attractive.²⁷

The future transportation network will be built on today's system. The existing street network will serve as the framework for enhancements to transit, walking and cycling systems, making efficient use of existing and future infrastructure investments.²⁸ Along with the subway connection, VIVA Rapid Transit (BRT), Züm and other local transit systems will also connect the VMC with the surrounding region. A dedicated "rapidway" for Buses along Highway Seven will eventually extend west from Yonge Street to Highway 50. The first segment will be built around the Vaughan Metropolitan Centre. At the terminus for the Spadina subway extension, subway riders will have seamless connections to Viva and other transit systems.²⁹ Consistent with the York Region Official Plan, an overall transit modal split of 30% during peak periods is targeted for the city as a whole and a transit modal split of 40% and 50% are targeted for Intensification Areas and the Vaughan Metropolitan Centre respectively by 2031.³⁰

Building on the Region's and TTC's transportation plans, the City of Vaughan is following a "new path" whose foundation will incorporate subway service, several rapid transit routes and expanded GO Transit service. Combined with more efficient transit service, the City's "new path" includes higher density residential and mixed-use development in key centres and along transit corridors.³¹ The City of Vaughan has made it a goal to increase connectivity by maximizing connections to significant destinations, including intensification areas, employment clusters, schools and institutions, parks and open spaces, and other key public places by creating transportation networks that cater to pedestrians and bicycles. Vaughan is representative of what the future suburban city has the potential to look like. Vaughan can be a well-connected, complete community, and in some ways, have the potential to draw many more investors, employers, and citizens.

The City of Vaughan is seeking to create a hierarchy of streets in order to create more accessible and better mobility within the region. The official plan has identified provincial highways, arterial streets, collector streets and local streets and prescribed uses and goals for each. The Toronto-York Subway extension (to be operational in 2015) will provide three subway stations in Vaughan and will be supplemented with enhancements to the existing VIVA rapid transit system. The goal is to encourage the provision of transit service within 500 metres of at least 90% of residences and the majority of jobs and other activities throughout the city, and within 200 metres of at least 50% of residents in the urban area.³²

The Ontario Transportation Ministry is currently planning a new super highway called the GTA West Corridor. This highway is proposed to extend across Vaughan to Milton, beginning at Highway 400. This new highway is believed necessary in order accommodate future commuter and shipping needs, Vaughan is currently opposed to this idea, stating that the new highway will simply create more congestion by funneling more cars into Vaughan.³³

Mobility hubs in the GTHA

The GTHA is comprised of 6 million people today, a number that is expected to grow to 8.62 million by 2031. This population is scattered across 30 municipalities, governed by four levels of government and has ten transit agencies. In terms of distance, the GTHA covers approximately 8,242 km².³⁴ For large cities consisting of smaller suburbs around its periphery, it is vital that transportation throughout the region be reassessed. Mobility hubs can provide the user with viable and attractive transportation options that can move large groups of people to and from their destinations in a comfortable and timely fashion.

Key stakeholders

City of Vaughan

Vaughan envisions itself as a city of choice that promotes diversity, innovation and opportunity for all citizens, fostering a vibrant community life that is inclusive, progressive, environmentally responsible and sustainable.

Metrolinx

Metrolinx was created in 2006 to improve the coordination and integration of all modes of transportation in the GTHA.

Viva

With York Region being one of the fastest growing areas in Canada, traffic congestion continues to increase on roads. VivaNext will make it easier to get around by providing an efficient and reliable rapid transit network.

Smart Centres

Canada's fastest growing and most active commercial developer, leading the industry in new format retail development, specializing in large-scale, value-oriented shopping centres.

TTC

The Toronto-York Spadina Subway Extension Project will provide a critical extension from the existing Toronto Transit Commission subway system across the municipal boundary between the City of Toronto and The Regional Municipality of York.

Cortel Group

Cortel Group is a real estate developer based in Vaughan. They have been leading the *Expo City*, the first new major development in the transformation of more than 300 hectares in the Jane Street and Highway 7 area into the Vaughan Metropolitan Centre, a new downtown hub for that city.

Con-Drain Group

Con-Drain Company (1983) Limited is one of the most experienced sewer and watermain contractors in North America with 50 years in the business. It is also one of the largest contractors of its kind in Canada.

Vaughan Mills Mall

Vaughan Mills is a large shopping centre located at the southeast corner of Highway 400 and Rutherford Road, about 32 km north of Downtown Toronto. Vaughan Mills has almost 1.2 million square feet (110,000 m²) of retail space.

York Region School Board

York Region District School Board is the third largest school district in Ontario, with over 117,000 students in 166 elementary schools and 31 secondary schools.

City of Markham, Richmond Hill, King, Aurora, Newmarket

Centre for Social Innovation

The Centre for Social Innovation is a social enterprise with a mission to catalyze social innovation in Toronto and around the world. We believe that society is facing unprecedented economic, environmental, social and cultural challenges. They believe that new innovations are the key to turning these challenges into opportunities to improve communities and the planet.

MAPS & SITE IMAGES



Indication of general challenge area highlighting the purposed site of the hub (1), future Finch West (2), York (3) and Steeles West Stations (4) and Vaughan Mills Shopping Centre (5).



Proposed site of the hub – HWY 7 and Edgeley Blvd. to Jane St. and Apple Mill Rd.



Zoomed in challenge area highlighting the purposed site of the hub (1), future Finch West (2), York (3) and Steeles West Stations (4) and Vaughan Mills Shopping Centre (5).



Street views of the site for the proposed hub.

PRECEDENTS

TRANSIT ALIGNMENT



Bremen, Germany – Integrating Different Transit Operators

Transit alignment is imperative to effectively move people on a regional scale. In Bremen, Germany, one umbrella organization oversees 35 transit operators in a 4800 km² region. The result: one ticket, one tariff, and one information system for all the transportation modes. Effectively aligning all of these transit organizations through mobility hubs creates integration. It has also created a shift in the transportation modal split, reaching 60% sustainable transportation.

http://www.communauto.com/images/03.coupures_de_presse/video_summary.pdf
http://www.eltis.org/docs/studies/Bremen_s_Integrated_Mobility.pdf
<http://www.bsag.de/eng/index.php>



Madrid, Spain – Transportation Integration

After decreased ridership for over a decade, an integration of services was introduced in Madrid, Spain. The project created administrative, modal, and fare integration. Furthermore, mobility hubs were created to act as exchange stations to allow the user with multiple route choices.

http://www.ctm-madrid.es/servlet/IdiomaServlet?xh_IDIOMA=2

TRANSIT ALIGNMENT



Denver, Union Station – Master Plan to Develop an Effective Mobility Hub

The City of Denver is currently implementing a master plan for the transformation of its Union Station to create a multi-modal hub and gateway for the city. The transformation will see local and regional rail and bus service, bicycle parking, pedestrian walkways, parking facilities, green spaces, and car sharing. Essentially, Union Station will allow the city with a focal point in which its heritage, natural features, and long term economic and social goals can be considered in order to create a mobility hub, acting as a complete street that provides its users with multiple transit options.

http://www.rtd-fastracks.com/dus_1
<http://www.denverunionstation.org/>



DESIGNING FOR FUNCTION AND EXPERIENCE



Madrid, Spain – Atocha Station

Mobility hubs act as areas that channel many transit users both into and out of its city. However, mobility hubs can be destinations, places where people want to spend time in, instead of just a layover in between stops. Mobility hubs can serve as places where people connect, meet, enjoy a bite to eat, or simply as a place to reflect.

DESIGN FOR TRANSIT ORIENTED DEVELOPMENT



Hong Kong, China – Integrating PTOD with Network Expansion

The Mass Transit Railway (MTR) in Hong Kong has been praised as one of the most successful transport agencies in the world. As the system expands, the MTR acquires properties adjacent to the stations to create PTOD to generate ridership and revenues through sales and leases of mixed-use developments. Revenues generated are split between the MTR and its private partners. The funds obtained are then used to finance future expansion projects.

http://www.mtr.com.hk/eng/homepage/cust_index.html
<http://en.wikipedia.org/wiki/MTR>

PRECEDENTS

DESIGN FOR TRANSIT ORIENTED DEVELOPMENT



Calgary – The Bridges

The Bridges is a planned compact urban village that is pedestrian friendly, making access to public transit, work, shopping and recreational amenities more convenient, safe and pleasurable. In 1976, the City of Calgary decided to invest in light rail transit. Since 1981, approximately \$1 billion has been invested in a radial LRT system. This area will become a highly utilized transit node with increased ridership. The focus was to create higher density, walkable, mixed-use environments within station areas to optimize use of existing transit infrastructure, create greater mobility options, and benefit local communities and city-wide transit riders alike.

http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/upload/66652_Nov5-w.pdf



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CHALLENGE 04

NOTES & RESOURCES

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ONLINE

Annotated Google Map
<http://g.co/maps/hxkcn>

CHALLENGE 05: SHARED SPACES

How can we create a new grid for our dense city centres?

SOURCE: ENCOUNTERINGURBANIZATION.WORDPRESS.COM

CHALLENGE 05

SHARED SPACES

PROJECT LOCATION

Toronto, Ontario – Downtown Core (Parliament to Spadina, College to Queens Quay)

PROJECT VISION

Envision the city's core as a grid built around a dense transportation network made up of interconnecting larger and smaller fibres (such as transit-priority routes, pedestrian plazas, separated bike lanes, and service laneways) to facilitate a spectrum of activities.

PROJECT MISSION

Redesign the street grid as a dynamic web of multi-functional and “flexible” streets (meeting a variety of needs at different times of the day and for different times of the year) in Toronto's downtown core.

THE CHALLENGE

In many North American and European cities, aging infrastructure, once designed primarily for the automobile, cannot accommodate the competing needs of pedestrians, cyclists, public transit and delivery vehicles. Increasing demand on city infrastructure makes congestion a serious issue and a deterrent for the commuters, residents, tourists and businesses who share the streets. Gridlock, increased wait times, overcrowding, pollution and accidents are the symptoms of a system that is struggling and that undermines the city core as a vibrant place for living, working, visiting, and traveling. Toronto, like cities around the world, is experiencing a period of growth that will continue to put pressure on an already inadequate transportation system. The city's population is projected to rise from 2.72 million in 2010 to 3.36 million in 2036, an increase of 23.7 per cent.¹

How can we re-evaluate the overall functionality, efficiency and effectiveness of transportation and mobility corridors within the downtown core? Can we design and map a new mobility grid for the 21st century city? How can the limited space and infrastructure in urban centres be designed and managed to ensure that the complex activities of commerce and daily life can continue despite growing populations? How can we accommodate multiple modes of transportation and optimize the space available by intensifying, extending and connecting the grid to brownfield sites in the downtown core?

OBJECTIVES

- Develop a dynamic, multi-functional and responsive web of mobility options for the densely populated urban core, that is “people-focused” (commuters, residents, business and tourists).
- Integrate all forms of transportation including automobiles, bicycles, pedestrians, personal mobility devices, transit and freight in an equitable, safe, accessible, attractive and comfortable environment.
- Maximize existing infrastructure and transportation corridors downtown to increase efficiency and flexibility of use, configuration, management and operations.
- Improve quality of life and the economy in the downtown core using a holistic approach to mobility and “complete streets.”
- Develop a transportation system and streetscape that build on downtown Toronto's unique assets (e.g. the Path, Union Station, the business district and its parks and architecture), and contribute to a positive identity for the city as progressive and at the forefront of sustainable transportation.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- Existing and proposed land-use patterns within the downtown core.
- Urban planning restrictions and guidelines (i.e. Toronto Avenues and Mid Rise Buildings Study, City of Toronto Urban Design Guidelines).
- Street classification and hierarchy (i.e. whether certain streets should have a linking function only, or be destinations in themselves).
- Existing and proposed transportation systems within the downtown core, including but not limited to: TTC streetcars, buses, Wheel-Trans and subway systems, existing road network, PATH underground pedestrian system, recreational trails, bicycle trails and lanes, Bicycle sharing network, car sharing networks (ZipCar, Autosshare, Options for Cars, etc.), train systems (GO, VIA Rail), Greyhound and other coach buses, Toronto Island airport and Porter airlines, taxi services, etc.

- Planned transportation hubs within Toronto and the GTHA and how those will affect movement within the downtown core.
- Current modal split within Toronto, and future modal split targets.
- Overlapping infrastructure and the transfer between various modes of transportation within the downtown core.
- Conflicts between various modes of transportation (e.g. between cars, bicyclists, public transit and pedestrians).
- Potential for limited access and paid zones (e.g. pedestrian days, car-free zones, congestion charges, tolls).
- Changing needs of various users throughout the year, including commuters, residents, tourists, and business owners.
- Goods movement within the downtown core, including delivery patterns, types of vehicles, stopping and loading.
- Parking and storage of vehicles.
- Rising oil prices and access to fuel (i.e. gas stations and systems for charging vehicles using alternative energies).
- Intelligent transportation systems (ITS) that can collect data, integrate ticketing and payment, as well as improve communication, efficiency, connectivity, safety and access to real-time information.
- A user-centered design approach that ensures accessibility, safety and comfort for a wide range of abilities, ages, sizes and incomes.

PROGRAM REQUIREMENTS

- Identify all overlapping transportation infrastructure within the downtown core to highlight nodes and propose ways to increase efficiency, choice and coordination between the various modes to enhance exchange and flow.

- Create a streetscape and mobility system that allow for a great variety of transportation options, their use, storage and refueling.
- Create an intelligent wayfinding system that is compatible for all users, enhances the overall user experience while encouraging greater flow within the downtown core.
- Create a clear, long-term vision for the transportation grid in the downtown core that is consistent with the goals of the City of Toronto.

CRITERIA

- Create a revenue model that will cover the escalating operational and maintenance costs associated with the transportation system.
- Increase economic investment and create new jobs within the city of Toronto.
- Increase, diversify and facilitate the modal split within Toronto to reduce the overall dependency on the automobile (e.g. increase walkability, increase number of bikes in use).
- Reduce congestion, commute, shipping and wait times within the city by better utilizing the existing infrastructure and proposing solutions that enable better flow within the downtown core.
- Decrease the overall energy requirements and emissions associated with the transportation system within the city.
- Increase the overall safety within the city for all users.
- Increase the number of visitors attracted to the downtown core and the amount of time they stay within the city.
- Encourage more visitors to explore more destinations within the city limits.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

- Residents of Toronto: 8-80 years of age.
- Visitors and tourists (Local, Regional, & Global): 6 - 80 years of age.
- Commuters: 21 – 65 years of age.
- Pedestrians, cyclists, and people who use other forms of personal mobility (e.g. skateboards, scooters, strollers): 8 - 80 years of age.
- Public transit users: 8 - 80 years of age.
- Drivers and passengers: 8 – 80 years of age.
- Transportation companies and organizations (e.g. taxis, TTC, Greyhound, BIXI, Options for Cars)
- Shippers, from bike couriers to trucking companies.

DELIVERABLES

The following deliverables are specific to this challenge:

- A master plan that illustrates the proposed transportation system within the downtown core, highlighting the following:
 - Various modes of transportation and their routes through the city
 - Existing and proposed land-use patterns, identifying residential, commercial, institutional, and industrial development, as well as mixed-use zones
 - The identified transportation nodes and the overlap of infrastructure at these nodes.
- Typical street sections for the following scenarios:
 - Multi-level systems (e.g. University Ave, Yonge and Bloor Streets) including the subway, PATH, streetcars, pedestrians, bicycles, etc.
 - Multi-use streets (e.g. Queens Quay, King St., Queen St.) including streetcars, cars, bicycles, pedestrians, etc.
 - One way main streets (e.g. Adelaide, Richmond) mainly used by cars with light pedestrian and bicycle travel.

- Typical two-way streets (e.g. Beverly, Harbord, Sherbourne) with various uses including bicycle, pedestrian and car.
- Design an “intelligent” wayfinding and payment system, branding and awareness campaign at one of the identified nodes, and illustrate how the system can be implemented citywide.
- Create user experience scenarios that demonstrate how movement throughout the city is enhanced by the proposed systems. This should consider the various users and modes of transportation (i.e. how residents who rely on transit move through the city vs. residents with cars, or how tourists interact with the proposed wayfinding).



Approximately
70% of the
world's popula-
tion will live in
cities by 2050.

SOURCE: UNITED NATIONS

GENERAL CONTEXT

THE PAST

How has transportation in city centres evolved in North America?

The Central Business District (CBD) has been historically shaped by transportation trends, policies and technologies.² As the basis of commerce and wealth generation in the city remained in the older “walking” core of the city, transit lines served the central core, like “spokes radiating from a wheel hub”.³ This meant that the downtown had an advantage over other locations in the mass transit era because it offered far greater access to more points in the metropolis than any other site. As the automobile became the primary method of transportation, infrastructure was designed to accommodate cars, which resulted in increased suburban development and people being able to live further away from their place of work. This meant more people were actually moving away from city centres and commuting into the city, particularly in the seventies and eighties.

As city populations grew, businesses in the downtown, particularly specialized services such as banks and insurance companies, needed to expand. However, they could not give up their location in the city centre since such a move would make them less accessible to many of their transit-dependent customers. Businesses interested in expansion had only one way to go: up. After pushing the limits of building technology, three major breakthroughs – Bessemer steel, the elevator, and higher municipal water pressure, allowed buildings to be constructed at even greater heights.⁴ However, with the construction of freeways, the downtown no longer had a virtual monopoly on access. With freeways, any point in the metropolitan area gained access to virtually any other point. This lessens the competitive advantage that downtowns enjoyed during the mass-transit era.⁵

THE PRESENT

The current North American downtown is the product of nearly two centuries of different transportation technologies, trends and policies.⁶ In the early twentieth century, the CBD arose as the “walking city” which was then transformed into a “mass transit” city.⁷ However, the automobile has changed the face of the metropolis, spawning vast, low-density development. Many observers point to the shift in office space from downtown to the fringes of the metropolitan area as a sign that the downtown has entered a period of decline. The rapid growth of suburban office markets is cited as evidence that as urban areas become more decentralized, the downtown becomes less significant as the commercial and cultural centre of the region.

Today, downtowns are still relevant because their density gives them a distinct advantage within the realms of high finance, innovation, and entrepreneurship. Firms will pay higher rents for space in a CBD for the efficiencies that come with density.⁸ Many of today’s planners, engineers, and civic leaders recognize that the density of the downtown is an asset that must be embraced and encouraged. A greater number of people are choosing to live in dense urban areas, fostering downtown’s cultural and residential environments. There are a number of reasons for this including a change in lifestyle, greater personal mobility and increased energy prices. In response to these trends, recent downtown revitalization efforts across North America have sought to embrace density by increasing pedestrian friendly environments and reversing the effects of accommodating the automobile in the 1950s and 1960s.

An increasing number of people are choosing active transportation methods (e.g. walking, cycling, skateboarding), and public transit as their primary methods of travel, requiring updated infrastructure to accommodate them. Technological advancements have also provided new, more efficient modes of public transportation such as high-speed rail, maglev transportation systems, and smaller more efficient personal vehicles. However, a recent study found that transport was the single biggest infrastructure challenge for cities at all stages of development. Effective transport is central to a city’s economic competitiveness, and severe congestion is known to have an equally severe economic cost, estimated as high as 1 to 3 percent of GDP in developed and developing countries.⁹

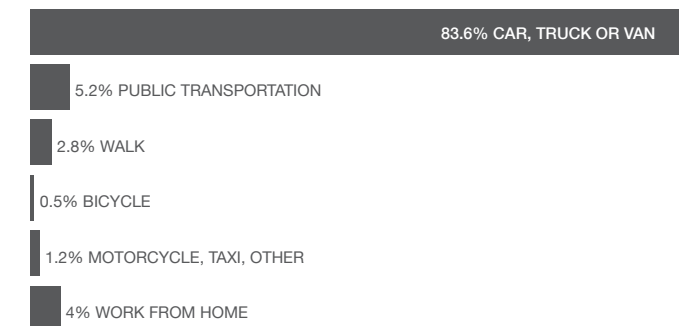
THE FUTURE

The world is urbanizing rapidly, and population density in cities is also increasing. A United Nations report estimates that approximately 70 percent of the world’s population will live in cities by 2050.¹⁰ This increased population density within city centres means that there will be greater demand on our urban infrastructure, emphasizing the need to re-evaluate our current systems. In many North American and European cities, this infrastructure is aging or was designed in a manner that is better suited to the use of the automobile as the primary method of travel. Although the automobile still makes up the largest percentage of transportation mode share in many developed cities (such as Toronto), there is increasing demand for efficient public transit and designated pedestrian and bicycle path networks. New technological advancements and innovative transportation methods exist, however our infrastructure has failed to adapt or reinvent the way in which it is used.

It is likely that the dominant form of transportation in 2050 will be some form of automobile, and thus metropolitan areas will continue to decentralize. Communication advances may also accelerate this trend. The downtown may take on a more important role as the place where the region “comes together”, where all the disparate sections of metropolitan life converge.¹¹ Attractive, usable transit options and a more navigable city will go a long way toward luring downtown visitors, residents and workers out of their cars, thus reducing congestion and the amount of land devoted to parking and traffic lanes. This will also have a number of other associated benefits including attracting more visitors to the downtown core, increasing the amount of time they stay within the city, encouraging visitors to explore more destinations within the city limits, and increasing the overall money spent within the city centre.

What is the future of transportation in cities?

It is not possible to simply build our way into a safer, cleaner, and more efficient transportation system. We must make better use of the tools that are available, including intelligent transportation systems (ITS), to actively manage our transportation network to improve safety, efficiency, and multimodal connectivity.¹² There are technologies available today that would help cities and regions reduce congestion and emissions, make our roads and transit systems safer, and provide the public with improved access to transportation options and real-time information to make efficient travel decisions.¹³ Major transformations to the organization of our cities will undoubtedly take advantage of advances in communications technologies that are reshaping our personal interactions.¹⁴ A common emerging theme is the potential for cities to become “smarter” – to apply advanced technologies to collect more and better data, analyze it more intelligently and connect it through more effective networks. The end result is more efficient, effective and targeted services for citizens.¹⁵



Means of Transportation to Work in America, based on the US Census 2008

LOCAL CONTEXT

THE PAST

What is the history of transportation & planning in Toronto?

Toronto was incorporated as a city in 1834, with a population of just over 10,000. Since that time, a grid-like planning structure was imposed on development, creating a system of through streets and city blocks. While the city was establishing itself as a major commercial centre in the late 19th century, transportation consisted mainly of stagecoaches for regional trips (which ran to and from Kingston, Niagara and Ottawa). At the time, horses and private carriages, and of course walking, met the transportation needs of local residents.¹⁶

As the city's population grew to over 21,000 by 1849, there was a growing need for public transportation services. A young entrepreneur named Burt Williams saw this as an opportunity and created the omnibus – a comfortable stagecoach could hold up to 6 passengers. These omnibuses were immediately popular, and began to run along King Street and Yonge Street, starting at the St. Lawrence Market and ending at the village of Yorkville in front of the Red Lion Hotel.¹⁷ In 1861, the Toronto Street Railway Co. was established and Toronto's first streetcar began operation on September 11, 1861. "The first route duplicated Williams' omnibus service, following tracks from the St. Lawrence market laid down along King and Yonge to the Yorkville Town Hall. The second route started operation on December 2, 1861, running along Queen Street west from Yonge Street to the mental hospital at the foot of what was then known as Dundas Street (today's Ossington Avenue). The streetcars were all pulled by horses, and the car barn and horse stalls were located in Yorkville."

A little more than 20 years after the first streetcar was in operation, experimentation began with the electrification of transportation systems in Toronto. An experimental streetcar line was created in 1834, taking passengers from Strachan Avenue into the Exhibition grounds. This experimental line was later abandoned in 1889, however it inspired city officials and local business owners who had been convinced of the great advantages of electrification. Over the next thirty years, the streetcar system expanded and grew in ridership. In 1920, the city created the Toronto Transit Commission. In 1949, construction of the subway system was started, developing over the next thirty years. Over time, the streetcar network shrank as it was replaced by buses and the subway.

THE PRESENT

Why do we need to re-evaluate transportation within the downtown core?

Toronto currently has a complex network of transportation systems that are evolving and that are constantly analyzed for improvements. The major transportation systems within the city are:

Toronto Transit Commission (TTC)

The Toronto Transit Commission has provided Toronto with public transportation services since 1921. Services provided by the TTC include the subway system, streetcars, light rail transit and buses.

Bicycle Lanes

The city of Toronto has an extensive network of bicycle lanes and recreational trails that accommodate recreational and commuter cyclists throughout the city. The bikeway network is an estimated 1000km of designated paths being developed by the City of Toronto, comprised of bicycle lanes, shared roadway routes and multi-use pathways in parklands, hydro and rail corridors.¹⁸

BIXI – a public bicycle sharing network – was introduced in 2011 and enables residents and tourists access to bicycles 24 hours a day. The system includes 1000 bicycles and 80 BIXI terminals with over 1500 docking spaces within Toronto's downtown core. The project has been extremely successful thus far, with over 300,000 trips to date.¹⁹

Car Sharing Programs

There are currently a number of car sharing programs within the City of Toronto, including AutoShare, Zipcar, and Options for Cars. These systems provide users with access to hundreds of vehicles on demand that can be picked up and dropped off at a number of locations throughout the city.

PATH

The path is an underground walkway that links about 28km of shopping, services, entertainment and businesses. Many new developments are continually adding to the PATH system. More than 125 access points, over 50 buildings/ office towers, 20 parking garages, five subway stations, two major department stores, six major hotels and the Union Station railway

terminal are all connected to the current PATH network. It is estimated that the existing system accommodates 100,000 daily commuters and thousands of additional tourists and residents.²⁰

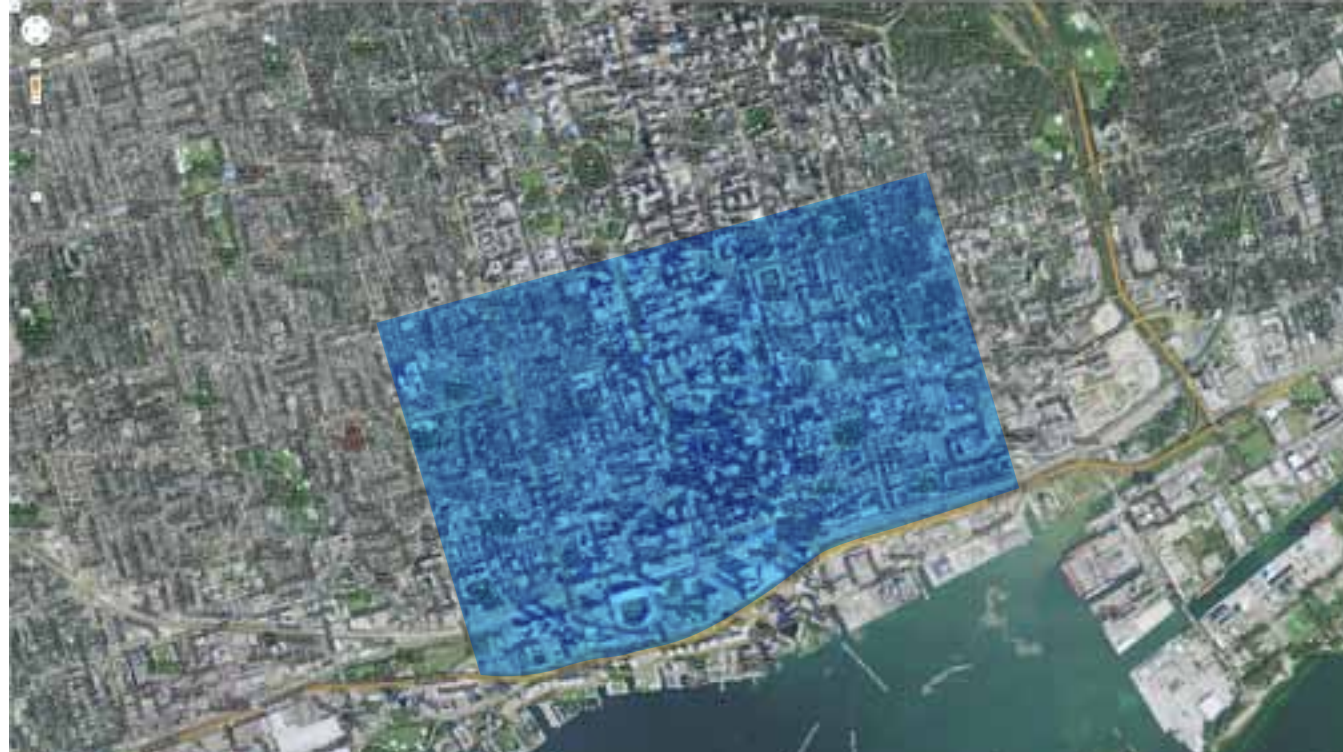
THE FUTURE

Toronto's population is projected to rise from 2.72 million in 2010 to 3.36 million in 2036, an increase of 23.7 per cent.²¹ This population increase means more congestion in city streets and increased demand for a rejuvenated transportation system that can accommodate the needs of all modes and all ages within the city centre. The TTC is currently implementing a plan to expand the TTC with rapid Light Rail Transit lines across all parts of Toronto. This is a significant element in the City of Toronto's commitment to an environmentally sustainable future and livable city.

The Transportation Planning Department at the City of Toronto released a report outlining options to improve transportation for the City of Toronto: improved road use policies, greater accessibility for seniors and people with disabilities, priority for public transit on surface roads and the expansion of commuter rail services. Other transportation infrastructure improvements will be needed to support the City's growth. The broad objective is to provide a wide range of sustainable transportation options that are seamlessly linked, safe, convenient, affordable and economically competitive.²²

In keeping with the vision for a more livable Greater Toronto Area, future growth within Toronto will be steered to areas which are well served by transit, the existing road network and which have a number of properties with redevelopment potential. The growth areas are knitted together by the City's transportation network, the viability of which is crucial to supporting the travel needs of residents and workers over the next 30 years.

MAPS & SITE IMAGES



Proposed highlighted area of Toronto for the challenge



Street views: Queen St. W. and Spadina Ave. (left), Dundas Ave. and Beverly St. (upper right), and Parliament St. and Adelaide St. (lower right).



Street views: College St. and University Ave. (upper left), Queen St. W. near Osgood Subway Station (lower left), and Dundas Ave. and University Ave (right).



Street view: Front St. and University St. near Union Station.

PRECEDENTS

INTEGRATED FARE PAYMENTS



Hong Kong – The Octopus Card

The Octopus Card is a rechargeable contactless smart card used to transfer electronic payments in online and offline systems. Launched in 1997, The Octopus is widely used to pay for virtually all public transport in Hong Kong as well as payment at convenience stores, supermarkets, fast-food restaurants, parking meters and garages, and service stations. In recent years, the card's usability has expanded as it is increasingly being used as a recording device, for example, to record student attendance in schools.

<http://www.octopus.com.hk/home/tc/index.html>
<http://hong-kong-travel.org/Octopus/>

LIVING STREETS

The Gorbals, Scotland – A Walking Friendly Community

Original perceptions of crime and anti-social behavior had a big impact on people's decision not to walk in the area. What became apparent was that crime wasn't the only deterrent for active transportation. The health of the community and the accessibility of various streets prevented more people from walking more in their daily lives. The result was an introduction of walking routes with pocket maps, wayfinding, signage, and street furniture that transformed the streets into walkable and safe environments.

http://www.transport-research.info/web/projects/project_details.cfm?id=14838

SOCIAL NETWORKING AND SHARING



Getaround

Getaround is an alternative to conventional car sharing programs. A social car sharing service, Getaround allows car owners to safely rent out their underutilized cars to a community of trusted drivers. People in need of a car can rent by the hour using the website, or a convenient iPhone app. Since car owners invest huge amounts of money and time into cars that are sometimes seldomly used, Getaround offers the possibility of earning money, while creating sustainable transportation solutions.

<http://www.getaround.com/>



San Francisco – SF Park

SFpark uses new technologies and policies to improve parking in San Francisco. It works by collecting and distributing real-time information about where parking is available so drivers can quickly find open spaces. To achieve the right level of parking availability, the system adjusts meter and garage pricing up and down to match demand. SFpark can be accessed online, by phone, or through a handy application that allows the user to plan out their route and parking arrangements well in advance.

<http://sfpark.org/>



YOUR TEAM

BUS RAPID TRANSIT



Bogota, Colombia – TransMilenio

TransMilenio is essentially a high-end subway that happens to operate on surface vehicles. Dedicated central lanes are serviced by articulated buses which stop at various boarding stations. The system carries 1.3 passengers per average weekday, and the fare is 1,300 pesos, or roughly \$0.55, which enables passengers to travel anywhere in the system without paying any transfer fees. The system works on a “trunk and feeder system” where smaller feeder buses transfer riders to the major trunk lines. The result is a remarkably clean and well-maintained

<http://www.gobrt.org/Transmilenio.html>
<http://www.sustainablecitiesnet.com/models/bus-rapid-transit-bogota/>

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CHALLENGE 05

NOTES & RESOURCES

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ONLINE

Annotated Google Map
<http://g.co/maps/kba5y>

CHALLENGE 06: THE MEGA METRO



How can we move people and products in the megaregions of the future?

SOURCE: ALEX-REID.NET

CHALLENGE 06

THE MEGA METRO

PROJECT LOCATION

Quebec Ontario Megaregion - Quebec City-Windsor Corridor (QWC)

PROJECT VISION

Imagine the movement of goods and people within the large, densely populated regions of the future.

PROJECT MISSION

Propose a holistic inter-modal shipping and transportation system for the Quebec City-Windsor corridor.

THE CHALLENGE

As major cities and their economies expand, mega regions are emerging that consist of multiple interconnected city centres that operate on many levels as a single entity. By working together, these networked regions are able to increase their competitiveness in the global market. Richard Florida describes mega regions as “agglomerations of contiguous cities and their suburbs... ranging in size from five to more than 100 million people and producing hundreds of billions, sometimes trillions of dollars in economic input.”¹

One of the largest mega regions in North America includes Quebec City, Montreal, Ottawa, Toronto, Kitchener/Waterloo, London and Windsor. At present, this mega region is linked by the Quebec City-Windsor corridor (QWC), a transportation system that includes the busiest highway in North America, and which connects to the US and international destinations. As the region has grown, problems of congestion and efficiency have become increasingly serious. In 2006, the average economic costs of congestion to commuters within the GTHA alone were \$3.3 billion, while costs to the economy as a whole were close to \$3.7 billion. If current trends continue, these costs have the potential to increase to \$7.8 billion per year by 2031.² In order to maximize the economic competitiveness of this mega region, the overall transportation network needs to be re-evaluated.

How can we build an integrated, environmentally sound system that efficiently moves people and products along a corridor stretching from Windsor to Quebec City? How

can a transportation corridor respond to both the internal dynamics of mega regions and their place within the global economy? How can we reimagine moving goods and people in the Quebec City-Windsor corridor using multiple platforms including road, rail, water and air?

OBJECTIVES

- Explore ways of connecting the Quebec City-Windsor corridor to regional, national and global transportation networks by improving infrastructure, connection hubs and points of entry (air and sea ports, bus and train stations, freight consolidation and distribution centres).
- Explore ways to further integrate modes (plane, ship, train, truck, bus, car, bike, etc.) and carriers (private, public, local, regional, provincial, national, international).
- Make better use of multiple routes such as the Great Lakes transportation system, underused land and infrastructure.
- Use new technology and tracking to make the system more efficient and user friendly.
- Reduce the carbon footprint and greenhouse gas emissions produced by moving goods and people across the region (e.g. by reconfiguring the trucking industry to emphasize modes with less impact such as trains and ships), considering the entire shipping process down to the “last mile” of delivery to the household.
- Improve safety and reduce congestion on routes shared by commercial shipping and individual travelers.
- Examine how this corridor will be used in the future to move people for purposes including business travel, tourism and recreation, and for the shipment of goods to and from local, regional and global destinations.
- Propose how the future transportation corridor will improve the identity, quality of life and economy in the mega region.

CONSIDERATIONS

- Existing regional and global transportation networks including air, rail, water and road.
- Future trends and technologies in mobility, such as hub-urbanization, integrated systems design, information management, high-speed rail, traffic and highway management, fleet management, freight tracking, freight terminal processes, electronic tolling.
- Future demand and user requirements within the mega region and beyond (i.e. moving individuals and groups of people for leisure and business, transporting information and goods in small and large quantities between businesses and consumers).
- Future growth of population and industry in the mega region, and what types of commodities will be imported, exported and exchanged locally.
- Regional transportation plans proposed by governments in Ontario, Quebec and New York.
- Trade agreements.
- Current issues such as delays in customs and increasing congestion due to border crossings and growing international trade.
- Current modal split and reliance on the 401 to connect the mega region.

PROGRAM REQUIREMENTS

- Connect cities by removing bottlenecks and providing missing links.
- Enhance inter-city connections for both passenger and freight by the most sustainable modes – prioritize waterway, rail (possibly high speed rail lines) and other improvements that reduce environmental impact.
- Create a strong intermodal network for freight.
- Improve supply chains, including freight consolidation and distribution centres.

- Assess how mode share for passenger and for freight could change.
- Consider how to improve border crossing procedures.
- Consider the potential use of ITS to ensure better use of existing infrastructure by both passenger and freight vehicles.

CRITERIA

- Reduce the overall GHG emissions associated with goods and people movement through the Quebec City – Windsor corridor.
- Reduce overall congestion by maximizing the productivity of movement space, utilization of new technologies and co-ordination of transport systems so that goods and people move more efficiently, travel times are reduced and vehicle use is maximized (e.g. fewer trucks running empty).
- Increase the overall modal split for both goods movement and people movement, effectively reducing the overall dependence on road vehicles for mobility.
- Enhance connections regionally and globally, considering the existing relationships with the United States and Europe.
- Increase multi-modal systems by utilizing existing transportation networks in new ways and proposing new systems and connections that compliment or enhance the existing infrastructure.
- Create new jobs and/or attract new economic development through enhanced connections and other proposed incentives.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

- Business Travelers: 25-65 years of age.
- Business travelers: 25-65 years of age.
- Recreational travelers: 8-80 years of age.
- Local and regional tourists: 8-80 years of age.
- Shipping and distribution companies.
- Transportation providers and hubs (infrastructure and vehicles, e.g. CN/VIA, GTAA/Pearson/Air Canada).

DELIVERABLES

The following deliverables are expected to be completed:

- A regional map that illustrates the proposed transportation network for the Quebec City – Windsor Corridor. This should include a detailed program diagram that shows the major routes, hubs, terminals, etc.
- Detailed statistics and drawings that illustrate the expected flow of people and goods throughout the mega region in the future.
- A modal-split diagram that estimates the percentage of people and goods associated with each particular mode of transportation.
- A user experience diagram that demonstrates how passengers and goods are moved through the corridor using different modes of transportation. This should illustrate how different modes of transportation, passengers and goods coexist and interact.
- An effective wayfinding, information and payment system that enhances the overall user experience and provides seamless mobility across municipal and regional borders.



Traffic congestion and delays on the corridor are already so severe that they are estimated to cost over \$5 billion in lost GDP every year.

SOURCE: IBD

GENERAL CONTEXT

THE PAST

How regional development has evolved

Historically, settlement patterns in North America have led to a relatively low population density spread out across vast areas. The major cities that did develop over the 19th century were connected to major waterways and railways. However, it was not until recently that the world's population became more urban than rural.

Prior to the railway, regional travel and goods movement was limited primarily to waterways and horse and carriage. Both forms of transportation took considerable amounts of time. As technology advanced and the railways began to cover long distances across Canada and the US, travel times were reduced and the movement of goods between population centres became more efficient. The railway also spurred the growth of new cities along these transportation corridors. As the population grew and cities became larger, the transportation networks that connected them also continued to develop. The cities that were connected to the most advanced networks of rail and waterways remain the largest centres of commerce and make up the core of today's mega regions (New York, Chicago, Boston, Toronto, Montreal, etc.).

As transportation systems were transformed by the combustion engine and the arrival of the automobile and airplane, the movement of people and goods became more efficient over the course of the 20th century, enabling people and businesses to be more connected regionally and globally. Rapid population growth and the mass adoption of the automobile in the mid 20th century enabled the construction of new commercial and residential development. Sprawl enveloped the land surrounding major cities.

As metropolitan centres continued to expand throughout the second half of the 20th century, a series of densely populated regions have become connected due to economic development and cultural similarities.³ This has created a new scale of geography known as the mega-region. Defined by Richard Florida, mega-regions are characterized by interlocking economic systems, shared natural resources and ecosystems, and common transportation systems linking these population centres together.⁴

THE PRESENT

As urban centres continue to expand, mega-regions around the world are increasing their effectiveness, competitiveness and overall share of the global economy. The world is undergoing the largest wave of urban growth in history.⁵ Collaboration within mega-regions promotes growth and economic development through shared transportation planning, policy, implementation, and operations.⁶ In Asia and Europe, Global Integration Zones link specialized economic functions across vast geographic areas and national boundaries with high-speed rail and separated goods movement systems.⁷ Based on a study completed by Richard Florida in 2007, the most prominent mega-regions in the world were identified as follows:⁸

- Greater Tokyo
- Bos-Wash
- Chi-Pitts
- Am-Brus-Twerp
- Osaka-Nagoya
- Tor-Buff-Chester

Within these regions, the movement of people and goods has been increasing at an astonishing rate. This is due in part to growth in population, but it is also a result of technological and economic development that has made us a more transport-intensive society.⁹

The Quebec City-Windsor corridor is an essential part of the region's transportation infrastructure and its operation is critical to almost every aspect of the region's economy. The trend towards the integration of global markets and increasing international trade puts new pressures on national transportation systems like the corridor, and on mega-regions as engines of economic growth and development.

The significant growth of international trade since 1980 has strained the capacities of the Canada-United States ports and the international/national transportation networks that serve them. The Ontario government's 2005 plan for growth proposes to concentrate efforts to increase the density of certain urban and exurban centres, the majority of which are located along the corridor.¹⁰ The official vision declares that access to mobility and physical connectedness will define a prosperous future.¹¹

Nevertheless, there are risks involved in pairing rapid growth with an already congested system across a limited geographical space.¹² The consequences may be catastrophic: analysts are predicting that the system could degenerate into complete gridlock in a matter of years. The latest reports indicate that over 15,000 collisions occur on the corridor annually.¹³ Traffic congestion and delays on the corridor are already so severe that they are estimated to cost over \$5 billion in lost GDP every year.¹⁴ In order for the region to remain competitive, new strategies are required to mediate these symptoms of dysfunction.

What are the current issues/challenges?

Cities are an environmental paradox. As dense centres of commerce and industry, they are responsible for more than their population's share of global environmental impacts.¹⁵ The mega-regions will experience key challenges in the coming decades, including: rapid population growth, expansion of suburban landscapes, aging infrastructure, social equity challenges, strained ecosystems, and uneven inter- and intra-regional growth patterns.¹⁶ The movement of goods accounts for a large portion of GHG emissions globally. Though globalization continues to change the way businesses operate, transportation infrastructure and methods have essentially not changed.¹⁷

The resulting impact of the shifts from urban to suburban development throughout the corridor is immense. Longer commute times increase demand on highways and cause severe congestion. Congestion, however, is more than a traffic problem; it is a land use and environmental issue as well. The environmental cost of cars caught in severe highway congestion leads to an increase in fuel emissions that negatively impacts air quality. Poor air quality emissions, coupled with the land use impacts of highway construction, have created significant environmental degradation throughout the Megalopolis corridor.¹⁸

THE FUTURE

Why is it important to re-evaluate the movement of people and goods within and between the densely populated regions of the future?

The availability of transport drives development, by facilitating specialization and trade. Transport activity is likely to continue to grow at a rapid pace for the foreseeable future as economic growth increases transport demand. However, the shape of that demand and the means by which it will be satisfied depend on several factors:

- **Peak Oil & Increased Energy Demand:** It is not clear whether oil can continue to be the dominant fuel source for transport. There is an on-going debate about "the date when conventional oil production will peak, with many arguing that this will occur within the next few decades."¹⁹ While there are alternative sources available, all of these are costly, and several would increase green house gas emissions significantly.
- **Economic Insecurity:** The growth rate and shape of economic development, the primary driver of transport demand, is uncertain. For example, if China and India as well as other Asian countries continue to rapidly industrialize, and if Latin America and Africa fulfill their economic potential, transport demand will grow with extreme rapidity over the next several decades. Even in the most conservative economic scenarios, considerable growth in travel is likely.²⁰
- **Technology:** Transport technology has been evolving rapidly. The energy efficiency of the different modes of transportation as well as their cost and desirability will be strongly affected by technological developments in the future. For example, although hybrid electric vehicles have made a strong early showing in the Japanese and US markets, their ultimate degree of "market penetration" will depend strongly on further cost reductions.²¹ Other near-term options include the migration of light-duty diesel from Europe to other regions. Longer-term opportunities requiring more advanced technology include new biomass fuels, such as those made from sugar cane in Brazil or corn in the USA, and fuel cells running on hydrogen and battery powered electric vehicles.²²

- Demand: As incomes in developing nations grow, transport infrastructure is likely to grow rapidly. Current trends point towards a growing dependence on private cars, but alternatives exist (as demonstrated by cities such as Curitiba and Bogota with their rapid bus transit systems).²³ The level of car ownership varies widely around the world even when differences in income are accounted for; different communities have made very different choices as they have developed.²⁴ The future choices made by both governments and travellers will have huge implications for future transport energy demand and CO2 emissions in these countries.



Provincial and regional level highways play a key role in the movement of intercity passengers and goods, and by 2026 will carry over 75% of the total system traffic in vehicle kilometres

SOURCE: FROM FOOTPATHS TO FREEWAYS

LOCAL CONTEXT

THE PAST

What is the history of the Quebec City - Windsor Corridor?

The development of the Quebec-City Windsor Corridor has been marked by intense “battles” between competing visions of the future and tradeoffs that have shaped decisions over routes, proximity to cities, disruption of neighborhoods, and public expenditures in support of private enterprise. Historically, the cities of southern Ontario have been located on water and rail access routes which were the key determinants of eighteenth- and nineteenth century settlement and trade patterns. The oldest transportation route along the corridor is the St. Lawrence Seaway, which is a series of channels and locks that run along the St. Lawrence River, into the Great Lakes to the Southwest and the Atlantic Ocean and Labrador Sea to the Northeast.

Suburban growth, the arrival of the automobile and the construction of highways have changed this to some degree. Today, patterns of development following the construction of the corridor show a definitive movement towards the highway. Business parks and residential subdivisions line both sides of the highway, absorbing the route into the municipal footprint. On the one hand, highways have been seen as a force for economic and social progress, while on the other hand they have also caused environmental problems and concerns about community development.

THE PRESENT

A very large portion of transportation activity in Canada occurs within the Quebec City–Windsor Corridor (QWC) (refer to Figure One). It contains roughly half of Canada’s population and about 85% of the Quebec and Ontario populations, with nearly all of the major urban centres in these two provinces located along the corridor. Due to this concentration of industry and population, it is the busiest and most important trade and transportation corridor in Canada. The Montreal-Toronto section forms the busiest segment. The corridor is linked by complex transportation systems that utilize water, road, rail and air. By 1997, road had captured 65% of freight tonnage compared to rail’s 35%, a much higher share than in the country as a whole, and up from 60% in 1990.

Any meaningful movement towards sustainable transportation will need to address the importance of this corridor and the problems it is facing today. It is at the very heart of the Canadian economy. The corridor is an essential conduit for the automotive industry concentrated in southern Ontario and Detroit; parts are shipped from the US for assembly in Canadian plants and then shipped back across the border in a coordinated just-in-time production system that is an important part of the economy of the mega-region and both nations. In 2006, 947,000 tons of agricultural products were shipped to the Ontario Food Terminal in Toronto, which acts as a distribution hub for the entire region, and Toronto shipped approximately 450,000 tons of garbage back into Michigan for landfill. The 18 million acres of farms in the region use the corridor to distribute Canadian produce globally, and access to the corridor has created North America’s most intensive concentration of greenhouse farming, mediating climate limitations on food production and facilitating rapid distribution of locally grown produce during winter months. The corridor also accommodates hundreds of thousands of commuters daily.

What are some of the issues associated with the Quebec City – Windsor Corridor?

In Canada, transportation is responsible for about 25% of all greenhouse gas (GHG) emissions and, while regional breakdowns are not available for sources of GHGs, it is likely that transportation’s share of GHG production is similar in the QWC if not higher. Canada is larger, less populated, and more dispersed than European countries and, as a result, is highly dependent on road and heavy truck transportation. Trucking is the primary means of moving goods in Southwestern Ontario. As the highway system links industry and markets in Southern Ontario and the U.S., there is substantial international truck freight movement on freeways in the region. The accessibility provided by the provincial and municipal road network makes trucking very competitive with other modes, except in the case of certain bulk goods and long distance hauls to markets outside Ontario. The provincial and regional level highways play a key role in the movement of intercity passengers and goods, and by 2026 will carry over 75% of the total system traffic in vehicle kilometres.

THE FUTURE

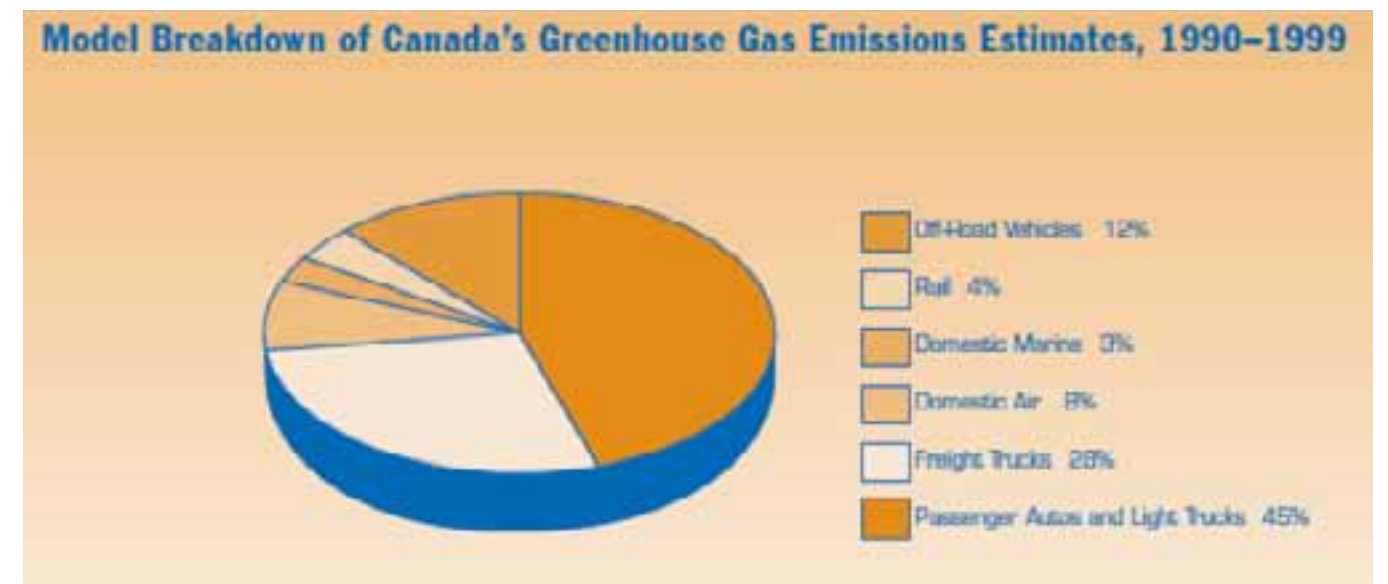
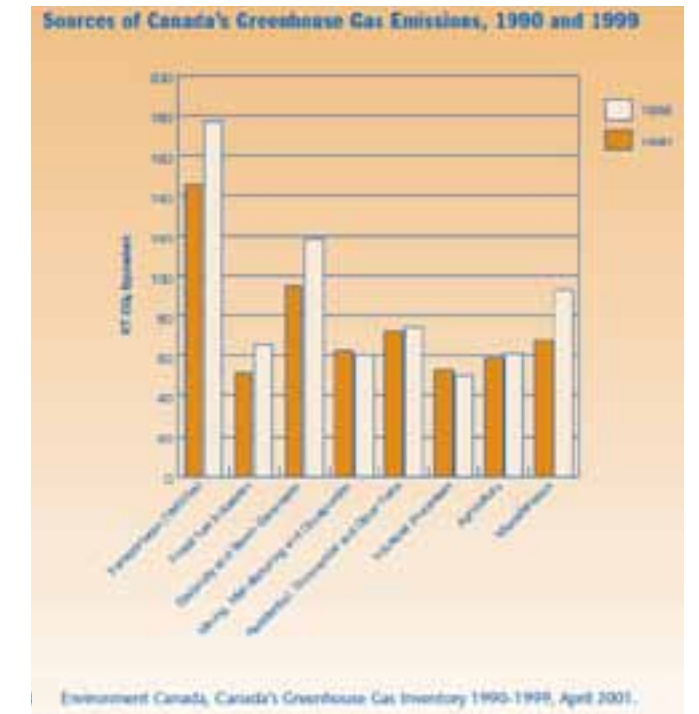
What is the future of the QWC?

Although various levels of government often work together to coordinate large infrastructure and transportation projects, the mega-regions of the future cross provincial and national borders. This means that infrastructure and development issues must be addressed and coordinated at a large scale in order to ensure the compatibility and efficiency that future business and people will require and demand.

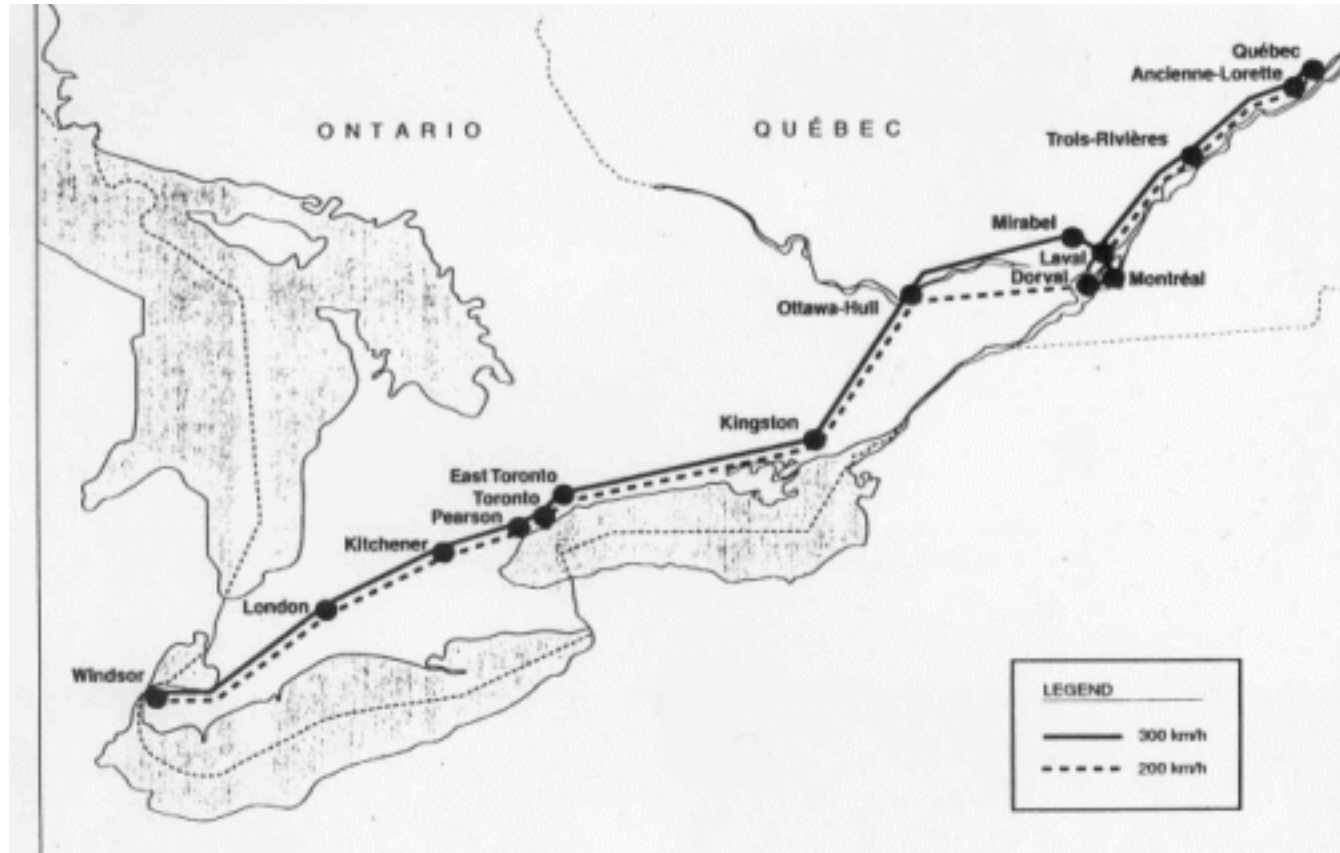
Due to increasing congestion, provincial and regional routes will have substantial decreases in the quality of transport service. As the most densely populated area in Canada, the Quebec-Windsor Corridor faces many challenges related to intercity passenger movement: air pollution, traffic congestion, a slow and infrequent (subsidized) rail system, and infrequent and unpopular bussing services. This will be detrimental to trade, tourism and all travelers.

High-speed rail has been proposed as a viable option as the distances between major cities are short enough that even 200 km/h trains can deliver travel times competitive with other modes of transportation. Bombardier proposed the Jet Train, a new rapid transit train technology designed to run on updated existing

tracks. This train is capable of speeds of up to 240 km/h. The biggest impediment, and issue that needs to be addressed, is the co-existence of freight and passenger traffic on the same rail system.



MAPS & SITE IMAGES



Quebec City - Windsor Corridor and connecting cities



Map of North American mega regions

PRECEDENTS

TRANSIT ALIGNMENT



Bremen, Germany – Integrating Different Transit Operators

Transit alignment is imperative to effectively move people on a regional scale. In Bremen, Germany, one umbrella organization oversees 35 transit operators in a 4800 km² region. The result: one ticket, one tariff, and one information system for all the transportation modes. Effectively aligning all of these transit organizations through mobility hubs creates integration. It has also created a shift in the transportation modal split, reaching 60% sustainable transportation.

http://www.communauto.com/images/03.coupures_de_presse/video_summary.pdf
http://www.eltis.org/docs/studies/Bremen_s_Integrated_Mobility.pdf
<http://www.bsag.de/eng/index.php>

The Hallsberg – Maschen Corridor- European Green Corridor Initiative

The effective transportation of goods is a necessary precondition for growth and welfare. At the same time, the negative impact of transport on health, climate and the environment must be reduced. This challenge has put goods transportation and logistics high on the sociopolitical agenda and has resulted in greater responsibility being taken on the part of the transport sector for efficient transport solutions. A good example of how these goals have been implemented can be found in Sweden in the work carried out by the Logistics Forum, a group where industry, researchers and politicians meet and together take on common challenges. At the European level, a greener transport policy is now under development which may be seen in the Freight Action Plan, the ITS Action Plan and the Commission's Green Paper on TEN-T. These advocate the concept of Green Corridors.

http://www.trafikverket.se/PageFiles/51681/the_swedish_green_corridor_initiative_history_current_situation_and_thoughts_about_the_future.pdf
http://www.oru.se/Extern/Akademier/HH/Forskning/NEK_filer/Phd%20Workshop%20-%202020100511%20-%20Xing%20Liu.pdf
http://www.ewtc2.eu/media/97832/green_corridors.pdf

The Bothnian Corridor: “A strategically significant artery for securing efficient raw material transport and sustainable economic growth in Europe”

The Bothnian Corridor transport network connects northern Europe and its rich natural resources to the most important production and consumption areas in Europe. The heaviest railway freight transport flows in the Nordic countries are transported along the Bothnian Corridor. The Bothnian Corridor transport network is of high strategic importance to the EU. Its development has led to increased integration within the EU, the Baltic Sea Region and the neighbouring countries of EU (Norway, Russia).

http://www.bothniancorridor.com/images/winter/BC_broschyr_light.pdf
http://www.ltu.se/cms_fs/1.80829!/file/New%20Leaflet-Bothnian%20Green%20Corridor.pdf

Sun Corridor

The Sun Corridor is Arizona's megapolitan region stretching from south of Tucson to Flagstaff. The Sun Corridor is expected to expand by as many as 12 million people by 2040. This area is being studied as a potential corridor to introduce a parallel highway corridor rail line, expand airline capacity, and improve highways.

<http://one.aecom.com/issue02/#!/global-cities-institute>

Road Trains

Researchers in the European Union are using telematics to create “road trains” that merge the concepts of carpooling with the freedom of driving alone. Cars with similar destinations can create road trains whereby a lead vehicle will drive the route and following vehicles will be automatically controlled, connected to the actions of the lead car. All that is required are navigation systems that communicate with the lead vehicle and control acceleration and steering.

<http://www.wired.com/autopia/2009/11/with-road-trains-highways-become-public-transportation/comment-page-2/>

Trans-European Transport Networks (TENs-T)

TENs-T is a programme of projects aiming to remove bottlenecks, provide missing links and improve efficiency of transport across Europe. They are a planned set of road, rail, air and water transport networks designed to serve the entire continent of Europe. TENs-T envisions coordinated improvements to primary roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems, so as to provide integrated and intermodal long-distance high-speed routes for the movement of people and freight throughout Europe.

<http://www.fhwa.dot.gov/planning/megaregions7.htm>

YOUR TEAM

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CHALLENGE 06 NOTES & RESOURCES

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CHALLENGE 07: LOW CARB DIET

How can we encourage healthy lifestyles through active transportation in the suburbs?

SOURCE: TRAILNETSTL.BLOGSPOT.COM

CHALLENGE 07

LOW CAR^B

PROJECT LOCATION

Markham, Ontario – Markham Rd. – North/South connection from Major Mackenzie to Steeles Ave.

PROJECT VISION

Reimagine the transportation infrastructure in a suburban area in order to reduce car dependency while encouraging more active, sustainable and healthy transportation alternatives for residents from ages 8 to 80.

PROJECT MISSION

Adapt the concept of a “complete street” to create a “complete neighbourhood” in order to encourage physical activity and healthier lifestyles as part of transportation planning.

THE CHALLENGE

During the past 30 years, many of the municipalities in York Region were transformed from large areas of agricultural land into low-density residential developments. Such municipalities share commonalities like homes with private driveways, double car garages and ample free parking - features that cater to the automobile as the primary method of transportation.

Considered one of the fastest growing cities in Canada and with a population of over 300,000, Markham is the fourth largest municipality in the GTHA. Changes in planning philosophy in the area have shifted Markham’s development away from suburban sprawl towards the creation of more compact communities. The town now faces the challenge of developing a plan that increases density in designated areas while enhancing transportation networks as part of a complete community infrastructure. The local government has been extremely proactive and there are many plans currently underway to enhance the transportation systems, economy and quality of life of residents in the area. Markham offers an excellent opportunity to re-imagine more complete streets that provide residents with alternative sustainable, active and healthy methods of travel within their community.

The challenge is to develop a transportation plan that can be integrated into Markham’s overall plans for future growth. This plan should place a clear emphasis on

expanding alternatives to car-based forms of mobility and encouraging residents to take up transportation options that contribute to healthier lifestyles. This goal should be achieved as part of a “complete community,” developing the concept of a “complete street,” in which multiple transportation options can be used to access services and amenities in the area.

OBJECTIVES

- Consider how to foster healthy neighbourhoods and residents in the suburbs through “complete streets” that accommodate multiple forms of transportation and improve quality of life at the street level.
- Design healthier transportation alternatives for people of all ages, reducing stress on the health care system, contributing to a cleaner environment, shortening car trips and taking more cars off congested roads.
- Consider how to make active transportation a natural option for families and youth (e.g. dropping children off at school using bike paths, pedestrian-friendly walkways and public transit).
- Create a public awareness campaign that communicates the overall benefits of active transportation for individuals, the greater community and the health care system.

CONSIDERATIONS

- The design team shall consider the following when completing the deliverables:
- Existing local and regional transportation networks including, road, rail, and air.
- Proposed transportation improvements within Markham and the GTHA, including those by VIVA and YRT, TTC, GO Transit and all other transportation plans outlined by Metrolinx’s the Big Move and the Town of Markham.
- Provincial planning policy framework including the Growth Plan for the Greater Golden Horseshoe, Planning Act, and Greenbelt Act.

- Municipal planning framework, including the Town of Markham’s Official plan and the regional municipality of York’s official plan.
- Current and projected modal split within Markham.
- Existing wayfinding and signage associated with transportation systems.
- Markham and York Region’s vision and branding.
- Existing land use within Markham and the urban design challenge of creating a more walkable, transit-oriented community.
- Current lifestyle and resident demands within Markham.
- Proposed future residential, commercial, business and industrial development within Markham, and the associated land-use/density targets.
- Location of services in proximity to residents and how to introduce new local services in order to reduce long-term trips.
- Integrated payment systems such as “PRESTO” (an electronic fare system in the GTHA).

PROGRAM REQUIREMENTS

- Create a bicycle network and pedestrian system that compliments the existing Cycling Master Plan while encouraging greater ridership within Markham and enhances connections to existing transportation routes.
- Create a series of exchange stations that facilitate seamless transfer between various modes of transportation and compliment the existing/proposed transportation networks within Markham. (ie. cycle storage on public transport and in proximity to transit stations in proximity to car sharing etc.)
- Enhance the connections from existing suburban neighbourhoods (Including Cornell, Raymerville, Box Grove, Fincham/Wooten Way, and Bur Oak) to main arterials to reduce the overall auto dependency for daily activities.

- Re-evaluate land use patterns within these suburban communities to encourage new economic development while creating more livable communities.
- Create a series of public spaces that compliment the existing/proposed transportation systems while encouraging greater social interaction within the community.

CRITERIA

- Increase transit modal split during peak hours to exceed the current projections that estimate 20% transit share by 2031.
- Increase the overall safety for all modes of transportation by reducing the number of transportation related injuries and deaths.
- Diversify the modal split within Markham, encouraging alternative modes of transportation including active methods such as walking and cycling. Specifically increase the mode share of active transportation within Markham by min. 3%.
- Increase the use of public space within Markham.
- Improve the air quality by reducing the overall CO2 emissions associated with transportation in Markham.

TARGET USERS

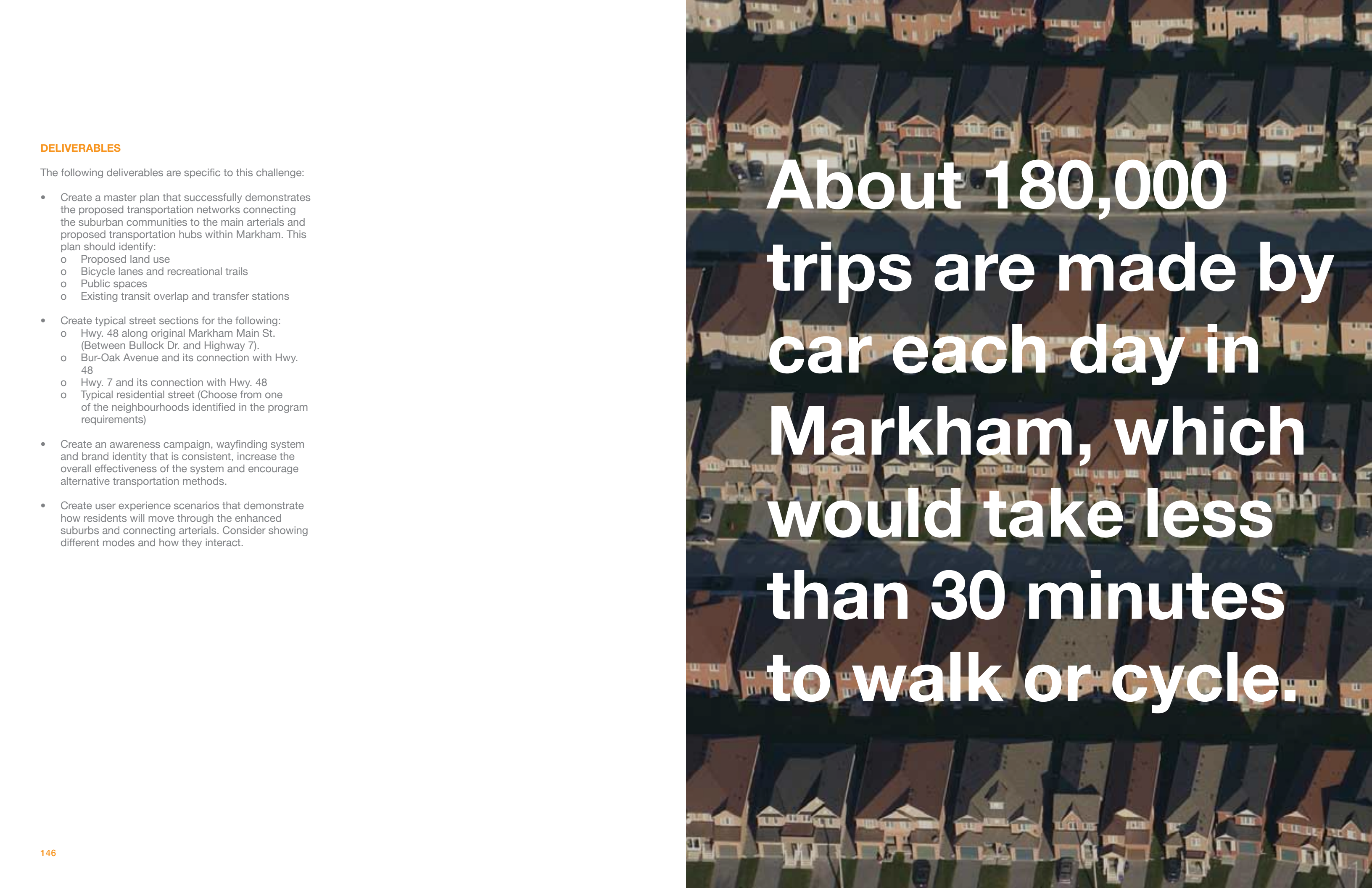
The following section provides a user profile outlining the targeted demographic:

- Transit Users: 20 to 65 years of age.
- Local residents: 8 to 80 years of age.
- Local business owners: 24-65 years of age.

DELIVERABLES

The following deliverables are specific to this challenge:

- Create a master plan that successfully demonstrates the proposed transportation networks connecting the suburban communities to the main arterials and proposed transportation hubs within Markham. This plan should identify:
 - o Proposed land use
 - o Bicycle lanes and recreational trails
 - o Public spaces
 - o Existing transit overlap and transfer stations
- Create typical street sections for the following:
 - o Hwy. 48 along original Markham Main St. (Between Bullock Dr. and Highway 7).
 - o Bur-Oak Avenue and its connection with Hwy. 48
 - o Hwy. 7 and its connection with Hwy. 48
 - o Typical residential street (Choose from one of the neighbourhoods identified in the program requirements)
- Create an awareness campaign, wayfinding system and brand identity that is consistent, increase the overall effectiveness of the system and encourage alternative transportation methods.
- Create user experience scenarios that demonstrate how residents will move through the enhanced suburbs and connecting arterials. Consider showing different modes and how they interact.



About 180,000 trips are made by car each day in Markham, which would take less than 30 minutes to walk or cycle.

GENERAL CONTEXT

THE PAST

Brief History of Suburban Sprawl in North America

Since World War II, North Americans have invested much of their newfound wealth in the construction of suburbia, as the promised sense of space, affordability, family life and upward mobility became the goal of many families. Since 1980 employment opportunities have also moved from the urban centre and spread across the suburban sprawl of many developed regions, further contributing to the low-density distribution of the population.¹ Fragmented, and dependent on the automobile, it is a development pattern that has significant problems. As James Howard Kunstler notes, “The project of suburbia is the greatest misallocation of resources in the history of the world. America has squandered its wealth in a living arrangement that has no future.”² Since the early 1980s, groups of planners, architects, and developers have called for the revival and reinterpretation of traditional American town planning ideas and principles.

THE PRESENT

What are the current issues associated with transportation in the suburbs?

It is evident that the current form of growth in many developed countries is unsustainable: continuous outward expansion of development and the ever increasing need for more transportation capacity cannot continue at its current rate. This is particularly evident in suburban communities, which are heavily reliant on the automobile as the primary method of transportation and now face numerous issues.

Our current road systems are unable to efficiently move the overwhelming number of cars that clog it daily. Today, governments in the U.S. alone spend \$200 million every day constructing, maintaining and improving roads.³ The National Transportation Board predicts that delays caused by congestion will increase by 5.6 billion hours in the periods between 1995 and 2015, wasting an unnecessary 7.3 billion gallons of fuel if our unsustainable growth patterns continue.⁴ In addition to the cost of infrastructure, the automobile as a primary method of transportation is consuming a large portion of our household income. It is estimated that in North America, nearly 30% of our income is spent on car

payments, gas, maintenance, and insurance. As the price of oil continues to increase, it is likely that a larger percentage of household income will be devoted to covering the cost of our cars.⁵

This way of life has considerable social, environmental and health effects as well. Automobile dependency creates a vicious cycle by:

- Polluting the environment by releasing GHG's and harmful particulates into the atmosphere.
- Contributing to social isolation by increasing the amount of time spent in our cars and homes, reducing the overall travel options available and promoting further automobile oriented planning creating and promoting unhealthy lifestyles.

The dependence on the automobile is creating and promoting unhealthy lifestyles.⁶ By spending more time in traffic, we have less time to actively engage in our communities. People living in sprawling American neighbourhoods walk less, weigh more and are more likely to be hit by a car if they do venture out on foot or bicycle.⁷ As Fred Pearce notes “planners and architects must now agree that to improve the social and environmental conditions of cities the top priority is to cut car use.”⁸

THE FUTURE

What is the future of suburban neighbourhoods that border large cities?

As communities confront the consequences of low-density development, a more balanced perspective must be developed. The future of transportation must involve the development of integrated transportation networks which encourage increased population density and services in specified areas. Nodes of more intense development can help achieve local economic development goals, provide housing options, create walkable neighbourhoods, and protect the natural environment from further sprawl.⁹ Added density is essential for the creation of new transportation choices, since the placement of a critical number of people within walking distance of stations and bus stops opens up new possibilities for increased service. The goal should

be the development of ‘great places’ for living. Dense developments with a complete street and path network and convenient access to routes for walking, bicycling and bus or rail create strong connections necessary for great places since more compact development will add more people to an area. Dense development with good connections to homes, shops, schools and offices allows people to choose an alternative to driving and also provides more route options to those who still choose to drive.¹⁰ This in turn will encourage more active, healthy lifestyles.

Key Benefits of Active Transportation

As we aim to create more sustainable transportation solutions in the future, it is essential to create communities that support and encourage active transportation methods. Travel modes such as walking and cycling have numerous social, economic and health benefits. Some of these benefits have been identified below:

- By promoting increased physical activity, active transportation can meet the recommended weekly activity allowances, contributing to both physical and mental health, and cutting the risk of major health problems such as cardiovascular disease, diabetes, obesity and depression.
- Helps to reduce the overall strain on the health system and services (i.e. About \$2.1 billion, or 2.5% of the total direct health care costs in Canada were attributable to physical inactivity in 1999, and a 10% reduction in the prevalence of physical inactivity has the potential to reduce direct health care expenditures by \$150 million a year).¹¹
- Increased active transportation also reduces the overall environmental impact and air pollution by eliminating the burning of fossil fuels, facilitates more active engagement in the community and is linked to increased productivity in the workplace.

Key planning considerations associated with active transportation:

- Walking and cycling environments (including off street paths as well as streets) need to be high quality in order to encourage their use. They need to be safe, attractive, well connected to local shops and services, and be relatively free from ‘clutter’ (unnecessary street furniture, barrier etc). The reduction in motorized traffic can go a long way towards the creation of improving pedestrian/cycle space, improving air quality, and reducing noise. Safety can be increased both by reducing conflict with motorized vehicles but also by enhancing natural surveillance (‘eyes on the street’) with increased footfall.
- The dominance of motorized forms of transport can be removed though the reallocation of space or the use of shared surfaces. The pavement dedicated to road traffic should be reduced while pedestrian movement and exchange space needs to be expanded.
- Developments should be mixed-use, active (have both a daytime and evening function), high density and permeable.
- The use of wayfinding can be particularly effective in promoting both active transport as well as public transport use. An easily legible city with clear signage and public transport information greatly enhances the user experience. For active transport users this can include the use of mental mapping techniques to produce on street maps as well as use of effective urban design to create distinctive markers (paths, edges, districts, nodes and landmarks) across an area’s physical urban form to increase legibility. For public transport, clear service mapping and Real Time Passenger Information is useful.

LOCAL CONTEXT

THE PAST

History of Markham

Markham's early years were characterized by homesteading and agriculture, with industry and development originally focused along the banks of the Rouge River.¹² Small hamlets such as Almira, Buttonville, Cedar Grove and Unionville began to spring up at mill sites and, with improved transportation routes along Yonge St. in the mid 19th century, population and urbanization began to increase. As additional transportation services were developed, including the Toronto Nipissing Railway Co.'s Scarborough-Uxbridge line in 1871, Markham continued to grow and was incorporated as a village in 1873.¹³

Over the next fifty years, as Toronto continued to grow, Markham also experienced growth but at a much slower rate. Nevertheless, after WWII, Markham – like many other suburbs of Toronto – began to feel the effects of urban encroachment from Toronto.¹⁴ Post war stability and the baby boom contributed to Markham's rapid population increase and by 1976 the town of Markham had approximately 56,000 residents.¹⁵ Further suburban sprawl was encouraged by the creation of Hwy. 404 in the late 1970's and its expansion throughout the 1980's. This made Markham one of the largest suburbs of Toronto as its population more than quadrupled over the next 20 years. During these years, much of the prime agricultural land within the community was consumed by urban sprawl. It was only recently that concerns have been raised over this kind of growth. The Greenbelt Act introduced by the provincial government in 2006 encourages increased density in built up areas and limits future development on prime agricultural and environmentally significant land. As Markham continues to grow, it is seeking to establish itself as a self-sufficient community and a leader in sustainable economic and social growth.

History of Transportation systems in Markham:

Over the past century, Markham has relied on the automobile as the primary method of transportation, while railroads and other forms of public transportation have also been used for personal and commercial transportation. In the past few decades, there have been increased efforts to improve public transportation within Markham and connect residents locally and regionally.

With the establishment of the Stouffville GO line in 1982, the connection from Markham to Toronto was enhanced as this provided a new alternative to get into the city that was both efficient and cost-effective. In June, 2002, the Region of York entered a private/public partnership which enabled the development and planning of a new transit system in York Region. This resulted in the creation of VIVA bus transit services which launched in September, 2005. The effort to improve transportation networks and land use patterns within the city is ongoing as Markham experiences continued growth.

THE PRESENT

What are the current transportation issues in Markham?

Steady growth in Markham and the rest of the GTHA has led to traffic congestion being a major concern for the municipality, resulting in money lost due to inefficiency and increasing emissions and associated environmental impacts.¹⁶ In 2002, the town of Markham identified that increased traffic volume due to population growth will exceed the capacity of already crowded roadways.¹⁷ To further emphasize the car dependency in Markham, a recent study indicates that the typical household in Markham has 2.2 cars, makes 85% of all trips with the use of the automobile, drives 63km per day, and generates about 5.5 tonnes of CO₂ emissions per household from transportation alone.¹⁸ While each day in Markham approximately 65% of total auto seats go unused and about 180,000 trips are made by car, which would take less than 30 minutes to walk or cycle.¹⁹

What transportation systems currently serve Markham?

Markham is well connected locally and regionally through a number of transportation systems that have been developed over the past 30 years. An extensive network of transportation services and facilities serve the Markham area. These include:

- Provincially funded roads including Highways 404, 7 and 48. There is also the Highway 407 Express Toll Route that traverses the town.

- A number of major arterial roads providing east-west (i.e. Steeles Ave, Major Mackenzie & Hwy. 7) and north-south (i.e. Hwy.48, McCowan, & Warden Ave.) connections within Markham.
- Commuter rail service, GO Transit, currently serves Markham at five stations and provides an important connection to the city of Toronto.²⁰
- VIVA – formerly York Region Transit (YRT), provides residents with a local system that provides regional connections and is continually seeking to enhance the efficiency, comfort and accessibility of their services.
- In addition to an extensive network of road and public transit infrastructure, Markham has also established a network of bicycle paths and lanes throughout the town as part of its cycling master plan.²¹

THE FUTURE

What future developments are planned for Markham?

While the current population of Markham is 303,500, the population is projected to reach 423,500 by 2031, a significant increase over 20 years.²² By that time, the municipality estimates that approximately 200,000 person trips to and from Markham will occur each day.²³ As this population increase continues to drive development within the area, there is an excellent opportunity to establish a more integrated, diverse, accessible and sustainable transportation system while creating a more livable and prosperous community.

While Markham has set a target of 20% transit mode share for 2031, it has the potential for greater change within the next twenty years and can become a model suburb for sustainable transportation.

Plans to accomplish this goal include:

- The implementation of the Bicycle Path Master Plan, which is to be fully implemented by 2022;

- The VIVA Highway 7 rapidway, a bus rapid transit route, is planned to provide a fast, reliable east-west transit connection through Markham and connecting to the Vaughan Metropolitan centre;
- The development of Markham Centre as the anchor hub that will become a major transit hub for five proposed transit lines connecting the region.²⁴ It will consist of a planned urban development project located on 243 acres of land at the northeast corner of Warden Ave & Hwy 407 with the vision of becoming a world-class, mixed-use urban centre and a key destination place.

The typical household in Markham has 2.2 cars, makes 85% of all trips with the use of the automobile, drives 63km per day, and generates about 5.5 tonnes of CO₂ emissions per household from transportation alone.

MAPS & SITE IMAGES



Markham, Ontario – Markham Rd. – North/South connection from Major Mackenzie to Steeles Ave.



Street view of Markham Go Station: Existing GO Transit Station that is served by both rail and Bus



Mount Joy GO Station: existing GO Transit Station that is served by both rail and Bus (01); Markham Go Station: Existing GO Transit Station that is served by both rail and Bus (02); Old Markham Main St.: Markham's original thriving Main St. lined with a number of heritage buildings, unique shops, and restaurants (03); Centennial GO Station: Existing GO Transit Station that is served by both rail and Bus (04)



Street views of Markham's Main St. (left) and Markham Rd./HWY 48 by Mount Joy GO Station

PRECEDENTS

MULTI-MODAL CITIES



Minneapolis, U.S. – Vehicle Infrastructure Integration

Minneapolis has 64km of dedicated bike lanes, and 134km of off-street bike paths. The city has placed a lot of emphasis on getting commuters to bike, walk, or use transit. Furthermore, the city implemented a Bike Walk Ambassador Program to educate people on the importance of increasing walking and biking along with minimized driving.



Ottawa, Canada – A City that Embraces All Seasons

Home to the Rideau Canal, this 7.8km stretch becomes a skating rink used to get people to and from work. Furthermore, Ottawa is also home to a network of 180 km of bike paths throughout the city known as the Capital Pathway. Every Sunday from Victoria Day to Labour Day between 6am and 1pm, Ottawa closes its streets to cars and opens them to people. Titled “Car Free Sunday”, over 65 km of roadways are shut down each week allowing citizens and tourists to actively enjoy the city’s streets.



Brantford, Ontario

The City has recently invested heavily in the downtown in reaction to the dwindling economy in the 1980s and 1990s. In order to bring people into the downtown, the City created Harmony Square, which serves as an attraction and meeting place for the community with various events involving music, art, and movies as well as an ice rink open in the winter. Furthermore, the streets of Brantford have been enhanced through various streetscape designs.



Copenhagen, Denmark

Rated as one of the best cycling cities in the world, Denmark had 36% of the population cycling to work in 2006, and this number is expected to reach 50% in 2015. An impressive 55% of all trips are cycled. These numbers did not suddenly appear however. The City of Copenhagen spent the last 30 years transforming the roads and communities into cycling-friendly environments. Cycling in Copenhagen is also safe as cycling infrastructure is separated from motor vehicles.

YOUR TEAM

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CHALLENGE 07

NOTES & RESOURCES

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CHALLENGE 08: BOOMING AROUND

How can we adapt transportation in the inner-suburbs to fit the needs of an aging population?

SOURCE: PENNLIVE.COM

CHALLENGE 08

BOOMING AROUND

PROJECT LOCATION

Keele and Wilson area around Downsview Park including proposed station at Sheppard Ave.

PROJECT VISION

Provide efficient and accessible transportation networks that respond to an aging demographic.

PROJECT MISSION

To reimagine transportation services in the inner suburbs of Toronto to accommodate the needs of the elderly.

THE CHALLENGE

Today's aging population is an unprecedented challenge throughout the globe.¹ The post-World War II period (1946-1964) saw increased birth rates and emergence of 'the baby boom.' This generation now represents a large segment of the population, and people aged 65 and older will soon outnumber youth under the age of 16. According to the most recent census, 14 percent of Toronto's total population is over the age of 65. By 2031, this percentage will increase to an estimated 38 percent of the population.²

Since many seniors live on reduced incomes and pensions, the availability of affordable and accessible public transit is of high priority according to the Toronto Senior's Forum report.³ With ongoing transit cuts and greater restrictions on senior drivers, there are concerns regarding how the elderly will be able to get around the city, conduct day-to-day tasks and maintain independence.

Some tough questions that need to be answered as we move forward include; how can we reimagine transport in the inner, post-war suburbs to build universally accessible, affordable transportation that connects neighbourhoods originally designed for single families with cars? How can public transportation meet the needs of seniors, and the population more broadly, in terms of safety and health? How can transportation systems allow individuals to maintain mobility, and age in place without compromising quality of life or risking social isolation?

OBJECTIVES

- Take into account the future needs of Toronto's population, which will be older than those of the surrounding suburbs.
 - Accommodate transportation and access issues for an aging population including access to amenities, health care, and family.
 - Propose new living patterns for the aging that promote independence and improve quality of life through universally accessible transportation and intelligent infrastructure and services.
 - Explore options for serving aging customers through choice, reliability, convenience and appropriate user-centred design solutions.
 - Design a citywide "universal" transportation system that is safe, reliable, accessible, affordable and convenient, regardless of size, age, mobility or income.
 - Consider personal mobility options that do not rely on mass transit, including pedestrian friendly infrastructure and unique individual mobility devices for the aging.
 - Consider how existing public transit and services such as Wheel-Trans can be redesigned to better meet the needs of an aging population.
 - Increase connectivity and transit options for individuals who live in areas that are not easily accessible from arterial roads.
- Access to major highway networks (400/Black Creek Dr., 401, Allen Expressway) and planned road improvements.
 - Accommodating the needs of the elderly while also meeting the demands of other demographics (e.g. increased visibility and clarity of signage can benefit everyone).
 - Improving the overall streetscape to accommodate the needs of an older population to increase comfort and safety.
 - The ability of an older generation to adapt to new technologies and the potential to reduce the need to travel through the use of technology (e.g. online health care).
 - The increased reliance on family members to provide mobility to the elderly.
 - Consider the aging population and create safer, more accessible transportation options that encourage independence and healthy lifestyles, reduce isolation, and increase the overall quality of life for an aging population.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- The proposed developments including the Humber River Regional Hospital, renewal of the Keele MTO campus, greening of Wilson Avenue, access to the new Downsview subway station at Downsview Park, and new condominiums including Metro Place.
- Existing and planned local and regional transit including GO, TTC, and VIVA as well as Metrolinx's "Big Move."

- Enhance public space connections (e.g. between Black Creek, Downsview Dells, Longholm Park, Heathrow Park, Roding Park, MTO Keele Campus, Downsview Park, Mt. Sinai Memorial Park and North Park) to encourage healthy lifestyles for all ages and increase overall connectivity and social cohesion within the neighbourhood.

CRITERIA

- Increased access to public transportation for elderly residents within the post-war suburbs of the Downsview area.
- Increased access to well-planned public space within proximity to transit stops.
- Increased affordability of public transportation for the elderly.
- Increased social activity by expanding the number of spaces that promote social interaction for an aging population.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

- Seniors: In Ontario, seniors are classified as 65 and older.
- Baby Boomer Generation: This generation was born post WWII between 1946 and 1965 and the early boomers have now begun to reach the age of 65. Over the next 20 years, this generation will continue to retire and make up a significant portion of the overall population. Some of the common traits associated with baby boomers have been listed below:
- Next generation that will be providing the elderly with services such as health care and transportation.

PROGRAM REQUIREMENTS

- Connect elderly residents in Downsview's post-war suburbs to the new proposed Humber River Regional Hospital and associated complex.
- Create a safe and accessible active transportation network that connects residents to existing healthcare facilities, amenities, and existing recreational trails including Downsview Park and Black Creek.
- Enhance the connection to both Wilson and Downsview stations for residents living west of Downsview Park and the airport.
- Consider access to and from major highways including 400/Black Creek Dr., Hwy 401, and Allen Expressway.

DELIVERABLES

The following deliverables are expected to be completed:

- Create a master plan that illustrates the proposed transportation networks and their connection to local amenities, health care facilities and recreational trails.
- Design a series of public spaces that enhance connections to public transportation, local amenities, and promote a more active lifestyle for local residents.
- Design an enhanced typical streetscape and transit stop that accommodates the needs of an elderly population. This should include:
 - o Plans
 - o Sections
 - o Elevations
- Create user experience scenarios that demonstrate how residents move through their neighbourhood and how their overall quality of life is enhanced.
- Communication action plan to effectively target and disseminate necessary information to the elderly, including:
 - o Marketing & branding strategy
 - o Communication strategy.
- Create an effective way-finding system for the elderly to efficiently move around their neighborhood and the connecting region.
- New solutions for land use that caters to the evolving demographics within the neighbourhood.
- A program schedule of transit service options.
- Proposals for alternative vehicles and corresponding infrastructure that caters to the elderly population. Vehicles can be for mass or personal transit and may already be on the market.
- Guidelines for universal transportation that apply to infrastructure, streetscapes and vehicles.



14% of Toronto's total population is over the age of 65. By 2031, this percentage will increase to an estimated 38% of the population.

SOURCE: TORONTO.CA/SENIORS

GENERAL CONTEXT

THE PAST

What were the events that lead to the increase of an elderly population?

With the end of the Second World War in 1945, veterans of the armed forces returned home to find a more stable economic, political and social climate. Most began families. This created a dramatic increase in the number of births between 1946 and 1964, referred to as the baby boom. In order to meet the needs of the growing population, large suburbs were developed around North American cities. At the same time, the automobile was steadily becoming more affordable for the typical family. Many of these suburbs were tailored to serve the automobile as the primary method of transportation. People born during this period came of age during the unprecedented economic expansion that followed World War II.

In 2011, the oldest baby boomers have hit the age of 65 and are considered seniors. Over the next 20 years, the baby boomer generation will cause a major shift in the age demographic.

THE PRESENT

Transportation Issues Associated with an aging population?

As the population in major cities throughout the world continues to shift toward an aging demographic, there are a number of issues that need to be addressed. Below are some of the issues associated with developing transportation for an aging population.

There is a growing need to create more reliable, accessible infrastructure in order to reduce public health issues associated with road safety, but also to increase mobility. In Europe, walking is an important mode of transport for older people, with 30-50% of seniors' trips being made on foot. However, older people account for nearly half of all pedestrian fatalities in many countries.⁴

A recent study by Transportation for America indicates that only a small percentage of the elderly population changes residences after they reach the age of retirement. Since many of these older residents already live in suburban developments that are reliant on the automobile as the primary method of travel, they will be “stuck” in neighbourhoods where daily activities require

frequent car trips.⁵ A 2004 study found that seniors aged 65 and older who no longer drive make 15 percent fewer trips to the doctor, 59 percent fewer trips to shop or eat out, and 65 percent fewer trips to visit friends and family, than drivers of the same age.⁶

Safety and access both contribute to the health and well-being of an aging population. Access to health care and encouraging a healthy lifestyle can aid in reducing the overall burden on the healthcare system, while increasing the quality of life for seniors. While many cities provide accessible public transportation to get people with mobility challenges to medical appointments, these “para-transit” services often present barriers that compromise their utility for the very people they serve. For example, some services prohibit caregivers from accompanying older clients to their appointments. In some cases, accessible transportation is only available for medical appointments and therefore prevents people from accessing other community supports and services.⁷

Pedestrian-friendly streets and recreational trails built with seniors in mind will help older Canadians get around safely and remain active, regardless of where they live. But only adequate public transportation services can assure that older adults are able to travel as often or as far as they would like, without worrying about inconveniencing others.

Getting older is a major life transition that typically means leaving the workforce and living on a fixed income that either does not increase over time or rises modestly to cover only a portion of annual inflation.⁸ Many low-income seniors living well above the national poverty line struggle to cover the daily costs of food, housing and transportation.⁹ Although many baby boomers in North America are fairly affluent, they are also the portion of the elderly population that can afford to live in areas well served by transit.

Finally, there are important social costs that must be taken into account. There is a growing sense of urgency that the potential decline in public transit use amongst older residents will have disastrous effects on the lifestyles of the elderly.¹⁰ Increased isolation and poor access to transportation can lead to adverse societal costs. Independence is extremely important as seniors continue to age. Seniors contribute to informal social support activities, including visiting other seniors, helping with shopping, transportation, housework and household maintenance. Nearly 60% of senior women and men participated in these types of activities outside their

homes in 1997. Many seniors spend considerable time providing such support; for example, in 1996, 7% of seniors spent five or more hours per week on child care activities, and another 7% spent five or more hours helping other seniors. Seniors are also the beneficiaries of these social supports. In 1996, 84% of all people aged 65 and over received some kind of assistance of this nature.¹¹

THE FUTURE

What defines an aging population?

Population aging is a shift in the distribution of a country's population, and is the result of two factors: increasing longevity and declining fertility. An increase in life expectancy raises the average age of the population, while a decline in fertility reduces the number of youth. The rate at which the median age of the population is growing older is likely to speed up over the next three decades.¹² In 2006, almost 500 million people worldwide were 65 and older. By 2030, that number is projected to increase to 1 billion - 1 in every 8 of the earth's inhabitants. Significantly, the most rapid increases in the senior population will occur in developing countries, which are projected to experience an increase of approximately 140% in the number of citizens over the age of 65 by 2030.¹³

Over the past 50 years, the median age of Canadians has risen from 27.2 to 38.8, while the share of those aged 65 and over has increased from 7.7 to 13.2 percent. Statistics Canada predicts that by 2026 – when many of the baby boom generation will be retired – the median age will rise to 43.3 and seniors will make up 21.2 percent of the population.¹⁴

Why must we gear transportation and services towards the elderly?

Just as the transportation infrastructure in North America continues to age, so does the baby boomer generation. In 2001, one Canadian in eight was aged 65 years or over. By 2026, one Canadian in five will have reached age 65.¹⁵ Over the next 20 years, baby boomers will continue to reach the age of retirement. Updating our infrastructure presents an opportunity to design for an aging demographic, and in particular for those who

will not have a large amount of dispensable income. For many seniors in the suburbs and areas reliant on automobiles, giving up driving will mean reduced independence unless viable transportation alternatives are made available.¹⁶ New infrastructure will need to address the lack of access to transportation and amenities that seniors require to lead healthy lives. Efforts must be made today to create safer, more accessible transportation options that encourage independence, healthy lifestyles, reduce isolation, and increase the overall quality of life for an aging population in the very near future. For example, since seniors' travel needs can normally be met outside peak-load periods, additions to the fleet may not be required.

Seniors aged 65 and older who no longer drive make 15% fewer trips to the doctor, 59% fewer trips to shop or eat out, and 65% fewer trips to visit friends and family, than drivers of the same age.

LOCAL CONTEXT

THE PAST

A Brief History of the Downsview Area:

The settlement of Downsview occurred gradually after the founding of the City of York in 1793. The area was originally heavily forested, but was cleared to provide lumber for construction. In 1929, the de Havilland Aircraft Company purchased a 70 acre site to expand their manufacturing operations and aid in the Canadian military's war efforts. Ten years later, de Havilland purchased an additional 96 acres to expand their manufacturing capabilities.¹⁷ This company provided jobs to a large number of residents and encouraged increased development surrounding the manufacturing facility and military base.

Being home to a military base and the de Havilland Aircraft Company, Downsview was a popular destination for returning members of the armed forces, resulting in a building boom. This saw a large number of residences constructed during the 50's and 60's, while development continued into the 70's. By the early 70's, the entire neighbourhood was developed.¹⁸

In 1994 the Federal government announced the closure of Canadian Forces Base at Downsview and stated their intent to hold the lands in perpetuity for urban recreational use on a self-financing basis.¹⁹

Transportation in Downsview:

Historically, Downsview has been well connected to the city and the region. During the post war boom, investments in major highway infrastructure connected the area to the surrounding region. Highway 401 provided an East-West connection in the 60's and shortly after, the Allen Expressway was constructed, enhancing the North-South Connection to the City of Toronto.

Public transit has also served Downsview for many years with both bus and subway services within the area. Wilson station was constructed in 1978 and served as the northern terminus of the subway until the completion of Downsview station in 1996. Upon completion, Downsview station became a major terminal for many of the bus routes that serve the neighbourhood and provide further regional mobility.

THE PRESENT

Why should we re-evaluate transportation and services for the elderly in areas such as Downsview – Keele and Wilson?

Over the past 20 years, the median age in Ontario rose from 33 years in 1989 to 39 years in 2009, reflecting the aging of the baby boom generation, low fertility rates and increasing life expectancy.²⁰ By 2030, the number of seniors is projected to more than double, increasing from 1.8 million in 2009 to 3.7 million.²¹ This is represented in Downsview's current demographics that indicate its elderly population is greater than the province's average, with approximately 16.6% of the population over the age of 65.²² The median age for Keele and Wilson is 38 and over, which is also greater than the province's average.

As people age, they tend to move from family to non-family situations. This transition can be accompanied by a loss of income, community isolation, and a growing need for a variety of support to help them to maintain their independence (i.e. the ability to navigate the city safely and effectively).²³ In 2011 alone, there have been numerous cuts to the public transportation that serves the Downsview area. Most of these were made to TTC bus services in areas already in need of better public transportation. For these reasons, the Downsview area is entering a critical phase in its development as it accommodates the changing demographics of its community and confronts their changing transportation needs.

What are the current transportation problems facing the elderly?

As stated in the general context, the key issues associated with developing transportation for an aging population includes safety, access, health, cost, and social isolation. These issues are all relevant in the Downsview neighbourhood and many other inner post-war suburbs within the GTHA, where the elderly continue to "age in place."

Within the Downsview area, those who are retired typically live off of a fixed income consisting of pensions and other savings. Increased transportation costs hinder their options of travelling safely and efficiently throughout the city. According to the Toronto Seniors Forum, seniors

want Toronto to lower the cost of the senior's pass. Furthermore, seniors voiced their need for increased availability of transportation for non-medical appointments.²⁴

Another major problem is the fact that amenities such as grocery stores, health centres, and retail spaces are often spaced apart at distances inaccessible on foot. The private automobile allows people to access these amenities with ease. But what happens when an elderly person has reached an age when driving is not an option? Public transit appears to be the primary choice. However, the elderly often use transit during the day, at off-peak times, when transit service is reduced or suspended. The assisted mobility service Wheel-Trans is another option, however, there is a strict application and interview process, and trips are often for medical reasons only.²⁵ Also, such services only accommodate few people compared to mass transit, and can be costly to operate. The result is a lack of confidence in the public transit system. Those fortunate to have family nearby can rely on their support, however this is a limited option and does not apply to everyone.

Existing transportation Infrastructure that serves the Downsview Area:

The Downsview area is well served by major highways as well as several main roads. Key components on the road network in the area include:

- Highway 401: At the southern boundary of the southeast portion of the study area, it is the area's largest highway. The number of lanes for the highway varies from six to eight in each direction through a core-collector system.
- Allen Road: This road has between four and six lanes with a concrete median, and the combination of the relatively wide right-of-way, speed permissions, and interchanges classify it as an expressway. There are no sidewalks on Allen Road, however, the Allen-Sheppard Urban Design Guidelines identify proposed changes to the local street pattern that would introduce a sidewalk and landscaping improvements along the northern portion of Allen Road.
- Keele Street: Keele Street marks the western boundary of the plan area and is a major north-south arterial street in the City, with a designated right-of-way of 36 metres. There are sidewalks on both sides of the street

- Wilson Avenue: Wilson Avenue is a major east-west arterial roadway located at the south end of the plan area. The section of the street between Keele and Allen Road has a designated right-of-way of 36 metres. There are sidewalks along both sides of the street. It often assumes Highway 401 overflow or bypass traffic.

The Downsview area is also well served by public transit, with existing service including regional GO Transit rail service, and TTC subway and bus service. A dedicated bus-only lane providing service from Downsview subway station to York University is currently under construction, the Spadina Subway Extension has been approved, and dedicated surface rapid transit is under review for Finch Avenue West and Jane Street which form the north and west boundaries of the larger study area.

THE FUTURE

The future of the Downsview Area

The Government of Ontario has committed \$ 670 million (one third of the expected cost) to extend the Spadina subway line to York University and Steeles Ave and on to the Vaughan Metropolitan Centre (currently under construction). The extension has been scheduled for completion by 2015. In addition to the development of new subway networks and enhanced public transportation to serve the Downsview area and provide greater regional connections, there are also plans for a new Regional Hospital. The proposed Humber River Hospital will be constructed on a block of approximately 30 acres at Keele St and Hwy. 401 on the MTO Downsview campus. The project has been planned for completion by 2015 along with the renewal of the entire MTO campus and greening of Wilson Ave. When completed, the new hospital will be approximately 1.6 million square feet.²⁶ This new Humber River Regional Hospital will be the primary healthcare provider for many of the residents in the Downsview area.

While new development continues to transform the neighbourhood, the area is also on the verge of a major demographic shift, providing an excellent opportunity to address the future of transportation, urban design and planning for an aging population.

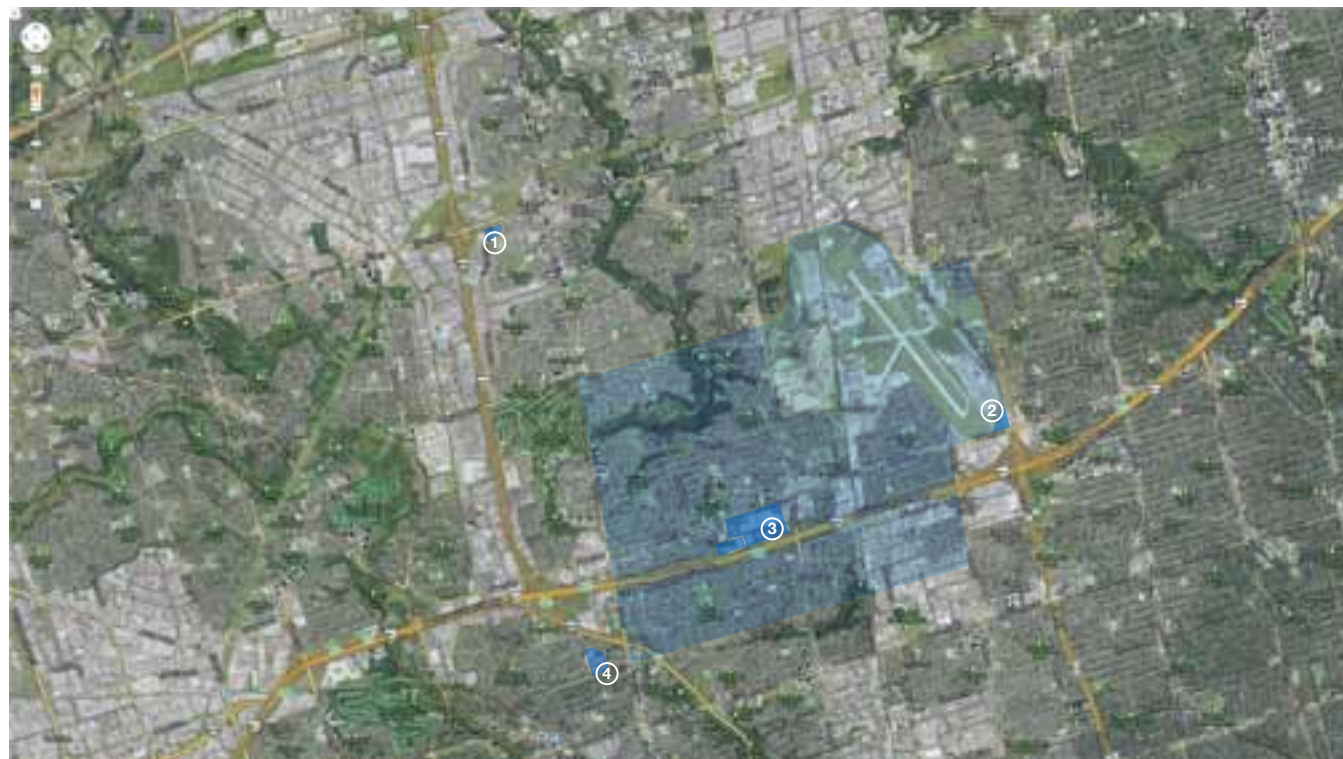
MAPS & SITE IMAGES



Overview of challenge area



Humber River Hospital (01); Humber River Hospital - Keele (02)



Existing Humber River Hospital (01); Wilson Station (02); MTO Keele Campus and proposed Humber River Regional Hospital (03); Humber River Hospital (04)



Sheppard West Station (01) and overall view of Downsview/challenge site

PRECEDENTS

CREATIVE TRANSIT IDEAS



Graz, Austria – Get fit at the bus stop campaign

Time spent travelling by public transport – be that walking to the stop, waiting at the stop, or time actually travelling – has to be made more interesting. To try to achieve this, passengers in Graz were offered a special programme of exercises that they can do both at the stop, on the vehicle and even at home or at work. The exercises aim to reduce stress and help people to relax, and are designed to be done in a way that other passengers will not notice (to minimize any embarrassment a passenger might feel in exercising in front of their fellow travellers).

http://www.eltis.org/index.php?id=13&study_id=3022

Leuven, Belgium – Save the Pavement Campaign

In 2008, the city of Leuven launched the “Save the Pavement” campaign together with an NGO, the police department and university. The project was intended to create more walkable streets for disabled people, parents with strollers and the elderly by eliminating the numerous obstacles and damaged infrastructure that deters people from using sidewalks. Each project began with an analysis of the largest issues within the city and then provided incentives for local residents to take action and report sidewalk damage. For example, bicycle seat covers were distributed to people who correctly parked bikes and a campaign website was set up where people could register as ‘pavement savers’.

http://www.eltis.org/index.php?id=13&study_id=3022



Donostia-San Sebastian, Spain – Adapting public transit for older people

Workshops are organized in collaboration with DonostiaBus Company to inform senior citizens about topics such as routes, schedules, understanding transit information in bus stations, and how to negotiate the buses themselves.

http://www.eltis.org/index.php?id=13&study_id=2858
<http://www.aeneas-project.eu/?page=donostia>

Riverside County, California – T.R.I.P. (Transportation Reimbursement and Information Project)

TRIP (Transportation Reimbursement and Information Program) originated as a senior transportation program in Riverside, California. It evolved into a model for programs across the country, designed as a low-cost, low-maintenance, customer driven approach for providing transportation to older adults. The model works in rural as well as urban and suburban

communities. It is an award-winning transportation program that complements rail, fixed route and special public transportation service by reimbursing volunteers to transport individuals where no transit service exists, or when the individual is too frail, ill, or unable to use public transportation for other reasons. TRIP also provides information on public transportation in Riverside County through a single toll-free phone call to the Riverside County Office on Aging HelpLink.

<http://www.healthmattersinsf.org/modules.php?op=modload&name=PromisePractice&file=promisePractice&pid=837>

MILITARY DEVELOPMENT LANDS

Irvine, California – Orange County Great Park

The former Marine Corps Air Station El Toro is being transformed into the first great metropolitan park of the 21st century. Spanning more than 1,300 acres, the plan embraces environmental sustainability, preserves agricultural heritage, and honors military history.

<http://www.ocgp.org/>

Calgary, Alberta – Garrison Woods

Garrison Woods is conveniently located seven minutes from the downtown core. It boasts a friendly community where neighbours congregate on front porches, and safety and security is extended far beyond the front doorstep. Garages are nestled in backlanes, as walkways, sidewalks, and porches are the main focus for this community. The result is less vehicle traffic, local amenities, health care, education, and facilities, and a safer more interactive environment.

<http://www.garrisonwoods.com/en/default.htm>

YOUR TEAM

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CHALLENGE 08 NOTES & RESOURCES

NOTES

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ONLINE

Annotated Google Map
<http://g.co/maps/zjks7>

CHALLENGE 09: GREENWAYS & WATERWAYS

How can we use nature's corridors to move through the city?

SOURCE: LUKE HOLLINS

CHALLENGE 09

GREENWAYS & WATERWAYS

PROJECT LOCATION

Toronto Ontario – Toronto Waterfront & Don River Tributary Ravine System

PROJECT VISION

Working with the natural environment, establish and encourage new ways to move through our cities.

PROJECT MISSION

Utilize the ravine system and waterfront to establish transportation routes down the Don River and along Lake Ontario that can better connect neighborhoods in Toronto and across the GTHA.

THE CHALLENGE

Greenways are often defined as long, narrow parcels of land intended to provide trails for pedestrian and bicycle use, while some also include streetcar/light rail and retail uses. They are also often shaped by characteristics of the natural environment, running alongside rivers and waterfronts in the more traditional sense. As urbanized areas continue to expand and increase in population, it is essential to maintain greenways and waterways that provide recreational trails, support an active, healthy lifestyle and act as a key feature of the local ecology. Flowing through the heart of Toronto, the Don River is one of Canada's most degraded rivers with much of its surrounding territory covered with urban development.

The challenge is to establish a transportation system that utilizes the natural waterways and greenways in Toronto and contributes to mobility through the city. Using the city's waterfront and the Don River watershed as sites for environmentally sustainable transportation routes both on water and through surrounding territory, the aim is to rebuild some elements of the city's transportation network as it existed before the street grid was constructed.

OBJECTIVES

- Imagine how a series of ports and docks might transport residents and visitors on foot, bicycle and by boat along the waterfront and up through Toronto's unique ravine system.

- Examine ways to incorporate a public commuter service that travels by water that would link ports in major centres along lake Ontario at a larger scale.
- Develop a plan for a port and trail system that would connect the waterfront trails with the ravine trails along the banks of Don River and at its intersection with Lake Ontario.
- Take into account connections with existing roadways, bicycle paths, walking trails, as well as other amenities and services (e.g. community centres and tourist attractions) as part of this overall system.
- Using human centered design principles, create a series of universal standards that address access, safety, lighting, and signage in our ravine system to create an exciting user experience for recreational mobility.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- Consider how travel along greenways and waterways can accommodate current commuter, recreational and tourist populations and further increase the modal split within the city
- Proposed plans for development along Toronto's Waterfront, including Waterfront Toronto's plans for the Central Waterfront, East Bayfront, West Don Lands, Lower Don Lands, Port Lands, and the wider waterfront
- Existing and proposed development along the Don River, including Evergreen Brick Works, Todmorden Mills, Don River Park, etc.
- Connections and transfer between modes of transport (e.g. natural paths to roadways, public transit, highways, water taxi, etc.)
- Existing recreational trail networks along waterways and greenways such as the Don River Trails, Martin Goodman Trail, Waterfront Trail etc
- Existing transportation modal split within waterways and greenways

- Potential for alternative vehicles and better utilization of existing infrastructure
- Existing branding, wayfinding and public furnishings
- Preservation requirements established by the TRCA and MOE concerning the environmental impact on existing natural habitats, waterways and ecosystems

PROGRAM REQUIREMENTS

- Create a wayfinding system that clearly establishes flow between different modes of transportation, encourages greater access to the existing trail networks and promotes the proposed transportation systems and/or development.
- Establish a clear network of crossing and exchange nodes between existing and proposed transportation systems (i.e. car to bicycle, public transit to foot etc.)
- Create a new method of transit that utilizes the existing waterways along Lake Ontario and up the Don River.
- Enhance the waterfront and connecting greenways by developing urban furnishing standards that accommodate various users (e.g. bicycle racks, rest stations etc.)
- Improve the connection between Toronto's waterfront and the Don Valley by creating a node that facilitates movement.
- Increase environmental awareness and appreciation for Toronto's watershed system, greenways and waterways.

CRITERIA

- Diversify the modal split to reduce overall automobile dependency.
- Increase and attract tourism to the waterfront and connecting greenways.
- Minimize the overall environmental impact as a cause of mobility and the development of infrastructure.

- Integrate and preserve nature along the waterfront and connecting greenways.
- Encourage a healthier lifestyle by promoting active transportation and increasing the overall environmental quality (e.g. air quality and remediation of contaminated sites).
- Create new jobs and encourage new economic activity.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

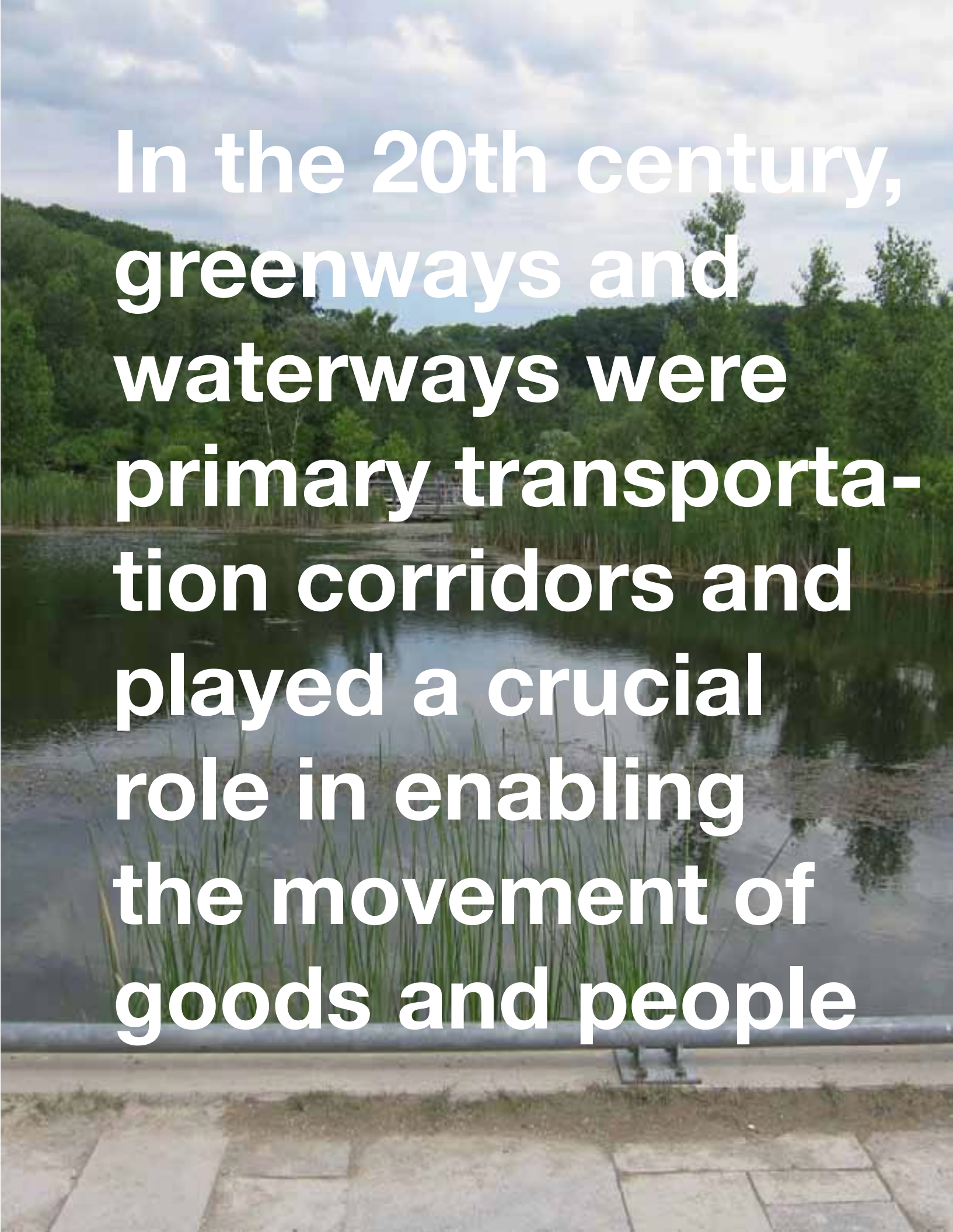
- Recreational cyclists: 21 to 65
- Local residents: 8 to 80
- Recreational hikers and walkers: 8 to 80
- Visitors and tourists: 20 to 65
- Local & Regional Commuters

DELIVERABLES

The following deliverables are specific to this challenge:

- Create a master plan that identifies a network of greenways throughout the city that enhance the connections to major attractions, waterways and the existing trail networks. This map should include:
 - o Existing and proposed bicycle & recreational trails
 - o Existing and proposed ferry networks
 - o Major attractions and parks
 - o Major nodes where transportation modes intersect and transfer.
- Create standards for the trail network that runs alongside the Don Valley including the following exchange points:
 - o Valley to Path
 - o Road to Path
 - o Water to Path

- Design the node that enhances the connection between Toronto's waterfront and the Don Valley, and create plans to illustrate:
 - Land Use in proximity to this node
 - The connection to existing and proposed transportation networks
 - Modal use, and flow
- Design a transit system that utilizes the existing waterways and establish a series of ports that enable commuter to transfer on and off the proposed transit system and integrate with existing transportation systems within the city.
- Create user experience scenarios that demonstrate the journey through the city utilizing the proposed greenways and waterways network.



**In the 20th century,
greenways and
waterways were
primary transporta-
tion corridors and
played a crucial
role in enabling
the movement of
goods and people**

GENERAL CONTEXT

THE PAST

The history of waterways and greenways as a mode of transportation:

For most of human history, waterways were at the centre of transportation networks. They have facilitated the settlement of communities throughout the world, acting as corridors for the movement of people and goods. The expansion of European settlements in the Great Lakes Basin at the turn of the 19th century took place when rivers and lakes were the only practical means of transporting people and freight.¹ The locations of many major cities in North America were initially chosen due to their proximity to major waterways, which facilitated their connection to the outside world prior to the development of the extensive rail and road networks. For example, New York City began construction on the Erie Canal in 1825, the first major transportation system connecting the eastern seaboard to the continent's interior, because it understood the importance of connecting the city with the great lakes shipping routes. The canal increased the efficiency of goods movement and reduced transport costs by nearly 95%. This resulted in further expansion of the waterways network in North America, and by the end of the 19th century, significant investment was made in harbour improvements in order to allow a greater quantity of even larger ships to dock at U.S. & Canadian ports, carrying immigrants and goods from Europe and Asia.²

Shortly after the establishment of major waterways in North America, technological advancement in railway transport further enhanced regional transportation. Trains became the preferred travel method for the movement of people and goods across the continent. The arrival of the automobile meant that the next major infrastructure investments in North America came in the form of paved roads. These modes of transportation further reduced the need to utilize waterways for the local and regional movement of goods and people, even as maritime transportation remained a crucial element of the existing system of international trade.

What are greenways and waterways?

Waterways are defined as any navigable body of water. This includes rivers, lakes, seas, oceans and canals that facilitate the movement of both people and goods. Greenways are often defined as long, narrow parcels of land that might include transportation facilities ranging

from pedestrian and cycling trails through to light rail paths. Greenways may also perform ecological and social functions such as maintaining biological diversity, protecting water resources and promoting recreational and social cohesion, all by providing the crucial connectivity among green urban areas and other remnant vegetation patches across a landscape.³

How have greenways and waterways, and the natural environment contributed to our transportation system in the past?

Prior to the rapid expansion of cities and establishment of the automotive industry in the 20th century, greenways and waterways were primary transportation corridors and played a crucial role in enabling the movement of goods and people. In the 19th and early 20th centuries, American cities and towns arose around their waterways, which not only linked them to the larger world but also interconnected the communities themselves, through ferries and other vessels, which turned their waters into vital thoroughfares.⁴

THE PRESENT

Current transportation associated with waterways and greenways:

Waterways still play a major role in international trade, as it is a relatively economical mode of transport for bulky and heavy goods as well as being quite safe. At the same time, the cost of constructing routes is very low as most of them are created by the natural environment.⁵ Indeed, there have been recent efforts in the US to reduce the overall strain on and along interstate highways by designating specific shipping channels as marine highways.⁶ However, waterways no longer play a significant role in the movement and transportation of people and commuters in most North American Cities.

Most major cities have dedicated a large portion of their waterfront to industrial development and as a result many great lake cities have little to no community development along their waterfronts. Many North American cities underutilize their waterfronts and the

connecting waterways and greenways. Waterfront cities like Detroit, Cleveland, Buffalo, Toronto and Chicago all have significant amounts of disused industrial sites that dominate waterfront regions. These areas offer tremendous possibilities for new, sustainable development as well as providing natural transportation routes for people which might reduce strain on existing infrastructure.

Why is it important that we preserve and enhance our greenways and waterways?

Waterways play an important role in the global ecology and contribute to the overall water quality of the larger bodies of water they flow into. As water becomes a more valuable resource, it is important to ensure that tributary systems of creeks and rivers are maintained and even enhanced in order to improve the overall water quality in the long term. Riverways in particular are often part of the stormwater system and are often associated with stormwater retention and recharge of groundwater. Many major cities have waterfronts that are directly connected to the greater watersheds (ravine systems, aquifers, groundwater) that purify and replenish the larger bodies of water in the area. The overall health of the city, air quality and greater ecosystem is dependant on the greenspace occupied by these watersheds and their associated natural systems. It is essential to preserve this valuable land from being consumed by unsustainable urban development.

THE FUTURE

How can greenways and waterways contribute to cities and their transportation systems?

Greenways and waterways provide residents access to nature and can aid in providing trails to encourage active transportation, which creates a healthier, more balanced lifestyle. Utilizing major waterways can also expand existing transportation systems, aiding in connecting waterfront cities to one another while providing an alternative method of travel for both residents and visitors.

Current highway and railroad infrastructure has been severely strained by the trucking needs for distribution of goods. Moreover, alternatives to vehicular use would have tremendous environmental benefits. By re-establishing transportation networks that utilize our waterways there is a possibility to further increase the modal split while minimizing infrastructure investment. Utilizing the connections created by the natural environment may also provide other benefits. These greenways and waterways can be utilized to promote active transportation, increase the overall quality of life by creating health benefits relating to increased air quality and increased environmental awareness by providing greater access to nature and environmental awareness in urban settings.

As major cities in North America begin to transform their waterfronts and utilize the valuable real estate that was once used for industry, there is an opportunity to re-evaluate the way we use the waterways and greenways to provide local and regional connections.

LOCAL CONTEXT

THE PAST

What is the history of Toronto's Waterfront?

As Toronto expanded in the mid 19th century, industrial development began to consume much of the waterfront. As railway connections and factories overran the harbour and destroyed the quality of life by the water's edge, residents retreated to more congenial environments further north.⁷ The "Don Improvement" was launched toward the end of the 19th century with the aims of straightening the river south of Gerrard Street, creating room on either side for railroads, roads and other urban infrastructure. This in turn halted flowing and created a shipping channel and additional industrial land near the lake.⁸

In the early 20th century, rail and water transportation systems grew to meet the growing demand. The creation of the Toronto Harbour Commission in 1911 by the federal government was a pivotal moment in the management of waterfront resources after decades of inadequate and uncoordinated development along Lake Ontario.⁹ As the century progressed, the established waterways continued to play a major role in the movement of goods and trade between Toronto and other cities within the Great Lakes Basin, the extensive rail networks developed by the early 20th century both complemented the existing network of waterways and reduced the overall strain on the waterway system by increasing the modal split. With the development of the highway system and increased accessibility of the automobile in the mid 20th century, the movement of people within waterways was significantly reduced. In the post World War II era the city rapidly expanded and the Don Valley Parkway and Bayview Avenue Extension were created to serve new suburbs such as Don Mills and Scarborough.¹⁰ This resulted in the movement of people along waterways becoming even less significant as it became more efficient and accessible to travel by rail or car.

Development in the Don River Valley

Industrial development started in the Don Valley in late 18th century. Todmorden Mills was one of the first major industrial establishments as one of three paper mills operating along the river in the 1790's. During the following sixty years, the Don was a "working" river: highly industrialized and home to mills, quarries and factories that provided lumber, paper products, flour, bricks, beer and liquor, and meat and tallow to the rapidly growing city. After 1850, gas works, petrochemical plants and other heavy indus-

tries followed and by the late 19th century, Ashbridge's Marsh became filthy, blackish and unhealthy. At the end of the 19th century, "the Don Improvement" was launched to halt the flooding, to provide a shipping channel and to create additional industrial land near the lake. This resulted in the development of the Keating Channel in 1893, created to reduce the risk of flooding and enhance industrial development within the area. As industrial development continued along the Don River, the second half of the twentieth century also witnessed the construction of major roadworks, including the Bayview Avenue Extension (1959) and the Don Valley Parkway (1961-1966) connecting the Gardiner Expressway, running along the waterfront) to the northern suburbs of the city.

THE PRESENT

What transportation networks currently exist along Toronto's Waterfront and within the Don Valley?

Toronto's Waterfront and the Don River continue to play a role in the movement of goods and people in the area. Some of the facilities which contribute to the movement of goods include a marine terminal and warehouse which occupy approximately 50 acres of Toronto Waterfront, the Gardiner Expressway, which runs alongside Lake Ontario, and the Don Valley Parkway, running through the Don Valley also facilitate the movement of both people and goods. These highways are currently the main highway networks running through the City of Toronto, providing access to the Don Valley, downtown Toronto and the waterfront.

With regard to the movement of people, ferry services exist that carry passengers to three destinations on the Toronto Islands. The city also offers docking services and complete services for boaters.¹¹ Finally, there are a number of trails and bike lanes that facilitate both commuter and recreational movement along the waterfront and through the connecting Don Valley.

Why is the Don River important/what is its current use?

Though the river originates north of Toronto, in the largely undeveloped and protected Oak Ridges Moraine, most of the Don's 360 square kilometre watershed lies within the city of Toronto and its sprawling suburbs.¹² It flows through the heart of central Canada's urban nexus with over 80 per cent of the watershed lying in urbanized areas and home to over 800,000 people.¹³ Almost half of the watershed is devoted to housing, and a fifth to industrial, institutional or commercial development.¹⁴ Due to this high level of development, the Don River is one of Canada's most degraded urban rivers, although there have been a number of efforts to improve the water quality of the Don River and there are currently proposals to re-naturalize the mouth of the Don River at its intersection with Lake Ontario.

What are some of the current issues associated with the Don River?

For the past century, the Don Watershed has been affected by increasing pressures from human settlement.¹⁵ These human settlement patterns have fragmented the river's natural flow, and have significantly degraded the water quality and natural habitat. Generally, the area is at a crucial point in its history with regards to environmental degradation. Once entirely forested, the Don River now has only 7.2% forest cover. It has also lost almost all of its significant wetlands and the region's ecological viability is severely threatened by the loss of its natural areas.¹⁶

Other more specific issues associated with the trail network and greenway systems that run alongside the river include access and safety. Access by both pedestrians and cyclists is limited and difficult from the existing infrastructure. An overall lack of signage at access points, and along the trails to indicate the types of use and trail locations limit the overall use of the existing recreational trails, and create confusion for those not familiar with the area.

The importance of The Great Lakes

The Great Lakes of North America form the largest group of freshwater lakes in the world, containing more than 20 per cent of the world's surface freshwater and 95 per cent of North America's. Add to this the groundwater underlying and feeding the Great Lakes or its tributary streams and lakes, and the percentage is closer to 25 and 97 per cent respectively.¹⁷ However, the Great Lakes are in serious trouble. Pollution, climate change, over-extraction, invasive species, and wetland loss are all taking their toll on the watershed that provides life and livelihood to more than 40 million people and the thousands of species that live around it.¹⁸

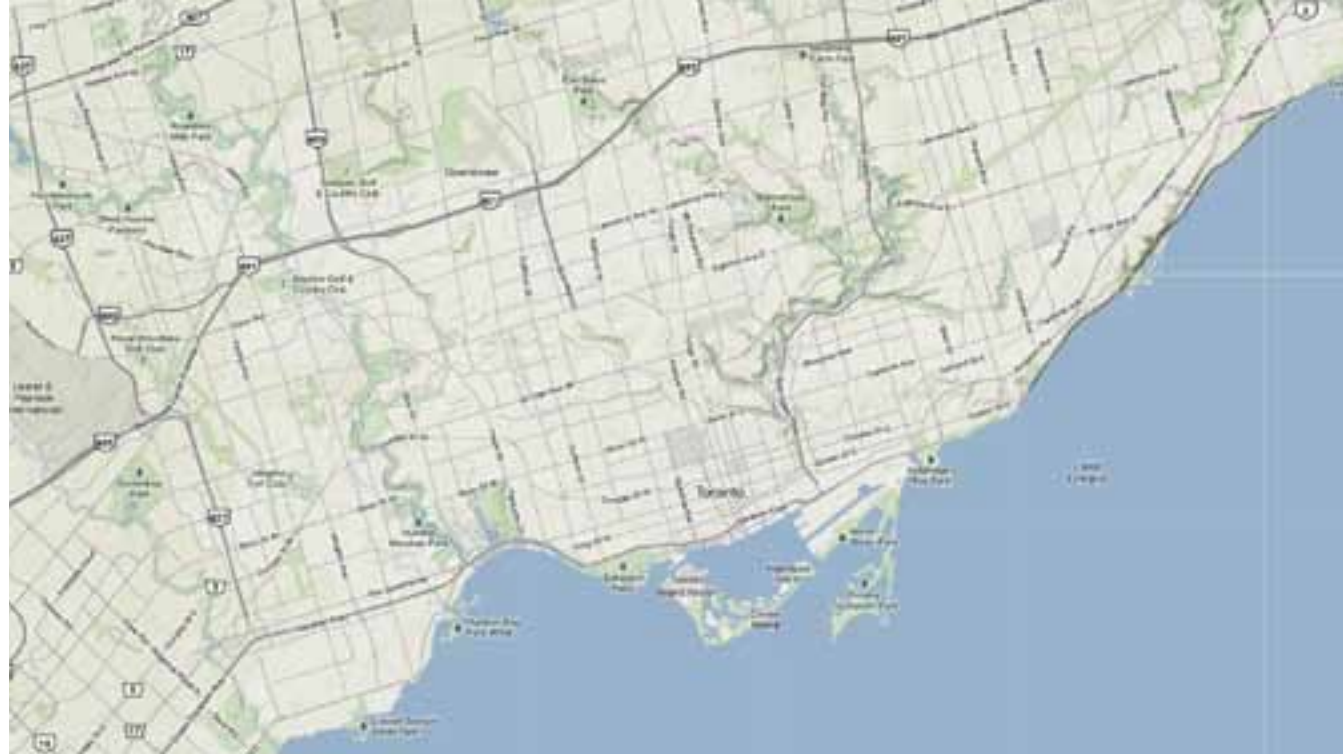
THE FUTURE

The future of Toronto's waterfront and greenways

There have been a number of proposals for the waterfront and the Don River over the past few decades. Waterfront Toronto has proposed to re-naturalize the mouth of the Don River, creating abundant greenspace that would provide flood protection and a mix of residences, retail and business development. The project continues to revitalize and encourage sustainable development at many of the brownfield sites that currently occupy the shore of Lake Ontario and the mouth of the Don River. Proposals for the development of the West Don Lands and Lower Don Lands will significantly transform the mouth of the Don River and its connection to Lake Ontario. It will also transform the urban fabric and dynamic by introducing approximately 6000 new residents and 23 hectares of parks and public space into the West Don Lands, and approximately 12,500 residents, 3,000,000 of sq. ft of commercial and retail space, and 53 hectares of parks/public spaces into the Lower Don Lands.

As Toronto and other major cities along Lake Ontario continue to grow, their waterfronts are becoming more valued and developed, providing an excellent opportunity to re-evaluate the connections between local waterways and major waterfront developments from east to west (including the cities and towns of Whitby, Pickering, Scarborough, Toronto, Oakville, Mississauga, Burlington, Hamilton, Niagara). This also provides an opportunity to enhance connections utilizing greenways and other natural paths to provide alternative transportation corridors while re-integrating nature into the urban landscape.

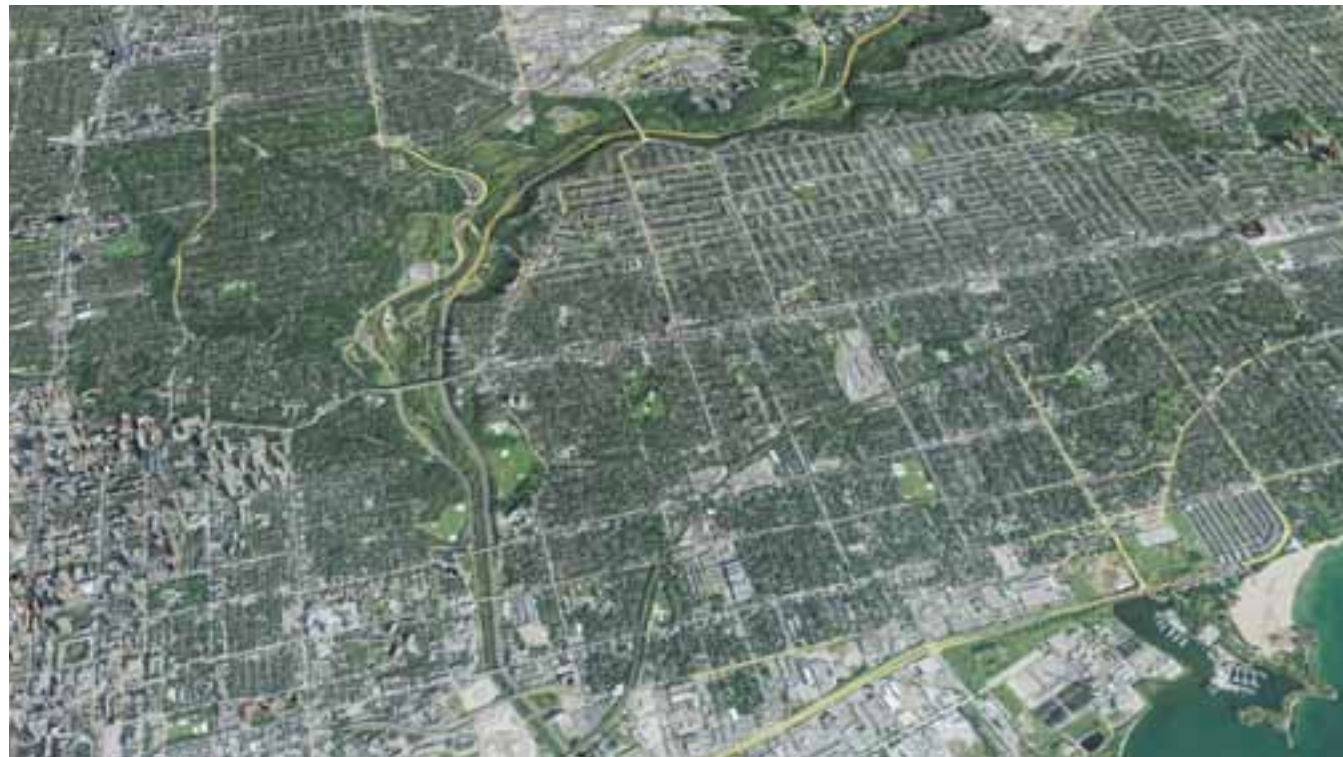
MAPS & SITE IMAGES



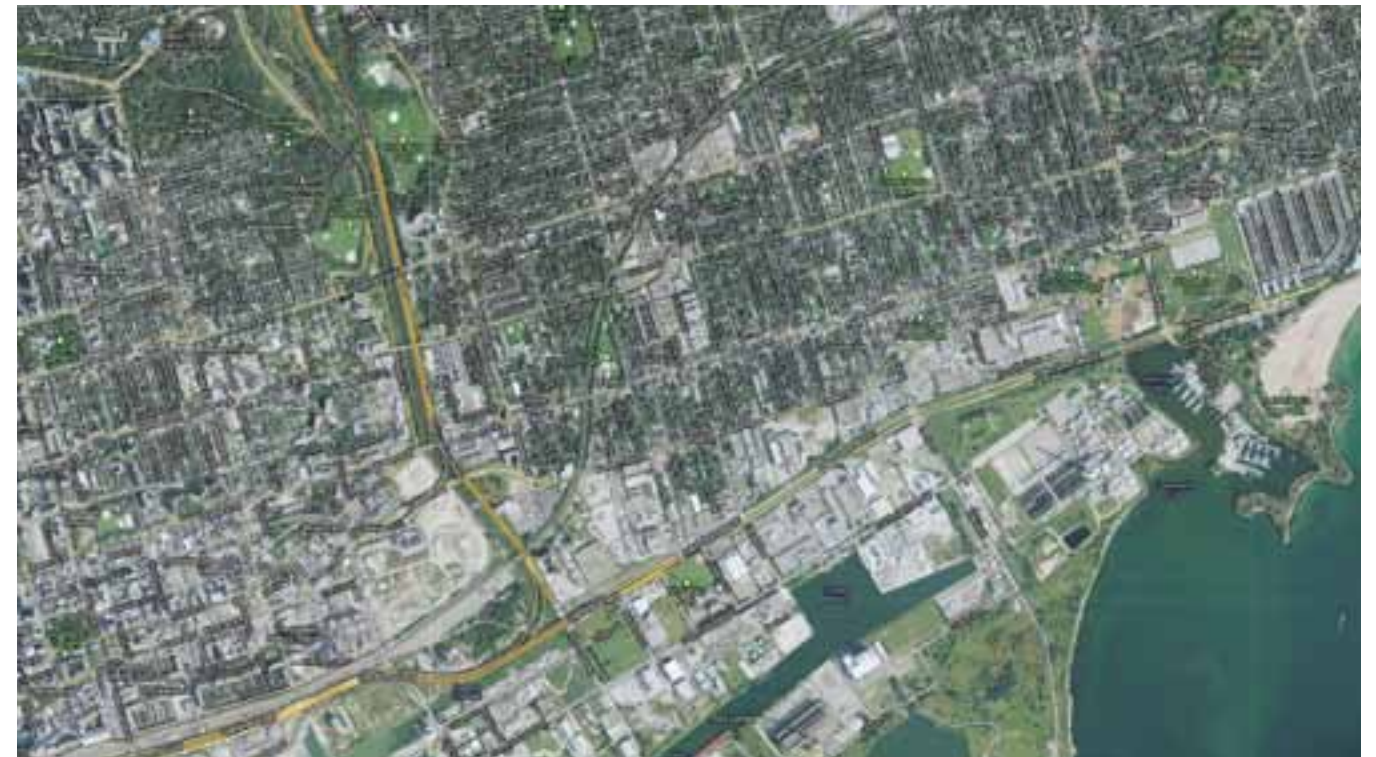
Overview of Toronto and its waterways



Evergreen Brick Works located in the Don Valley



Don Valley river and greenways



Lower Don Lands and waterfront

PRECEDENTS

ESTABLISHED GREENWAYS & WATERWAYS



Boston, Massachusetts – Emerald Necklace

The Emerald Necklace is likely the oldest established greenway in the United States. Originally established by Frederick Law Olmsted Sr. between 1878 and 1896, the Necklace comprises half of the City of Boston's park acreage, parkland in the Town of Brookline, and parkways and park edges under the jurisdiction of the Commonwealth of Massachusetts. More than 300,000 people live within its watershed area. The park is woven into the city's fabric and offers activities including walking and biking tours, guide maps, interactive learning activities and exhibits.



<http://www.emeraldnecklace.org/the-necklace/>
<http://www.cityofboston.gov/parks/emerald/>



Vancouver, British Columbia – City Greenways Program

First adopted by council in 1995, the Vancouver Greenways Plan was created to introduce a series of "City Greenways" and "Neighbourhood Greenways" in order to promote the development of a city wide network of linear public corridors. City Greenways make up the majority of the greenways plan, with sixteen planned routes that will provide a network of approximately 140km when completed, while Neighbourhood Greenways are small-scale, local connections for pedestrians and cyclists that respond to a neighbourhood's unique needs, linking parks, natural areas, historic sites, amenities and commercial streets and providing opportunities to express the unique character of the neighbourhood. Together they create an extensive network of greenways that will be no more than a 25 minute walk or 10 minute bicycle ride from every residence in the city of Vancouver.

http://vancouver.ca/engsvcs/streets/greenways/city/documents/CoV_Greenway_Plan_2011.pdf
<http://vancouver.ca/engsvcs/streets/greenways/city/index.htm>
<http://vancouver.ca/engsvcs/streets/greenways/neighbourhood/index.htm>

PRECEDENTS

ESTABLISHED GREENWAYS & WATERWAYS



New York City, NY – Greenway Plan

The Greenway Plan, published in 1993, presents the city's vision for the most ambitious urban greenway system in the United States - 350 miles of landscaped bicycle and pedestrian paths crisscrossing New York City. The plan signaled the start of a multi-year effort to create new public recreational opportunities, increase the mobility of cyclists, walkers, and joggers, and enrich the lives of all New Yorkers. New York City's greenways are intended to provide a system of bicycle-pedestrian pathways along natural and manmade linear spaces such as rail and highway rights-of-way, river corridors, waterfront spaces, parklands and, where necessary, city streets. They are at once parks for the 21st century and a part of the city's transportation infrastructure. They provide pleasant, efficient, healthy and environmentally sound travel by foot, bicycle or skates. The city-wide greenway systems are also part of the greater East Coast Greenway, which is the nation's most ambitious long-distance urban trail project, spanning approximately 3000 miles along the eastern seaboard connecting cities from Maine to Key West, Florida.

<http://www.nyc.gov/html/dcp/html/bike/gp.shtml>
<http://www.nyc.gov/html/dcp/html/bike/gpvision.shtml#vision>



PRECEDENTS

ESTABLISHED GREENWAYS & WATERWAYS



Seattle, Washington – Ferry System

The Washington State Ferry system is the largest in the United States. It welcomes nearly 23 million riders per year, operates from 20 terminals on nine routes, and completes over 450 trips per day. It is estimated that 35% of the population within Seattle utilizes the ferry system during the course of a year.

<http://www.ferrymedia.com/WSFMediaKit.pdf>



Glasgow, Scotland – Clyde Gateway Green Network Strategy

The existing Clyde Gateway comprises 3.3 square miles (2,095 acres), approximately 30% of which is derelict, vacant or underused land. The area has experienced dramatic decline in industrial activity and resident population since they peaked in the 1950s, and now has amongst the worst health statistics, highest unemployment levels and lowest life expectancies in Scotland. To improve living conditions and enhance the local and regional connectivity of this area, the Green Network strategy aims to:

- Enhance a range of public spaces while creating new pedestrian and cycle routes
- Improve access routes through landscaping upgrades
- Develop areas around the River Clyde to improve connectivity and living environments for people and wildlife
- Contribute to building a positive legacy for the Green Network

The Green Network strategy is also a part of the larger Clyde Gateway regeneration initiative, which aims to encourage new businesses and visitors to the area.

http://www.clydegateway.com/pages/clyde_gateway_faqs.php
<http://www.gcvgreennetwork.gov.uk/projects/Clyde-Gateway/Clyde-Gateway-Green-Network-Strategy.html>



Vienna, Austria & Bratislava, Slovakia – Twin City Liner

The Twin City Liner is a waterway transit service that carries passengers between the two city centres of Vienna and Bratislava. With 60km separating the two city centres, this provides an efficient connection between the two cities as the ship is able to travel 60km/h along the Danube River, carrying approximately 120 passengers per trip. The service accommodates approximately 5 trips per day, taking approximately 75 minutes per trip.

<http://www.twincityliner.com/web/index.php>

PRECEDENTS



London, England – River Bus & Tours

The River Bus & Tours service in London, offers a variety of travel options along the Thames River to meet the needs of both residents and visitors. The River Bus offers a fast and frequent commuter service, while the River Tours are a more leisurely affair, usually with a sightseeing commentary, and are ideal for spotting some of London's hidden gems. The services are integrated with the other transportation networks within the city, and a smart payment system – “Oyster” – provides frequent passengers with discounts to the river bus services as well as other transportation services within London.

<http://www.twincityliner.com/web/index.php>

YOUR TEAM

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CHALLENGE 09

NOTES & RESOURCES

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CHALLENGE 10: FOOD NOT CRUDE



How can we
create farms
in our cities in
order to reduce
transportation
costs and energy
consumption?

CHALLENGE 10

FOOD NOT CRUDE

PROJECT LOCATION

Port Lands – Toronto, Ontario

PROJECT VISION

Imagine local agriculture integrated into the urban, suburban and regional fabric, increasing food security within cities and raising revenue for local farmers while at the same time reducing the overall cost and distance travelled associated with the transportation of food.

PROJECT MISSION

Design an urban agriculture network that supports local farming using a sustainable transportation and distribution system.

THE CHALLENGE

In North America, food items travel an average of 1,500 miles before they arrive on the shelves of our local grocery stores. Global food distribution flourished when low shipping costs and advances in food storage were the norm, but recent spikes in energy prices and concern about the environment are forcing a re-evaluation of the “true” cost associated with transporting food around the world. A basic diet using global ingredients can consume four times the amount of energy and create four times the amount of greenhouse gas emissions as the same diet using locally sourced products.

With an expected population of 7.45 million inhabitants by 2031, growth in the GTA is raising a number of concerns with regards to the supply, distribution and security of food. There is a pressing need to cultivate solutions that will increase food production and distribution in urban settings. At the same time, there is a growing local food movement that recognizes the invaluable resources associated with the greenbelt surrounding the GTA, which is considered to be Ontario’s most fertile farming land. Farmer and community markets are on the rise and demand for local and organic produce is expanding. Nevertheless, further growth of this industry is limited by the loss of farmland outside of the city, and the lack of infrastructure for distributing, storing, selling and growing food within the city.

The challenge is to envision the agricultural system of the future. What does a network of local farms that support a major urban centre look like and how would it operate?

To what degree does the transportation model at the heart of the modern diet need to change in order to support more sustainable views about where our food should come from? How can we reduce the negative consequences associated with the long distance transport of our food and their impact on our health and environment? How can we support local farms and resources so that they flourish, connecting local producers with local consumers in a manner that is competitive with the current global food supply chain? How can we further organize and coordinate the distribution of food in order to reduce unnecessary and irrational food miles accumulated?

OBJECTIVES

- Create an urban food production network and distribution system, using the Portlands neighbourhood as a model, connecting consumers to regional and local urban farms.
- Design facilities to grow, store and sell fresh produce at key locations within a neighbourhood. These should ensure that there are the right physical conditions for growing (sun, wind, temperature control) as well as for community work and central sales.
- Address the sustainable transportation requirements to move food from farms to urban consumers with an appropriate distribution and supply system.
- Consider the energy, water and waste requirements associated with local farming and the generation of food in urban regions, and propose solutions to minimize overall environmental impact.
- Develop a strong business model and case for the urban farm network that competes with and supplements the current global food supply chain.
- Expand public acceptance and support of the local food production culture through education, easier access and stronger connections to producers.

CONSIDERATIONS

The design team shall consider the following when completing the deliverables:

- The existing global distribution and food supply networks that connect Toronto to agricultural producers around the world.
 - The existing local distribution and food supply networks within the GTHA, from packaging and shipping, to food terminals, local distribution, markets and retail, transportation to the consumer’s home and restaurant, and finally the disposal, composting, recycling and reuse of food waste and packaging.
 - Local food processing requirements and standards.
 - Local climate, growing conditions and crops.
 - Local market and demand (residents of Toronto have specific standards relating to the quality and freshness of food products).
 - Environmental and ecological demands of food production and distribution.
 - How food retailers help to reinstate the direct relationship between the producers and users, thereby increasing desire to trace the food they are eating and improving people’s willingness to trust and use local produce.
 - Large establishments such as schools and hospitals as on-site producers of much of their own food.
 - Well-established community centres such as schools, community halls and squares, as locations for markets and produce sale/swap.
 - The use of local distribution centres to consolidate loads for the delivery of goods between communities within a city, to help ensure efficient use of delivery vehicles and the reduction of trip distances.
 - Shops as providers of the home delivery of fresh produce from a number of local suppliers.
 - Deliveries sent to central drop-off points within a community to allow for flexible local pick up, and to reduce supplier vehicle trips.
 - Collaboration with local shops and restaurants to ensure that local produce use is encouraged.
 - The provision of information to local residents on how to purchase local food and how to get involved with local food production.
 - Local food production as an important promoter for disadvantaged and struggling communities.
 - Sale of enhanced produce and high-end foodstuffs (jams, honeys, smoked meats etc.) can be used to generate income to keep local and community farms profitable and keep general produce costs low.
 - How to change public opinion about the role and value of green space and building space (rooftop plantations etc) in communities.
 - Consider the port connections that exist along Lake Ontario and how food distribution networks can be enhanced within the Great Lakes.
- ### PROGRAM REQUIREMENTS
- Design an urban food supply and distribution system, using the port lands as a model, connecting consumers to regional and urban farms.
 - Create a network that includes facilities for farming, storing, preparing, consolidating, delivering, selling and disposing/composting/recycling of local food products and their packaging.
 - Create a network that reduces the overall energy associated with the distribution of food and enhances the overall accessibility of local food products for residents.
 - Reduce the overall reliance on external food production by proposing a system that can be universally adapted to other locations in Toronto.
 - Create a system that is competitive with the current global food supply chain and mass production, supporting the local economy and food security.
 - Create an educational component that encourages social innovation, and informs local residents of the benefits of local and urban agriculture and food production.
 - Create new job opportunities for local residents.

CRITERIA

- Make local food production more economically viable and more competitive with the global food supply chain.
- Create new job opportunities that are a direct result of the proposed farming network and its associated supply and distribution system.
- Create a food distribution and supply network that has the capability of supporting the estimated 12,500 new residents that are expected by 2015 as part of Waterfront Toronto's innovative mixed-use proposal in the Lower Don Lands.
- Increase coordination between suppliers and distributors, and create a network that has a significantly lower carbon footprint than the current food distribution and supply systems.
- Using a cradle-to-cradle approach, ensure that there is no waste created by the farming network and the associated distribution system.
- Increase resiliency to food shortage within the GTHA.

TARGET USERS

The following section provides a user profile outlining the targeted demographic:

- Local farmers: 21 to 60 years of age.
- Local residents: 1 to 80 years of age.
- Visitors and Tourists: 21 to 60 years of age.
- Restaurants.
- Food distribution companies.
- Local grocery stores, markets & associated supply chain.
- Other consumers of mass quantities of food, such as school and hospital cafeterias.

DELIVERABLES

The following deliverables are specific to this challenge:

- Create a master plan and distribution network that demonstrates the supply chains from producers to end-users, connecting consumers to farmers in Ontario's green belt and urban farms within the GTHA to its neighbourhoods, and illustrating how the network will be integrated into existing networks.
- Create a detailed plan for the regional/suburban/urban farming network that includes facilities and programs for:
 - o Farming
 - o Storing, preparing and packaging food
 - o Consolidating, distributing, delivering and selling food
 - o Disposing/composting/recycling food and packaging
- Create an exploded axonometric drawing of a proposed urban farming and distribution facility that could serve as a model for other facilities across the GTHA, and that illustrates the systems and complexity of the farming and distribution processes. This diagram should include the same elements listed in the detailed plan above, and indicate:
 - o Ideal location for these facilities, taking into account growing conditions (sun, wind, temperature control)
 - o Types of crops and livestock
 - o Energy and water production and consumption
 - o Waste cycle
 - o Jobs required including positions for community participants, volunteers, students
 - o Methods of distribution including vehicles, packaging, how produce will be sold and transported home
 - o Create user-scenarios from the perspectives of the farmer, the consumer and other actors in the supply chain.
- Include a breakdown of the food products that will be cultivated, amounts and the radius or percentage of population that the urban farm will be capable of supplying.
- Create a promotional program that educates the public about supporting, accessing and participating in local food production.
- Develop a business model and case for the urban farm network that competes with and supplements the current global food supply chain.



96% of North America's food has traveled over 1000 miles and requires 1 gallon of fossil fuel for every 100lb being transported.

SOURCE: THE WASHINGTON POST

GENERAL CONTEXT

THE PAST

The evolution of modern agriculture

The evolution of global agriculture has been characterized by the use of scientific methods and new technologies to feed ever larger populations. Agricultural production increased four fold between 1820 and 1975 to feed a constantly growing population.¹ Beginning in the 20th century, fossil fuels played a key role in producing increased yields and greater productivity through the use of mechanized farm equipment that enabled the scale of food production to increase drastically. During this period, the number of people involved in farming decreased significantly as farming practices became more efficient and much of the labour was done using modern machinery. There was also an increase among the processing of food products underwent as well as the transfer of foods over increasingly longer distances. These developments provided more diversity in the available food products in areas throughout the world.

As the world's population and wealth continued to increase after WWII, farmers were encouraged to maximize yields. As the efficiency of farms increased and the cost of transportation decreased, food products were able to travel greater distances than ever before, allowing agricultural land to be pushed further away from city centres. Agricultural land continues to be pushed further from city centres due to the immense urban sprawl that is still occurring in many cities in North America.

More recently, we have seen a growing demand for local and organic food products, and we are becoming more aware of the effects that food transportation and preservation are having on both our health and natural environment.

A brief history of food distribution networks

Since the industrial revolution, new agricultural machinery and farming methods have allowed for greater economies of scale and mass production to take root on farms. During this period, innovations such as the railroad and the shipping container radically transformed the movement of goods and food products around the world by enabling products to be shipped from boat to train and distributed to cities connecting to the developed rail networks.

In the 20th century, additional transportation networks further aided the distribution of goods throughout the world. Most of these advances were a direct result of advancements in the combustion engine and affordability of the automobile, which resulted in expansive road networks and highways.

When did urban farming become more prevalent and how has it evolved?

Urban agriculture is not a new concept; before the industrial revolution, "urban farms" were a common means for food production and supply within cities. In more recent times, the benefits of urban agriculture have been extolled during periods when food supplies were deemed to be uncertain. During both World Wars, "Victory" gardens were set up in public parks and on private property to help feed people in urban areas and to help ease the pressure put on farms that were needed to support the war effort.² Today urban farms are being adopted in response to the ever-increasing population in urban areas.

What is food security?

The World Health Organization defines food security as existing "when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life." The concept of food security is defined as including both physical access and economic access to food that meets daily dietary needs as well as their food preferences. The latter is especially important in cities with a diverse population where people's ethnicities and religious beliefs vary.³ The Centre for Studies in Food Security at Ryerson University works with the following five components of Food Security:

Availability - sufficient food for all people at all times

Accessibility - physical and economic access to food for all at all times

Adequacy - access to food that is nutritious and safe, and produced in environmentally sustainable ways

Acceptability - access to culturally acceptable food, which is produced and obtained in ways that do not compromise people's dignity, self-respect or human rights

Agency - the policies and processes that enable the achievement of food security

THE PRESENT

Why have local farming practices and urban farming solutions become more important?

As urban sprawl continues to consume more valuable farmland close to the densely populated city centres, food is required to travel further distances to reach the end users. Within North America 96% of its supply of food has traveled over 1000 miles and requires 1 US gallon of fossil fuel for every 100 pounds being transported.⁴ Because traditional farming practices require our food to be transported over large distances, the rising price of oil has a big impact on the cost of food. The percentage of each dollar we spend on purchasing food that actually goes to food has been declining for decades.⁵ This also causes increased pollution relating to transport and other related costs. For example, keeping food fresh during transport and the need for farms to produce high yield crops in response to demand has changed agricultural practices by making it necessary to use unnatural fertilizers and preservatives. These practices have been linked to health hazards such as animal diseases spread in intensive livestock systems (avian flu, brucellosis), pesticide poisoning and aflatoxicosis. These risks are then amplified when considering the number of people that are potentially exposed to a single contaminated crop. Current agricultural and farming practices are extremely detrimental to the environment. Food production, processing and transportation are responsible for 8% of the average person's carbon footprint, and 23% of their ecological footprint. We can reduce this by using green space in towns and cities to grow our own fruit and vegetables.⁶

Increased population density in cities requires us to re-evaluate the way we produce food products within cities. By 2015 around 26 cities are expected to have a population of 10 million or more. To feed a city of this size, at least 6,000 tons of food must be imported each day.⁷ Currently, the average North American city has a food supply of only approximately 3 days.⁸

By 2050, nearly 80% of the earth's population will reside within urban areas and the global population will increase by at least 3 billion.⁹ As urban populations increase, creating new farmland in the traditional sense (i.e. crop fields) is no longer a practical option. In response to this many major cities, as well as key United Nations agencies, promote urban agriculture as the most viable solution.¹⁰ This has resulted in a growing urgency to create solutions for improving food and nutritional security for urban populations and the need for a system that addresses not only new ways to cultivate food but also a way to cost effectively and sustainably transport it.

THE FUTURE

The benefits of urban farming

The benefits of urban farming can be grouped into three main areas: energy efficiency, health and food quality, and economic benefits.

Energy Efficiency: The most obvious advantage of urban farming is energy efficiency. The current industrial agricultural system requires food to be shipped on average 2,400 km before reaching consumers making the industry one of the biggest consumers of fossil fuels.¹¹ By harvesting food directly in an urban setting, the energy being wasted from transportation is virtually eliminated. Furthermore, the resources needed to allow food to be shipped such as refrigeration and the production of chemical preservatives is another component that is removed when transportation is taken out of the equation.

Health and Quality: Eliminating the need for food to travel before reaching its end consumers can also increase its nutritional value. Because food can be consumed the same day it is harvested there is no need to add chemical preservatives, which have been linked to health issues such as cancers and the degradation of the nutritional qualities of some foods.¹² Secondly, because urban farms can be multiplied throughout urban areas their size can remain comparatively small eliminating the need to use genetically modified high yield crops. Smaller farms are also much easier to monitor and control and therefore allow the successful growth of organic plants and animals, removing the need for pesticides as well as synthetic fertilizers and feed.

Economic Impact: Urban farming expands the economic base of the city through production, processing, packaging, and marketing of consumable products. This results in an increase in entrepreneurial activities and the creation of jobs as well as a reduction in the cost of food. Chronic food insecurity has more serious consequences for those dealing with urban poverty.¹³

What is the future of the global agricultural and farming industry?

With a greater percentage of the world's population living in urban centres than ever before (we have just passed the 50% mark and that is expected to increase to 70% by 2030) it is possible to create a closed loop system that utilizes waste to create food. An increased market and demand for local, organic food products in addition to an increased concern for food security within large cities means that urban farming will become more prevalent. Increased awareness of the environmental, socio-economic and health concerns associated with current food distribution and production leads to better planning decisions and increased business opportunities for local entrepreneurs.



Today, over 500 million kilograms of food crops are imported from the United States alone to meet the growing demand of Toronto.

SOURCE: FEEDING THE CITY FROM THE BACK 40

LOCAL CONTEXT

THE PAST

How has agriculture and farming evolved over the past century in Toronto?

Much of the land within the boundaries of Toronto was once used for agriculture. In the past two centuries the agricultural landscape has been steadily replaced by an urban and suburban landscape as Toronto's population grew into the millions. However, since the process of urban expansion began, pockets of agricultural land have remained and other sections of land have been returned to food production. These urban agricultural spaces included Victory Gardens, allotment gardens, backyard gardens, and community gardens, along with some farms that held out to developers longer than their neighbours.¹⁴

How have food distribution networks and the supply chain evolved?

When Toronto was incorporated as a city in 1834, the main transportation systems were via waterways. At this time the city was still very small and it is likely that agricultural land was still in abundance within the city's boundaries. Prior to 1954, the main distribution centre for wholesale food and produce was the St. Lawrence market. However, increased congestion in the downtown core resulted in access issues and the Ontario food terminal at The Queensway and Park Lawn Rd. was built in 1954 at what was then the edge of the city. It is the largest wholesale food and produce distribution centre in Canada and fifth largest in North America.¹⁵ Originally, most of the shipments to the Ontario Food terminal were shipped by rail, however today shipments are mainly received by Truck and sometimes by air via Pearson International airport.¹⁶

THE PRESENT

Types of Crops Grown in Toronto

A wide variety of crops are grown in the city of Toronto, ranging from grains (corn, wheat, oats, alfalfa) to fruit (apples, grapes, pears, plums, apricots) to vegetables (sweet corn, tomatoes, cucumbers, cabbage, peppers and squash.) Several farms in the area also make use of

greenhouses to grow flowers as well as food. There is approximately 7,700 sq. metres of total greenhouse area. There is also a small amount of livestock raised in the city as well.¹⁷

What are the current issues associated with Food Security and transportation that are specific to Toronto?

With the population in Toronto expected to reach over 3 million by 2031, and the surrounding GTA expecting a population of 7.45 million, local agriculture and farming will become an increasing concern to ensure food security, reduce our overall impact on the environment and increase our overall health. As the population grows so does the amount of food that is consumed. Since the growing demand to feed Toronto's population cannot be met by local sources, it will become necessary to import greater amounts of foods. Today, over 500 million kilograms of food crops are imported from the United States alone to meet the growing demand of Toronto.¹⁸ While many of our crops come from places of even greater distances: for example, between 50-60% of all produce consumed in Toronto is imported, mostly from Florida, California and Mexico.¹⁹ Local coordination between distributors and suppliers is also a major issue, contributing to a significant amount of unnecessary food miles. A recent study by the municipality of Waterloo indicates that lack of coordination results in apples being shipped to Nova Scotia from Waterloo, while at the same time similar apples from Nova Scotia are being shipped to Waterloo – a major waste of energy and effort that could easily be avoided.

Creating local food supply and distribution networks can significantly reduce the overall environmental implications and GHG emissions in Toronto. For example, the entire CO2 emissions created by transporting the local food is less than the CO2 emissions for almost any single imported product. The CO2 emissions caused by transporting food locally is 0.118 kg, while the emissions caused by importing those exact same foods is 11kg.²⁰ This is the same pollution that is detrimental to the food production that we require to increase food security within the city.

THE FUTURE

What is the future of food production and distribution in Toronto?

As the facts above illustrate, Toronto is at a point where it must re-evaluate the way food products are produced and distributed in a highly urbanized setting. Food plays a powerful role in promoting health, building strong communities, protecting the environment and strengthening the economic capacity and security of the city.²¹ As we begin to rethink urban farming for the future, there is an urgent need for policy change in this area. New land use strategies that encourage local farming must be devised that can be coordinated with existing distribution networks in order to improve the overall supply chain associated with the food industry. The future of the food system will require greater energy and water efficiency, and more integrated, collaborative solutions that aim to meet the local demand for high-quality, fresh, organic products.

Toronto has the opportunity to develop a sustainable urban food production and distribution system, using the new concepts of industrial ecology (or eco-industrial parks) as the centerpiece of a larger food economy clusters development strategy. This strategy must take into account not just food production, but all of the

ways in which food impacts the urban environment from distribution through to waste management. With regard to how food is distributed, a decline in car ownership in Toronto (down 9% since 1991) and an increased emphasis on sustainable transportation is an opportunity to make food retail in Toronto more accessible to residents who walk, cycle or take public transit.²² The management of food waste is also of great importance. A report completed in the late 90's suggested that the City of Toronto should commit to full recovery of urban food and wet wastes. It states, "We should have a principle of no net loss of urban nutrient resources. These should be transformed into useful production as compost and other products to supply urban horticultural and agricultural production".²³

The following chart shows some of the key factors associated with the existing food industry and how those factors will change in the emerging food system of the future:²⁴

Existing Food System	Emerging Food System
Prioritizes mass production	Prioritizes health
Food is not seen as the business of cities	Food is seen as a strategic vehicle for meeting city goals
Founded on access to cheap fossil fuels	Environmental protection is a cornerstone of food production, processing and distribution
Market forces determine location of food stores	Neighbourhoods are planned with food access in mind
Food pricing unconnected to nutritional benefit	Food pricing favours healthy choices
Food issues carved up into separate government departments and jurisdictions	Food solutions come from collaborative partnerships within and among governments and civil society

MAPS & SITE IMAGES



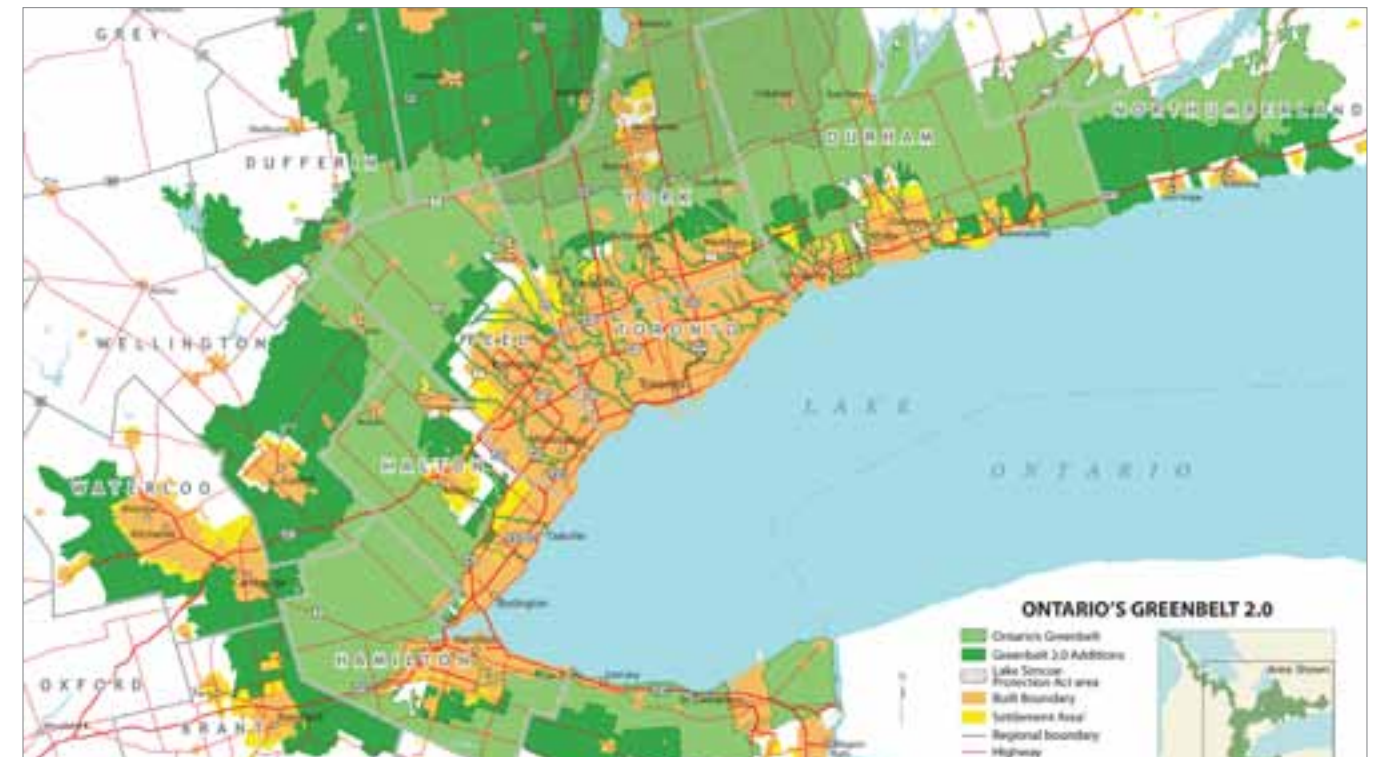
Toronto's portlands in relation to the city



Toronto's portlands taken from Lake Ontario with view on to the downtown core



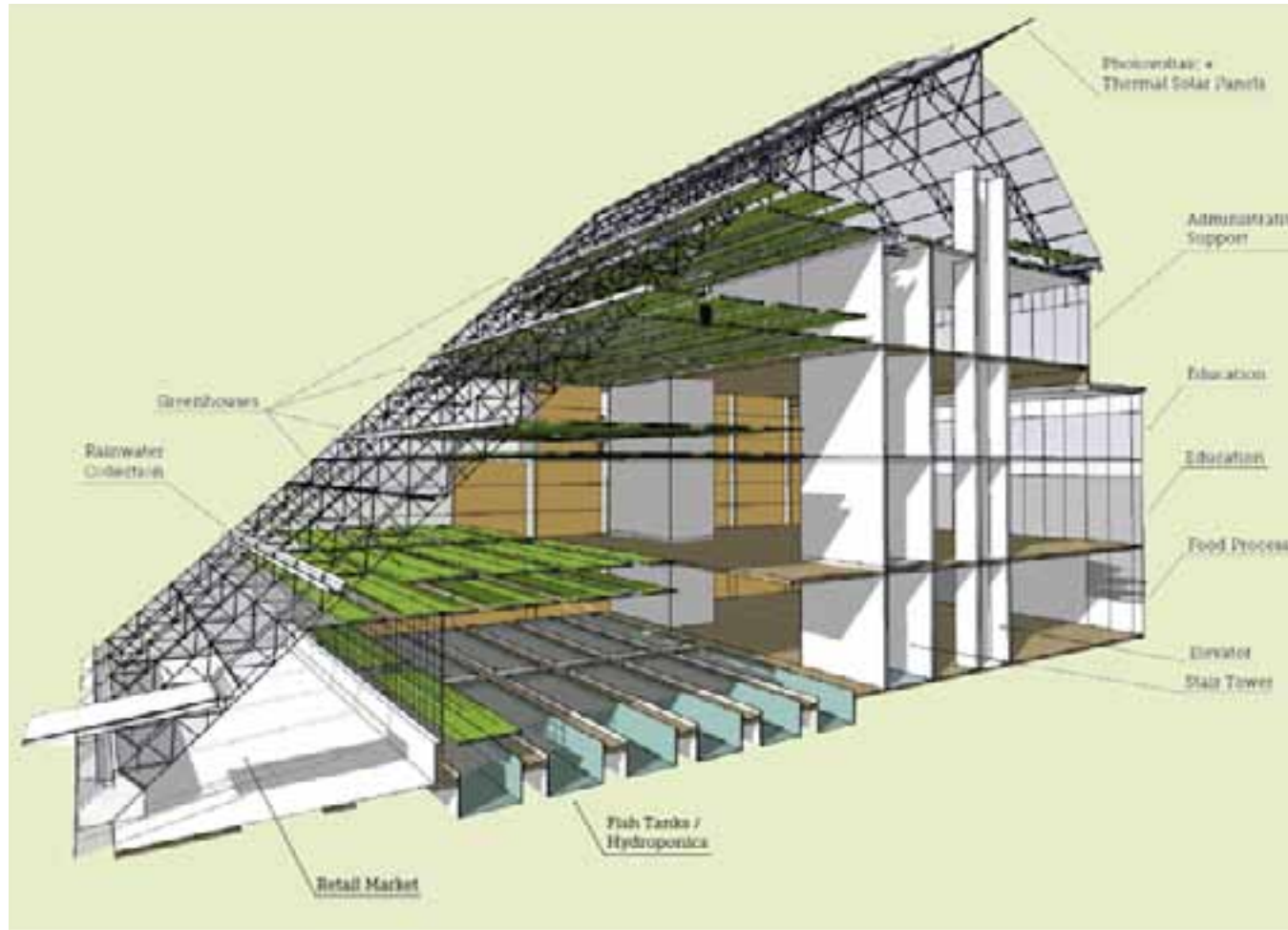
Zoomed in view of the portlands



The Ontario Greenbelt

PRECEDENTS

URBAN FARMING AND EDUCATION



Will Allen – Growing Power

As stated on their website, “Growing Power transforms communities by supporting people from diverse backgrounds and the environments in which they live through the development of Community Food Systems. These systems provide high-quality, safe, healthy, affordable food for all residents in the community. Growing Power develops Community Food Centers, as a key component of Community Food Systems, through training, active demonstration, outreach, and technical assistance.” With multiple urban farms in Milwaukee and Chicago, Growing Power and its founder Will Allen has been a leader in food production and education. As one of the most prominent thinkers in agriculture and food policy, and with a proactive mandate, Growing Power is currently in the process of creating the first five-storey vertical farm in the world.

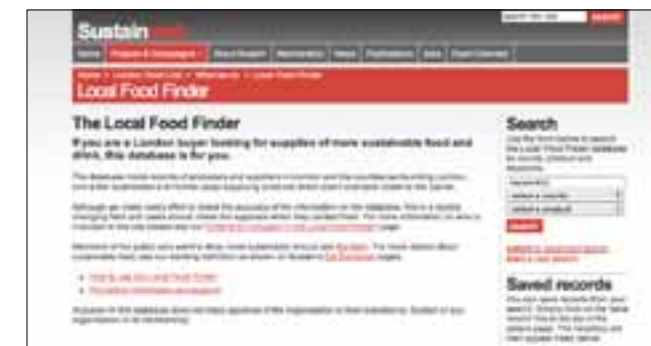
<http://www.growingpower.org/>
<http://www.growingpower.org/blog/>
<http://www.growingpower.org/blog/make-history-be-part-of-the-first-vertical-farm>



Havana, Cuba – Urban Food Strategy

Following the collapse of the Soviet Bloc, Cuba embarked upon a massive redesign of food provision and agricultural systems to reduce dependence on imported agricultural goods. As part of these initiatives, the City of Havana has implemented a comprehensive urban food production plan. Forty-two percent of the land area of this city of 2.2 million is now devoted to food production. The city has approximately 900 gardening groups with about 17,000 members, all involved in growing for their home needs and selling surplus to neighbours through garden vegetable stands.

<http://sustainablecities.dk/en/city-projects/cases/havana-feeding-the-city-on-urban-agriculture>



London, England – Local Food Finder

The Local Food Finder is a database that holds records of producers and suppliers within the city and counties surrounding London, intended to promote more sustainable food networks. The service is offered only to small to medium sized businesses in an effort to promote a greater diversity of food producers and food businesses within the area. Applicable businesses must meet specific criteria, ensuring the companies are local and support more sustainable practices.

http://www.sustainweb.org/londonfoodlink/local_food_finder/



London, England – Making Local Food Work

Making Local Food Work helps people take ownership of their food and where it comes from by providing advice and support to community food enterprises across England. By providing information, advice and support this organization helps enterprises with many of the challenging aspects associated with running a business. They are also working to map local food networks across England.

<http://www.makinglocalfoodwork.co.uk/index.cfm>

YOUR TEAM

CORE TEAM

FACILITATOR: Kar Yan Cheung
Alumni, Institute without Boundaries/ Bruce Mau Design

TEAM EXPERT: Aimee Carson
Community Food Project Manager, Evergreen

TEAM EXPERT: Wayne Roberts
Canadian Food Policy Analyst

LEAD DESIGNER: Christopher Pandolfi
Department of Unusual Certainties (DoUC)

LEAD DESIGNER: Brendan Cormier
Department of Unusual Certainties (DoUC)

DOCUMENTER: Lizzie Gresh
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Student, Institute without Boundaries

YOUR ADVISORS*

Morgan Skowronski
Analyst, Metrolinx

Rhonda Teitel-Payne
Green Barn Manager

Arlene Stein
Director, Visitor Experience for Evergreen Brick Work
Centre for Green Cities

Tim Stoate
VP Impact Investing the Toronto Atmospheric Fund

Heather Wray
Founder of Sky Garden, PhD Student at University of
Toronto

Seema Pabari
President, Tiffinday Inc.

* Please note that advisors may not be available on all
the charrette days.

YOUR STAKEHOLDERS

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Chef - Restaurant Makeover/ Food Network

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Founder of Sky Garden, PhD Student at University of
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Rhonda Teitel-Payne
Green Barn Manager, The Stop

Paul DeCampo
Slow Food Toronto

Dr Mark Gorgolewski
Professor, Director for graduate program in building
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Ryerson University

CHALLENGE 10 NOTES & RESOURCES

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ONLINE

Annotated Google Map
<http://g.co/maps/bnmcc>

GENERAL CRITERIA

Each brief outlines unique site- and project-specific considerations and criteria, but all designs should consider:

ACCEPTANCE

- Acceptance by the province, municipality, residents and associated stakeholders
- Consideration of user and stakeholder needs
- Facilitation of collaboration between public, government and industry in order to effect change
- Alignment with existing government, community and corporate strategies and visions
- Creation of positive social, economic and environmental impacts

AFFORDABILITY AND FEASIBILITY

- Economic capacity of stakeholders
- Alternative and creative funding models where appropriate
- Life cycle assessment and material selection
- Short and long-term planning, implementation and maintenance
- Phasing of proposals to ensure viability

COMMUNITY AND REGIONAL DEVELOPMENT

- Development of complete communities where people can live and work, walk, cycle and use transit
- Contribution to overall identity, livability, vibrancy and growth of the local community and the GTHA region
- Consideration of regional development projections for 2040 (demographics, industry, environment, economy, infrastructure)

CONNECTIVITY

- Increased connectivity within the assigned charrette site
- Increased connectivity to regional GTHA transportation in 2040

RESILIENCY

- Ability to withstand natural and man-made disaster
- Ability to withstand financial and political instability
- Flexibility to meet unknown future needs

CONTEXT

- Physical site constraints
- Cultural factors specific to the region
- Building codes
- Local resources, materials and building typologies

ECONOMY

- Increased and diversified economic capacity of the GTHA
- Increased private investment through attractive and efficient infrastructure proposals that respond to the needs of Ontario's growing economy
- Opportunities for greater prosperity throughout the region through leadership in transportation innovation and efficiency
- Minimized expenditure related to transportation inefficiencies through reduced congestion and increased effectiveness and new technologies
- Creation of new jobs through infrastructure investment and integration of new and green technologies
- Reduced operation and life cycle costs through solutions that are forward thinking, durable and consider future technologies

ENVIRONMENT

- Meeting and exceeding current environmental standards
- Reduced impact on built and natural environments
- Preservation of naturally significant land
- Density rather than sprawl into greenfields
- Reduced CO2 emissions in the GTHA to meet regional and provincial targets through less dependence on the automobile, increased efficiency and integration of new technologies

INNOVATION AND CREATIVITY

- Balance between realistic, feasible designs that respond to user needs and project constraints, and visionary proposals that inspire new thinking and collective action
- Designs that demonstrate interdisciplinary collaboration resulting in new and holistic solutions

INTELLIGENT DESIGN

- Combination of new technological innovations with traditional knowledge and processes to complement daily routines and respond intuitively to our evolving needs

SOCIAL IMPACT

- Increased quality of life
- Increased community cohesion and social activity
- Balance between preserving heritage and culture and creating solutions that address the future
- Balance between individual and collective lifestyle habits
- Increased livability through comfortable, convenient, affordable and attractive solutions that enhance the overall user experience

SUSTAINABLE DESIGN

- Distribution, allocation and management of resources to achieve local and global objectives
- Meeting the needs of today without compromising those of the future

UNIVERSAL AND ETHICAL DESIGN

- Flexibility, simplicity and self-evidence to accommodate various life stages, circumstances and needs
- Designing for all people regardless of size, age or ability, to the greatest extent possible

Transit's Contribution to Quality of Life, developed by the Canadian Urban Transit Association, for "Transit Vision 2040:"

source: www.cutaactu.ca/en/.../CUTABook_Compressed_complete.pdf

	QUALITY OF LIFE ATTRIBUTES	TRANSIT'S CONTRIBUTION TO QUALITY OF LIFE
Society	<ul style="list-style-type: none"> Equity: with equal opportunity for all sectors of society, young or old, rich or poor, urban or rural Lifestyle choice: where people have options in how and where they live, with flexibility to live independently under changing circumstances Freedom of movement Safety and security 	<ul style="list-style-type: none"> Available: to support the full scope of our daily activities (to homes, workplaces, schools and services) Affordable: competitive in cost to other travel options and responsive and flexible: to respond to differing demands and needs of the population Accessible: to meet all stages of living and a diverse set of needs from conventional to specialized transit Safe and secure: where transit is a safer option than driving and there is an orderly and secure environment for travelling Resilient: where transit allows us to continue with our daily activities even during periods of uncertainty or crisis
Culture/ Community Form	<p>Distinctive and vibrant places:</p> <ul style="list-style-type: none"> Supporting identity and sense of place with a varied, human-scale design that encourages activity and allows spontaneity, exploration and exchange Complete communities: offering a variety of opportunities and choice of housing and employment Compact: bringing these opportunities closer together 	<ul style="list-style-type: none"> Quality design: contributing to civilized places and spaces Integration: proximity to land use and harmonious facility design Coverage: allowing choice of home, school and employment Competitive: to minimize automobile use, road needs, parking requirements, etc. (cost, travel time, comfort) Impact reduction: minimizing overall noise, vibration, emissions, and visual intrusions
Economy	<ul style="list-style-type: none"> Enabling activity: trade, mobility of goods and services A capable workforce: available to fill jobs Individual access: to jobs and services 	<ul style="list-style-type: none"> Connecting people and economic opportunities: jobs, shopping, services Congestion management: and its role in reducing vehicle travel Efficient use of resources: both financial and human

	QUALITY OF LIFE ATTRIBUTES	TRANSIT'S CONTRIBUTION TO QUALITY OF LIFE
Economy (continued)	<ul style="list-style-type: none"> Conservation of inputs: using resources efficiently Robust economy: able to adapt to uncertainty and crisis 	<ul style="list-style-type: none"> Spin-off benefits: transit investment by creating jobs in construction, services and manufacturing Resilience: maintain mobility in periods of uncertainty or crisis
Environment	<ul style="list-style-type: none"> Safe, comfortable, clean and conserving communities: safe from environmental hazards and adverse events related to climate change; have clean air, clean water and land; and where there is conservation of resources; and reduction of waste 	<ul style="list-style-type: none"> Reduced air emissions: greenhouse gases and other contaminants Reduced energy consumption: particularly non-renewable petroleum fuels Reduced material consumption and waste Reduced noise emissions All of the above can be achieved through enabling density, modal shift and through cleaner, quieter and more efficient transit operations. Transit also provides resilience, maintaining mobility and response capacity in periods of adverse environmental events.

VISIONS FOR THE FUTURE

Goals developed by Metrolinx, the transportation authority for the GTHA, as outlined in the “Big Move”

source: <http://www.metrolinx.com/thebigmove/en/>

In addition to the criteria, the following measures of success will be useful in developing and evaluating charrette proposals.

TRANSPORTATION CHOICES

People will have a wide range of options available to them for getting around regardless of age, means or ability, including walking, cycling, public transit and automobiles.

COMFORT AND CONVENIENCE

There will be a strong emphasis on the traveler. Getting around will be more convenient with coordinated information, facilities, operations and pricing; more comfort and less crowding; and the highest standard of customer service across the system. Uncertainty regarding travel times and delays will be reduced.

ACTIVE AND HEALTHY LIFESTYLES

Walking and cycling will be attractive and realistic choices for all, including children and seniors.

SAFE AND SECURE MOBILITY

Getting around will be safer and more secure. Parents will feel comfortable allowing and encouraging their children to walk, cycle or take public transit to school.

FAIRNESS AND TRANSPARENCY

Citizens will be active partners in shaping the future transportation system. Decision-making will be transparent and inclusive.

A SMALLER CARBON FOOTPRINT AND LOWER GHG EMISSIONS

The transportation system will operate sustainably within the capacities of – and in balance with – the GTHA’s ecosystems. The GHGs and other harmful emissions related to transportation will be reduced.

REDUCED DEPENDENCE ON NON-RENEWABLE RESOURCES

By reducing our dependence on non-renewable resources, the transportation system will be more resilient. We will be better able to withstand volatility in energy supply and prices, and have more flexibility to switch to new fuels and technologies.

FOUNDATION OF AN ATTRACTIVE AND WELL PLANNED REGION

The transportation system will be a cornerstone of city building, helping to create a region that is a destination of choice for new residents and businesses. The transportation system will help us create valuable, beautiful and attractive places. Roads, streets, transit lines and stations will be designed to benefit both travelers and local residents. The transportation system itself will use less space, and help curb sprawl by supporting more compact and efficient urban forms. Transportation services, particularly transit, will not lag behind population and employment growth.

PROSPERITY AND COMPETITIVENESS

The transportation system will respond efficiently and equitably to the needs of the Ontario economy. It will create opportunities for greater prosperity throughout the region and support Ontario in becoming a leader in attracting the best and the brightest from around the world, especially for new green jobs in the transportation sector. Deliveries, imports and exports will be faster and more reliable thanks to a more efficiently integrated and coordinated transportation system. Residents will be able to get to a greater number of jobs.

MULTI-MODAL INTEGRATION

The transportation system will be fully integrated. It will be easy to make a decision on how to get somewhere or ship something thanks to seamless integration, accurate and timely information, and prices determined in a transparent manner.

INTERCONNECTEDNESS

The GTHA transportation system will be well connected to surrounding regions, the rest of Canada and the world.

EFFICIENCY AND EFFECTIVENESS

The transportation system will be designed to optimize the use of resources and provide better value to households, businesses and governments. Greater emphasis will be placed on moving people and goods, rather than vehicles.

FISCAL SUSTAINABILITY

Funding to build and operate the new and existing system will be sufficient, reliable and predictable. Technology and infrastructure will be selected that promote system productivity and safety, reduces ongoing operating and maintenance costs, and ensures integration across the system.

DELIVERABLES

Each charrette challenge includes specific deliverables, however all teams must produce:

- Statement including: a concept title and summary sentence to explain the ‘big idea,’ objectives, and a 250-500 word description of the design proposal explaining how it responds to the brief, achieves the team’s objectives, and highlighting key innovations
- Summary of the target market
- Plans and elevations of one or more buildings, landscapes or products as relevant
- Site design of the specific location including relationship to existing infrastructure and buildings as relevant
- 3-D physical and virtual model(s) at the most appropriate scale to the project (i.e. site, buildings, vehicles or products)
- Maps and systems diagrams
- User experience scenarios that show how people would interact with the proposal, preferably from more than one perspective. This can be done using methods such as storyboards, performances or walkthroughs
- Branding and target market engagement programs as relevant
- Implementation plan including schedule, key stakeholders, policy decisions, resources required (i.e. labour, materials, infrastructure, financial investment), short and long-term development planning
- Feasibility evaluation such as SWOT or Risks/Threats assessment
- Final presentation followed by the submission of working and final files for use in exhibition



DISSEMINATION



FINAL PRESENTATIONS

SUNDAY, NOVEMBER 13TH, 7PM : SUBMISSION OF DRAFT PRESENTATION

Each team should have a draft of their presentation completed by the end of the charrette. Documenters will organize all digital and hard copies of files, models and working drawings. These must be submitted along with the draft presentation on a USB key to charrette organizers by 7pm.

MONDAY, NOVEMBER 14TH – FRIDAY, NOVEMBER 18TH : PRESENTATIONS FINALIZED

Teams will have the opportunity to revise and fine tune their presentation over the course of this week. Each team will be assigned a graphic design student to work with the lead designer and the rest of the team to ensure that the final presentation conveys ideas clearly and effectively, and that it meets the requirements listed below.

TUESDAY, NOVEMBER 15TH: OPTIONAL CHECK IN

Lead designers and graphic designers can check in to discuss and get feedback from charrette organizers on their draft presentation. These meetings can take place by phone or in person.

FRIDAY, NOVEMBER 18TH, 11PM : SUBMISSION OF PRESENTATION

Final presentations must be submitted as pdfs to movecharrette@gmail.com

SUNDAY, NOVEMBER 20TH, 10:30AM – 4PM : FINAL PRESENTATION

Each team will make a ten-minute presentation on Sunday, November 20, followed by questions from the audience (consisting of other charrette participants, advisors and stakeholders). The order of the presentations will be shared in the week between the charrette and the presentations. Charrette organizers will load and test all presentations ahead of time. Teams should assign 1 to 2 presenters and have them rehearse ahead of time.

Presentations should be 10 minutes in length and must include the following content:

- Team name & member names
- 1-2 slides detailing your challenge, project site, context and criteria
- Design concept title & statement
- Target users and other significant criteria/considerations
- Design rationale (this might include precedents and concept development)
- Designs (schematics, plans & digital 3-D models, programming and content features)
- Systems diagram(s)
- User experience scenarios
- Implementation plan
- Feasibility evaluation
- Other deliverables specific to each brief

Any physical models will be displayed on site.



**PRACTICAL
INFORMATION**

OVERALL SCHEDULE*

NOV 10, 2011: PROJECT KICK OFF @ Wychwood Barns (601 Christie St.)

7:00-7:10pm	Meet and Greet / Networking
7:10-8:10pm	Welcoming Remarks by Geoff Cape (Evergreen) Remarks from Matthew Blackett (Spacing Magazine) Keynote address by George Hazel
8:10-8:30pm	Overview of the Charrette by Luigi Ferrara (Institute without Boundaries - George Brown College)
8:30-9:00pm	Team Meeting (introductions, review the brief, plan for the morning)

NOV 11, 2011: CHARRETTE DAY 01 Morning presentations at 333 King St. E.

8:45-9:20am	Light breakfast (provided) Stakeholder presentation for Shared Spaces (optional for other teams)
9:25-9:30am	Welcome by Geoff Cape, Executive Director, Centre for Green Cities, Evergreen
9:30-10:15am	Presentation by Metrolinx to all teams
10:30am-12:30pm	Stakeholder Presentations (Remembrance Day Moment of Silence at 11:00am)
1:00-2:00pm	Lunch (provided)
Afternoon working sessions at 230 Richmond St. E	
2:00-5:00pm	Team working sessions (project discussion and brainstorming)
5:00-5:30pm	Advisor Welcome
5:30-6:30pm	Advisor sessions with teams (presenting multiple ideas, concepts and vision to advisors for feedback)
6:30-7:00pm**	Team Wrap Up (review feedback, plan for day 2 and 3)

OVERALL SCHEDULE*

NOV 12, 2011: CHARRETTE DAY 02 @ Institute without Boundaries (230 Richmond St. E.)

9:00-9:30am	Light breakfast (provided)
9:30am-12:00pm	Team working Session (concept evaluation and selection of 3 preferred approaches to present to advisors)
12:00-1:00pm	Advisor sessions with teams (presenting 3 proposals for feedback)
1:00-2:00pm	Lunch (provided)
2:00-5:00pm	Team working sessions (concept development and selection of 1 idea to further develop and present to advisors in the morning)
6:00-7:00pm	Team Wrap Up (review feedback and progress, plan for day 3)
7:00-8:00pm**	Dinner (provided)

NOV 13, 2011: CHARRETTE DAY 03 @ Institute without Boundaries (230 Richmond St. E.)

9:00-9:30am	Light breakfast (provided)
9:30-10:30am	Advisor sessions with teams (teams present selected proposal to advisors for feedback)
10:30am-1:00pm	Team working sessions (design development, creation of visuals, concept statements and supporting documentation)
1:00-2:00pm	Lunch (provided)
2:00-5:00pm	Team working sessions (further design development and preparation of presentation)
5:00-6:00pm	Optional advisor sessions with teams (reviewing presentation)
6:00-7:00pm**	Team Wrap Up (review feedback, finalize presentation and deliverables, plan for the presentation day on November 20, 2011 at Brickworks)

* The schedule is subject to change. The charrette organizers will notify your team's facilitator of any such changes.
** Workspaces will be available to teams outside of formal charrette hours.

* The schedule is subject to change. The charrette organizers will notify your team's facilitator of any such changes.
** Workspaces will be available to teams outside of formal charrette hours.

OVERALL SCHEDULE*

NOV 15, 2011: OPTIONAL CHECK IN

@ Institute without Boundaries (230 Richmond St. E.)

Lead designers and graphic designers can check in to discuss and get feedback from charrette organizers on their draft presentation. These meetings can take place by phone or in person.

Contact movecharrette@gmail.com to schedule a time.

NOV 18, 2011: SUBMISSION OF PRESENTATION

to movecharrette@gmail.com

By 11:00pm Submission of final digital presentation (pdf) to charrette organizers

NOV 20, 2011: FINAL PRESENTATIONS

@ Evergreen Brick Works BMO Atrium (550 Bayview Ave.)

10:30-11:00am	Tour of the Kiln Building
11:00am-11:10am	Welcome Remarks
11:10am-12:30pm	3 teams present (10 mins/ presentation followed by Q & A)
12:30pm-1:15pm	Lunch
1:15-2:55pm	4 teams present (10 mins/ presentation followed by Q & A)
2:55-3:05pm	Break
3:05-4:15pm	3 teams present (10 mins/ presentation followed by Q & A)
4:15-4:20pm	Closing Remarks

* The schedule is subject to change. The charrette organizers will notify your team's facilitator of any such changes.



NOV 11/2011: STAKEHOLDER PRESENTATIONS

CHALLENGE 01 & 02: BEYOND THE CAR & ENERGY WAY

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-11:00am	There will be 3 x 10 mins presentations during this time. Presenters include : Martin Rovers (Director, Better Place Canada), Josh Tzventarny (Director of Operations and Planning, Plug'nDrive Ontario), Cara Clairman (Plug n' Drive), Anthony Santilli (Vice President, Sales and Marketing, Bullfrog Power Inc.)
11:00am	Remembrance Day Moment of Silence
11:02-11:20am	Q & A and discussion for first 3 presentations
11:20am-12:20pm	There will be 4 x10 mins presentations during this time. Presenters include: Kevin McLaughlin (President, Auto Share), Joe Durzo (VP Sales & Marketing, Solar Tech North), Nicholas Parker (Parker Venture Management Inc.) and Richard Brown (CEO, Rogue Specialty Transport). Q & A and discussion will follow the presentations

CHALLENGE 03: RECONNECT

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-10:50am	Presentation by Deborah Cowen (Assistant Professor, Geography and Planning, University of Toronto) followed by Q & A
10:50-11:00am	Presentation by Leslie Gash (Senior Development Manager, Toronto Community Housing)
11:00am	Remembrance Day Moment of Silence
11:02-11:10am	Q & A and discussion for first 2 presentations
11:10am-11:30am	Presentation by Paul Dowsett (Architect, Sustainable TO) followed by Q & A
11:40am-12:00pm	Presentation by Bern Grush (BG and Associates) followed by Q & A
12:00-12:20pm	Presentation by Christopher Norris (CUTA) followed by Q & A

CHALLENGE 04: HUBURBIA

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-11:00am	Presentation by Brian Titherington (Senior Project Engineer, VIVA) and Praveen John (Senior Project Engineer, VIVA)
11:00am	Remembrance Day Moment of Silence
11:02-11:30am	Presentation by Sandra Kaiser (Vice President, Corporate Affairs, Smart Centres) and Paula Bustard (Director Land Development, Smart Centres)
11:30-11:50am	Presentation by Diana Birchall (Director of Policy and Planning, City of Vaughan) followed by Q & A
11:50am-12:10pm	Presentation by Tonya Surman (Executive Director, Centre for Social Innovation)
12:10-12:30pm	Presentation by Sony Rai (Sustainable Vaughan)

CHALLENGE 05: SHARED SPACES

Location @ 333 King St. E.

8:45am	Light Breakfast (provided)
9:00am	Presentation by Councillor Joe Mihevc (Room 517)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-10:50am	Presentation by Paul Bedford (Former Chief Planner, City of Toronto) followed by Q&A
10:50-11:00am	Presentation by Yvonne Bambrick (Cycling Consultant, Coordinator Kensington Market BIA) followed by Q & A
11:00am	Remembrance Day Moment of Silence
11:02-11:10am	Q & A following above noted presentation
11:10am-11:20am	Presentation by Ryan Whitney (Complete Streets Research and Project Manager, TCAT [Toronto Coalition for Active Transportation])
11:20am-11:40am	Presentation by Erin Wood (Eco School Specialist, Toronto District School Board)
11:40am-12:00pm	Presentation by Bern Grush (BG and Associates) followed by Q & A

NOV 11/2011: STAKEHOLDER PRESENTATIONS

CHALLENGE 06: MEGA METRO

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-10:50am	Presentation by Steven Erwin (Head, ITS Policy, Planning & Programming, Ontario Ministry of Transportation) followed by Q & A
10:50-11:00am	Presentation by Richard Gilbert
11:00am	Remembrance Day Moment of Silence
11:02-11:10am	Q & A following above noted presentation
11:10-11:30am	Presentation by Louisa Mursell (Project Manager, Transportation Options) followed by Q & A
11:30-11:50am	Presentation by Joe Hynes (Director of Transportation in Canada, UPS) and Amgad Shehata (VP of Public Affairs, UPS) followed by Q & A
12:05-12:25pm	Presentation by Bern Grush (BG and Associates) followed by Q & A

CHALLENGE 07: LOW CAR^B DIET

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-10:50am	Presentation by Brian Hollingworth (Director, IBI Group) followed by Q & A
10:50-11:00am	Presentation by Brian Lee (Senior Manager Development Engineering & Transportation, Engineering, Town of Markham)
11:00am	Remembrance Day Moment of Silence
11:02-11:15am	Q & A following above noted presentation
11:15am-11:55am	Presentation by Beth Jones (Associate Director, Green Communities Canada) followed by Q & A
11:55am-12:15pm	Presentation by Alison Minato (Vice President, Sustainability at Minto Group) and Wells Baker (Manager of Sustainable Developments, Minto Group) followed by Q & A

CHALLENGE 08: BOOMING AROUND

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-10:50am	Presentation by Glenn Miller (Vice President, Education & Research Canadian Urban Institute) followed by Q & A
10:50-11:00am	Presentation by Scott Haskill (Senior Planner - Transit Service, Toronto Transit Commission)
11:00am	Remembrance Day Moment of Silence
11:02-11:15am	Q & A following above noted presentation
11:15-11:45am	Presentation by Fiona Chapman (Manager, Pedestrian/Projects, City of Toronto) followed by Q & A
11:45am-12:10pm	Presentation by David Anselmi (Senior Vice President, Development and Sustainability, Downsview Park) followed by Q & A

CHALLENGE 09: GREENWAYS & WATERWAYS

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) presenting on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-10:50am	Presentation by Robert Plitt (Senior Manager, Sustainability, Evergreen) followed by Q & A
10:50-11:00am	Presentation by Paul Bedford (Former Chief Planner, City of Toronto)
11:00am	Remembrance Day Moment of Silence
11:02-11:15am	Q & A following above noted presentation
11:15am-11:35am	Presentation by Marlaine Koehler (Executive Director of the Waterfront Regeneration Trust) followed by Q & A
11:35am-11:55am	Presentation by Paul Young (Principal, Public Space Workshop) followed by Q & A

NOV 11/2011: STAKEHOLDER PRESENTATIONS

CHALLENGE 10: FOOD NOT CRUDE

Location @ 333 King St. E.

8:45-9:20am	Light Breakfast (provided)
9:25am	Welcome by Geoff Cape (Executive Director, Centre for Green Cities, Evergreen)
9:30-10:15am	Antoine Belaieff (Director Innovation, Metrolinx) present- ing on The Big Move to all teams, followed by Q & A
10:15-10:30am	Teams break into individual rooms. Team members will be escorted by charrette organizers
10:30-10:40am	Presentation by Brad Long (Chef, Brad Long Cafe)
10:40-10:50am	Presentation by Heather Wray (Founder of Sky Garden, PhD Student at University of Toronto)
10:50-11:00am	Q & A following above noted presentations
11:00am	Remembrance Day Moment of Silence
11:02-11:30am	Presentation by Dr Mark Gorgolewski (Director for graduate program in building science, Ryerson University) followed by Q & A
11:30-11:50am	Presentations by Rhonda Teitel-Payne (Green Barn Manager, The Stop) followed by Q & A
11:50am-12:10pm	Presentations by Paul DeCampo (Slow Food Toronto) followed by Q & A





TOOLS & METHODS

RESPONSIBILITIES & TASKS

One of the reasons teams are better at creative projects is that everyone shares the responsibility for having great ideas, brainstorming and building on each other's ideas. A good team player is always prepared to offer their help on whatever needs to be done to make the project the best it can be, and is willing to take responsibility for getting tasks done. In this sense, good team members understand both how to lead and follow.

Your team facilitator will help the group break down the creative work into tasks that different members of the team can take on. Each team will have members from a variety of different backgrounds and with a range of different skills. It is critical to your team's success to evaluate what all the skills are and design your tasks to fit these different skill sets.

FACILITATION

The facilitator is responsible for keeping the project on track, assigning roles to the members of the team and ensuring consistency between the different elements of the design. They will coordinate project communication materials and ensure that results come together in a unified final presentation. They will contribute ideas, knowledge and other skills as necessary. Every facilitator has experience in IwB charrettes and will serve as the team's point person for communication with charrette organizers.

DESIGNER

The lead designer is responsible for developing the design concept in partnership with the transportation expert and with the support of the rest of the team. The designer will bring their expertise in sustainability, transportation, and community engagement to ensure that the proposal responds to the brief in a manner that is compelling, visionary and feasible. The lead designer will spearhead the visualization of the proposal and oversee the development of design deliverables, from drawings and plans, to models and presentation materials. They will provide guidance for developing other supporting documents such as user experience scenarios and budgets.

TRANSPORTATION EXPERT

The transportation expert will work closely with the lead designer to guide the concept development. The expert will contribute information and resources about the charrette challenge, issues of sustainability and transportation, best practices, current trends and stakeholder needs. The transportation expert will help to ensure that the team proposal is both innovative and feasible, and takes into account the constraints of the site and the future requirements of the community. The expert will ensure that proposal content is accurate and that the rationale behind the design is strong. The transportation

expert will provide guidance for supporting documents such as implementation plans, policy recommendations and budgets.

DOCUMENTER

The documenter will record the creative process, capturing different charrette activities and discussions using photography and text. On each of the 3 charrette days, the documenter will post at least one entry to the charrette blog, providing an overview of the team's progress so that the general public and stakeholders can give feedback on the design, and raising awareness and excitement about the charrette. Following the charrette, the documenter will organize the team's files so that they may be transformed later into materials for exhibition and publication.

GRAPHIC DESIGNER

George Brown Studio Lab graphic design students and alumni will be responsible for assisting with all graphic design elements of the team's proposal. This may include proposal elements such as any branding or graphic standards, logos, wayfinding systems, etc. In particular, they will be responsible for ensuring that the final presentation is engaging, consistent, of a high graphic standard, and effective in communicating the essence of the team's proposal.

OTHER TEAM MEMBERS

Each team will include three to five professionals and students who will bring additional skills in design, business and transportation. They will contribute to the overall concept and design development, and execute particular elements of the proposal such as 3-D and virtual models, technical drawings, systems diagrams, video, budgets, materials sourcing, implementation plans, and the final presentation.

ADVISORS

The advisors will visit their assigned teams three times during the charrette. They will review the team's work, commenting on concepts, design development, final proposals and presentation materials. The advisors will provide insight, support and feedback based on their knowledge of the specific challenge, site and community.

STAKEHOLDERS

Representatives from community groups, industry and government will make presentations to teams on the morning of Friday, November 11th. They will also comment on charrette progress by visiting the charrette web site over the weekend and during the week leading up to the final presentations. Stakeholders may also attend the presentations.

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SKILLS ASSESSMENT

Spend some time at the beginning of the project getting to know each other. Go around the group and have people list their skills, strengths and abilities and record them on a flipchart for easy reference later. Be detailed! If you are a photoshop montage master, a talented hand-illustrator, or a math wizard, be sure to let the team know.

RESEARCH

Teams are encouraged to conduct additional research in the weeks leading up to the charrette. Each team will be given background research with their design brief, as well as links to more information, and a USB key with additional reports. Stakeholders will visit on the first morning of the charrette to provide their perspectives on the challenge and relevant issues. Teams may want to prepare questions ahead of time to ask of stakeholders. Teams will also be provided with maps and photographs of their site. Nevertheless, teams may want to visit the sites in person before the charrette begins, and may want to assign particular tasks and lists of specific information to gather.

DESIGN

Everyone is responsible for contributing design ideas during the brainstorming phase! After the brainstorming phase, use the skills assessment to assign people design development tasks like producing design sketches, 3-D models and technical drawings. The people selected for these roles should have a strong design sense and skill at hand-drawing and digital and physical modelling.

PLANNING

A good sustainable design is only as strong as its implementation plan. This means you must consider the practical aspects of the design such as phasing, implementation and evaluating costs and revenues.

COMMUNICATION

A great design needs a great communication strategy. During the design development phase, take the time to consider how you will tell the "story" of your design, and begin planning how you will do this. This may include producing high-quality sketches, renderings and drawings, sketches and 3-D models that convey the design strategy, and creating storyboards and scenarios that communicate the design in action. A good narrative structure for the final presentation is key to the communication strategy.

BRAINSTORMING



Overview

Brainstorming is the most vital part of the charrette process. Great ideas generated at this stage are the foundation that the rest of the design process will build upon. Your team leader will use some or all of the following brainstorming techniques with you to get the creative process started, and you'll soon find that once the ideas begin to flow, you'll be engaging in an energetic and creative discussion. The goal here is to create a huge number of ideas that you can pick and choose from later, so don't waste time on criticism, elaboration or evaluation at this stage. Come up with ideas quickly, record them and keep going to come up with even more new ideas! Review your ideas and if they are too alike, think up new ones that are meaningfully different and unique.

THE FLIP

This brainstorming technique is a fun and effective way to get ideas flowing. Make a list of the barriers you want to address and then identify a really terrible way to address each one. Once this is done, go back and "flip" each one, identifying the opposite of all the bad ideas. This helps everyone see these situations from a different perspective and can be a powerful way to generate creative concepts.

FAR OUT

Take a safe idea and push it to the extremes: the wilder and crazier the better! Don't discard or discount any ideas at this stage, no matter how unrealistic they seem. A wild idea can be pulled back to create a moderate idea much more imaginatively than a safe idea can be pushed in the other direction.

100 IDEAS

Generate 100 ideas! Have each group member write their ideas on sheets of letter paper in large type, no more than 50 words per idea. Each idea should be accompanied by a sketch or precedent photograph.

ARCHETYPING

What are you really trying to design? Jump scale and get to the deeper meaning: Instead of trying to design a better chair, think about what a chair really means. Break the design challenge down to its basic archetype and consider the act of sitting or at a more basic level, the human need for rest.

Tips

Below are some tips to remember during the process of brainstorming

STAY POSITIVE

No matter how terrible an idea sounds, don't waste time debating or criticizing during the brainstorming session. Sometimes what seem like terrible ideas at first inspire the very best ideas later on.

KEEP A RECORD

Don't forget to record every idea you generate and put them up for later review. Write big, use short and catchy phrases and use diagrams and sketches to illustrate your ideas. If someone else is talking and you can't wait to share the idea, grab a marker and jot it down for yourself.

QUANTITY NOT QUALITY

The goal of brainstorming is to create as many ideas as you can. The more ideas you generate at this stage, the more great options you will have to choose from later.

COMBINATION IS KEY

Look for ways that ideas and concepts can be combined to make unique, new ideas. Identifying new combinations is the key to great innovation.

DON'T ELABORATE

It's always tempting to take a great idea and run with it during the brainstorming process, figuring out how it would work and considering the positive effects it could have. This is definitely something you will do later in the process, so don't worry about getting everything perfect right away, it can take time away from the goal of creating as many ideas as possible.

SYSTEMS AND TOOLS



Practicing sustainable design requires tools and systems that teams can use to ideate, develop and evaluate during the process. The Institute without Boundaries develops such tools as a part of their practice, and uses the Worldhouse and City Systems matrices to design and evaluate.

Teams should also consider using other sustainable design principles, tools and systems to guide their designs. Some of these are included here, such as the Hannover Principles, the Natural Step, and the Five Principles of Ecological Design. Discuss with your team which tools are most appropriate to help you generate more innovative, holistic designs and to help them audit the quality of the final product.

World House Matrix

From 2006 to 2009, the IwB worked on the World House Project, developing housing systems that operate on the principles of sustainability, universality, technological responsiveness and ecological balance. Rather than approaching the challenge of new housing needs purely from the perspective of architecture and technology, the IwB has developed a holistic approach called the World House Matrix. Organizing the basic elements of housing design into twelve systems provides a simple, easy-to-understand method of investigating the impact of the built environment on many aspects of our lives. The IwB uses the Matrix primarily for housing design challenges, although it can be adapted to suit other scenarios.

A full World House Matrix Workbook is included digitally on your team's project USB Key.



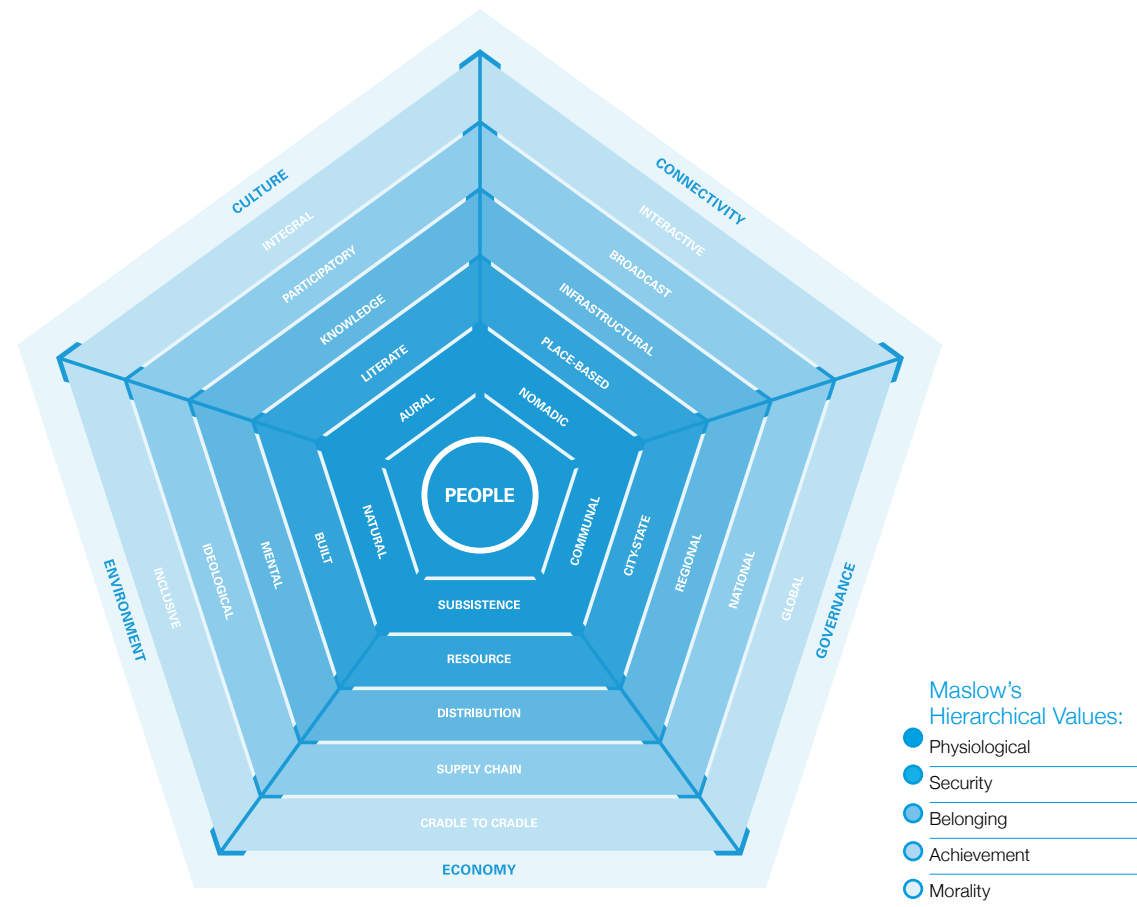
City Systems 1.0

This tool is a framework for organizing information to better understand the elements that shape a city, and the different ways they can be configured or combined to improve the urban landscape. This framework is a model for thinking of a city as a series of interconnected relationships. By looking at urban issues at different scales, this framework can be applied to problems that range from a citizen looking to improve their local park, to an urban professional working on the redevelopment of a brownfield site. Using this tool you will be able to:

- Understand the different systems that make up a city
- Understand the ideal principles of a city
- Identify gaps and problems within your city or neighbourhood

- Create relationships that address weaknesses and build upon strengths within your city or neighbourhood

The City Systems Framework has seven Characteristics, represented in the inner coloured circles of the above graphic, and fifteen City Systems, represented in the outer loop of the graphic. Characteristics are ideal principles that a city should aspire to, while systems are what makes a city function.



City Systems 2.0

The second year of the City Systems project (2010-2011) used this new evolving matrix to identify and understand what makes a city resilient. The IwB worked with the City of Lota in Chile to understand the effects of economic collapse and natural disaster. This provided an opportunity to test and advance the City Systems year one matrix.

The matrix is a framework tool to propose immediate solutions and to forecast the future needs of citizens, industry and the environment.

The team focused on the systems and characteristics that make up a resilient city and the relationship between residents and their natural environment. This resulted in a Resilient City framework that helps to identify the importance of collaboration, knowledge transfer and revitalization catalysts and, in particular, the need for community actors.

Resilience is a process that is dictated by a hierarchy of needs. Once a level is attained in the hierarchy of needs, actions must be taken in order to reach the next level of resiliency.

ENVIRONMENT: The goal is to reach a state that goes beyond the basic needs of survival to one that is of a high quality of life that meets the physical, social and emotional needs of a person and city.

CULTURE: This is the quest of reaching a community's full potential. This is the process that continues to grow with new opportunities to create a resilient city.

CONNECTIVITY: Once a person's physiological and safety needs are met, social needs and the need to belong are important motivators. Interacting with others will create a community that changes to reflect the future needs of the city.

GOVERNANCE: Once individuals feel they belong to a community, the need to attain a level of importance emerges. A city's success lies in its reputation and recognition to foster multiple levels of development, creating a prosperous community.

ECONOMY: Once physiological needs are met, a citizen's safety and security must be addressed. A city must rise to a state of wealth and abundance so that citizens' physical and emotional well-being are assured.



Timelining Tool

Timelining is a good research, project management and communication tool.

Timelines are often used to help people understand events and trends. In this respect they can also be used, to some extent, to forecast what might occur in the future.

With project management, timelines help people know what milestones need to be achieved and under what schedule, helping to determine phased approaches to large projects.

At the IwB, timelining has been used as a design tool within individual projects and charrettes. The following timeline can be found on www.worldhouse.ca under World House Year 1.

PATTERNS IN HOUSING (THE SYSTEMS TIMELINE)

Students developed a linear timeline to explore the interaction and evolution of trends in housing throughout history and cultures. The timeline illustrates 12 systems needed in every home regardless of location and culture, over the last 8000 years and provokes the viewer to predict key trends for the future.

MOUNT DENNIS TIMELINE FOR CHANGE

This timeline mapped out a phased approach to community-led revitalization of the Mount Dennis community in Toronto. This timeline emphasized the idea of scalable action so that inhabitants could bring about change quickly and with limited resources, but strategically build towards a bigger goal and long term plan for the community.

Community Roles

A technique used by the IwB is called “Community Roles”. Defining community roles helps residents and stakeholders to understand the informal and formal contributions of various community members. This facilitates a collaborative process and makes it easier for each group to acknowledge and coordinate efforts and to determine what skills they still need.

A complete breakdown of the Community Roles by World House Year 2 is included digitally on your team’s project USB Key.



The Wise One

The Wise One is sought out for empathy and advice. He or she is open-minded and listens without making a moral judgement but then sets people on the right path.



The Cautionist

The Cautionist stops the community from making big mistakes. He or she is often unpopular, but plays an important role in preventing the community taking ideas too far and too fast.



The Navigator

Acting as the conscience of the community, the Navigator ensures that others don’t stray from the correct path.



The Visionary

The Visionary can enliven and animate communities. Visionaries deal in ideas and have a keen interest in having the community take up their thoughts.



The Guardian

Guardians protect the community. To function effectively and ensure the safety of the community, Guardians need to gain people’s trust and cooperation.



The Naturalist

Naturalists take personal responsibility for the local environment. A Naturalist might decide to protect a local species or fight to maintain an area of special environmental interest.



The Caretaker

Caretakers have a personal relationship with the place they care for. They are commonly self-directed and act through a sense of ownership or belonging to place.

Scenario Planning

source: www.paularojas.com/scenario-planning-may-be-used-in-a-variety-of-disciplines/

Scenario planning in design practice refers to the creation of a hypothetical narrative illustrating a usage event or series of events. In user-centered design, personas are frequently used by design teams to represent archetypal users of the product or service being designed.

Whereas a persona characterizes a user’s needs, goals, and motivations, scenarios are used to animate the persona through a realistic though fictional event crafted to ground the designers in the world inhabited by the user. In other words, personas portray motivation, while scenarios portray context.

For example, in an airport terminal redesign project, the team might create a story about a business person named Susan, traveling with a garment bag and a laptop bag, whose goals are to check in with minimal effort, grab a quick, healthy meal, and check her e-mail messages before boarding.

Susan’s scenario would be constructed to walk her through the steps and obstacles associated with reaching these goals. The designers can refer to Susan, among the other personas and travel scenarios constructed, when planning the redesign. Scenario planning is most often performed early in the design process to help orient the design team.

Key techniques to illustrate scenario planning can include storyboards, high or low fidelity prototypes, or simple text-based narrative.

Principles for Creating Great Community Places

1. THE COMMUNITY IS THE EXPERT

The important starting point in developing a concept for any public space is to identify the talents and assets within the community.

2. CREATE A PLACE, NOT A DESIGN

The goal is to create a place that has both a strong sense of community and a comfortable image, as well as a setting, activities and uses that collectively add up to something more than the sum of its often simple parts.

3. LOOK FOR PARTNERS

They are invaluable in providing support and getting a project off the ground. They can be local institutions, museums, schools and others.

4. YOU CAN SEE A LOT JUST BY OBSERVING

We can all learn a great deal from others’ successes and failures. Looking at how people are using (or not using) public spaces and finding out what is liked and disliked, makes it possible to assess what makes them work.

5. HAVE A VISION

An idea of what kinds of activities might be happening in the space, a view that the space should be comfortable and have a good image, and that it should be an important place where people want to be. It should instill a sense of pride in the people who live and work in the surrounding area.

6. START WITH THE PETUNIAS

Lighter, quicker, cheaper elements such as seating, outdoor cafes, public art, striping of crosswalks and pedestrian havens, community gardens and murals are examples of improvements that can be accomplished in a short time.

7. TRIANGULATE

In a public space, the choice and arrangement of different elements in relation to each other can put the triangulation process in motion (or not).

8. FORM SUPPORTS FUNCTION

The input from the community and potential partners, the understanding of how other spaces function, experimentation, and overcoming the obstacles and naysayers provides the concept for the space. Although design is important, these other elements tell you what “form” you need to accomplish the future vision for the space.

9. MONEY IS NOT THE ISSUE

Once you’ve put in the basic infrastructure of the public spaces, the elements that are added that will make it work (i.e., vendors, cafes, flowers and seating) will not be expensive. In addition, if the community and other partners are involved in programming and other activities, this can also reduce costs.

10. YOU ARE NEVER FINISHED

Being open to the need for change and having the management flexibility to enact that change is what builds great public spaces and great cities and towns.

Creating Personas

source: <http://interactivereflection.wordpress.com/2011/03/20/planning-personas-scenarios/>

Personas are fictional characters created by the designers. When creating a persona there are five key questions that should be asked:

- What would they be like?
- How would they react to the product?
- How would you describe the product to a friend?
- How is it different to other products?
- Which celebrity is the product most like?

After creating a persona, a scenario should be created to visualize customers actually interacting with the product and address the issues that might arise when doing so. A scenario is a narrative that describes foreseeable interactions of types of users (characters) and the system. It includes goals, expectations, motivations, action and reactions.



Human-Centred Design

source: www.ideo.com/images/uploads/.../HCD_INTRO_PDF_WEB_opt.pdf

Human-Centered Design (HCD) is a process and a set of techniques used to create new solutions for the world. Solutions include products, services, environments, organizations, and modes of interaction.

The reason this process is called “human-centered” is because it starts with the people we are designing for. The HCD process begins by examining the needs, dreams, and behaviors of the people we want to affect with our solutions.

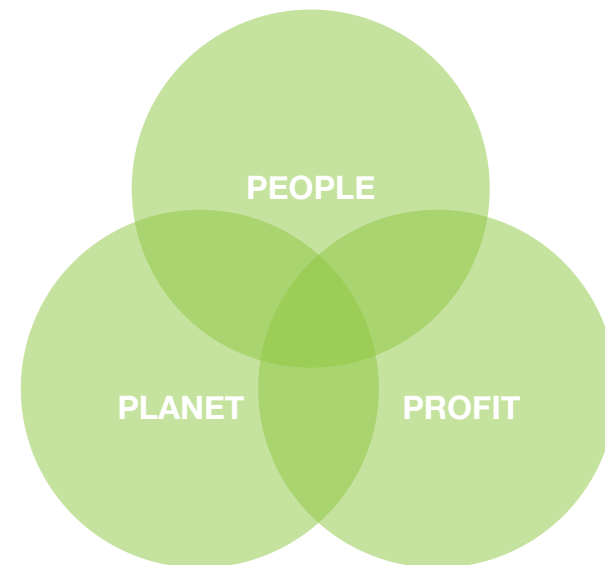
We seek to listen to and understand what they want. We call this the Desirability lens. We view the world through this lens throughout the design process.

Once we have identified a range of what is Desirable, we begin to view our solutions through the lenses of Feasibility and Viability. We carefully bring in these lenses during the later phases of the process.

Triple Bottom Line

source: www.mcdonough.com/writings/design_for_triple.htm

This design perspective creates products that enhance the well being of nature and culture while generating economic value. Design follows the laws of nature to give industry the tools to develop systems that safely generate prosperity. Materials become food for the soil or flow back to industry forever. Value and quality are embodied in products, processes and facilities so intelligently designed, they leave footprints to delight in rather than lament. When the principles of ecologically intelligent design are widely applied, both nature and commerce can thrive and grow.



The Hannover Principles

source: www.mcdonough.com/principles.pdf

The Hannover Principles aim to provide a platform upon which designers can consider how to adapt their work toward sustainable ends. Designers include all those who change the environment with the inspiration of human creativity. Design implies the conception and realization of human needs and desires.

1. Insist on rights of humanity and nature to coexist in a healthy, supportive, diverse and sustainable condition.
2. Recognize interdependence. The elements of human design interact with and depend upon the natural world, with broad and diverse implications at every scale. Expand design considerations to recognizing even distant effects.
3. Respect relationships between spirit and matter. Consider all aspects of human settlement including community, dwelling, industry and trade in terms of existing and evolving connections between spiritual and material consciousness.
4. Accept responsibility for the consequences of design decisions upon human wellbeing, the viability of natural systems and their right to coexist.
5. Create safe objects of long-term value. Do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to the careless creation of products, processes or standards.
6. Eliminate the concept of waste. Evaluate and optimize the full life-cycle of products and processes, to approach the state of natural systems, in which there is no waste.
7. Rely on natural energy flows. Human designs should, like the living world, derive their creative forces from perpetual solar income. Incorporate this energy efficiently and safely for responsible use.
8. Understand the limitations of design. No human creation lasts forever and design does not solve all problems. Those who create and plan should practice humility in the face of nature. Treat nature as a model and mentor, not as an inconvenience to be evaded or controlled.
9. Seek constant improvement by the sharing of knowledge. Encourage direct and open communication between colleagues, patrons, manufacturers and users to link long-term sustainable considerations with ethical responsibility, and re-establish the integral relationship between natural processes and human activity.

5 Principles of Ecological Design

source: www.ecodesign.org/edi/ecodesign.html

1. SOLUTIONS GROW FROM PLACE
Ecological design begins with the intimate knowledge of a place. It is small scale and direct, responsive to local conditions and people. If we are sensitive to the nuances of place, we can inhabit without destroying.
2. MAKE NATURE VISIBLE
Making natural cycles and processes visible brings the designed environment back to life. Effective design helps inform us of our place within nature.
3. DESIGN WITH NATURE
By working with living processes, we respect the needs of all species. Engaging processes that regenerate rather than deplete, we become more alive. Making natural cycles and processes visible brings the designed environment back to life. Effective design helps inform us of our place within nature.
4. ECOLOGICAL ACCOUNTING INFORMS DESIGN
Trace the environmental impacts of design and use this information to determine the ecologically sound design possibilities.
5. EVERYONE IS A DESIGNER
Listen to every voice in the design process. As people work together to heal their places, they also heal themselves.

CREDITS & THANK YOUS

The Natural Step

source: www.naturalstep.org/learn/principles.php

Four Simple Principles Of Sustainability:

1. Eliminate our contribution to systematic increases in concentrations of substances from the Earth's crust. This means substituting certain minerals that are scarce in nature with others that are more abundant, using all mined materials efficiently, and systematically reducing dependence on fossil fuels.
2. Eliminate our contribution to systematic increases in concentrations of substances produced by society. This means systematically substituting certain persistent and unnatural compounds with ones that are normally abundant or break down more easily in nature, and using all substances produced by society efficiently.
3. Eliminate our contribution to systematic physical degradation of nature through over-harvesting, depletion, foreign introductions and other forms of modification. This means drawing resources only from well-managed ecosystems, systematically pursuing the most productive and efficient use both of those resources and land, and exercising caution in all kinds of modification of nature.
4. Contribute as much as we can to the goal of meeting human needs in our society and worldwide, going over and above all the substitution and dematerialization measures taken in meeting the first three objectives. This means using all of our resources efficiently, fairly and responsibly so that the needs of all people on whom we have an impact, and the future needs of people who are not yet born, stand the best chance of being met.

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