Hamilton

BUILDING A STRONG FOUNDATION
HAMILTON
VISION 2020 • GRIDS GROWTH STRATEGY • OFFICIAL PLAN

HAMILTON
TRANSPORTATION MASTER PLAN

VOLUME 1: CLASS ENVIRONMENTAL ASSESSMENT REPORT

May 2007

IBI GROUP and DILLON CONSULTING

in association with

MRC

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EXECUTIVE SUMMARY

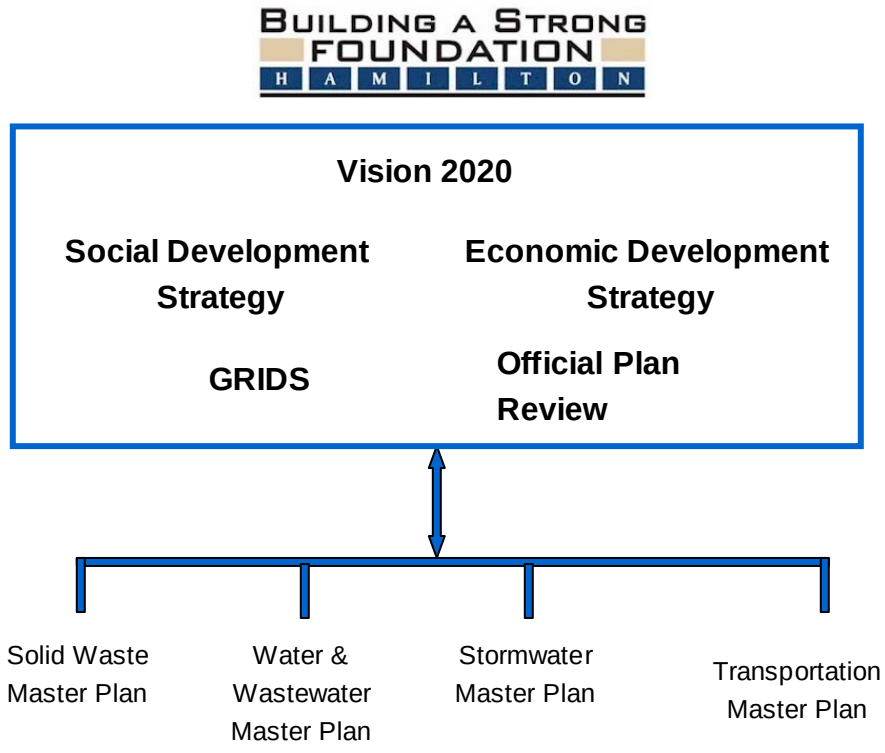
Introduction

The Transportation Master Plan was completed as part of the Growth Related Integrated Development Strategy (GRIDS), along with the Water/Wastewater and Stormwater Master Plans. Exhibit ES.1 illustrates the interrelationship between these initiatives.

The overall purpose of the Transportation Master Plan is to develop policies and strategies for the transportation network over the next 30 years. This network includes roads, transit, cycling, walking facilities, and the City's connections to rail, marine and aviation facilities. Results of the Transportation Master Plan will be used to develop new transportation and land use policies for the City's Official Plan and the Development Charges By-law Review. It will also serve as a support document for the City's capital budgeting.

The Transportation Master Plan has been developed in three major phases or stages. The first stage consisted of the calibration of the existing transportation model to reflect current transportation conditions in Hamilton. The second stage focused on the development of the underlying policies of the Transportation Master Plan, consisting of policies in 23 major subject areas. The third stage was the preparation of the master plan itself, which was developed in an iterative manner in conjunction with the land use scenarios, developed through the broader GRIDS study.

Exhibit ES.1: Inter-relationship between City Initiatives



The final recommendations for the Transportation Master Plan (TMP) reflect the Council endorsed "Nodes and Corridors" option as the preferred growth scenario for the City as approved by Council on May 24, 2006. This growth concept is based on directing growth to an interconnected system of nodes (central foci of community activity) and corridors (mixed use, transit friendly linkages).

Recommendations in the Transportation Master Plan are intended to move the City towards the achievement of the objectives of Vision 2020 and are reflective of the 9 Strategic Directions to guide development decisions that were identified as part of the GRIDS process, including Direction #6 - Expand transportation options that encourage travel by foot, bike and transit and enhance efficient inter-regional transportation connections.

Problem Statement

Between 2001 and 2031, Hamilton's population will increase by 162,000 people (32%). During the same period, 105,000 new jobs are expected to be created. If current travel characteristics remain the same, there will be 180,000 additional auto driver trips per day that will need to be accommodated by the road network. This translates into 1.2 million additional kilometres driven by Hamilton residents each day and a consumption of 40 million litres of fuel per year. Left unchecked, significant congestion on most Escarpment crossings will result in increased delays to auto drivers, transit riders and commercial vehicles. Accordingly, key objectives of the Transportation Master Plan include reducing dependence on single-occupant vehicles and promoting improved options for walking, cycling and transit, while maintaining and improving the efficiency of trips related to the movement of goods and servicing of employment areas.

A Vision for Transportation in Hamilton

In Stage 2 of the TMP development, a set of guiding principles was established focusing on 7 key objectives:

- Offer safe and convenient access for individuals to meet their daily needs
- Offer a choice of integrated travel modes, emphasizing active transportation (walking and cycling), public transit and carpooling
- Enhance the liveability of neighbourhoods and rural areas
- Encourage a more compact urban form, land use intensification and transit-supportive node and corridor development
- Protect the environment by minimizing impacts on air, water, land and natural resources
- Support local businesses and the community's economic development
- Operate efficiently and be affordable to the City and its citizens

These guiding principles and objectives were consistently referenced throughout the development of the Master Plan elements.

Over the course of the plan preparation, many individuals and stakeholders helped to formulate an overall Vision for the Plan. This Vision is anchored by the City's Vision for Sustainability – Vision 2020.

Plan Elements

In the initial stages of the Master Plan development, several broad strategies were examined in terms of their potential to address the City's transportation needs while respecting the principles of GRIDS and VISION 2020. These included the Status Quo Option (or Do Nothing), implementing 'Committed Projects' Only, Modest Transit Expansion, Aggressive Transit Expansion, Travel Demand Management (TDM), Roadway Capacity Optimization and Roadway Capacity Expansion. Although no single approach will address all transportation needs, the preferred overall strategy is to rely on transit and travel demand management, in combination with road capacity optimization to solve transportation problems, before looking to road expansion (including Escarpment crossings).

What will Hamilton's Transportation System look like in 20-30 years?

- *Businesses and industries will be prospering because they took advantage of the close proximity of Hamilton's Port, Airport, railway facilities and parkways to regional and international markets. Truck routes within the City will be well marked and receive priority for improvements*
- *Twice as many Hamiltonians will be using transit for daily trips because they can get across the City using a network of Bus Rapid Transit routes and express buses that offer travel times and comfort that parallel the automobile*
- *Commuters will be able to travel between Hamilton and surrounding areas such as Niagara and Waterloo via new GO Rail lines and bus services*
- *Cyclists will become a common sight given the 120 km of new on-street bike lanes and over 140 km of new multi-use paths*
- *Pedestrians will feel comfortable walking on streets with wider and more accessible sidewalks and improved streetscapes*

Accordingly, the Master Plan places a high emphasis on significantly improving transit services, providing options for cycling and walking and optimizing existing road capacity before considering major expansions. Also central to the plan is the need to improve transportation access to existing and future employment lands in order to support existing businesses and attract new ones.

Key elements of the plan are detailed in this report and include:

- Establishment of a Bus Rapid Transit (BRT) network consisting of three primary spines and other interconnecting routes: A Lower City east-west corridor between McMaster University and Eastgate Square; a Central North-South Corridor on James Street and Upper James via Mohawk College; and, a Mountain East-West Corridor on the LINC or parallel facility. The staged implementation of BRT could begin with updating and enhancing the existing BLine, located on the lower City east-west corridor)
- Establishing other priority transit routes between major nodes.
- Construction of 120 km of new on-street bike lanes and over 140 km of new multi-use paths.
- A series of road improvements to reduce localized congestion and improve access to employment lands and new communities.
- Suggestions to expand the commuter rail and regional bus system to integrate with land use intensification policy objectives.

- A potential incline railway near Wentworth Street, which can serve to reduce the barrier effect of the Escarpment for cyclists and pedestrians while potentially becoming a major tourist attraction for the City.

- Continued improvement of the road system to address existing capacity issues and to ensure access for existing and new employment areas.

Financial Impacts

Appendix A provides a detailed listing of the estimated capital costs and timing of specific road and cycling infrastructure improvements identified in the Transportation Master Plan.

The table below provides an estimate of the order-of-magnitude annual capital investments by mode to implement the Transportation Master Plan. Further details on the costs by each mode are provided in Section 7 and 8. It should be recognized that these figures represent desirable targets and, when combined, are significantly greater than the current capital spending.

The majority of transit capital costs are related to fleet replacement and expansion, which are not location specific. Other transit capital costs include terminal upgrades and fare collection equipment. The initial phases of the Bus Rapid Transit system could be implemented without major infrastructure investments (i.e. separate bus lanes). Additional design studies will be required to determine the cost and feasibility of more aggressive Bus Rapid Transit treatments on a corridor specific basis. It is expected that funding assistance will be required from senior levels of government to fully achieve the Vision for Bus Rapid Transit. The Provincial Gas Tax (currently $12 million) is an example of such funding.

Roads improvement and projects identified in the TMP are estimated to require approximately $418 million over the next 25 years. Thus the total investment into the City's roadway network would increase by an average of $16.7 million per year. The majority of these costs would be growth related and hence covered by development charges. In addition, significant investment in roads is required to address a backlog of maintenance and rehabilitation, which will place additional demands on the roads budget. It is estimated that capital investment should be at least $60 million annually to maintain a sustainable funding level for road improvements and road rehabilitation.

Allocation of costs by project and year, and the development of long term funding strategy, will be developed as part of the City's on-going budgeting process.

Exhibit ES.2: Summary of Average Annual Capital Costs

	Current Trends ($) millions	Projected Requirements ($) millions
Active Transportation	0.5	3.0
Transit	12	20
Roads [(1)]	42	60-100

[(1)] Total road costs including reconstruction, widenings, traffic operations, rehabilitation and structures

In addition to capital costs, increases in operating costs are required, particularly for transit. To achieve the goals and targets for the transit system, it is projected that transit operating costs will need to approximately double. Increases are required for both the conventional transit system as

well as the Accessible Transit System. As the population ages, considerable demands will be placed on the Accessible Transit System.

Implementation and Monitoring

The process for implementing the TMP and its recommended actions requires continuous effort on the part of City staff, key stakeholders and the public. The adoption of the TMP is the first step in the overall implementation process. Following this, policies and recommendations on infrastructure will be carried through to annual *programming* exercises including the annual budgeting process wherein investment priorities and timings are established. The *planning* and *design* phase for future infrastructure begins once priorities are set, and follows the Municipal Class EA process. Physical implementation occurs with *construction*, and continues into the *operation* and *maintenance* of the facilities. *Monitoring* is undertaken to gauge the effectiveness of the policies, programs and infrastructure improvements in achieving the TMP goals and objectives. Shifts in underlying assumptions or achievement of objectives signal the need for a review of the basic policy direction, and the process starts again.

A regular review of the TMP is proposed every five years, ideally in conjunction with updates to the Official Plan.

Short Term Actions

The City of Hamilton is already moving on the recommendations of the Transportation Master Plan. Sample actions planned for 2007/2008 include:

- Replacing aging buses on the BLine express route with new environmentally friendly hybrid buses and extending hours of operation;
- Initiating a study to review truck routes;
- Increasing transit service within the West Hamilton Innovation District
- Working with the goods movement industry through the recently established Southern Ontario Gateway Council;
- Constructing new bike facilities on York Boulevard, Hunter Street and other routes and embarking on an update to Shifting Gears, the City's cycling plan;
- Continuing to implement streetscape improvements; and,
- Expanding the number of employers signing on to the Smart Commute Initiative.

These short-term actions are considered essential for ensuring that the TMP becomes a living document to which the general public can relate.

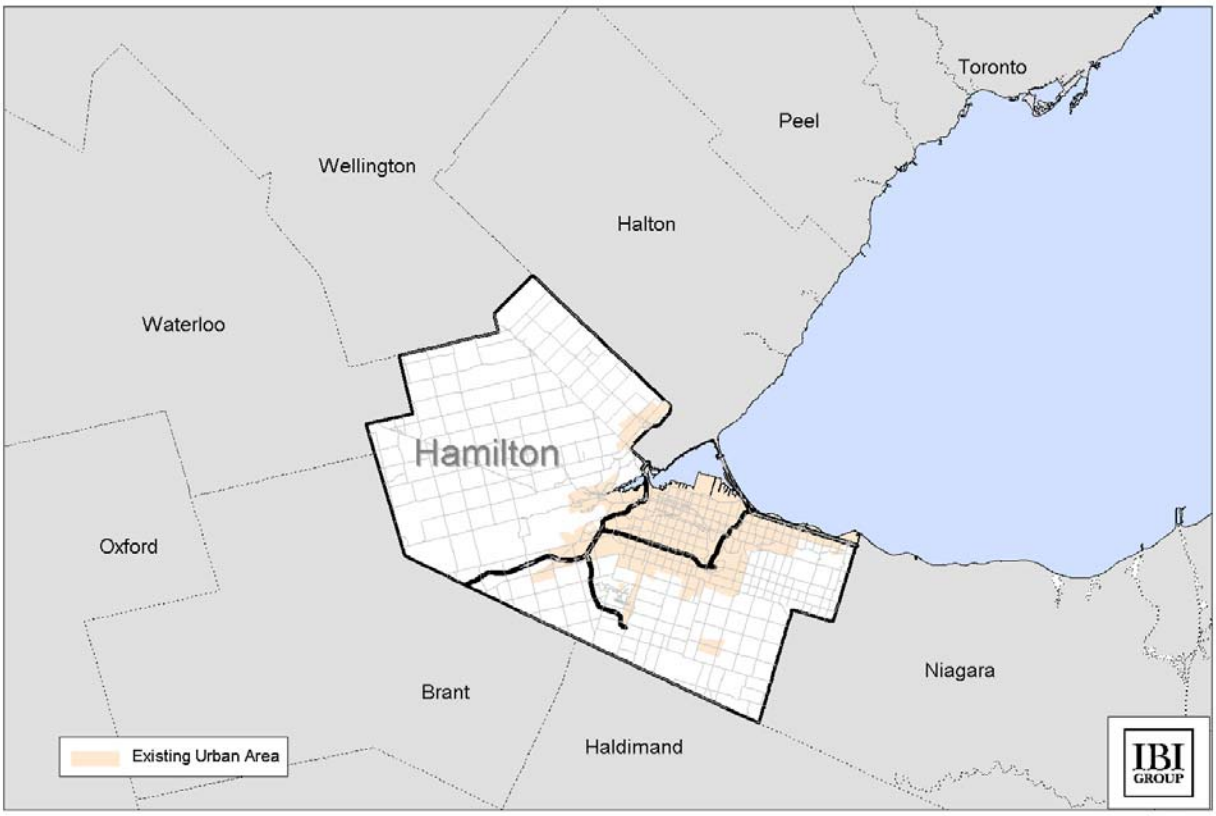
1. INTRODUCTION

1.1 Purpose and Scope of the Transportation Master Plan

The City of Hamilton is located in the heart of the Greater Golden Horseshoe at the western end of Lake Ontario (Exhibit 1.1). On January 1, 2001, the Towns of Ancaster, Dundas, and Flamborough, the Township of Glanbrook and the Cities of Hamilton and Stoney Creek were amalgamated and became the new City of Hamilton.

The City of Hamilton is home to some 505,000 people. Population has been growing by about 1 percent per year. By 2031, the City of Hamilton's population is expected to grow to 668,000, or by about 32%. There are many ways this growth could be accommodated, both in terms of location and in terms of servicing. One of the key objectives of this Transportation Master Plan is to ensure that future growth is accommodated in a socially responsible, economical and environmentally sustainable manner.

Exhibit 1.1: The City of Hamilton



The Transportation Master Plan is part of the GRIDS process (see Section 1.2). The overall purpose of the Transportation Master Plan is to develop policies and strategies for the transportation network over the next 30 years. This network includes roads, transit, cycling and walking facilities, and the City's connections to marine and aviation facilities. Results of the

Transportation Master Plan will be used during the City's Official Plan Review and the Development Charges By-law Review. It will also serve as a support document for the City's capital budgeting.

The Transportation Master Plan has been developed in three major stages[1] as follows:

Stage 1: The first stage, completed in 2003, consisted of the calibration of the existing transportation model to reflect current transportation conditions in Hamilton.

Stage 2: The second stage focused on the development of the underlying policies of the Transportation Master Plan, consisting of policies in 23 subject areas. These policy papers were approved by Council on November 24, 2004. The policy papers developed included:

1. Economic Development
2. Urban Structure and Land Use
3. Urban Design
4. Energy Use and Greenhouse Gas Emissions
5. Air Quality
6. Noise
7. Transportation Targets (including Transit)
8. Travel Demand Management
9. Walking and Cycling
10. Accessibility
11. Parking
12. Goods Movement
13. Traffic Calming
14. New Technology Initiatives
15. Access Management
16. Level of Service Standards
17. Road Classification
18. Rural Road Standards
19. Warrants
20. Provincial Highway Initiatives
21. Road Transfers
22. Financing and Infrastructure
23. Background Paper on Land Use and Travel Patterns

The policies and implementation strategies are centred around four key themes including *Promoting a Strong and Vibrant Economy, Building Liveable Communities, Providing a Balanced Transportation Network and Improving Public Transit.* A copy of the Final Phase 2 Summary of Policy Papers is included as part of the Technical Reports (separate document).

Stage 3: The third and final stage involved the preparation of the Class Environmental Assessment Master Plan for transportation infrastructure, referred to herein as the Transportation Master Plan (TMP). This phase was developed in an iterative manner together with the broader GRIDS study.

1.2 Growth Strategy

The Growth Related Integrated Development Strategy, or GRIDS, is a made-in-Hamilton smart growth strategy. The purpose of GRIDS is to identify the most ideal places for growth and the type

[1] Initially the three stages were referred to as Phases. To avoid confusion with the Environmental Assessment Process, the term "Stage" was subsequently adopted.

of growth based on environmental priorities, social issues, economic opportunities and population studies as well as to identify strategies to fund the servicing of these areas.

The GRIDS project, approved in May 2006, recommends a strategy to accommodate a projected population of 660,000 and 80,000 additional households by 2031. In keeping with the principles of Smart Growth, a minimum of 1000 hectares (2,500 acres) of additional employment lands are required to accommodate projected employment growth including 400 – 800 hectares of employment lands required to facilitate the development of the area around the Hamilton International Airport, as an economic growth node within the City of Hamilton and Golden Horseshoe area.

A further discussion of how the alternatives for GRIDS were evaluated in terms of Transportation Impacts is provided in Section 6.

1.3 Provincial Policy Framework

The Province of Ontario has recently undertaken several planning initiatives that focus on projected growth in the area of southern Ontario extending west from Toronto through Hamilton to the Region of Niagara commonly known as the Greater Golden Horseshoe. In its Growth Plan (Places to Grow) the Province outlines a strategy and identifies the necessary tools for managing growth in the fastest-growing region in Canada.

In the Provincial strategy, Downtown Hamilton is identified as a designated Urban Growth Centre, which has several planning implications, one of which is that it will serve as a regional transit hub with well-developed transit infrastructure (See Exhibit 1.2).

The Province has also adopted a Greenbelt Plan aimed at permanently protecting greenspace and containing urban sprawl in the Golden Horseshoe.

Exhibit 1.2: Places to Grow Concept

Source: Ministry of Public Infrastructure Renewal, Growth Plan for the Greater Golden Horseshoe, 2006 www.pir.gov.on.ca

1.4 Status of Plan Under the Environmental Assessment Process

The Hamilton Transportation Master Plan has been undertaken following the requirements of the Environmental Assessment Act as outlined in the Municipal Class Environmental Assessment document (Municipal Engineers Association (MEA), June 2000).

The Master Plan approach recognizes that there are benefits to the process when comprehensive and integrated plans are undertaken for projects which have some common elements such as geography or function. As outlined in the Municipal Class EA document, the key features of a Master Plan are that it:

- addresses the key principles of successful environmental planning (see below);
- addresses at least the first two phases of the Municipal Class EA and can also cover other phases;
- allows for an integrated process with other planning initiatives;
- provides a strategic level assessment of various options to better address overall system needs and potential impacts and mitigation;

- is generally long term;
- takes a system-wide approach to planning which considers related infrastructure either geographically or by a particular function;
- recommends an infrastructure master plan which can be implemented through the completion of separate projects; and,
- includes a description of the specific projects.

This Master Plan follows a planning process that incorporated the following Environmental Assessment principles:

- consultation with affected parties early in the planning process so that decision making is cooperative;
- consideration of a reasonable range of alternatives;
- identification and consideration of the effects of each alternative on all aspects of the environment;
- systematic evaluation of advantages and disadvantages of identified alternatives to determine their net environmental effects; and,
- provision of clear and complete documentation of the planning process followed, to allow "traceability" of decision making with respect to the project.

The plan has also been developed in an integrated manner with the growth strategies discussed above.

The Master Plan was undertaken in accordance with Section A.2.7. *Master Plans* as defined in the Municipal Engineers Association, Municipal Class Environmental Assessment document (June 2000) and will satisfy Phases 1 and 2 of the planning and design process.

The Transportation Master Plan does not require approval under the Environmental Assessment Act, although the projects recommended by the Plan must fulfil all appropriate EA requirements. Requests for an order to comply with Part II of the Act, the portion of the legislation regarding appeals, is possible only for those projects that are subject to the Municipal Class EA, and not the Plan itself. All major road, transit and cycling improvements fall into this category.

If the period of time from filing of the Notice of Completion of the Plan to commencement of construction exceeds five years, the City will need to review the planning process carried out in developing the Transportation Master Plan to ensure it remains relevant and valid. It is anticipated that the Plan will be reviewed and updated prior to the five-year period elapsing.

1.5 Consultation and Communication

At the outset of the Master Plan process, a Public Consultation Plan was developed. The activities that were undertaken as part of the process are described in the following sections and are considered critical and required under the Class EA Master Planning process.

At the onset of the project, the City developed a website (www.gridsmasterplans.com), where all project publications, presentation materials and other documentation has been made available to

the general public. Notices of upcoming Public Information Centres (PICs) and other project milestones were also posted on this website. For those without Internet access, the City also maintained a Contact List, and sent relevant project materials to all who had expressed interest in the process.

Full documentation of the consultation and communication program is contained in Volume 3 of this Report.

1.5.1 PUBLIC CONSULTATION

Over the course of the TMP development, numerous events were held to obtain public input on the preferred directions for City of Hamilton's Transportation Master Plan and subsequently the proposed TMP elements.

During Stage 2, several events were held with the public and representatives of the public (i.e. Council). A chronology of these events is as follows:

- Dec 2003 – Staff/Council Workshop
- Jan 2004 – 1st Public Open House
- Feb 2004 – Charrette with Stakeholders
- March 2004 - Council Workshop
- September 2004 – 2nd Public Open House
- November 2004 – Council adoption of policy papers

Public consultation continued through Stage 3 (Master Plans) with the following major events:

- June 2005 – Initial series of Public Open Houses (Master Plans)
- November 2005 – GRIDS Open Houses
- May 2006 – GRIDS Final Open House
- September 2006 – Final series of Public Open Houses (Master Plans)

1.5.2 STAKEHOLDER AND AGENCY CONSULTATION

In addition to formal public consultation events, a number of organizations were asked for their input on specific needs and issues including the Cycling Committee, Transit Users Group, Accessibility Committee, Transit Master Plan and Gas Tax Committee, Chamber of Commerce, Transportation Club, and others. Meetings were also held with the Niagara Escarpment Commission.

The preferred transportation strategy seeks to balance the needs and objectives of all stakeholders.

1.5.3 SUMMARY AND KEY HIGHLIGHTS

Response to these consultation events was very positive and a signal that residents of Hamilton are concerned about transportation issues. Perhaps the overwhelming theme that came from these

consultations is that transportation and land use are intrinsically linked. Urban form affects transportation demand and transportation systems affect urban form. There was a clear direction that the transportation system must provide choices for people – whether they want to walk, cycle, take transit or drive. Most people also recognized the need to become more sustainable in terms of reducing environmental impacts, improving economic efficiency, improving health and improving social interaction.

Specific feedback from various stakeholder groups and individuals of the public was received in response to the presentation of the preliminary proposed infrastructure plans. There was strong support for Bus Rapid Transit as well as a large interest in a proposal to investigate the potential for an incline railway facility.

1.6 Implementation and Interpretation of the Transportation Master Plan

The basic mechanisms for implementing the recommendations of the Transportation Master Plan are:

- The Official Plan, which provides the background policy framework and outlines where and how growth will occur;
- The City's long range financial plans and annual budgets, including the 10 year capital plan and Development Charges Studies;
- Other Transportation Master Plans that have been adopted, are in progress, or pending; and,
- Vision 2020, which tracks progress through the Annual Sustainability Indicators Report Card; and,
- Inclusion of policies and programs in Secondary Planning processes.

The TMP provides a framework that will guide the preparation of Secondary Plans for new growth areas, as well as major changes in existing built-up areas. Because the TMP is an over-arching City-wide document, many local details will require further study and analysis through these Secondary Planning processes.

The successful implementation of long-range plans requires ongoing efforts to monitor relevant external conditions, outputs (i.e. actions taken) or outcomes (i.e. things achieved). Hamilton must track progress toward its goals and objectives so that it can add, change or delete implementation strategies over time.

A detailed implementation strategy for the Transportation Master Plan, including funding, staging and performance monitoring, is outlined in Section 8 of this report.

1.7 Structure of the Transportation Master Plan

Volume 1: Main Report

This Transportation Master Plan is structured into 8 sections. The following sections are provided following this introduction:

- Section 2 summarizes guiding principles and the major themes embodied in supporting policies to the TMP.
- Section 3 provides a context for existing environmental conditions, including potential constraints.
- Section 4 summarizes the existing transportation system performance while Section 5 presents insights on future transportation system performance. Together, these sections are used to formulate the Problem and Opportunity Statement.
- Section 6 discusses the alternatives that were considered during the development of the Master Plan, an essential stage of the EA process.
- Section 7 describes the major elements of the Transportation Master Plan including improvements to public transit, road network, cycling and pedestrian and goods movement systems.
- Section 8 provides a detailed implementation strategy.

In addition to this report, two other supporting documents are provided under separate cover:

Volume 2: Technical Reports

Summary of Phase 2 Policy Papers

Higher Order Transit Strategy

Cycling Network Strategy

Pedestrian Network Strategy

Road Network Strategy

Volume 3: Public and Agency Consultation Reports

PIC Documentation

Public Consultation

Agency Consultation

2. STRATEGIC OBJECTIVES AND KEY POLICIES

The City of Hamilton's new Transportation Master Plan will mark the first comprehensive update of transportation policy in Hamilton since municipal amalgamation in 2001. A major effort was undertaken as part of Stage 2 in the Transportation Master Plan process to harmonize and update the transportation-related policies of the former Regional Municipality of Hamilton-Wentworth and its constituent municipalities. This policy analysis step was intended to:

- Consider significant transportation policy directions established by former area municipalities;
- Reflect the broad role and mandate of the new City of Hamilton; and,
- Address new challenges and opportunities that have emerged over the last few years.

The main role of TMP policies is to shape long-term plans by identifying objectives, principles and preferred outcomes. They also guide (rather than specify) day-to-day operational and spending decisions. TMP policies typically have a long-term horizon (e.g. 20 years), and are intended to remain in force without review or amendment (unless dictated by significant changes in circumstance) for five to ten years. Effective policies strike a balance between ensuring a consistent direction over the years as staff and Councillors change, and preserving the flexibility of staff and Council to make decisions that reflect the City's circumstances at a given point in time.

In general, policies work indirectly. They are brought to life through day-to-day Council decisions and other mechanisms such as annual budgets, long-range financial plans, implementation strategies for individual transportation programs, Environmental Assessment processes, and guideline documents. Even the best, most thoughtful TMP policies will fail unless subsequent actions are consistent with them.

2.1 Directions to Guide Development

Through its Building a Strong Foundation process that is guiding the implementation of VISION 2020, the City of Hamilton has identified **nine directions** to guide background studies and the creation of development options as part of GRIDS (See Exhibit 2.1)

Exhibit 2.1: GRIDS Directions to Guide Development

• Direction #1	Encourage a compatible mix of uses in neighbourhoods that provide opportunities to live, work and play.
• Direction #2	Concentrate new development within existing built-up areas and within a firm urban boundary.
• Direction #3	Protect rural areas for a viable rural economy, agricultural resources, environmentally sensitive recreation and enjoyment of the rural landscape.
• Direction #4	Design neighbourhoods to improve access to community life.
• Direction #5	Retain and attract jobs in Hamilton's strength areas and in targeted new sectors.
• Direction #6	Expand transportation options that encourage travel by foot, bike and transit and enhance efficient inter-regional transportation connections.
• Direction #7	Maximize the use of existing buildings, infrastructure and vacant or abandoned land.
• Direction #8	Protect ecological systems and improve air, land and water quality.
• Direction #9	Maintain and create attractive public and private spaces and respect the unique character of existing buildings, neighbourhoods and settlements.

2.2 Statement of Transportation Objectives and Guiding Principles

As part of the development of policies under Phase 2, the 9 directions for GRIDS were translated into an integrated policy framework for the TMP. This process led to the development of a Statement of Transportation Objectives and Guiding Principles for the TMP that, like a vision statement, is a marker of intent. It can remain relevant in the face of inevitable short-term shifts in political, economic or social context.

The Statement of Transportation Objectives and Guiding Principles is presented in Exhibit 2.2.

Exhibit 2.2: Statement of Transportation Objectives and Guiding Principles

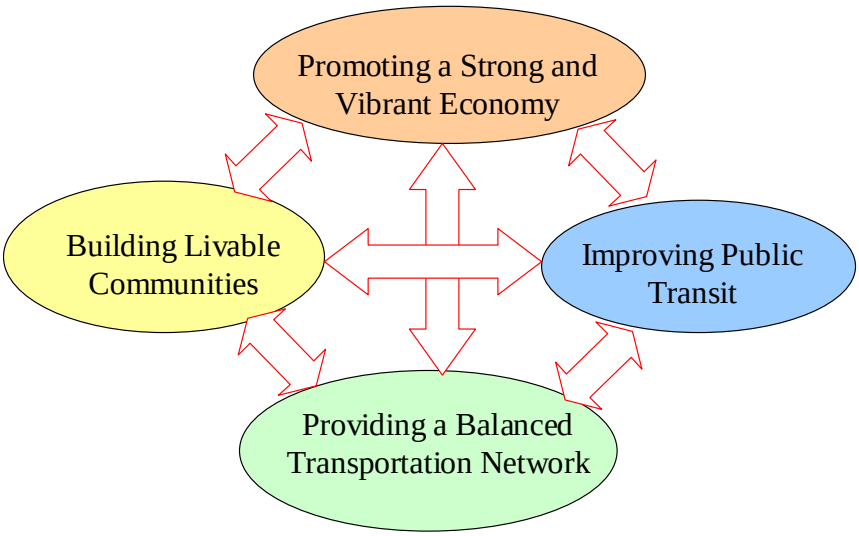
In 2031, the City of Hamilton's transportation system will:	
Objective 1	Offer safe and convenient access for individuals to meet their daily needs
Principle 1(a)	Transportation facilities and services should be safe, secure and barrier-free
Principle 1(b)	Each transportation mode should have an acceptable level of service
Principle 1(c)	Non-travel alternatives and shorter trips should be encouraged
Objective 2	Offer a choice of integrated travel modes, emphasizing active transportation, public transit and carpooling
Principle 2(a)	Alternatives to single-occupant vehicle travel should be practical and attractive
Principle 2(b)	Transportation facilities and services should be continuous and seamlessly integrated
Principle 2(c)	The health benefits of active lifestyles should be recognized and promoted
Objective 3	Enhance the liveability of neighbourhoods and rural areas
Principle 3(a)	Transportation facilities should reflect and complement their community context
Principle 3(b)	Noise and other undesirable impacts of traffic on residential areas should be minimized
Objective 4	Encourage a more compact urban form, land use intensification and transit-supportive node and corridor development
Principle 4(a)	Investment in transit-supportive land uses should be encouraged by quality public transit services and facilities
Principle 4(b)	Transportation facilities should meet current needs while remaining adaptable to those of the future
Principle 4(c)	Zoning, urban design and parking management strategies should minimize land consumed by automobile travel
Objective 5	Protect the environment by minimizing impacts on air, water, land and natural resources
Principle 5(a)	The use of greenspace for new infrastructure should be minimized
Principle 5(b)	Transportation technologies and behaviours should reduce energy consumption and air emissions
Principle 5(c)	The impacts of surface water runoff from transportation facilities should be minimized
Objective 6	Support local businesses and the community's economic development
Principle 6(a)	The efficiency of goods movement to, from and within the City should be maximized
Principle 6(b)	Businesses and institutions should remain accessible to employees and visitors
Objective 7	Operate efficiently and be affordable to the City and its citizens
Principle 7(a)	Maximum value should be extracted from existing facilities and services
Principle 7(b)	Decisions should take into account the life-cycle costs of transportation facilities and services
Principle 7(c)	Transportation funding opportunities involving other governments, the private sector and individual users should be considered

2.3 Summary of Key Policies

Policies to support and guide the Transportation Master Plan were developed for the 23 subject areas listed in Section 1.1. These policies are summarized in respective background reports as well as an overall summary document is provided in Volume 2 of this report.

While policies are tailored to each subject area, four themes were prominent in most of the policies, as illustrated in Exhibit 2.3:

Exhibit 2.3: Transportation Policy Themes



Examples of how policies respond to each of these themes are presented below.

Promoting a Strong and Vibrant Economy:

- Provide transportation access for existing and future employment lands
- Promote Downtown Hamilton as a place to live and work
- Identify and protect a strategic goods movement network

Building Liveable Communities:

- Design streets to support a pedestrian and transit-friendly environment
- Pursue use of para-trasit vehicles or other community buses services to improve transit access to lower density neighbourhoods
- Consider traffic calming as an effective means of reducing the negative impacts of traffic when warranted

Providing a Balanced Transportation Network:

- Consider all modes when evaluating Level of Service in a corridor
- Tailor roadway design standards to surrounding environment

Improving Public Transit:

- Incrementally increase transit service levels in high demand corridors
- Initiate a Bus Rapid Transit system, building on existing services and past work
- Expand intercity passenger transportation systems

This Transportation Master Plan presents a recommended plan that responds to each of the underlying policy directions.

2.4 Transportation Targets

Targets for transportation demand have been established through the Phase 2 Policy Papers. These targets reflect long standing direction of the City of Hamilton to reduce its environmental impacts while increasing mode choice and accessibly for its residents.

These strategic targets, summarized in Exhibit 2.4, are based on significantly increasing the portion of trips made by public transit, walking, cycling, as well as reducing trips through travel demand management. Near term targets are reflected of the 2011 horizon and long term targets are reflective of the 2021-2031 timeframe. The strategic transportation network improvements and supporting strategies outlined in this TMP are designed to help achieve these targets.

Exhibit 2.4: Transportation Targets (Transportation Master Plan Phase 2)

	Current Situation (based on 2001 data)	Potential Near Term Scenario (based on a goal of reducing auto vehicle-kilometres by 10% compared to 2001)	Potential Long Term Scenario (based on a goal of reducing auto vehicle-kilometres by 20% compared to 2001)
Estimated daily vehicle kilometres of travel by Hamilton residents	4.8 million km	4.3 million km	3.8 million km
Share of daily trips made by single-occupant drivers	68%	58%	52%
Share of daily trips made by using municipal transit	5%	9%	12%
Share of daily trips made by walking or cycling	6%	10%	15%
Annual transit rides per capita (City-wide) (1)	40	60	80-100

(1) Based on total residents within City boundaries, including residents outside primary service areas. Excludes GO Transit ridership.

3. DESCRIPTION OF EXISTING ENVIRONMENT

This section provides a broad description of City's existing physical, natural, socio-economic, cultural and recreational resources based on information derived from the City of Hamilton, the Ministry of Natural Resources, various Conservation Authorities, the Niagara Escarpment Commission and the Hamilton Naturalists Club.

Exhibit 3.1 provides an overall geographic context for the discussion.

3.1 Physical Environment

The City of Hamilton spans an area that covers 1171 km^2 and is located at the apex of Ontario's Golden Horseshoe. The landscape includes parts of six distinct physiographic regions (Niagara Escarpment, Iroquois Plain, Flamborough Plain, Horseshoe Moraines, Norfolk Sand Plain and Haldimand Clay Plain), and can primarily be described in terms of three prominent landform features:

- The Niagara Escarpment, which runs parallel to the shoreline and is set back approximately 2 km inland;
- The western Lake Ontario shoreline, including the Hamilton Harbour embankment; and
- The Dundas Valley, partially buried bedrock gorge that shapes a major indentation in both the shoreline and Escarpment.

The Niagara Escarpment, formed by differential erosion, is a 725 km long ridge that runs from the tip of the Bruce Peninsula, through Hamilton to Niagara Falls along the southern edge of Lake Ontario. Physiographic regions located above the Escarpment, in the communities of Flamborough, Ancaster and Glanbrook are comprised primarily of bedrock, sand and clay plains. The Galt moraine, a major glacial ridge, is also located above the Escarpment skirting the northwestern boundary of the City. This northern area of Hamilton also contains a number of scattered drumlin fields, moraines and other landforms directly descendant from glacial processes. The areas located below the Escarpment contain soft, reddish shales and sandstones. A number of ravines have been cut into this soft material and, on occasion, these ravines extend back into the Escarpment. The Dundas Valley is the deepest and largest of these notches. Also, this area contains the western edge of the Lake Ontario shoreline, which is characterized by it gently sloping topography, clay till and lacustrine sands.

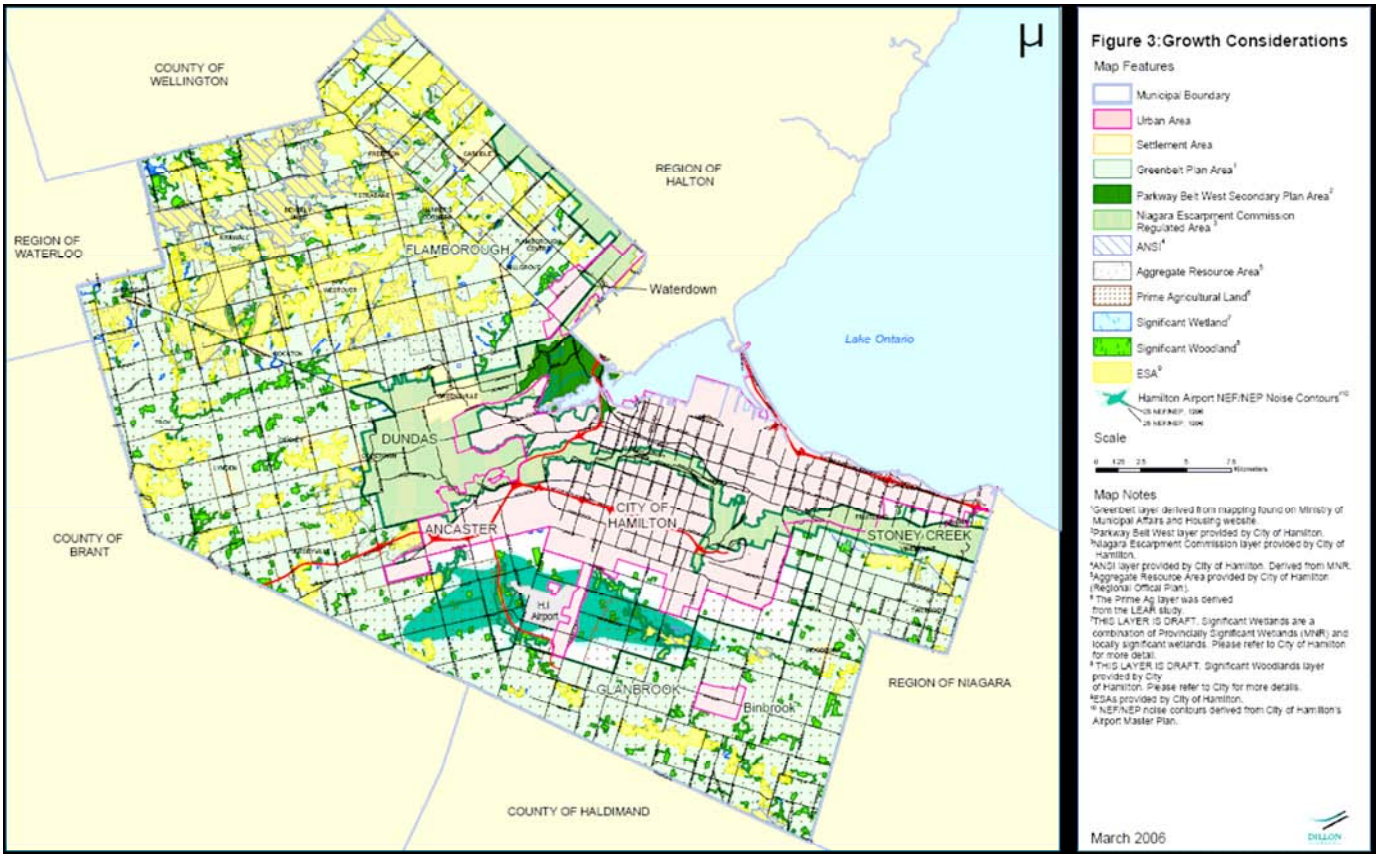
3.2 Natural Environment

The City of Hamilton, located in the transition zone between two major forest regions, the Eastern Deciduous Forest (Carolinian Zone) and the Great Lakes St. Lawrence Forest, contains a diverse range of natural features that serve important ecological and hydrologic functions. The natural features of the area include both undeveloped lands such as woodlots, wildlife

reserves, Escarpment lands, ravines and wetlands and previously disturbed lands that are reverting to a natural state. Although no part of the City can be considered pristine, there are several large, relatively undisturbed greenspace areas.

The largest natural features in the area are associated with the Niagara Escarpment and/or the bedrock plain located above the Escarpment in Flamborough. The Niagara Escarpment, a UNESCO World Heritage Site, cuts a 22 km linear route through the City and is home to broad range of plant and animal species. The poorly drained, shallow, rocky soils north of the Escarpment in Flamborough (bedrock plain) have resulted in a collection of broadleaf, mixed and cedar swamps.

Exhibit 3.1: Natural Environment Features and Constraints



Source: Growth Related Integrated Development Strategy, City of Hamilton, May 2006

This is considered quite significant compared to other parts of southwestern Ontario, as Hamilton has managed to maintain a number of its upland natural wetland areas. In addition to these areas, the City is also home to a number of riparian marshes and swamps, small slough forest remnants, shoreline marshes, and the occasional kettle bog.

Currently, various agencies are working to improve the natural heritage system by enhancing the inter-connection between natural areas and improving existing natural areas. The City of Hamilton also maintains a well-documented inventory of its natural features and the maintenance of the City's natural heritage database is an on-going initiative.

Four Conservation Authorities have jurisdiction within the City. The Hamilton Conservation Authority covers the Spencer Creek, Borer's Creek, Red Hill Creek, Stoney Creek and Fifty Creek watersheds. Conservation Halton maintains jurisdiction over the Bronte Creek and Grindstone Creek watersheds. The Grand River Conservation Authority is responsible for the Fairchild Creek and Big Creek watersheds. Lastly, the Niagara Peninsula Conservation Authority regulates activities within the watersheds of the Upper Welland River, Twenty Mile Creek and Forty Mile Creek

3.3 Socio-Economic Environment

As it has only been six years since amalgamation, the former constituent municipalities are still very distinctive in terms of their social and economic characteristics. Furthermore, the City of Hamilton is comprised of both urban and rural communities. With exception of the the former City of Hamilton, which is almost entirely urbanized, the former municipalities of Dundas, Ancaster, Stoney Creek, Flamborough and Glanbrook include significant rural and agricultural areas. The majority of land within the City's existing urban boundary is already built-up, with a few exceptions like Binbrook and vacant residential and employment lands scattered across the City. The urban areas contain a mix residential housing types and a variety of businesses while the rural areas consist of farming communities and small hamlets.

The City's Vision 2020 document envisions that Hamilton is a vibrant community that is socially, economically and culturally diverse, encourages opportunities for individuals, reduces inequities and ensures the full participation for all in community life.

The City's Economic Development Strategy organizes economic activity into three strategic clusters. Traditionally, the City of Hamilton has been a manufacturing centre. Initially its focus was on textile production and later it would transform into one of Canada's major producer of steel and metal materials. In recent years however, due to global shifts in the manufacturing industry, Hamilton's economy has been subjected to major structural changes that are dramatically impacting its industrial composition. As U.S. firms relocated to other places with cheaper labour costs, mid-sized manufacturing firms have grown to replace many of the large industrial giants that once dominated the City's economic landscape. Hamilton's advantageous access to transportation, relatively inexpensive power, and markets has fuelled the emergence of these mid-sized firms. Despite this shift, manufacturing still remains the largest of Hamilton's economic clusters.

The second traditional cluster of Hamilton's economy is an estimated $1 Billion a year agricultural industry. The rural areas of Hamilton are home to an agricultural/agri-business industry, which generates significant tax revenues while utilizing few municipal services. Closely related to the agriculture/agri-business sector is the food and beverage processing industry. Together, the two sectors pose a significant economic cluster within the City of Hamilton.

The third traditional economic cluster in the City consists of the Port related industries and businesses. Hamilton Harbour is a naturally protected body of water that is strategically located at the western tip of Lake Ontario. The Port of Hamilton, is accessible from the Burlington Shipping Canal, and has long been a major hub for economic activity.

The City's Economic Development Strategy also identifies three non-traditional economic clusters. These emerging clusters are the Airport Employment Growth District, Biotechnology/ Biomedical and the Film and Cultural Industries. Hamilton's desire to diversify its economic base is enhanced

by the presence of two major post secondary institutions, McMaster University and Mohawk College.

3.4 Cultural Heritage

The Hamilton area has a rich cultural history, which dates back approximately 9000 B.C. Due to the area's diverse and impressive natural environment, the City has attracted inhabitants dating back to the first arrival of humans to Ontario. The City has a rich archaeological record, with a number of sites that include finds from the hunting bands of the Paleoindian Period (9,000 B.C to 7,000 B.C.), the nomadic hunter-gatherers of the Archaic Period (7,000 B.C. to 1,000 B.C.), the native Iroquois of the Woodland Period (1,000 B.C. to A.D. 1650) and European settlers of the Contact Period (1650-present).

In addition to archaeological resources, the City also possesses a rich inventory of built heritage and cultural landscapes. Evidence of such features can be found throughout the City in the older commercial and residential areas, early residential suburbs, waterfront and riverscapes, rural crossroad and milling villages, cottage enclaves and agricultural areas of well-established fields and farms.

The need to protect and enhance cultural facilities was a key consideration in the identification of strategic transportation projects. Impacts on cultural heritage will be further considered in follow-on Environmental Assessments for specific projects.

3.5 Recreation Resources

Hamilton has a number of active and passive parklands, recreational trails and conservation areas supporting a wide range of uses. The City actively maintains over 400 community and neighbourhood parks covering an area of approximately 1400 hectares. The City boasts a number of hiking and biking trails, which are discussed in more detail in Section 4. Two of the most prominent trails are the Bruce Trail, which runs along the Niagara Escarpment and the Waterfront Trail, which links Bayfront Park to Cootes Paradise. In addition to parks the City operates a number of recreation and community facilities that include golf courses, ice rinks, swimming pools and community centres. The City also runs several museums, including Dundurn Castle and Military Museum, Children's Museum, Whitehern, Museum of Steam and Technology, Battlefield Park, and Fieldcote Museum. One of the major recreation facilities in the City is the Royal Botanical Gardens, which includes approximately 809 hectares of private open space.

4. EXISTING TRANSPORTATION SYSTEM PERFORMANCE

4.1 The Current Transportation System

The City of Hamilton is fortunate to have an extensive and diverse transportation system consisting of two provincial freeways (Highway 403 and the QEW) and the Lincoln Alexander Parkway, an extensive network of arterial and collector roads, an on and off-street trail and bikeway system, an international airport, several rail facilities, and the Port of Hamilton. Exhibit 4.1 illustrates the existing transportation system.

The conventional transit system, the Hamilton Street Railway (HSR) and the specialized transit system (DARTS) have been Regional or greater Hamilton entities, thereby preventing the proliferation of a fragmented system of smaller transit properties. HSR currently provides regular services in the urban portions of all Hamilton communities, except Flamborough. DARTS serves all urban and rural lands throughout Hamilton.

GO Transit provides inter-regional bus and rail services, which are presently focused on the Downtown GO Transit Terminal and a newly opened terminal at McMaster University.

Existing travel characteristics in Hamilton as well as the opportunities and constraints for each of the components of the transportation system are discussed in the following sections. Each of the components of the transportation system is discussed further in Chapter 7 along with recommendations on how they will be developed over the next 30 years.

4.2 Existing Population and Employment

The City of Hamilton is the fourth largest city in Ontario in terms of population, preceded only by Toronto, Ottawa and Mississauga. In 2001, the population for the City of Hamilton was estimated at 498,000 while employment was estimated at 192,400, based on City of Hamilton figures. Recent census figures place the 2006 population at 504,559.

The distribution of population and employment is an important determinant of travel behaviour. Exhibit 4.2 illustrates how residents are distributed throughout the City of Hamilton while Exhibit 4.3 illustrates the existing employment distribution. Residents within the Urban Area are not evenly distributed. The majority of the population is concentrated in the former City of Hamilton. Development in the communities of Dundas, Flamborough, Ancaster, Stoney Creek and Glanbrook is limited to historical centres and some new subdivisions with the remainder of land consisting of rural farms or undeveloped land. Employment is much less evenly distributed than population and is mainly concentrated in the Downtown area and along the Waterfront, and in the designated employment areas.

Exhibit 4.1: Existing Transportation System

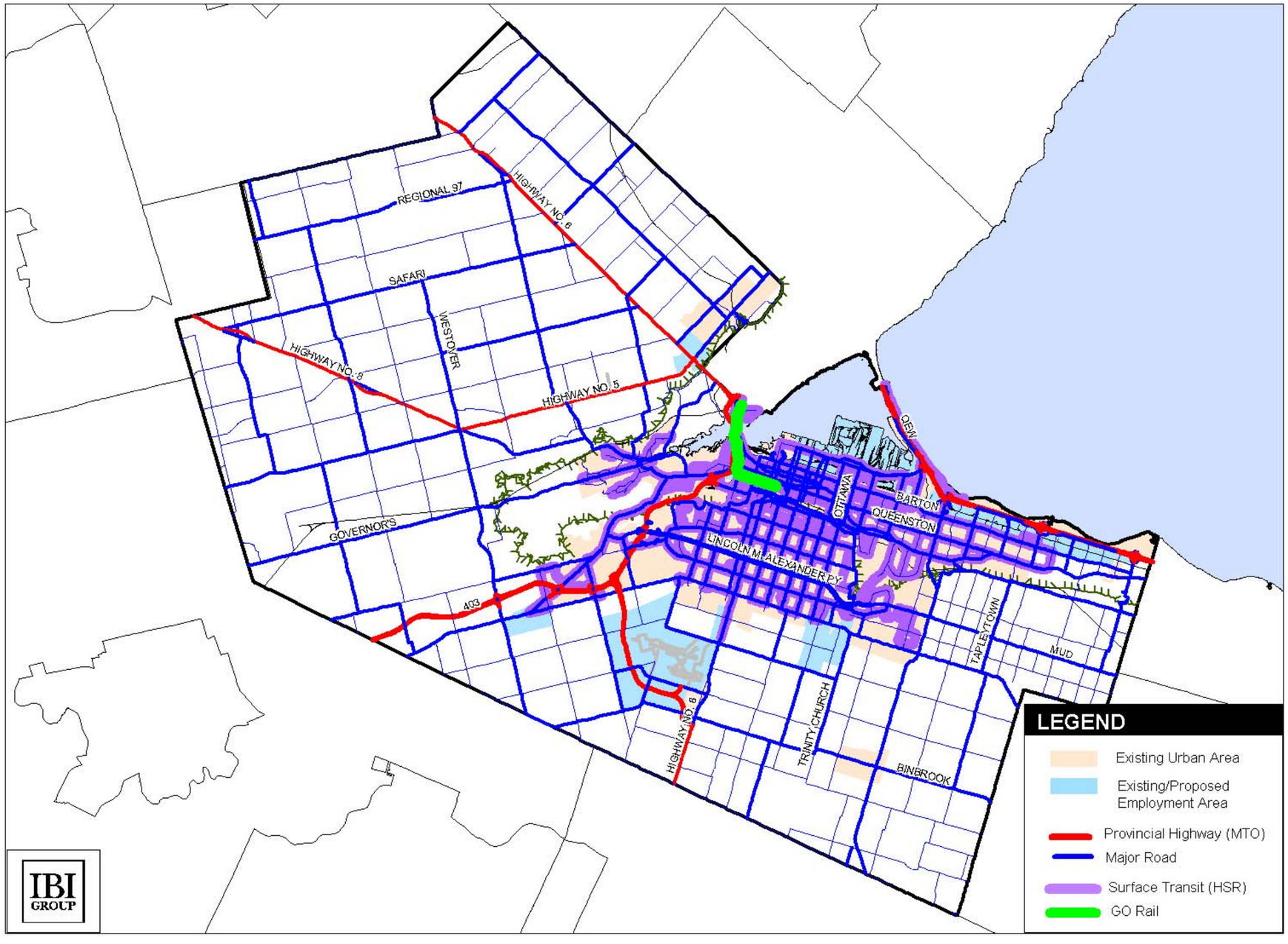


Exhibit 4.2: Existing Population Distribution (2001)

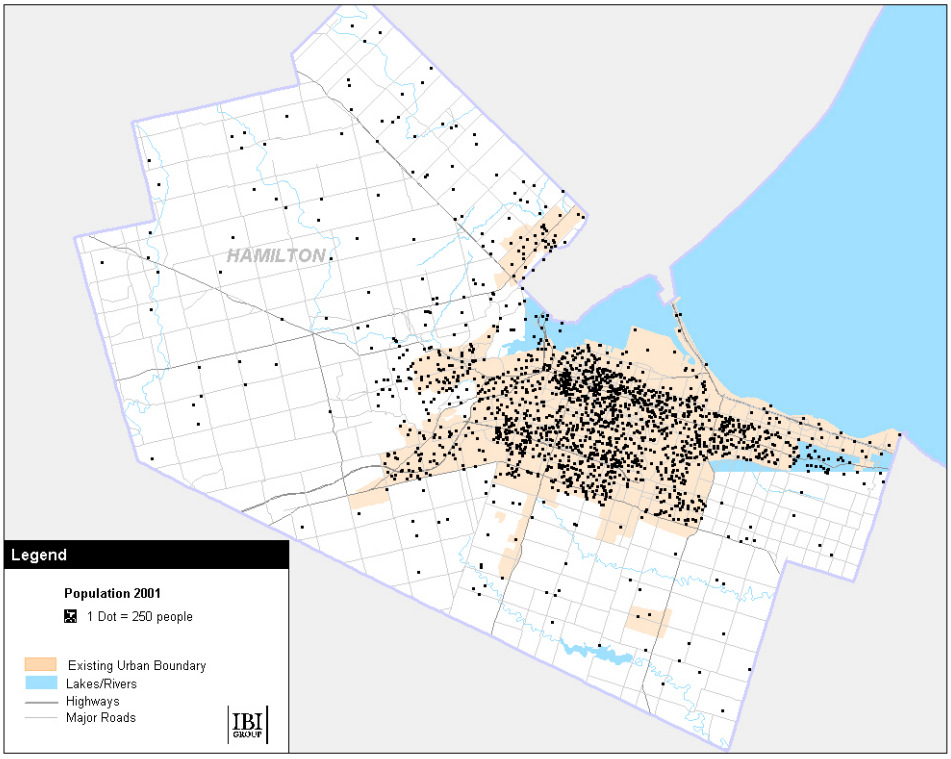
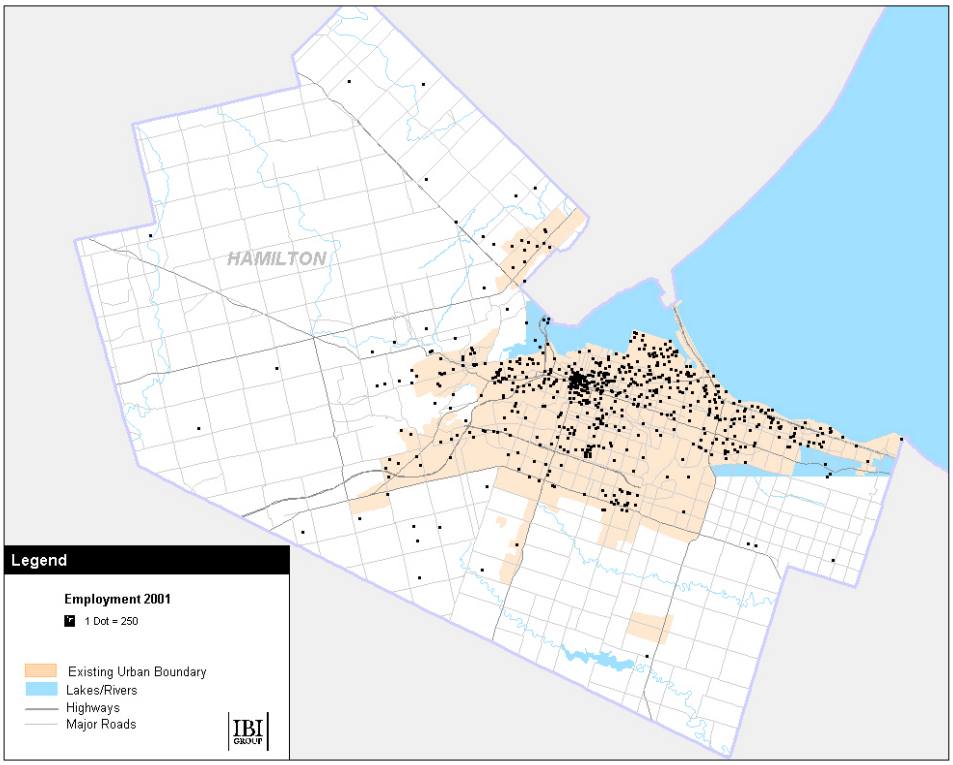


Exhibit 4.3: Existing Employment Distribution (2001)

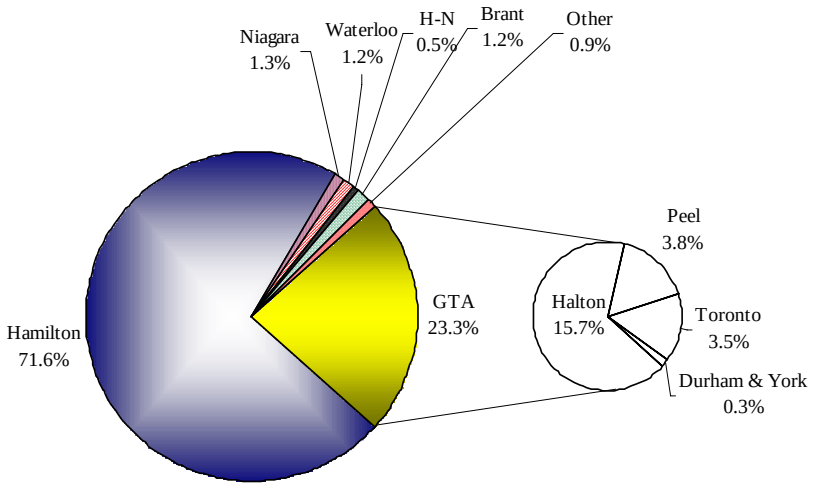


4.3 Travel Characteristics

4.3.1 PLACE OF WORK – PLACE OF RESIDENCE TRENDS

On an average day, residents of Hamilton make a total of approximately 1 million trips, or 2.5 trips for every person over 11 years of age. Approximately 81% of trips made by residents stay within the City of Hamilton; however, this figure has been declining since 1986 when 86% of trips stayed within the City. Part of this trend can be explained by place of residence - place of work trends. Exhibit 4.4 shows the place of work of Hamilton residents in 2001. Between 1986 and 2001, the proportion of the Hamilton's labour force employed outside Hamilton increased from approximately 17% to 28%, with the majority of those employed in Halton Region. This has significant implications on transportation demand patterns because most trips made by residents to areas outside Hamilton are made by car. It has also contributed to longer trip lengths as the median trip length is now 4.7 kilometres compared to 4.1 kilometres in 1986.

Exhibit 4.4: 2001 Place of Employment of Hamilton Residents



Source: Statistics Canada

4.3.2 MODE SHARE AND TRAVEL PATTERNS

Over the past two decades, the City of Hamilton saw a significant increase in the use of automobiles with a corresponding decrease in the use of transit. Between 1986 and 2001, local transit went from handling 12% of morning peak period trips to 6% (Exhibit 4.5). A large portion of this was due to increases in the use of automobiles, which now handle about 85% of daily trips (driver and passenger combined). While there is no single factor that has contributed to these trends, a growing reliance on automobiles for personal travel can be partially explained by development trends. Development in the City of Hamilton has been greatest in the periphery of the urban area, in areas such as Ancaster, Dundas and Stoney Creek. A large part of the development in these areas is characterized by low-density residential development, which relies on automobile travel and is difficult to serve by transit. Another factor is the decline in employment in the Downtown, which is the primary focus of the existing transit system.

Exhibit 4.5: Historical Trends in Mode Shares for Trips Made by Hamilton Residents

AM Peak Period						
Year	Auto Driver	Auto Passenger	Local Transit	GO Rail	Walk and Cycle	Other
1986	63%	11%	12%	0%	11%	4%
1996	63%	13%	7%	1%	12%	5%
2001	64%	12%	6%	1%	11%	6%
24 hours						
Year	Auto Driver	Auto Passenger	Local Transit	GO Rail	Walk and Cycle	Other
1986	63%	18%	10%	0%	7%	2%
1996	66%	18%	6%	0%	7%	3%
2001	68%	17%	5%	1%	6%	3%

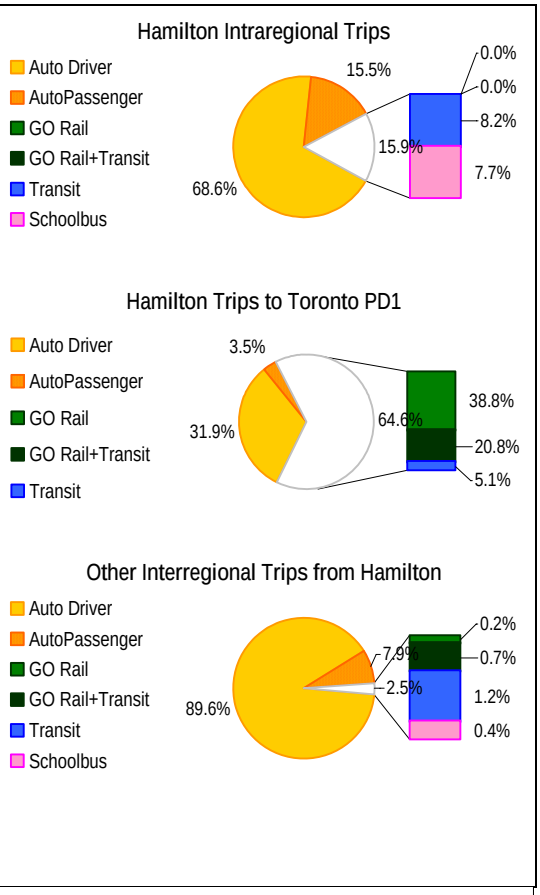
Source: Transportation Tomorrow Survey, 2001, 1996 and 1986 Travel Survey Summaries for the Greater Toronto Area, prepared by the Data Management Group, University of Toronto Joint Program in Transportation, February 2003.

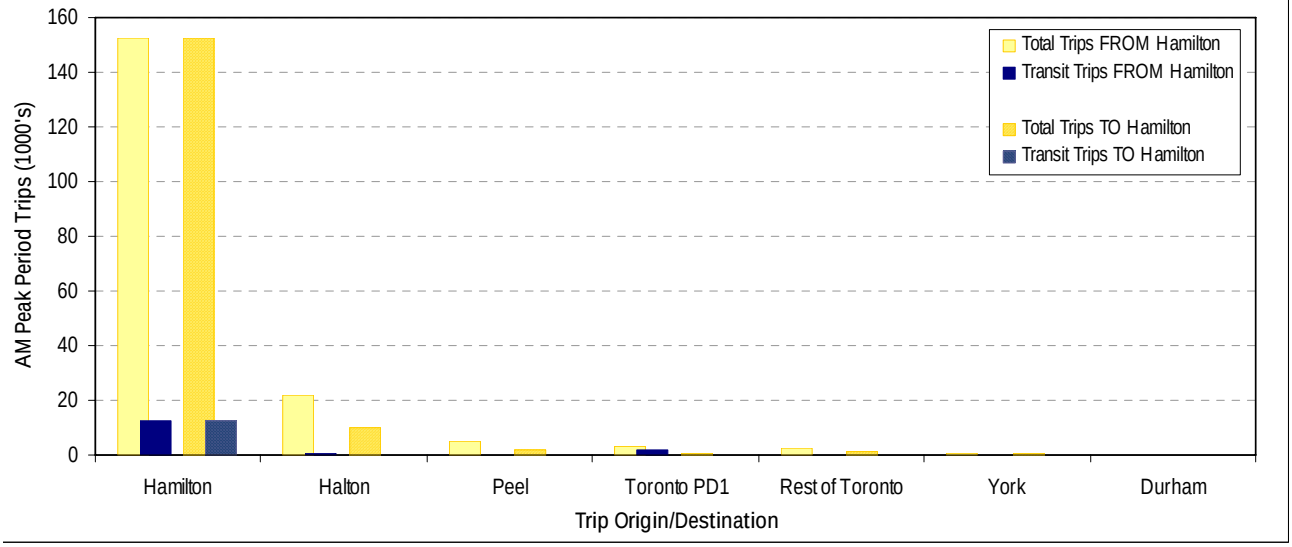
One encouraging travel trend is that the number of trips made by walking or cycling has increased or remained the same since 1986. Over 10% of Hamilton residents walk or cycle for utilitarian reasons in the morning peak period.

Exhibit 4.6 provides a more detailed breakdown of AM Peak Period motorized trips to/from and within Hamilton along with their respective modal shares (Note that transit mode shares include GO Bus as well as HSR). Consistent with the place of residence-place of work trends, the majority of Hamilton trips remain in the City. It is unfortunate that of the 13,000 trips made to Hamilton from other regions, only 3.5% are made using transit. This is indicative of a need for improved intercity transit, something that is a key objective of the newly formed Greater Toronto Transportation Authority.

Exhibit 4.6: AM Peak Period Mode Share of Hamilton Trips By Travel Linkage

AM PEAK MOTORIZED TRIPS [1]	Total Trips	Transit Trips (incl. GO Bus)	GO Rail Trips	Transit Mode Share
Intraregional Trips	152,000	12,500	0	8.2%
Interregional Trips	46,500	800	2,200	6.8%
Hamilton to Toronto PD1*	3,200	200	1,900	64.2%
Hamilton to Rest of Toronto	2,200	100	200	11.1%
Hamilton to Remaining Regions	27,700	300	100	1.4%
Total Hamilton Origins	33,100	500	2,100	8.1%
Toronto to Hamilton	1,400	200	0	13.5%
Remaining Regions to Hamilton	12,000	200	100	2.4%
Total Hamilton Destinations	13,400	300	200	3.5%
Total Trips from Hamilton	185,600	13,000	2,100	8.1%
Total Trips to Hamilton	164,600	12,600	100	7.7%
TOTAL Trips to/ from Hamilton	199,100	13,300	2,300	7.8%
Average Straight-Line Trip Length (km)				
Trips from Hamilton	9.5	5.6	59.0	n/a
Trips to Hamilton	7.2	5.2	52.9	





Source: Derived from 2001 TTS data

[1] Motorized trips include auto driver, auto passenger, transit, motorcycle and taxi.
* PD1 refers to Planning District 1, generally representing the Toronto Central Area

4.3.3 COMPARISON OF KEY TRANSPORTATION PERFORMANCE INDICATORS WITH OTHER CITIES

It is useful to compare transportation performance in Hamilton with performance indicators in other cities. Such a comparison shows how Hamilton ranks alongside its peers, helps to identify strengths and deficiencies, and illustrates the range of realistic levels of performance.

Exhibit 4.7 below shows Hamilton's performance indicator rankings versus ranking for other cities. Relative to its stature as the 5th largest city in the comparison, Hamilton scored lower than most on transit mode share and transit ridership, and higher than most for auto ownership, road miles per capita, fuel use, and length of commute. However, overall vehicle travel in Hamilton is still lower than most other cities in the comparison.

While there are many factors that must be considered in interpreting these figures, they suggest that there is room to improve in areas such as transit use and energy conservation. While these issues may not seem critical at the present time, conditions may change significantly over the next 30 years. If Hamilton does not anticipate and prepare for a possible future wherein energy may be constrained, or where fuel prices are prohibitively expensive, the impacts on its economy may be significant. Strategies must address both transportation and land use, as the location of housing with respect to jobs is a key determinant of transportation effort and mode choice.

Exhibit 4.7: Comparison of Transportation Performance Indicators for 10 Canadian Cities in 2001

Urban Area	Population	Automobile Ownership (veh/pers)	Annual Transit Ridership per capita	Share of Employees who Walk, Cycle or Transit to Work	Annual Fuel Use per capita (L/cap)	Arterial Roads & Expressways per capita (lane m/cap)	Length of Average Commute (km)
Toronto	4,683,000	0.50	117	28%	1116	2.99	11.96
Ottawa-Gatineau	1,064,000	0.48	110	27%	1087	7.38	10.14
Calgary	951,000	0.74	87	21%	1167	5.00	10.01
Winnipeg	671,000	0.55	63	21%	1025	2.79	7.8
Hamilton	498,000	0.62	41	14%	1242	7.08	10.66
London	432,000	0.59	49	13%	1151	n/a	7.02
Kitchener-Waterloo	414,000	0.61	27	10%	1052	3.66	7.02
Niagara	377,000	0.64	16	8%	1113	n/a	7.15
Halifax	359,000	0.58	52	21%	1007	3.16	8.19
Oshawa	296,000	0.59	45	11%	1248	5.55	13.91
Hamilton Rank of 10	5th highest	3rd highest	3rd lowest	5th lowest	2nd highest	2nd highest	3rd highest

Source: Transportation Association of Canada, Urban Transportation Indicators – Third Survey.

4.4 Existing Transportation Network Deficiencies and Opportunities

4.4.1 ROAD NETWORK LEVEL OF SERVICE

One important and tangible measure of roadway level-of-service (LOS) involves the number of roadway sections operating beyond an acceptable **V**olume-to-**C**apacity ratio (**V/C)**. Travel demand modelling for present conditions indicates that there are a number of sections of the road network with poor performance in the morning peak hour, as illustrated in Exhibit 4.8. Major observations confirmed by actual experience indicates:

- Highway 403 is experiencing pressure north of the Lincoln M Alexander Parkway from inter-regional traffic, combined with traffic merging onto Highway 403 from the Lincoln Alexander Parkway;

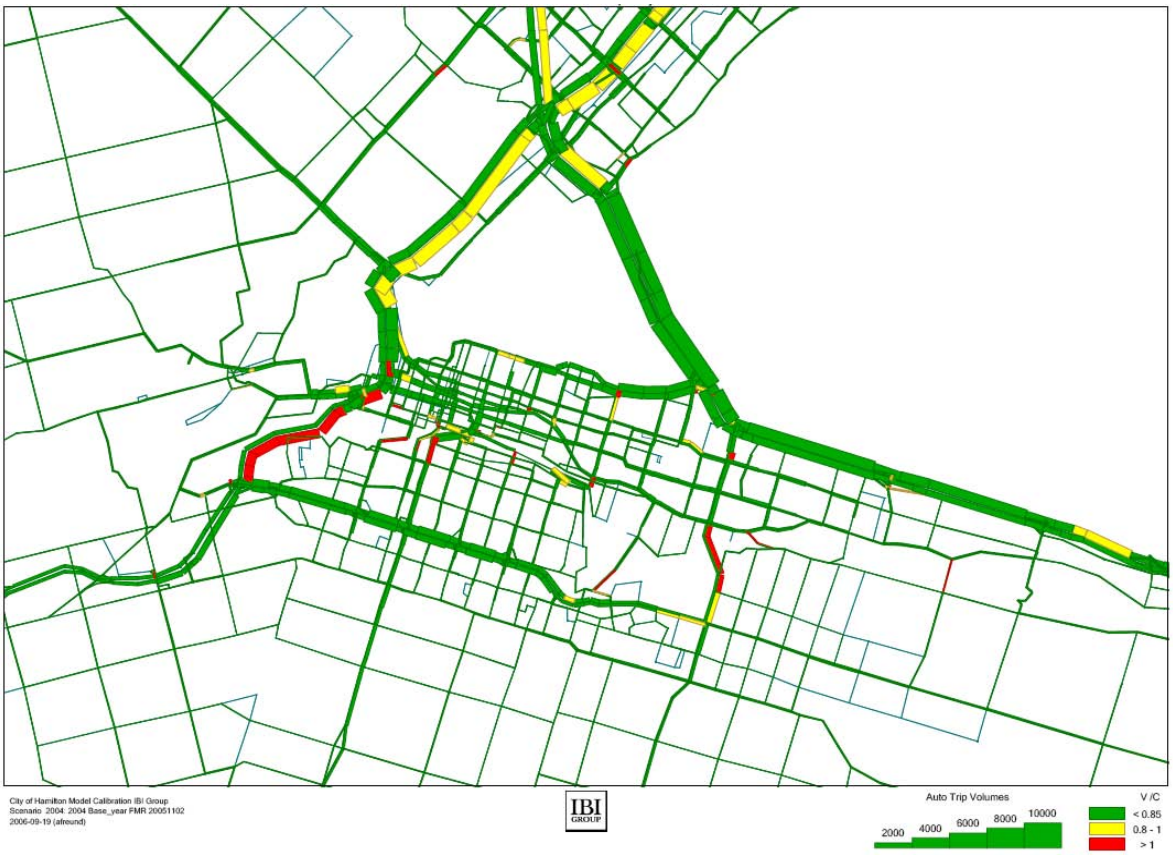
- Commuters crossing the Escarpment experience poor levels of service as the Hamilton Mountain accesses are generally at capacity; and,

- There are also unfavourable conditions in the Centennial Parkway area as well as along several sections of the QEW.

Completion of the Red Hill Valley Parkway between the Lincoln Alexander Parkway and the QEW will result in a redistribution of traffic volumes. The impact of this major new facility will be reduced pressure from the Mount Albion Road/Centennial Parkway corridor, but potentially increased traffic volumes on the QEW south of the QEW-403 interchange. The Red Hill Valley Parkway may also relieve some pressure from the Hamilton Mountain accesses for commuters travelling to Highway 403.

In general, the road network in Hamilton operates fairly well, particularly compared to other areas of the GTA. This is an opportunity in that there is some flexibility to re-balance the network to also accommodate other transportation modes such as dedicated transit and cycling lanes. However, it is important to maintain an acceptable level of service as this is essential for goods movement.

Exhibit 4.8: Existing Road Network Volumes and Deficiencies (AM Peak Period)



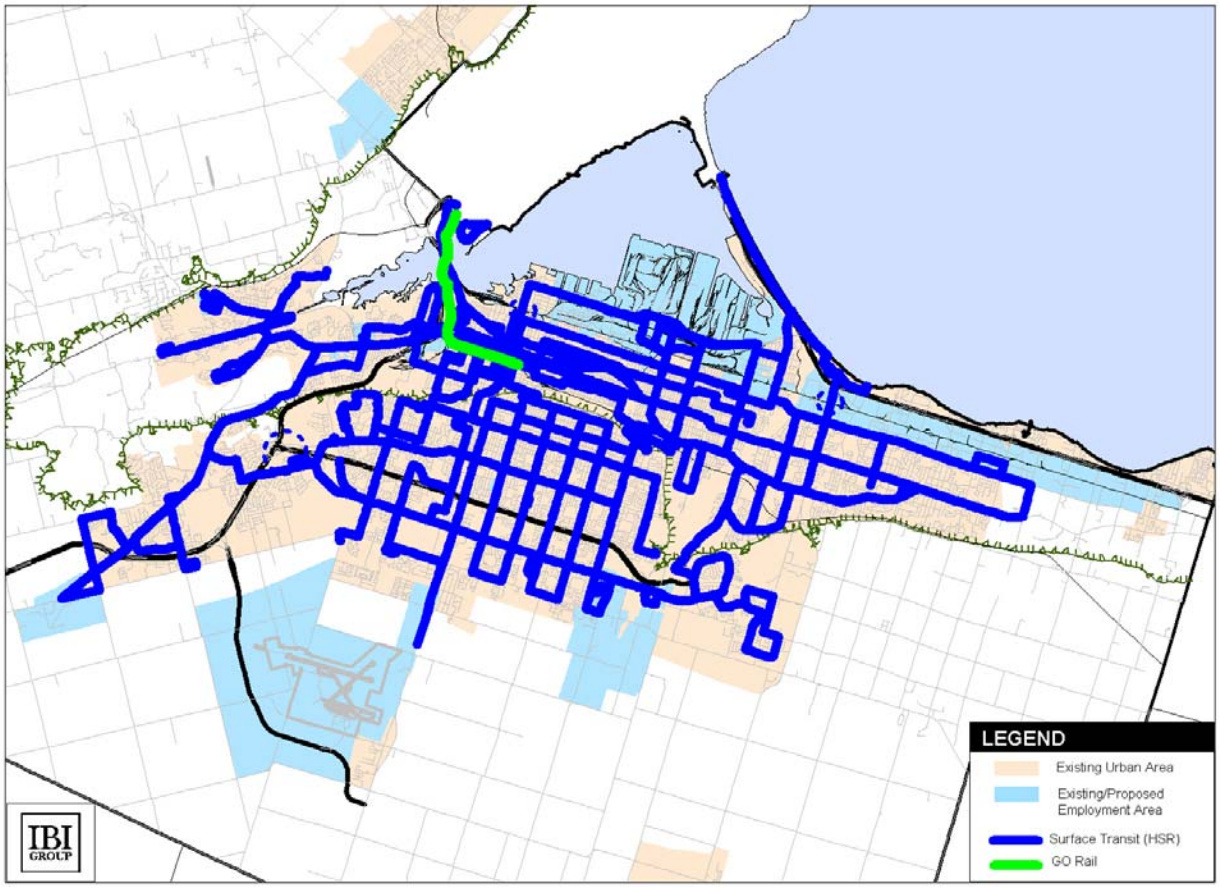
Source: Hamilton EMME/2 Model

4.4.2 TRANSIT NETWORK

The Hamilton Street Railway (HSR) currently provides regular fixed route bus services in the former City of Hamilton, Dundas, Ancaster and Stoney Creek. HSR contracted shared-ride taxi service is provided in a portion of Glanbrook. No service is currently provided in Flamborough. The bus system is characterized by a small number of hubs, with most buses either originating in the Downtown core, or at one of several key suburban activity locations (Lime Ridge Mall, McMaster University, Eastgate Square, etc.) The HSR has approximately 200 standard buses in active service. Exhibit 4.9 provides an illustration of the existing transit system.

The City of Hamilton also operates a specialized para-transit service for aged or disabled persons, DARTS, that uses a fleet of lift equipped vans and contracted taxi services where appropriate.

Exhibit 4.9: Existing Transit Network



In addition to the municipal bus services, GO Transit provides inter-regional bus and rail services, which are presently focused on the Downtown GO Transit Terminal. Bus stops for GO Transit regional service include King and Dundurn, Main and Longwood, the GO Centre and McMaster University, and others. Go Rail service stops at Aldershot (Burlington) and at the GO Centre. The Hamilton GO Centre is also located four blocks south of Jackson Square, facilitating connections with HSR service. Bus service to and from Toronto operates 15 times a day, every hour in both directions.

GO Rail service to Hamilton's Downtown terminal is limited to peak period peak direction service only. There are currently 3 trains that leave Hamilton in the morning and four trains that return in the evening. During remaining periods, trains start or terminate at Burlington station. There are 28 trains in the day and evening per direction to and from Toronto along the Lakeshore West line that serves Burlington Station.

Hamilton does not currently have an intercity rail (VIA) station within the municipal boundary. The nearest stations are located at Aldershot, Grimsby and Brantford.

Service Levels Outside the Former City of Hamilton

Transit service outside the former City of Hamilton is somewhat limited. The Airport, a growing employment centre, is not serviced by transit nor are other employment areas in Waterdown, Glanbrook and Ancaster. Regional and intercity transit services are limited to the GO/VIA station at

Aldershot (Burlington), along the Lakeshore line to Hamilton. Only two municipal (HSR) lines run through each of Ancaster and Dundas, with limited service on weekends.

In Glanbrook and Stoney Creek, arrangements have been made with local taxicab services to connect riders from areas beyond the bus service area with HSR bus lines. Started in 1998 as a pilot project to service eastern Stoney Creek, "Transcab" service has proven to be successful in cost-effectively connecting residents of areas not dense enough to warrant bus service with main transit lines. The service currently operates Monday to Saturday during the day, and costs an additional 50c above regular bus fare. Residents are required to call only an hour before their desired travel time when going toward transit lines. In Glanbrook, Transcab services are also fully accessible, upon customer request.

Ridership Trends

Due to financial constraints, the major theme of transit in Hamilton over the past decade has been cost-efficiency as shown in Exhibit 4.10. Despite reducing service hours and increasing fares, HSR has managed to retain about the same level ridership it had in 1994. However, HSR has lost out on the opportunity of growing transit ridership with population growth.

Exhibit 4.10: Summary of Conventional Transit Service Characteristics (2005 vs. 1994)

Indicator	1994	2005
Service Area Population	401,500	438,000
Conventional transit fleet size	172	204
Conventional transit service hours	740,576	625,409
Revenue Passengers	20,662,000	20,918,907
Annual Passenger trips per capita in transit service area	51	48
Total Operating Cost	$55,752,700	$50,810,018
Revenue/Cost Ratio	40%	56%
Average Fare	$1.04	$1.33

4.4.3 CYCLING AND PEDESTRIAN SYSTEMS

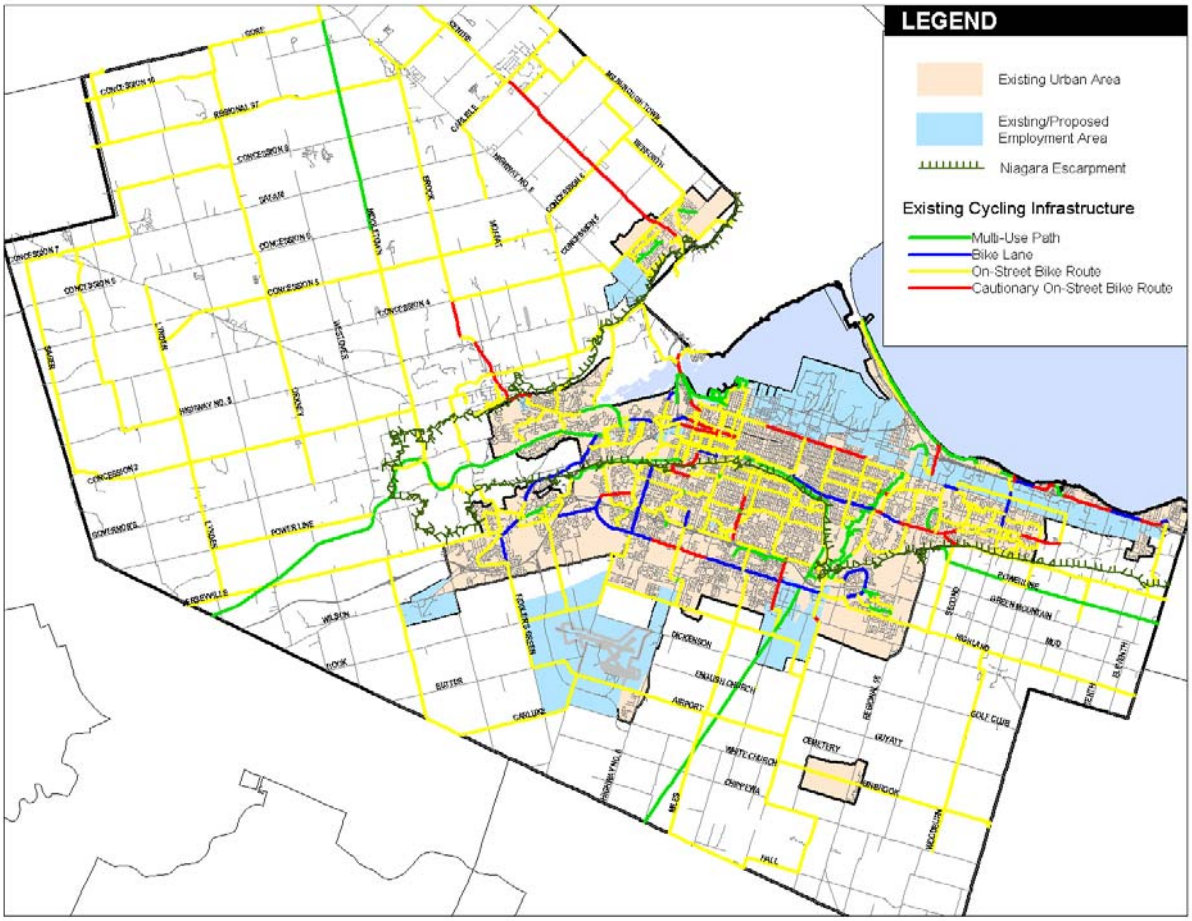
Promoting and encouraging walking and cycling through the provision of supportive facilities and programs helps build active communities, and reduces the dependence on automobile transportation and the associated infrastructure costs, air quality impacts, safety concerns and congestion problems. The City of Hamilton has a well-established network of cycling routes including dedicated bicycle lanes, cautionary on-street bicycle routes, multiple use paths, and on-street routes as shown in Exhibit 4.11. Numerous linear trails have been implemented within the City. In addition, physical barriers to cycling and walking such as major road corridors and the Niagara Escarpment have been addressed in key locations with investments in infrastructure such as the Chedoke bicycle-friendly stairs and the Highway 403 multi-use trail crossing. However, despite the extensiveness of the overall network, the dedicated bicycle lane/path network is fragmented and relatively sparse. The cycling network would be enhanced through the creation of more attractive routes though the Downtown core.

Walking and cycling mode shares are much higher in Downtown than in the lower density suburban areas for utility walking and cycling trips (i.e. non-recreational trips). For example, for AM Peak Period trips starting and ending in the Downtown core, walking accounts for 60% of all trips. In comparison, trips made by walking or cycling in the morning peak hour in outer areas (e.g. Glanbrook, Stoney Creek) represent less than 1% of all trips. The 1997 Hamilton-Wentworth Community Cycling Survey indicated that most cycling takes place in the Dundas/West Hamilton/Downtown Hamilton area on various trails, and to a much lesser extent in Ancaster, Waterdown and other local areas. Participation in cycling is very low in Stoney Creek and on the Mountain. This illustrates the impact that location, density of activities and supportive infrastructure have on walking and cycling travel choices.

The 1997 Hamilton-Wentworth Community Cycling Survey determined that the major factors deterring cycling include inconvenience and perceived safety risks from motorized traffic. Approximately 60% of current cyclists responded that they would cycle more if routes were safer, while 20% of non-cyclists indicated that they would start to cycle if routes were safer.

In addition to bicycle paths and lanes, supportive infrastructure, such as secure bike parking, and changing facilities can also encourage the use of active transportation modes. The Shifting Gears report discusses Hamilton's problems with inadequately maintained, insufficient, and poorly located bike racks. The report also identifies that efforts to link cycling with public transit, such as allowing bicycles onto low-floor buses. The recent decision to install bicycle racks on the front of buses may improve connectivity between cycling and transit.

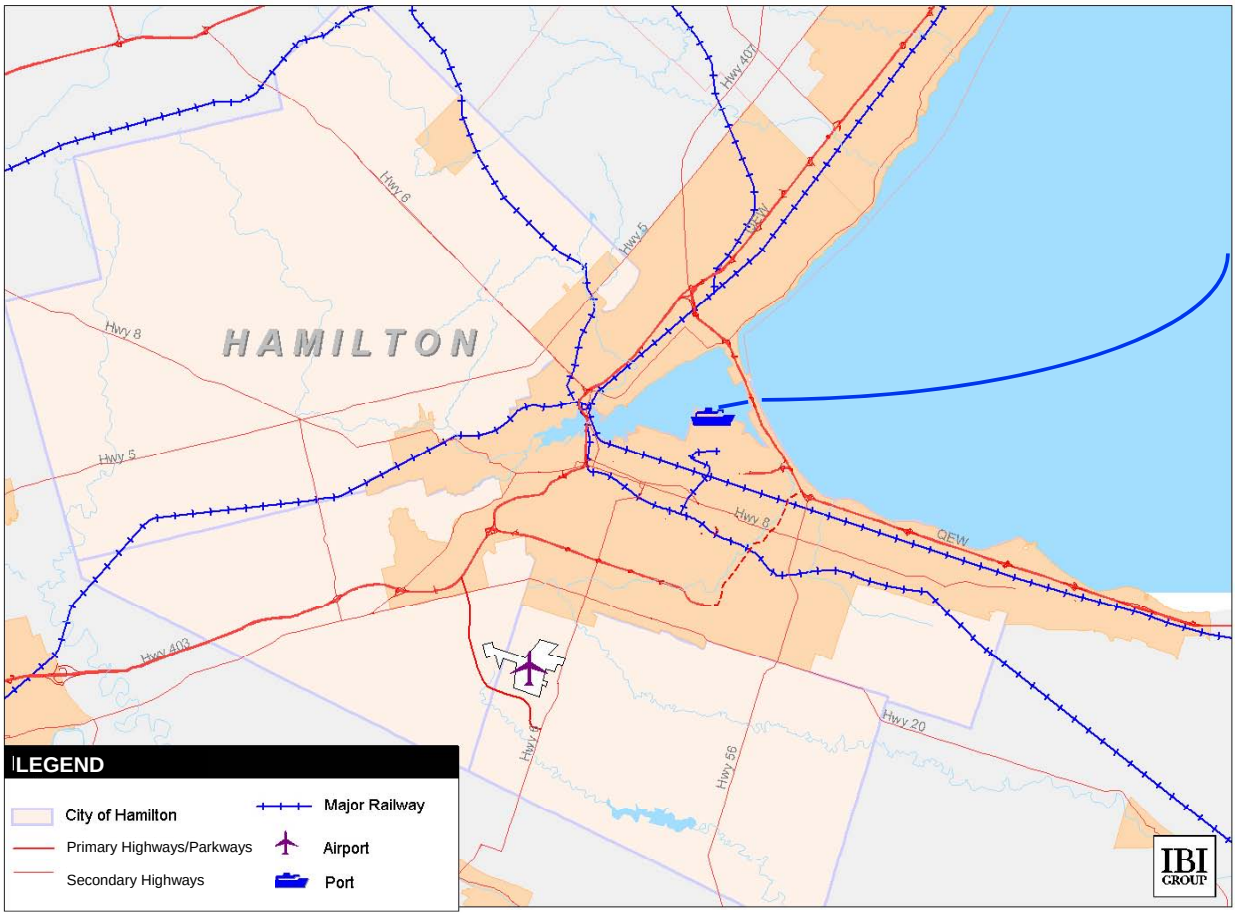
Exhibit 4.11: Existing Bicycle Network



4.4.4 FREIGHT/GOODS MOVEMENT SYSTEMS

Hamilton is a major centre for goods movement in Ontario. It is a major port, serves as an air cargo hub for express packages (i.e., courier companies), and it is strategically located for road and rail routes that serve both domestic and trans-border trade. Hamilton's freight transportation network is illustrated in Exhibit 4.12

Exhibit 4.12: Hamilton Strategic Goods Movement Network



Urban freight is important in terms of its role in the urban economy as well as its impact on quality of life (both positive and negative), which highlights the need for proper infrastructure provision, management, and regulation regarding goods movement systems. The sections below discuss the existing opportunities and challenges for goods movement by truck, air, rail, and ship.

Truck

In terms of tonnes of intercity goods serving the GTA and the City of Hamilton area, trucking dominates with 70% of the total tonnes. This translates into more than 250 million truck movements annually in the area. The Ministry of Transportation's Commercial Vehicle Survey (CVS) suggests that more than $2.5 billion worth of goods are moved on provincial highways in Ontario and the majority of those movements occur in the province's southwestern and central regions. Eight percent of all truck trips that use Ontario highways originate or terminate in the City of Hamilton[2].

The current major road network serving goods movement consists primarily of provincial highways. Highway 401 and the QEW handle 63% of the Canada's commercial vehicle trips to and from the US. The City of Hamilton transportation network of major highways and arterial roads promotes relatively easy access for trucks within the City area and beyond. The City has designated a network of roads and highways to serve as truck routes. Despite the extent of this network, there are somewhat circuitous road connections to the Port and Airport, which reduce the efficiency of freight transportation by truck to and from these facilities.

[2] Hamilton Goods Movement Study, City of Hamilton, 2005

As truck traffic increases, associated traffic and environmental impacts become more of a concern. Congestion is growing on highways and in urban areas. A survey of carriers conducted in 1996 found that 97% of carriers thought that congestion was a problem on Highway 401 and 100% indicated that congestion was a problem on the QEW/Highway 403[3]. Local delivery inside urbanized areas is much more costly than long-distance shipments, in part because it must use small vehicles with their low productivity (with increasing presence of parcel deliveries and less-than-truck load shipments), and in part because it must operate on congested streets. Furthermore, commercial vehicles on the roads contribute to truck loading and unloading on streets and avenues, an excess of truck traffic on avenues and streets, and trucks using residential streets to avoid delays on congested streets or at traffic lights. This suggests the need to clearly define future land uses adjacent to transportation corridors and to regulate on- and off-street loading to maximize the efficiency of the existing goods movement network.

Rail

Rail accounts for approximately 14% of intercity goods by tonnage serving the GTA and the City of Hamilton area. Since the rail mode is primarily used for long distance bulk goods, the opportunity for expansion of short-haul rail services in the GTA and the City of Hamilton area is limited. In fact, it is estimated that two-thirds to three quarters of the truck traffic movements in the GTA and Hamilton are captive markets since they cannot be served by rail. The biggest opportunities for rail are probably in the intermodal sector, combining with truck freight to move goods manufactured and assembled in the GTA and City of Hamilton area and surrounding areas to and from other locations across Canada. However, the closest intermodal (i.e. rail/road) freight facilities are located in Brampton and Milton.

There is a rail facility in the Stoney Creek Industrial Area; it includes a variety of warehouses and an industrial rail yard that serves Downtown Hamilton directly by CN Grimsby Subdivision. There is also considerable rail activity in the port with a transload[4] facility at Parkdale, served by Ontario Southern Railway. CPR operates rail service to a transload facility for steel in the Aberdeen area.

Air

Hamilton International Airport is located at the intersection of Highway 6 and Airport Road in the City of Hamilton. The Airport is approximately fifteen minutes driving time from Downtown Hamilton, forty-five minutes from St. Catharines, and an average of 60 minutes drive time from Toronto.

Scheduled passenger service is provided by Air Canada, and WestJet Airlines. In addition, Transat Holidays operate winter charters from Hamilton International Airport. In 2003, the Airport handled approximately 1 million passengers[5]. Sunquest and Globespan were also recently added to the list of airlines flying out of Hamilton International Airport.

In addition to passenger traffic, Hamilton International is an emerging air courier and cargo destination, handling about 93,000 tonnes of air cargo in the year 2003. composed of 60%-70% courier freight and 40%-30% cargo. Growth has been dramatic, from a small (almost negligible base) to second rank in Ontario in 2002. The largest overnight package delivery companies that operate in Canada (UPS, FedEx, Purolator and Cargojet Canada) use Hamilton International Airport, and it is Canada's largest integrated courier cargo airport, partly owing to unrestricted night time flight operations.

[3] GTSB Goods & Services Movement Strategy: Phase 1, January, 2001
[4] Transload refers to transfers between rail and truck either directly, or over a specialized dock or ramp. Intermodal terminals represent a type of transload facility in the broadest sense, but the term is generally reserved for trailers and containers exchanged between modes.
[5] Hamilton International Airport, 2004 Master Plan

Hamilton's Economic Development Strategy identifies the Airport area as a major employment growth area. The presence of an efficient and well integrated transportation system will play a critical role in the development of these employment lands.

Marine

The Port of Hamilton currently handles approximately 12 million tonnes tons of cargo and is visited by over 700 vessels each year making it one of the busiest ports on the Great Lakes. Through the St. Lawrence Seaway, the Port connects Hamilton to international shipping lanes. Marine freight activity at this Port has remained fairly stable during the last 14 years.

The Seaway is pursuing its plan to grow business by improving transit times, extending the navigation season and seeking incentives to spread demand over the operating season. It has launched a branding and advertising program centred on the notion of "Highway H_20" in which the Hamilton Port Authority is an active participant.

Shortsea shipping is another potential development for which the Port is well positioned geographically. The governments of Canada and the US are conducting research and practical examination of container feeder services, bulk barge services and Roll-on/Roll-off movements. The results of these investigation might spur or encourage new cross-lake or seaway services in the future.

4.4.5 SUMMARY OF TRANSPORTATION DEFICIENCIES AND OPPORTUNITIES

The assessment of existing conditions of the transportation network has identified deficiencies and opportunities on a few key fronts, which are described in Exhibit 4.13.

Exhibit 4.13: Summary of Existing Transportation System Challenges and Opportunities

Deficiency	Opportunity
Road System	
• Hamilton Mountain accesses, Upper Centennial Parkway, and sections of Highway 403 and the QEW are providing poor levels of service during peak periods.	• The Red Hill Valley Parkway will relieve some of the pressure on the 403 and Upper Centennial Parkway • Transit routes not operating in mixed traffic along Hamilton Mountain accesses could be an attractive option to commuters
Transit Systems	
• HSR ridership has not kept pace with population growth due to development trends on the periphery of the urban area that are not transit-supportive, a long term decline of employment in the Downtown and reduced levels of service. • HSR vehicles operate in mixed traffic and are not granted priority on the road network, resulting in slow operating speeds. • Public transit service outside of the former City of Hamilton is very limited, particularly during evenings and weekends.	• Due to the high ridership along the primary east-west and north-south corridors to and from the Downtown terminal, the development of surface rapid transit along these routes is a key opportunity.
• Go Rail service to Hamilton's Downtown terminal is limited to peak period peak direction service only	• More of the trains operating serving Burlington station could continue to Hamilton and a reverse peak service could be implemented.
Cycling and Pedestrian Systems	
• Convenience and perceived safety concerns of walking and cycling need to be improved. • The dedicated bicycle lane/path network is fragmented and relatively sparse in some areas. • Very few trips from outer areas are made by walking or cycling.	• Increase amount of on-street bicycle lanes throughout the Downtown core and rest of City. • Enhance cycling-supportive infrastructure, such as secure bike parking, change rooms, and programs to link cycling with public transit.
Freight/Goods Movement Systems	
• Poor and circuitous road connections to the Airport (from the east) and Port • Increasing compatibility issues between goods movement and residential uses	• Clearly define land uses adjacent to transportation corridors. • Ensure on- and off-street loading for new developments does not impact the efficiency of the existing goods movement network. • Work with goods movement industry to address network issues (e.g. seasonal closure of Port, signage, geometric constraints on truck routes)
• The biggest opportunities for rail are probably in the intermodal (i.e. rail/road) sector; however, large tracks of land are required to develop these facilities	• Continue to advance the recommendations of the Hamilton Goods Movement Study to establish logistics clusters at Port and Airport.
• Air traffic is a significant generator of noise and air emissions. • Aviation is the mode that is most vulnerable to increasing oil prices.	• Strong potential to create an Employment Growth District around the Airport.

5. FUTURE TRANSPORTATION SYSTEM PERFORMANCE

5.1 Future Population and Employment

The growth options developed through the GRIDS process were developed concurrently with Places to Grow. As the growth options were being developed, the Provincial process was also being updated. As such, preliminary planning projections ranged from 660,000 persons to over 700,000 persons for population in 2031 and ranged from 290,000 employees to over 310,000 employees for employment in 2031.

Once the Places to Grow Growth Plan and the GRIDS process were finalized, the preferred growth option and the long term planning projections to year 2031 were established. The distribution of population and employment growth among the primary geographic regions of the City of Hamilton are presented in Exhibit 5.1 and 5.2.

Exhibit 5.1: Projected Population Statistics (2001-2031)

	Serviced Population			
	2001	2011	2021	2031
Lower Hamilton	191,499	202,588	207,843	217,419
Upper Hamilton	143,100	147,473	158,531	164,719
Stoney Creek	59,783	65,464	80,818	89,109
Glanbrook	8,132	10,119	18,938	26,794
Dundas	23,817	24,874	25,575	25,708
Ancaster	29,920	33,066	39,453	39,692
Flamborough	15,707	16,066	21,976	31,354
EXISTING URBAN BOUNDARY	471,958	499,650	553,134	594,795
Southeast Mountain Urban Boundary Expansion	0	946	4,559	41,558
URBAN BOUNDARY EXPANSIONS AREAS	0	946	4,559	41,558
TOTAL URBAN	471,958	500,596	557,093	636,353
TOTAL RURAL	33,844	33,893	32,669	32,064
GRAND TOTAL HAMILTON	505,802	534,489	590,362	668,417

Source: City of Hamilton Long Range Planning, May 2006

Exhibit 5.2: Projected Employment Statistics (2001-2031)

	Number of Jobs			
	2001	2011	2021	2031
Lower Hamilton	115,497	126,302	139,100	154,931
Upper Hamilton	31,540	34,491	38,662	43,112
Stoney Creek	27,463	31,815	36,999	41,971
Glanbrook	4,022	5,404	8,477	15,374
Dundas	6,067	6,748	7,136	7,878
Ancaster	6,115	7,506	9,349	13,358
Flamborough	5,015	5,911	8,752	9,694
EXISTING URBAN BOUNDARY	195,718	218,177	248,475	286,318
Airport Lands Urban Boundary Expansion	0	0	4,482	12,560
Southeast Mountain Urban Boundary Expansion	0	0	3,140	3,525
URBAN BOUNDARY EXPANSIONS AREAS	0	0	7,622	16,085
TOTAL URBAN	195,718	218,177	256,097	302,403
TOTAL RURAL	9,194	10,116	6,079	6,502
GRAND TOTAL HAMILTON	204,912	228,293	262,176	308,905

Source: City of Hamilton Long Range Planning, May 2006

5.2 Future Transportation Demand, Supply and Performance

According to the above projections, Hamilton's population will increase by 162,000 people (32%) between 2001 and 2031. During the same period, 105,000 new jobs are expected to be created. If current travel characteristics remain the same, there will be 180,000 additional auto driver trips per day that will need to be accommodated by the road network. This translates into 1.2 million additional kilometres driven by Hamilton residents each day and a consumption of 40 million litres of fuel per year.

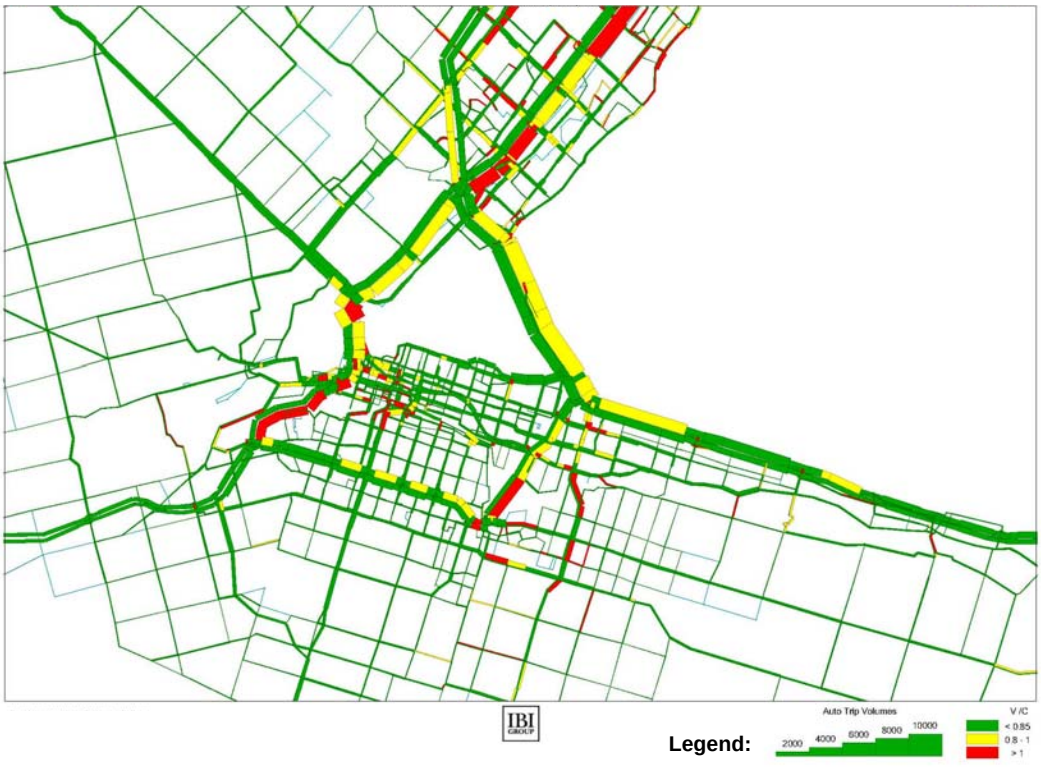
As discussed in the **Road Network Strategy Working Paper**, a number of previous sub-area studies have identified a base level of committed and planned road network improvements:

- Red Hill Valley Parkway.
- Arvin Avenue extension.
- Dartnall Road extension to Dickenson Road.
- Garth Street extension from Twenty Road to Dickenson Road.
- New east-west road from Tradewind to Trinity Road.
- Trinity Church Corridor (being examined as part of ROPA 9)

- Upper Ottawa St. extension
- Waterdown network improvements.
- Highway 6 widening to five lanes (3 northbound and 2 southbound) south of Dundas Street, and the construction of an interchange at Highway 6 and Dundas Street (EA was recently completed).

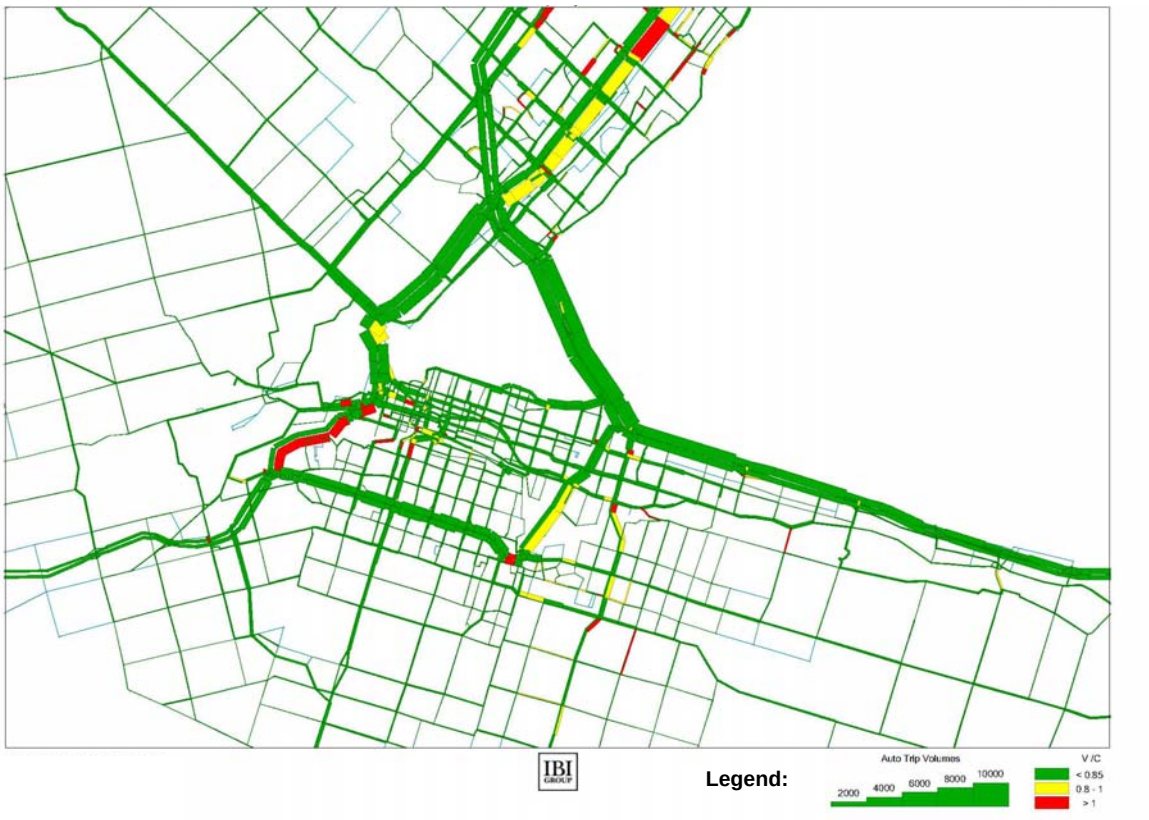
However, even with these improvements, it is projected that there will be road capacity shortfalls in the future. As shown on Exhibit 5.3 below, assuming current auto mode share trends, most of the Escarpment crossings will be well over capacity in 2031 (shown as red). Conversely, if a 20% reduction in auto driver trips can be achieved through improvements to transit and other travel demand management strategies, most of these crossings will be able to operate within their capacity over the planning horizon (see Exhibit 5.4). Considering that a new Escarpment crossing would cost in the order of $50 million, it is important that all options to minimize growth in auto trips be pursued.

Exhibit 5.3: Future (2031) Road Capacity Shortfalls (Current Mode Split Trends)



Source: City of Hamilton EMME/2 Model

Exhibit 5.4: Future (2031) Road Capacity Shortfalls (20% Reduction in Auto Driver Trips)



Source: City of Hamilton EMME/2 Model

6. ANALYSIS OF ALTERNATIVES

6.1 Integrated Land Use and Transportation Planning Approach

In 2003, the City of Hamilton initiated the Growth Related Integrated Development Strategy study, known as GRIDS. The GRIDS Study Design explains that "GRIDS is a planning process to identify a broad land use structure, associated infrastructure, economic development strategy and financial implications for the growth options to serve Hamilton for the next 30 years". GRIDS is an integrated planning process because all of the activities related to development have been brought together to enable a coordinated, time and cost efficient investment strategy for the public and private sectors.

There were essentially three steps in the GRIDS process as discussed further in the Final Growth Report[6].

1) Development and evaluation of growth concepts;

2) Development and evaluation of growth options; and,

3) Refinement of the preferred growth option.

Transportation infrastructure requirements, costs and impacts associated with growth were considered in all stages of the GRIDS process.

6.2 Analysis of Growth Alternatives

In stage 2 of the GRIDS process listed above, five options were initially considered to accommodate future growth:

- Option 1: No Residential Expansion;
- Options 2 to 4: Appropriately Distributed Development (three different options);
- Option 5: Nodes and Corridors.

All options reflected the requirements of Places to Grow and the Greenbelt legislation, including the target of accommodating 40% of all new households within the existing urban area through intensification.

The growth concepts and growth options were evaluated using a Triple Bottom Line (TBL) evaluation. TBL is a structured methodology for integrated analysis, evaluating how each growth concept will lead toward or away from the desired social, economic and environmental results identified in *Vision 2020* and the *Nine Directions*.

Specific criteria related to transportation were identified and assessed as part of the TBL approach, including:

- Community Well-Being
  - Potential For Disruption To Communities From Transportation Activities

[6] Growth Related Development Strategy: Growth Report, City of Hamilton and Dillon Consulting, May 2006.

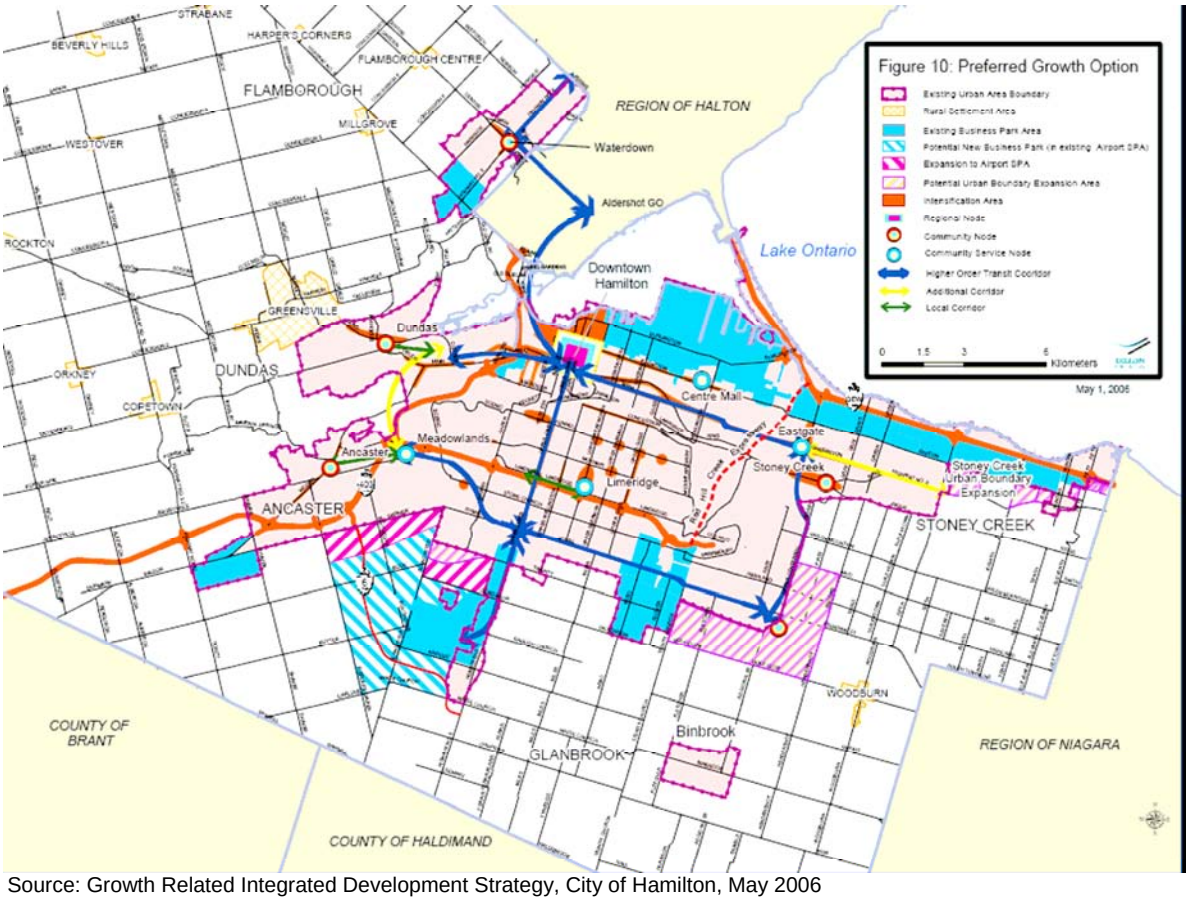
- Economic Well-Being
  - Ability To Use Existing Transportation Infrastructure
  - Impact On Accessibility For Goods Movement
  - Transportation Infrastructure Requirements And Level Of Service
- Ecological Well-Being
  - Ecological Impact Of Infrastructure
  - Estimated Change In Fuel Consumption
  - Proximity Of Residents To Transit
  - Degree Of Support For Transit
- Other Considerations
  - Potential Risks Of Not Achieving Options

From a transportation perspective, Option 1 (No Expansion) and Option 5 (Nodes and Corridors) were considered most preferred as they had the highest concentration of development in areas with the highest transit potential. For example, trips originating in the Downtown and Central Area currently display a transit mode split that is more than double the City-wide average. While both Option 1 and Option 5 were generally the most supportive of transit, Option 5 was considered to have a higher potential for transit in that it concentrates development around nodes and corridors where there is already high transit service levels (e.g. Downtown, McMaster, Eastgate Mall) or where transit services could be designed to operate efficiently and cost-effectively.

Options 1 and 5 also were determined to have the greatest potential to minimize auto travel demands across the Escarpment, thus minimizing the need for new Escarpment crossings.

Based on an extensive evaluation process involving multiple stakeholders from different disciplines, the nodes and corridors option (Option 5) was selected as the preferred option. This growth option, shown in Exhibit 6.1, is based on directing growth to an interconnected system of nodes (central foci of community activity) and corridors (mixed use, transit friendly linkages).

Exhibit 6.1: Final GRIDS Growth Option



Source: Growth Related Integrated Development Strategy, City of Hamilton, May 2006

6.3 Strategic Transportation Alternatives

6.3.1 IDENTIFICATION OF ALTERNATIVES

The consideration of functionally different solutions or "alternatives" is an essential part of the EA process. In parallel with the evaluation of growth options, several broad strategies were examined in terms of their potential to address the City's transportation needs while respecting the principles of GRIDS and VISION 2020. These included:

- **Status Quo** - No major changes to the road, transit or active transportation networks.
- **Committed Projects Only** - Projects already underway or identified in the 10 year capital plan.
- **Modest Transit Expansion** - Increases in existing bus services, expansion of bus routes to new areas, increased GO Transit Service.
- **Aggressive Transit Expansion** - Implementation of Bus Rapid Transit System in key corridors, policies to encourage more compact, mixed use development in transit corridors, transit to major employment areas, new GO Rail lines.

- **Demand Management Options** - Aggressive programs to encourage walking, cycling, ride-sharing, telecommuting, etc.

- **Roadway Capacity Optimization** - Localized intersection improvements, access control along major corridors (i.e. improved signal coordination, turn restrictions).

- **Roadway Capacity Expansion** - Selected road widenings, where justified based on demand, new arterial or collector roads to serve new developments, potential freeway expansion.

6.3.2 EVALUATION OF ALTERNATIVES AND PREFERRED TRANSPORTATION SOLUTION

Each of the strategic transportation alternatives were evaluated based on four broad categories. The evaluation was largely based on a subjective evaluation, drawing on the technical studies and modelling, as well as the concurrent analysis undertaken to assess the GRIDS options. Considerations under each of the four categories, or factors, are listed below.

- Natural Environment Factors
  - Reduces criteria air contaminants
  - Minimizes noise impacts
  - Improves water quality, green spaces, flora and fauna, etc.

- Socio-cultural Factors
  - Improves quality of life in neighbourhoods
  - Reduces collisions; improves personal safety and security
  - Improves mode choice

- Economic Factors
  - Attracts employment, capital, optimal use of transportation infrastructure capacity, and future land use
  - Increases land value, or does not decrease land values
  - Reduces or defers public and private costs of transportation capital (construction or acquisition of fixed infrastructure and rolling stock) and operations (maintenance, enforcement, delay, fuel, etc.)
  - Maintains traffic flow at acceptable level

- Technical Factors
  - Ease of implementation
  - Minimizes operational impacts

Exhibit 6.2 provides a summary of the evaluation of strategic transportation alternatives and the key considerations. Although no single approach is likely to solve all transportation problems, the preferred overall strategy is to rely on **transit** and **travel demand management**, in combination with **road capacity optimization** to solve transportation problems, before looking to road expansion. It is also recognized that adequate road infrastructure is essential for economic development and that strategies must reflect a balanced transportation network. Specific strategies also vary by individual location as discussed in the next section.

Exhibit 6.2: Evaluation of Strategic Transportation Alternatives

EVALUATION CRITERIA	Status Quo	Committed Projects Only	Modest Transit Expansion	Aggressive Transit Expansion	Travel Demand Management (TDM)Options	Roadway Capacity Optimization	Roadway Capacity Expansion
DESCRIPTION	- No major changes to the road, transit or active transit networks	- Projects already underway or identified in the 10 year capital plan	- Increases in existing bus services - Expansion of bus routes to new areas - Increased GO Transit Service	- Implementation of Bus Rapid Transit in key corridors - Policies to encourage more compact, mixed use development in transit corridors -Expanded transit service area - New GO Rail services	- Aggressive programs to encourage walking, cycling, ride-sharing, and telecommuting	- Localized intersection improvements - Access control along major corridors (i.e. improved signal coordination, turn restrictions)	-Selected road widenings - New arterial or collector roads to serve new developments - Potential Parkway expansion
NATURAL ENVIRONMENT FACTORS	- No impacts due to construction - Increase in congestion related air emissions	- Localized impacts due to road widening/extensions	- Will not achieve Vision 2020 targets for transit mode shares and air quality	-Most effective at reducing air quality - Can off-set need for new Escarpment crossings and other road widenings	-If successful air emissions will be reduced - Typically does not require new infrastructure	-Defers road widening - Can reduce localized congestion and air quality	-Road widenings could impact water crossings, Escarpment and other natural features - May increase vehicle use and related air emissions
SOCIO-CULTURAL FACTORS	- Would result in constrained social activities	- Current committed projects will not significantly improve transportation choices	- Improves transportation choice and access to transit for more of the population	- Helps to promote more sustainable, safe and integrated communities	- Requires behavioral change and may be seen as constraining mobility and freedom	- Few impacts on travel	-promotes auto-oriented lifestyles and related problems such as obesity, health problems
ECONOMIC FACTORS	-Delays due to congestion - Likely to "close door" on new development	-Committed projects can be accommodated within planned budget - Committed works do not account for new employment lands	-Modest increases can be achieved with available funds (i.e. gas taxes) - Improves transit to employment lands	- Will require funding from senior governments	- Measures involving disincentives may affect businesses, residents	-Travel time savings and other benefits usually outweigh costs - Some technological solutions have on-going operating costs	-Cost of new Escarpment crossings is significant - Will reduce travel time delay and improve access for goods movement
TECHNICAL FACTORS	- Operational problems would increase	- Committed projects are all technically feasible	- No major impediments	-Restricted roadway widths limits ability to implement dedicated transit lanes	-Requires extensive human resources -Uptake of programs has been low to date	- Existing traffic systems will require major upgrade	-Many corridors cannot be widened - Property acquisition is difficult and time consuming
OVERALL ASSESSMENT	◔	◑	◑	●	◕	●	◑

LEGEND: Least Responsive ○ ◔ ◑ ◕ ● Most Responsive

7. PLAN ELEMENTS

7.1 Public Transit

7.1.1 OBJECTIVES

The preferred overall solution discussed in the previous chapter is based on aggressive transit improvements. These improvements are essential not only to reduce the need for costly road improvements, but are also required to address the transportation needs of an aging population and potential uncertainties in energy prices.

Primary objectives of the Transit Strategy are:

- To develop a layer of bus routes connecting major transit nodes that are isolated from the effects of congestion;
- To encourage transit-supportive development around nodes and corridors;
- To provide a seamless transit system; and
- To facilitate travel to/from surrounding regions.

The first objective can be achieved through the development of a Higher Order Transit Network, as envisioned in GRIDS. Higher order transit can be defined as "bus or light/heavy rail that operates in its own right-of-way or in a priority situation, and therefore moves more efficiently than the regular flow of traffic and can carry large numbers of people quickly and comfortably"[7]. Examples include buses that have their own dedicated lanes and commuter rail, which operates on its own separate track. Higher order transit represents an opportunity to offer people a travel choice that is competitive with automobiles in terms of journey times and costs.

7.1.2 DEVELOPMENT OF PREFERRED STRATEGY

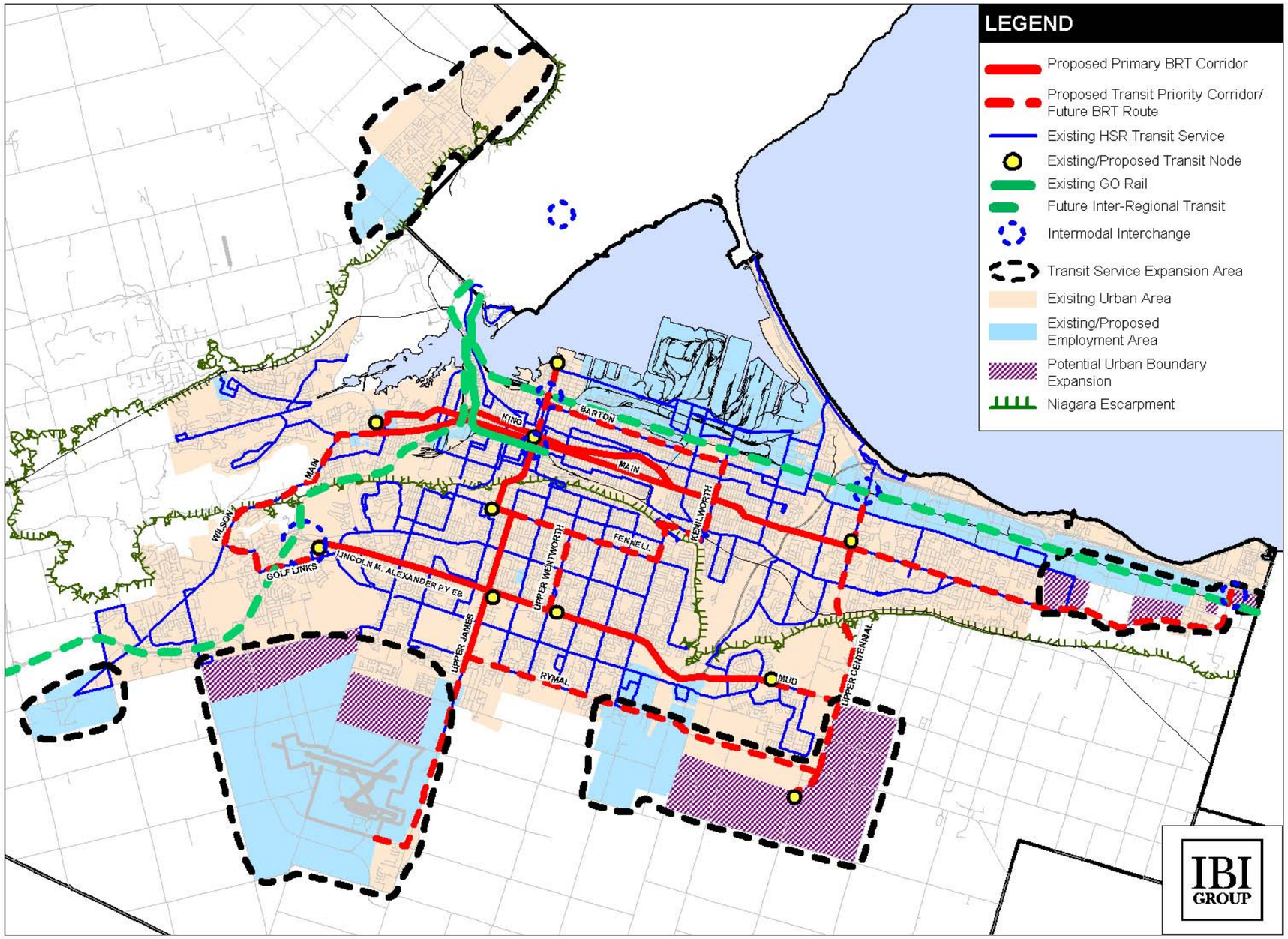
Exhibit 7.1 illustrates the preferred strategic transit network. Major components are discussed below.

Bus Rapid Transit

One of the key elements of the higher order transit network strategy for Hamilton is to develop a **Bus Rapid Transit (BRT)** Network, something that has been identified as a key need in numerous reports over the past few decades. Hamilton already has some of the initial elements of a BRT with the east-west BLine service, but significant improvements are required in both network coverage, including the establishment of one or more north-south lines, as well as in the operating characteristics, vehicle technologies and station amenities.

[7] Central Ontario Smart Growth Panel, Interim Advice on Unlocking Gridlock and Promoting Liveable Communities in Central Ontario, August 2002.

Exhibit 7.1: Proposed Higher Order Transit Network



The long-term goal for Hamilton is to develop full bus rapid transit in several corridors utilizing a combination dedicated transit lanes (where physically possible) and transit priority measures, in conjunction with high capacity, modern buses, advanced information systems and fare collection and enhanced transit stops/stations. In addition to the primary BRT Spines, several other **Transit priority** routes have been identified. Transit priority routes would rely on measures to expedite buses through congestion areas (e.g. queue jump lanes and transit signals) in combination with improved service levels and potentially upgraded transit stops. The BRT and Transit Priority network would be supported by land use policies that encourage more compact and mixed-use development around transit nodes and corridors, as further discussed in Section 7.1.4.

Building on the concept of the existing BLine, the BRT system would provide faster travel times between major origins and destinations allowing transit to compete with the private auto. Experience in other jurisdictions indicates that BRT can have a significant impact on attracting new transit riders. For example, a report for Transport Canada on the 98 B-Line Bus Rapid Transit System from Richmond to Vancouver found that 25% of current transit users changed their mode of travel to using the 98 B-Line service with 31% of the trips on the 98 B-Line being new transit trips[8].

The **Higher Order Transit Network Strategy Report Working Paper** (under separate cover in Volume 2 Technical Reports) provides a review of the history of enhanced transit initiatives in Hamilton, outlines the features and elements of BRT, and explores applications of BRT and enhanced transit service, including the identification of corridors and alignment characteristics. Based on this extensive review, three primary corridors emerged as having strong potential for BRT, or ultimately other forms of rapid transit:

- A Lower City east-west corridor on King Street/Main Street/ Queenston Road
- A Central North-South Corridor on James Street and Upper James via Mohawk College
- A Mountain East-West Corridor on the Lincoln Alexander Parkway or parallel facility

Specific alignments for BRT will be refined through subsequent phases of the Environmental Assessment Process and in consultation with HSR, the public and other stakeholders. However, as part of this Transportation Master Plan, an initial screening of potential routing alternatives for each of has been undertaken. The results of this screening is summarized in Exhibits 7.2-7.4.

Approaches for each of these corridors will vary depending on available right of way, adjacent land use, traffic conditions and other factors. The range of potential approaches is shown on Exhibit 7.5. An advantage of BRT is that it can be implemented in a staged approach. For example, it is recommended that the existing BLine be upgraded and enhanced starting in 2007.

New paint scheme for BLine Hybrid Buses put service in Spring 2007

[8] Transport Canada, 98 B-Line Bus Rapid Transit Evaluation Study, September 2003, www.itscanada.ca/english/documents/98B_Eval_Final.pdf

Exhibit 7.2: Preliminary Evaluation of BRT Routings - East-West Lower City Corridor

EVALUATION CRITERIA	King Street and Main Street	Main Street Contra-flow lane	King Street with Two-way Traffic
DESCRIPTION	Routing would follow existing BLine route on King and Main	North lane on Main Street would be converted to a westbound lane for buses only	King Street would be converted to two-way traffic to allow for single corridor BRT route
NATURAL ENVIRONMENT FACTORS	- Implemented using existing roadways - Improved transit service reduces air emissions	- Can be implemented using existing roadways - Improved transit service reduces air emissions	- Requires changes to ramps at Highway 403 - Improved transit service reduces air emissions
SOCIO-CULTURAL FACTORS	-Balances access for King and Main - Requires people to walk between eastbound and westbound services	-Promotes more compact land use on Main Street - Potential safety concerns	-Encourages slower traffic, more pedestrian friendly streets - Promotes more compact land use on King Street
ECONOMIC FACTORS	-Least capital costs - Least impacts to businesses on Main Street	- Requires new traffic signals - Impacts parking and access for business on Main Street	- Highest capital cost
TECHNICAL FACTORS	- Routing is already in operation therefore no major barriers	-Width of traffic lanes on Main Street are sub-standard -Signal progression challenges	- Congestion on King Street will slow bus travel times
OVERALL ASSESSMENT	●	◕	◑

LEGEND: Least Responsive ○ ◔ ◑ ◕ ● Most Responsive

Exhibit 7.3: Preliminary Evaluation of BRT Routings - Central Mountain North-South Corridor

EVALUATION CRITERIA	James Street and Upper James via Mohawk College	Victoria/Wellington/Upper James
DESCRIPTION	Routing would consist of James St, James Mountain Rd, West 5th, Fennell and Upper James to north of Rymal Road	Routing would consist of Wellington St/Victoria St, Claremont Access, West 5th, Fennell and Upper James to north of Rymal Road
NATURAL ENVIRONMENT FACTORS	- Implemented using existing roadways - Improved transit service reduces air emissions	- Implemented using existing roadways - Improved transit service reduces air emissions
SOCIO-CULTURAL FACTORS	-Most direct connection between Upper and Lower City	- Wellington and Victoria have less potential to develop into transit corridor; however the northern portions (e.g. north of King Street is an emerging employment area - Potential impacts on neighbourhoods
ECONOMIC FACTORS	- Promotes development of Downtown and James St corridor -- Upper James has potential to be developed for more compact and transit-supportive land uses - Costs depend on degree of segregation of buses	- Requires new traffic signals - Costs depend on degree of segregation of buses
TECHNICAL FACTORS	-Buses may experience congestion on James St unless dedicated lanes are provided - Further assessment is required to determine cross-section for Upper James	- Wellington and Victoria do not connect with existing/proposed transit terminals - Wellington and Victoria have excess capacity to accommodate transit lanes
OVERALL ASSESSMENT	●	◑

LEGEND: Least Responsive ○ ◔ ◑ ◕ ● Most Responsive

Exhibit 7.4: Preliminary Evaluation of BRT Routings - Mountain East-West Corridor (Heritage Green – Meadowlands)

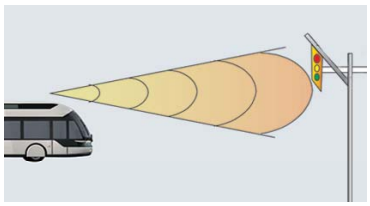
EVALUATION CRITERIA	LINC	Stone Church Road	Rymal Road
DESCRIPTION	Routing would operate as high speed service with intermediate connections to Lime Ridge and Upper James	Routing would follow Stone Church Rd and Golf Links Road	Routing would follow Rymal Rd, Garth Street, Stone Church Rd and Golf Links Rd
NATURAL ENVIRONMENT FACTORS	- Can be implemented using existing roadways - Improved transit service reduces air emissions	- Can be implemented using existing roadways - Improved transit service reduces air emissions	- Can be implemented using existing roadways - Improved transit service reduces air emissions
SOCIO-CULTURAL FACTORS	-Provides travel times more competitive with cars - Higher density development adjacent to LINC is unlikely	- May be noise and visual impacts on existing residences - Less opportunity to change land use	-May be noise and visual impacts on existing residences - Supports transit-oriented development of Elfrida
ECONOMIC FACTORS	- Will require improved terminal facilities and connections - Does not require road widening, but may require queue jump lanes in longer term	- serves a portion of North Glanbrook Industrial Park - May require additional road widening	- provides direct connection to North Glanbrook Industrial Park - May require additional road widening
TECHNICAL FACTORS	-Connections to/from LINC must be seamless - Has potential to provide dedicated transit lanes in long term	- Dedicated lanes not likely required - Both local and express services would need to be provided	-Dedicated lanes not likely required - Both local and express services would need to be provided
OVERALL ASSESSMENT	●	◕	◕

LEGEND:

Least Responsive ○ ◔ ◑ ◕ ● Most Responsive

Exhibit 7.5: Approaches for Bus Rapid Transit

Transit signal priority and "queue jump" lanes



Curb-side transit/High-Occupancy Vehicle lanes

Fully dedicated transit-only lanes (median transitway)

Transit Service Expansion

As noted previously, there is currently no fixed route transit service in Flamborough or Glanbrook. While this has not been a significant issue in the past as these areas were primarily rural settlements, the need for transit to areas such as Waterdown and Binbrook is growing as development is rapidly occurring. Similarly, there is a growing need to connect employment areas such as the Airport with transit. Access for employees is a major issue in attracting and retaining employees. If it is to be developed as planned, the North Glanbrook Industrial Business Park will also require transit services.

Conceptual transit service area expansions are shown on Exhibit 7.1.

One of the challenges with extending services to new areas is that these routes tend to have low cost-recovery ratios, at least in the short term. In the face of limited budgets, trade-offs need to be made between extending services to new areas versus addressing capacity issues on existing routes.

Park and Ride

There are presently no dedicated park-and-ride lots for HSR services, although many informal opportunities exist. For example, McMaster has an arrangement with Meadowlands Zellers allowing McMaster commuters to park in the Zellers lot in order to take the HSR to campus. Establishing dedicated parking facilities for transit riders near major transit terminals would encourage people from outlying areas to transfer to HSR for the remainder of their journey.

Establishing permanent park and ride lots at or near the following locations should be a key priority:

- Meadowlands area
- Eastgate Mall area
- Mount Hope (at or near Mountain Transit Terminal)
- Elfrida
- Winona

Formal arrangements with property owners would need to be established to ensure appropriate use of parking spaces. In addition, some locations, such as Mount Hope, would require land acquisition and funding to construct parking lots.

The Province of Ontario is also completing a Carpool Strategy for the GTA and Hamilton, which will identify potential carpool lots along Highway 403.

Commuter Rail and Bus

The two main intercity transit hubs in the Hamilton area are the Downtown GO Centre and Aldershot Station in Burlington. The Downtown GO Centre is well served by HSR while Burlington Transit operates a route between Downtown Hamilton and Aldershot.

The Provincial Growth Plan (Places to Grow) identifies a future intercity transit service to Niagara Region. Based on discussions with GO Transit, it is anticipated that this service will initially be implemented using buses, moving to commuter rail in the longer term. Logical connections to this system are at the following locations:

- James Street North (in the longer term in conjunction with intercity rail)
- Centennial Parkway at the QEW
- Stoney Creek, in conjunction with the development of the Stoney Creek Urban Boundary Expansion (SCUBE).

The Provincial Growth Plan also shows an improved inter-regional corridor from Downtown Hamilton to Brantford, via Highway 403, with connections to Guelph and Waterloo. This service would initially be provided using GO buses.

Intercity Rail

The City recently completed a study to establish the location for one or more new passenger rail stations (VIA Rail) in Hamilton with a James Street North (Liuna Station) location and East Hamilton location being the preferred locations. The VIA Rail Task Force has indicated a strong preference for the Liuna Station, given that it was the site of the previous VIA Rail Station and due to its higher economic potential compared to an east end location. This station could be tied into the existing Hunter Street Station and the future Downtown transit terminal with frequent two-way HSR service on James Street.

7.1.3 FINANCIAL IMPACTS

Achieving the goals and targets for transit set out in this TMP will require a significant influx of capital for transit projects and fleet expansion. In order to achieve the targets for transit ridership growth, it is estimated that the conventional fleet will need to expand from the current fleet of 205 vehicles to approximately 440 buses by 2031. Based on current bus costs, this equates to $91 million, or $3.6 million per year over 25 years. Other major costs, as shown on Exhibit 7.6, relate to transit facilities and the implementation of Bus Rapid Transit. These are estimated at $51 million and $159 million respectively. In total, it is estimated that approximately $300 million will need to be invested in the conventional transit system over the next 25 years, or approximately $12 million per year. This does not include the cost of replacing aging buses, which HSR estimates to be close to $60 million between today and 2015 ($6 million/yr) nor does it include the cost of replacing accessible transit (DARTS) vehicles. Additional capital will also be required to meet a growing need for accessible transit services.

Overall, it is projected that at least $20 million per year will need to be invested in the transit system to meet current and future needs. Currently, the transit division spends approximately $10-12 million per year on capital projects, including fleet expansion and replacement. Some of this funding need can be covered through current provincial and federal programs such as the Provincial Gas Tax Fund, which was $11.8 million in 2006 and the Ontario Transit Vehicle Replacement Program, which off-sets the cost of purchasing conventional transit buses that meet accessibility standards. Another source of funding for transit service expansion due to growth is Development Charges.

Exhibit 7.6: Conventional Transit Capital Costs

Category/Project	Anticipated Timing	Total Cost ($ Millions)
Fleet Expansion		
Conventional Fleet	On-going	91
Facilities and Equipment		
Downtown Transit Terminal	Short	15
Eastgate Transit Terminal	Short	1.5
Mohawk College Transit Terminal	Medium	4
Fare Cards-System Enhancement	Short	4.5
Automated Vehicle Control Equipment	Short	8
Automated Passenger Counter Replacement	Short	1
Maintenance and Operations Facilities Expansion	On-going	15
Park and ride lots (various)	On-going	2
Sub-total		51
Initial Bus Rapid Transit Implementation		
East-West Lower City (14 km @$1 M/km))	Short	14
Central North-South Corridor (6.5 km @$10 M/km)	Medium	65
East-West Mountain (14 km @ $5 M/km)	Long	70
Other Corridors	Long	10
Sub-total		159
Grand Total		301

Costs for Rapid Transit will vary depending on the routings and cross-sections, to be developed through subsequent planning process and detailed Environmental Assessment studies. Clearly, early and significant investments will need to be made by both the City and senior levels of government if meaningful progress is to be made on establishing a Bus Rapid Transit network.

The transit plan will also require a significant increase in transit operating funding. At present, HSR's net direct operating costs is approximately $22 million per year. It is estimated that this will need to grow to $37 million by 2016 and to over $50 million by 2031. As discussed in Section 8.1, a long term and sustainable funding strategy for transit is essential.

7.1.4 SUPPORTING MEASURES

Supporting Strategies are outlined in the Phase 2 Policy Papers as well as the Transit Division's **Ridership Growth Plan** and **Asset Management Plan**. Strategies include:

- Allowing for more compact mixed-use development around nodes and corridors throughout the City (see below)
- Conducting a comprehensive route restructuring study to determine how transit service should change in response to the proposed BRT plan
- Ensuring access for persons with disabilities
- Expanding the TransCab concept
- Establishing a "special project team" to implement BRT
- Developing a comprehensive marketing program
- Pursuing provincial/federal funding
- Utilizing the Smart Commute Program to promote alternative strategies
- Providing bike racks on buses
- Purchasing environmentally friendly buses

Guidelines on Transit-Supportive Densities

There is a strong relationship between transit utilization and land use, and this is explicitly recognized in both GRIDS and the Transportation Master Plan, calling for integrated land use/transportation planning in their implementation. The plans acknowledge that a more compact urban form focused on urban growth centres is needed to accommodate future growth levels and that the urban structure in Hamilton must change accordingly. Population and employment growth are to be accommodated by focusing intensification within presently urbanized areas and building compact, transit-supportive communities in designated greenfield areas with a mix of land uses to develop in a more self-contained manner.

A key principle is that compact, mixed-use urban development can support good transit service, which, in turn, serves and makes possible the compact urban form in a true symbiotic relationship. Transit tends to use space more efficiently and supports more compact, mixed use communities, with more pedestrian friendly areas that are less costly, require less energy for transportation and are more compatible with mobility and environmental goals. Conversely, automobiles can serve

dispersed settlement patterns and require a great deal of land for roads and parking. Auto-oriented urban areas also tend to have widely separated land uses and are often laid out in a manner that is not convenient for pedestrians, cyclists and transit users.

In addition to allowing a greater number of persons and jobs to be located within convenient access of transit, higher development densities tend to have higher parking costs and more pedestrian friendly urban design, which can lead to higher transit ridership. Transit can be very competitive with the private automobile under these circumstances, particularly if protection from general traffic is provided through either transit lanes or grade separation.

The Province's document *Places to Grow* (Growth Plan) proposes the achievement of a compact urban form to promote the use of transit and to create live-work opportunities. This more compact form is to be realized through the direction of future growth to areas designated for such purposes, through making transit a first priority for investment, and through the achievement of transit-supportive densities and a healthy mix of residential and employment land uses.

The Growth Plan identifies 25 urban growth centres, that are typically Downtown or central business district areas, and sets out a number of policies, including a density target. Hamilton falls within the category of "large or mid-size cities." For these urban growth centres, a density target of 200 people and jobs per hectare applies, where higher-order transit is in place or planned. It is not specified over what area these targets apply; however, it is noted that the Growth Plan also set a target that by 2015 a minimum of 40% of all residential development occurring annually within each upper- and single-tier municipality will be within the defined built-up area. The growth projections for Hamilton are based on this target.

In considering the application of density targets to nodes identified in GRIDS and reinforced in this Transportation Master Plan, it is appropriate to look at what is required to support different levels of transit service. Several studies have been completed that link transit level of service to the urban densities that are needed to support the transit service. Exhibit 7.7 summarizes these studies to obtain an overview of the level of transit service that can be expected from different urban density levels. Urban densities are defined as people and jobs per hectare of developable land. A density level of at least 40 people plus jobs per hectare is needed to support a minimum level of bus service. Below this point, development is too dispersed to be able to accommodate any effective scheduled transit service. Higher order transit service becomes feasible when urban densities exceed 200, and is generally most effective when linking a high density nodes and corridors.

Exhibit 7.7: Transit Supportive Densities

Density Range (People+Jobs/Hectare)	Land Use Type	Transit Level of Service
Below 40	Low Density Suburban	Unable to support minimum level of bus service (30 minute headways). Opportunity for limited dial-a-bus service.
40-80	Medium Density Suburban	Minimal bus service, operating at 30 minute headways
80-120	Low Density Urban	Intermediate bus service (10-20 minute headways)
120-200	Urban Medium Density	Frequent Bus Service (less than 10 minute headways). At the upper end of the range, can support some higher order transit (BRT/LRT) if linking high density centres.
200+	Urban High Density	Supports higher order transit such as BRT /LRT, ideally in high density nodes connected by medium/high density corridors. High capacity rapid transit modes such as subways can be supported when densities exceed 400 people+jobs per hectare.

Sources: Pushkarev and Zupan. Combining Transport and Community Development in Levinson and Weant's Urban Transportation: Perspectives and Prospects. Westport, Connecticut: Eno Foundation for Transportation Inc. 1982; Lehman Associates with IBI Group. Office of the GTA: Urban Density Study, 1995.; Berridge Lewinberg Greenberg Dark Gabor. Study of the Re-urbanisation of Metropolitan Toronto, 1991.

7.2 Road Network

7.2.1 OBJECTIVES

Hamilton has an extensive road network that generally provides an acceptable level of service for most trips. The preferred solution as identified in the previous chapter is to maximize the efficiency of the existing road network while making strategic road improvements to enhance economic development and goods movement.

One of the major challenges that the City faces is the growing backlog of roads needing maintenance and rehabilitation. Accordingly, a strategic and focused approach was adopted for the road network strategic development incorporating the following key objectives.

- Maximize the efficiency of the existing road network in order to minimize the need for new Escarpment crossings and other potentially high impact projects; and
- Focus road improvements on goods movement corridors and enhancing access to employment lands.

7.2.2 DEVELOPMENT OF PREFERRED STRATEGY

The development of a 2031 road network strategy for the Hamilton Transportation Master Plan underwent a transportation demand modelling exercise to determine 2031 network deficiencies and possible improvements. This is illustrated in **Exhibit 7.8** and described further in the **Road Network Strategy Working Paper** (under separate cover in Technical Reports).

It is noted that the purpose of the Roads Working Paper and supporting Appendices was to provide the background for the final proposed road strategy. All information in this working paper, and others, should be considered as background only.

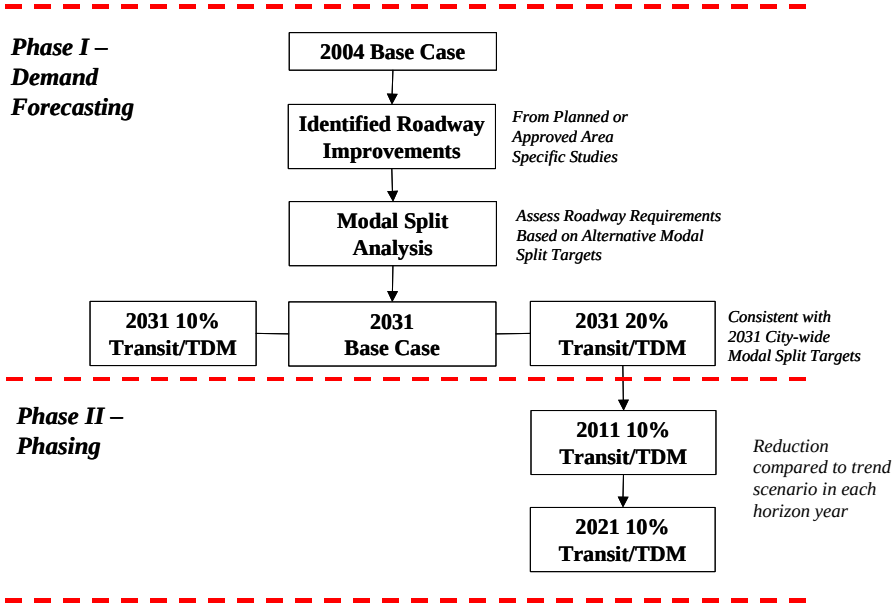
The assessment of 2031 network deficiencies began with a detailed network analysis to assess the 2004 roadway deficiencies in the City based on the existing conditions (network capacity and volumes). The purpose of beginning here was to quantify the magnitude of the transportation problems throughout the network.

The network analysis was developed using the City of Hamilton's A.M. Peak Hour Model to determine travel demand needs and phasing between 2004 and 2031. The model "runs" established the anticipated demand on the area network. The strategy then, was to determine how to best serve this demand within the conditions established through the study process.

The next step incorporated approved or planned roadway improvements into the model from multi-year capital budgets, Development Charge studies, previous sub-area Transportation Master Plans, and EA studies that have been undertaken by the City of Hamilton for works to be completed within the 2031 committed horizon year. Key areas of improvement included:

- Committed/planned road widenings to accommodate planned growth (Waterdown, Binbrook, Stoney Creek, Rymal Road Planning Area)
- Upgrading and expansion of road links serving employment areas and growth areas (North Glanbrook, Airport Area, Stoney Creek)
- Rebalancing of capacity in Downtown to improve pedestrian environment
- Recognition of need to provide efficient access to business parks and employment areas

Exhibit 7.8: 2031 Transportation Demand Forecasting Methodology



The 2031 Network with committed roadway improvements was then assessed to reflect alternative levels of investment in travel by transit, TDM, cycling and walking. Three 2031 planning horizon scenarios were assessed to reflect this range of travel behaviour, from current trends to a 20% reduction in auto driver travel demand compared to the "trends" scenario[9]. The performance of the City's 2031 roadway network under each of these conditions is discussed in the following sections:

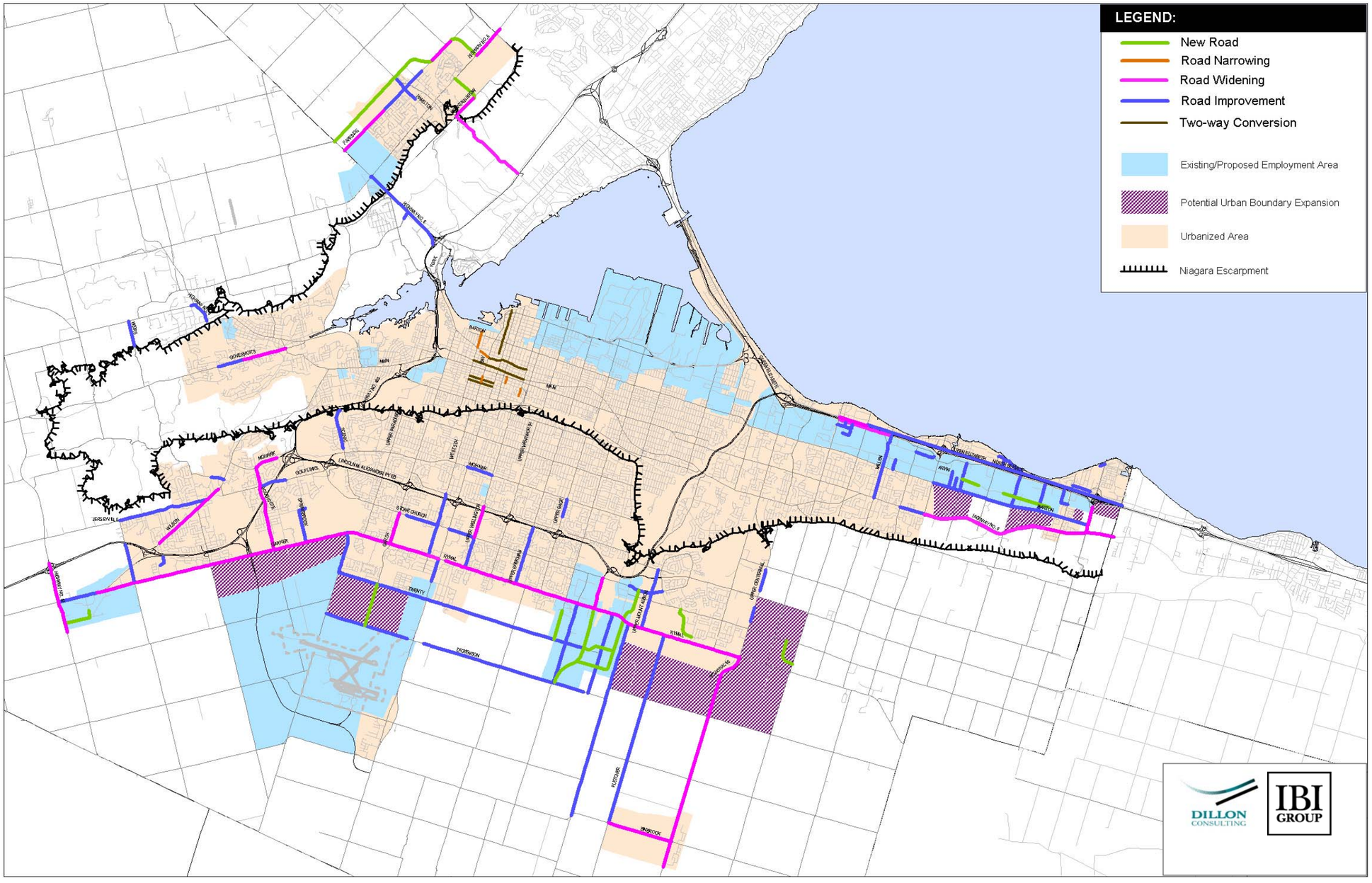
- 2031 Base (committed improvements);
- 2031 Base (committed improvements) with a 10 percent trip reduction due to transit and TDM; and
- 2031 Base (committed improvements) with a 20 percent trip reduction due to transit and TDM.

Once the 2031 network was established, a phasing strategy was developed by modelling intermediate horizon years (2011 and 2021). Both the 2011 and 2021 model runs incorporated a 10% reduction for transit and TDM improvements, vs. the trends scenario demand. In other words, it was assumed that vehicular demand would be 10% lower in each of these years than the demand that would occur if current travel behaviour continued.

Based on this iterative assessment, a preferred road network strategy was developed and is shown on Exhibit 7.9. This network strategy generally reflects committed and planned improvements identified through previous studies.

[9] This reduction in auto driver trips is less aggressive than the approved transportation targets, but considered appropriate for identifying potential road improvements. The need for these improvements will be reviewed in conjunction with the monitoring of progress towards the transportation targets.

Exhibit 7.9: Proposed Road Capital Improvements to 2031



Even assuming the implementation of committed improvements and the most aggressive scenario with respect to travel demand management, it is projected that there will still be some remaining capacity deficiencies as follows:

Downtown and Central Escarpment Crossings: As is the case today, many of the Escarpment crossings are projected to continue to experience some congestion. In the short term, this will be off-set by the opening of the Red Hill Valley Parkway. Major expansions to the Downtown road network are not consistent with the goals of promoting a pedestrian and transit supportive environment, therefore other approaches will be required:

- Accept some congestion as part of a successful Downtown
- Implement aggressive Transportation Demand Management (i.e. parking pricing)
- Additional transit improvements
- Postpone proposed conversion of east-west streets to two-way

Red Hill Valley Corridor: In the longer term, the Red Hill Valley Parkway may experience capacity limitations due to longer distance travel. This can be postponed by implementing additional Transportation Demand Management and/or auto disincentives (i.e. road pricing). However, it is possible that additional lanes may be required on Red Hill Valley Parkway by 2031 depending on the pace of development and success of TDM/transit initiatives.

Highway 403 Corridor: This Provincial Highway corridor experiences regular congestion, and this is expected to increase due to the growth in surrounding municipalities. Recognizing that major road expansion is not feasible due to the impacts on the Escarpment, other strategies to improve the person carrying capacity of the Highway 403 are required. This could include the implementation of High Occupancy Vehicle lanes (similar to Highway 404 and Highway 403 in Mississauga). The GTA-Niagara corridor (currently under assessment) may also have some potential to reduce travel demand on the 403 between the Lincoln Alexander Parkway and Highway 6 North. All of these potential improvements require on-going discussion with MTO.

New Link to Airport – Appropriate goods movement access to the Hamilton International Airport from the north and east has been identified as a significant issue. The 2005 Hamilton Goods Movement Study identifies the need to provide a connection between the Red Hill Valley Parkway and the Airport as a designated truck route. This is due to the current lack of truck access opportunities from the northeast to the Airport, south of the Lincoln Alexander Parkway. Following this TMP, a Schedule C EA should be initiated to identify specific routing alternatives as well as a phasing strategy. It is possible that existing roads could serve to provide this link in the short-medium term. The specific routing also depends to some extent on the location of the proposed Niagara to GTA Corridor.

7.2.3 FINANCIAL IMPACTS

Appendix A provides a detailed listing of roads projects along with their EA Schedule. Many of these projects have been identified through previous studies and are covered by approved Environmental Assessments. The Schedule ‘A’ projects are pre-approved and may proceed to implementation. The Schedule ‘C’ projects will proceed to Phases 3 and 4 of the planning and design process and will include the review and selection of a preferred design alternative.

Collectively, additional projects are estimated to require approximately $418 million over the next 25 years. Thus the total investment into the City’s roadway network would increase by an annual

average of $16.7 million from current commitments. Based on the preliminary timing developed in this Master Plan, the bulk of the expenditures would need to occur in the medium term horizon (i.e. 2011-2021). The projected incremental annual expenditures for the short, medium and long-term horizons are as follows:

2007 – 2011 – $20.84 million/year

2011 – 2021 – $29.10 million/year

2021 – 2031 - $4.38 million/year

The City's current (2006) Capital Programme for roadway infrastructure totals approximately $42 million (gross) (i.e. before deducting grants, DC contributions, etc.). To address a backlog of road maintenance and rehabilitation, it is estimated that this will need to increase significantly over the coming decades, potentially up to $100 million annually by 2031, including the above noted expansion requirements.

In addition, in order to keep the current network operating within the City's established levels of service, approximately $32 million was budgeted in 2006 for Operations and Maintenance (O&M). This is projected to increase to $52 million in 2031.

7.2.4 SUPPORTING MEASURES

Phase 2 of the Transportation Master Plan outlined several supporting strategies to enhance the capability of the road network while also improving quality of life for residents by implementing measures such as traffic calming and road diets. Major supporting strategies are as follows:

- Work with Province to develop solution to address Highway 403 congestion
- Identify other local road improvements through secondary plans
- Expand use of Intelligent Transportation Systems to optimize road capacity

7.3 Cycling Network

7.3.1 OBJECTIVES

The preferred solution identified in the previous strategy relies on travel demand management, including increasing use of non-automobile modes such as cycling. Promoting and encouraging walking and cycling through the provision of facilities and programs helps build active communities, and reduces the dependence on automobile transportation and the associated infrastructure costs, air quality, safety and congestion problems. Cycling activity consists of both utilitarian (e.g., commuter) and recreational trips. Reflecting that a successful Cycling Network Strategy will need to address all types of cycling activity, the objectives of the Cycling Strategy are to:

- Facilitate efficient and safe travel for commuters and other cyclists through expansion and improvement of the network of on-street cycling facilities and Escarpment connections; and
- Promote recreational cycling and active transportation through the development of off-street facilities.

Achieving these objectives will require a holistic approach including initiatives to:

- Improve the quality and extent of pedestrian and bicycle infrastructure;
- Encourage shorter average distances between home, work and other major destinations;
- Increase awareness of non-motorized networks and safety requirements;
- Enhance the co-ordination of transit trips with walking and cycling trips; and
- Designing new developments in a manner that encourages cycling, by including bike facilities, providing adequate connections through developments, animating the street, etc.

7.3.2 DEVELOPMENT OF PREFERRED STRATEGY

The existing cycling network represents a good start along the path to developing a high-quality, extensive cycling network. However, as identified in the previous section, there is a range of cycling trips, which is not well served by the existing network. In particular, the Downtown Hamilton-Westdale-McMaster University route and central and eastern Escarpment crossings require further attention.

Proposed bicycle infrastructure improvements were determined through evaluation of potential projects according to a variety of considerations. These criteria or decision factors are similar to those used in the analysis of existing conditions in the previous section and include:

- **Connectivity and Continuity**;
- **Directness of Route; and,**
- **Safety and Comfort.**

In addition to these categories, a fourth consideration was **Ease of Implementation**, which takes into account the presence of on-street parking, available space and the need to adjust lane widths, traffic impacts, and co-ordination potential with planned capital projects.

A variety of sources were consulted during this evaluation process. First, Shifting Gears provides a good starting point for this analysis. Several projects recommended in Shifting Gears, which have not yet been implemented were considered during the evaluation. Secondly, reports to Council from the Public Works Department provide a basis for cycling projects planned in the immediate term.

Thirdly, the Hamilton Cycling Committee was consulted and provided useful feedback on cycling needs and opportunities. The Committee also provided the study team with maps of what the ideal cycling network would look like from the Committee's perspective, which were considered in route selection.

Fourthly, a draft version of the Trail Master Plan (November 2005) was reviewed. There are many synergies between the Trails Master Plan and the Cycling Network Strategy and efforts were made to co-ordinate recommended on- and off-street facilities wherever possible. A final draft of the Trails Master Plan was released in August 2006 and further work is required to ensure that the two documents are mutually supportive, where appropriate

Finally, a variety of plans were consulted to determine roadway capital projects, such as widening and extension. These plans include, among others:

- Hamilton Development Charges Background Study – Transportation Projects, May 2004;
- Hamilton 2004-2014 Capital Budget;
- York Boulevard Commuter Cycling Class Environmental Assessment;
- South Mountain Area Transportation Master Plan Review;
- Downtown Transportation Master Plan;
- Waterdown Aldershot Transportation Master Plan – 2006;
- Setting Sail;
- Durand Neighbourhood Traffic Study; and,
- Corktown Neighbourhood Traffic Study.

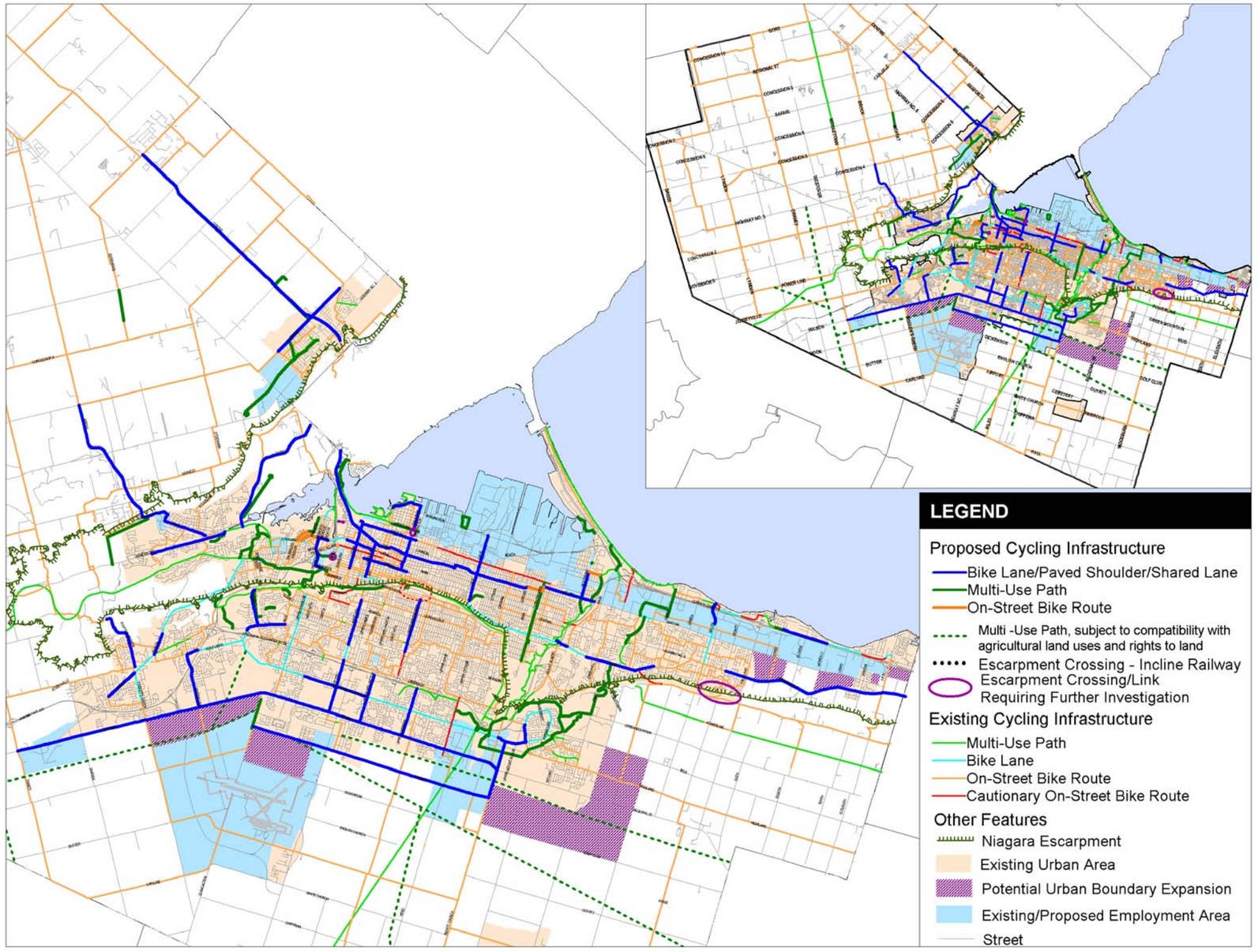
The proposed future cycling network is shown in Exhibit 7.10, which displays both existing and proposed facilities for urban and rural areas. Further background on the development of this plan is provided in the **Cycling Network Working Paper** (Under separate cover in Technical Appendices).

It should be noted that the proposed cycling improvements, including mutli-use paths will be subject to confirmation and refinement in current and subsequent planning exercises. Specifically, the Trails Master Plan will be the primary governing document when considering off-street trails. Similarly, the planned update to Shifting Gears, to be conducted following the Municipal Class Environmental Assessment process, may result in modifications to the on-street cycling network and will ultimate become the guiding document. All trails crossing the Niagara Escarpment would be subject to review and approval by the Niagara Escarpment Commission. Similarly, proposed trails on hydro corridors through agricultural lands would be subject to further consultation with affected parties. Lines shown on Exhibit 7.10 as dashed are potential locations only as the establishment of trails on Hydro corridors is subject to a review of compatibility with existing agricultural uses and rights to the use of these lands.

The proposed bicycle infrastructure improvements reflect the goals of the Strategy to (1) facilitate efficient and safe travel for commuters and other cyclists through expansion and improvement of the network of on-street cycling facilities and Escarpment connections; and (2) promote recreational cycling and active transportation through the development of off-street facilities. Key aspects from a bicycle commuting perspective include:

- On- and off-street connections between McMaster University, Westdale neighbourhood, and Downtown Hamilton;
- On-street east-west route across lower Hamilton;
- Direct and protected on-street north-south routes in upper Hamilton, in addition to existing local routes;
- New Escarpment crossings, including a proposed dedicated inclined railway for pedestrians and cyclists in vicinity of Upper Wentworth Street and Concession Street.

Exhibit 7.10: Preferred Cycling Network Strategy



Key aspects from a recreational cycling perspective include:

- Trail extensions and enhanced trail connections for the Harbour Waterfront Trail, Lake Ontario Waterfront Trail, Escarpment Rail Trail, and the Chippewa Rail Trail, among others; and
- New Escarpment crossings.

Specific aspects of the proposed improvements, including short-term actions and Escarpment crossings are discussed further below.This proposed plan was developed for the purpose of the Transportation Master Plan and represents a basic network improvement strategy. It should be considered a first stage, intended to focus capital investments and planning activities over the next 10-15 years. It is expected that other facilities will be identified and developed over the longer term based on experience with this initial proposed network. Essentially, the cycling network should be something that evolves and improves over time. The proposed update of Shifting Gears is a next step in this evolution and is likely to identify further refinements and additions to this basic plan. In addition, as an over-riding policy, it is essential that when any infrastructure project involving road reconstruction (i.e. major rehabilitation, water and sewer upgrades, and road widenings) is being considered, that the opportunity to incorporate bicycle facilities as part of the reconstruction is also considered. At the time of this report, changes to the Environmental Assessment Act were being finalized which would make the implementation of bicycle lanes less onerous in terms of EA requirements.

In some cases, the Transportation Master Plan identifies both on-street cycling routes that overlap with road improvements (See Exhibit 7.8 for road improvements). In these cases, further study would be required to determine the appropriate cross-section to accommodate both cycling objectives as well as road capacity objectives, while considering criteria such as safety, efficiency and property impacts.

Escarpment Crossings and Links Requiring Further Study

The Hamilton Trails Master Plan identifies a number of new or upgraded trails between the lower and upper mountain. Three potential cycling-friendly Escarpment crossings are proposed in the medium to long term. These include a central area crossing in the Upper Wentworth Street/Concession Street area, and two eastern crossings in the vicinity of First Road West and Greenhill Avenue, and Ridge Road and Fruitland Road. Each of these facilities would require further discussion and consultation with the Niagara Escarpment Commission (NEC) to ensure their design and implementation is respectful of the mandate of the NEC.

The central area crossing, an inclined railway or similar facility for pedestrians and cyclists in the vicinity of Wentworth Street and Concession Street, has the potential to generate the most excitement. If carefully planned, this inclined railway, could encourage cross-Escarpment walking and cycling, stimulate tourism, and recapture part of Hamilton's past. This project is also proposed and discussed in the Trails Master Plan. Exhibit 7.11 shows the previous Hamilton Incline Railway as well as contemporary example. The exact details of this facility and a full evaluation of its costs and impacts would be required.

In addition to Escarpment crossings, several links are proposed that require further study. This analysis could be conducted in the detailed cycling plan. These links are indicated by purple circles in Exhibit 7.9 and include:

- Connection across the LINC between the Escarpment Rail Trail and the Rail Trail;

- Connection between Desjardins Trail and York Boulevard multi-use pathway through Kay Drage Park and other minor roadways; and

Finally, Exhibit 7.10 also shows existing cautionary on-street routes that are not addressed through the proposed improvements due to the difficulty of implementing cycling facilities. These routes indicate the need for further cycling network improvements and should be the subject of further investigation in the detailed cycling plan.

Exhibit 7.11: Historical and Contemporary Incline Railway Facilities

7.11 A – Former Incline Railway Near Wentworth Street

7.11 B – Example of Modern Incline Railway

7.3.3 FINANCIAL IMPACTS

Appendix A provides a detailed listing of cycling roads projects while the Cycling Network Working Paper summarizes the costing methodology and assumptions. All of the cycling improvements identified are Schedule A or Schedule B projects and therefore the EA requirements have been fulfilled through this Master Plan. It is noted, however, some projects will require more in-depth detailed analysis of the current state of the road geometry and traffic conditions to develop a

preferred design. Projects in proximity to the Escarpment will require a more rigorous review and further consultation with the NEC.

The total capital costs of implementing the recommended cycling infrastructure investments are estimated at between approximately $7.7 and $12.4 million over 15 years, not including multi-use pathways. These preliminary cost estimates are based on several assumptions regarding unit costs and the required actions to implement each type of facility.

Estimated costs are exclusive of land acquisition, lighting of off-road paths, and management and administration costs. These costs correspond to an average annual capital expenditure between approximately $475,000 and $785,000 over 15 years. Annual expenditures will be significantly higher if the costs of developing multi-use pathways are also considered. Given that historically the cycling infrastructure capital budget has been approximately per $300,000, implementation of the recommended improvements within the 15-year horizon will not be realized without a significant increase in the budget.

7.3.4 SUPPORTING MEASURES

Encouraging cycling trips in Hamilton will require a holistic approach. In addition to enhancing the quality and extent of the cycling network, achieving the Council approved targets for walking and cycling mode splits (i.e., 10% of daily trips in the near term and 15% in the long term) will depend on several factors:

- The awareness of non-motorized networks and safety requirements;
- The provision and maintenance of bicycle facilities;
- The co-ordination of transit trips with cycling trips;
- The bicycle friendliness of new development.

Many of the action points developed in the **Walking and Cycling Policy Paper** prepared as part of Phase 2 of the Transportation Master Plan were adapted to this Strategy and are outlined below.

The implementation of the cycling improvements is contingent on having sufficient staff resources. Hamilton currently has only one staff member, a technologist in the Public Works Department, who is dedicated part-time to bicycle promotion and planning. Clearly, more staff resources are required to pursue cycling initiatives in a timely manner. Therefore, the following staffing-related actions are also suggested:

- Create a senior staff level pedestrian and cycling coordinator position to monitor and assist in the implementation of the policies until such time that the policies are integrated into the everyday practises of the City administration. The role of this coordinator would be to act as a liaison between different departments (e.g. Capital Planning and Works Departments) and to set priorities for the implementation of cycling improvements.
- Maintain position of TDM Coordinator within the City staffing structure, and expand role to assist in promoting walking and cycling.

Further detailed supporting measures are also provided in the Cycling Working Paper in the Technical Appendices to this Report.

7.4 Pedestrian Network

7.4.1 OBJECTIVES

> ***Walkable communities put urban environments back on a scale for sustainability of resources (both natural and economic) and lead to more social interaction, physical fitness and diminished crime and other social problems. Walkable communities are more liveable communities and lead to whole, happy, healthy lives for the people who live in them.***
> **Source: Walkable Communities, Inc.**
> **http://www.walkable.org/**

The preferred solution identified in the previous strategy relies on travel demand management, including increasing use of non-automobile modes such as walking.

Walking is the most basic form of transportation. Every trip begins and ends with pedestrian activity. Promoting and encouraging walking through the provision of facilities and programs helps build active communities, and reduces the dependence on automobile transportation and the associated infrastructure costs, air quality, safety and congestion problems. The City of Hamilton has an extensive network of pedestrian-supportive linear facilities, such as sidewalks, crosswalks, and trails, but achieving targets for active transportation mode splits will require significant further improvements.

Reflecting that a successful Pedestrian Network Strategy should address all the factors affecting pedestrian activity to promote both utilitarian and recreational trips, the objectives of the Pedestrian Strategy are to:

- Facilitate efficient, safe, and enjoyable travel for commuters and other pedestrians through expansion and improvement of the network of on-street pedestrian facilities; and
- Promote recreational walking and active transportation through the development of off-street facilities.

Achieving these objectives will require a holistic approach including initiatives to:

- Improve the quality and extent of pedestrian and bicycle infrastructure;
- Encourage shorter average distances between home, work and other major destinations;
- Increase awareness of non-motorized networks and safety requirements;
- Enhance the co-ordination of transit trips with walking and cycling trips; and
- Ensure the bicycle and pedestrian friendliness of new development.

7.4.2 DEVELOPMENT OF PREFERRED STRATEGY

A safe, convenient network of sidewalks and trails will make travel by foot more attractive to Hamilton residents. The existing pedestrian network provides good coverage across the City, providing many opportunities for utilitarian and recreational pedestrian trips. However, as identified in the Pedestrian Working Paper, there are several areas throughout the City that have extensive gaps in their sidewalk networks. These gaps will be particularly significant as BRT corridors are

developed along some of these areas. In addition, continually improving the pedestrian environment Downtown with high quality connections to the Western Waterfront is a key priority in encouraging walking trips in the City. These key issues are addressed in the proposed pedestrian infrastructure investments discussed below.

7.4.3 FINANCIAL IMPACTS

The capital and operating costs of sidewalk and other pedestrian improvements are typically incorporated into road rehabilitation budgets and stand-alone streetscape improvement projects. There is also an established annual budget for traffic calming.

7.4.4 SUPPORTING MEASURES

Encouraging walking trips in Hamilton will require a holistic approach. In addition to enhancing the quality and extent of the pedestrian network, achieving the Council approved targets for walking and cycling mode splits (i.e., 10% of daily trips in the near term and 15% in the long term) will depend on several factors:

- The awareness of non-motorized networks and safety requirements;
- The provision and maintenance of pedestrian facilities;
- The accessibility of the pedestrian environment;
- The co-ordination of transit trips with walking trips;
- The pedestrian friendliness of new development.

Further action points are outlined in the **Walking and Cycling Policy Paper** prepared as part of Phase 2 of the Transportation Master Plan.

7.5 Goods Movement

The Hamilton Goods Movement Study provides an overall framework for the incorporation of goods movement into the Transportation Master Plan. This study, completed in June 2005, served to highlight the need for a coordinated and progressive Goods Movement Strategy for Hamilton. Central themes identified as part of that study included:

- a **sense of urgency** and a **bias for action** to identify, prioritize and act – early improvements on some quick-return projects to relieve congestion and improve access to Port and Airport facilities would greatly enhance **credibility** in this area;
- the approach should be **future-oriented, proactive** and **strategic** focussing on planning, funding and resource allocations;
- an ongoing **collaborative** approach to **partnerships**, involving:
  - public sector jurisdictions working together;
  - clarity in communications between private and public sectors concerning commitments and expectations;

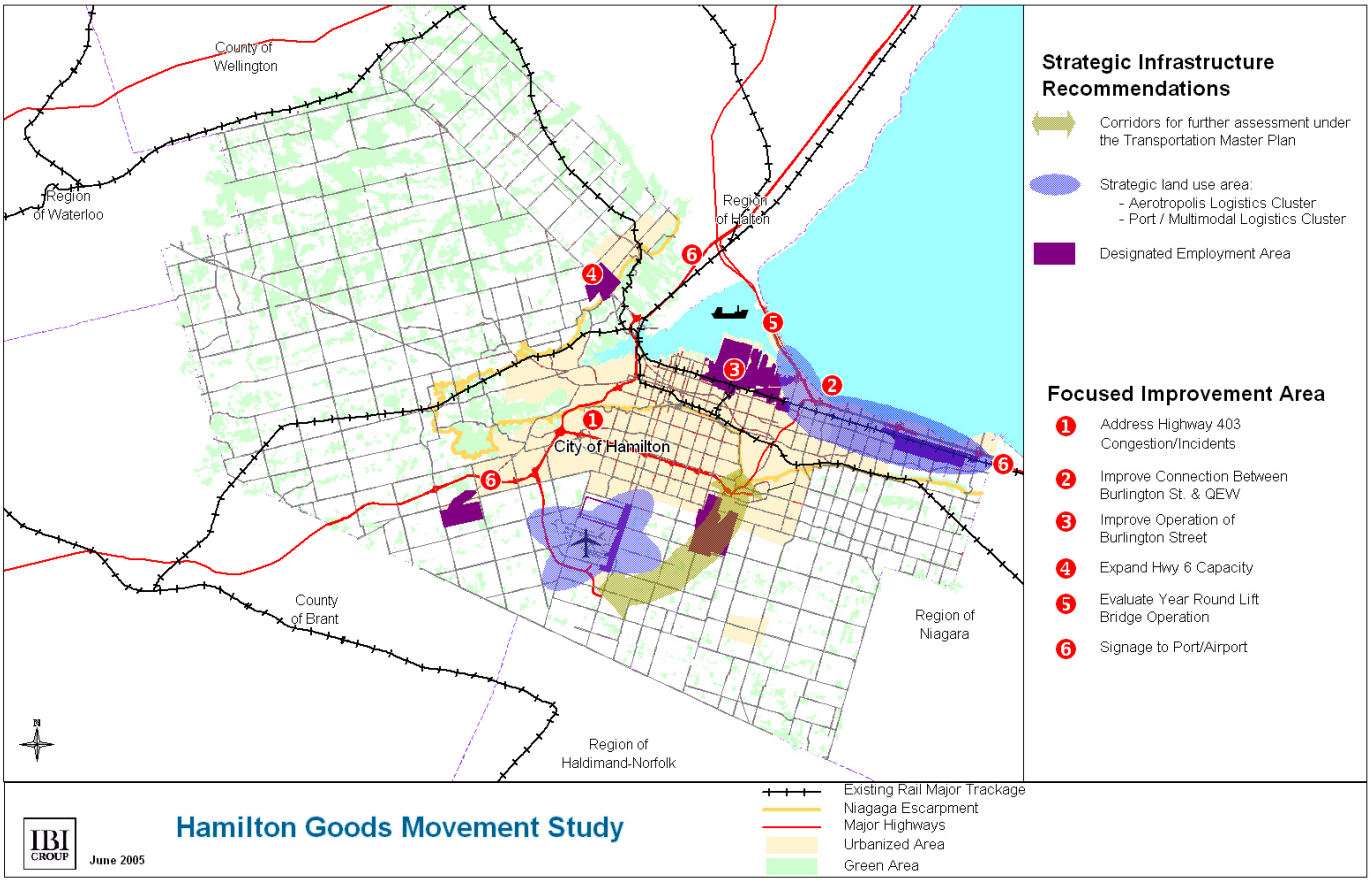
– private sector competitors finding common ground for concerted actions.

These central themes and related strategic objectives lead to four major recommendations including:

- Establishing On-going Private-Public Collaboration
- Promoting Economic Development Initiatives
- Carrying Out Transportation Improvements
- Developing Human Resource Skills

Of the four recommendations, the third is particularly relevant to the TMP. Exhibit 7.11, drawn from the Goods Movement Strategy, outlines several transportation-related improvements that are re-iterated in this Transportation Master Plan.

Exhibit 7.11: Strategic Goods Movement Initiatives



Source: Hamilton Goods Movement Study, 2005

Key recommendations are to:

- Resolve freight bottlenecks including short term measures such as improving signage for truck routes to and from major industrial areas, to and from the Port and to and from the Airport.

- Re-examine specifications for truck routes within the City to ensure that clearances are appropriate for traffic entering and leaving the Port area in particular. This would involve more routine operation of oversized loads from the Port to eastbound and westbound destinations. A truck route study will be initiated by the City in 2007.

- Establish policies to accommodate 24-hour freight operations in the Port, Airport, and rail freight facilities.

- Support Hamilton Port Authority initiatives concerning establishment of 12 month operations, which involves eliminating or minimizing the three month closure of the Burlington Lift Bridge each winter for maintenance.

Several infrastructure related items were discussed previously in the Road Network Strategy including:

- Initiating Phases 3 and 4 of the EA process for an east-west link connecting the Highway 6 extension from the airport to the Red Hill Valley Corridor or east of the City;

- Working with MTO to address Highway 403 congestion between the QEW and Highway 6 North;

- In conjunction with the Province, evaluating the need and justification for a Niagara to GTA Corridor, including alternatives that would connect Hamilton directly to Highway 401.

In addition to these major improvements, operational improvements can be made to Burlington Street to improve intersection geometrics and, over time, consolidate the number of rail crossings, which sometimes interrupt traffic movements.

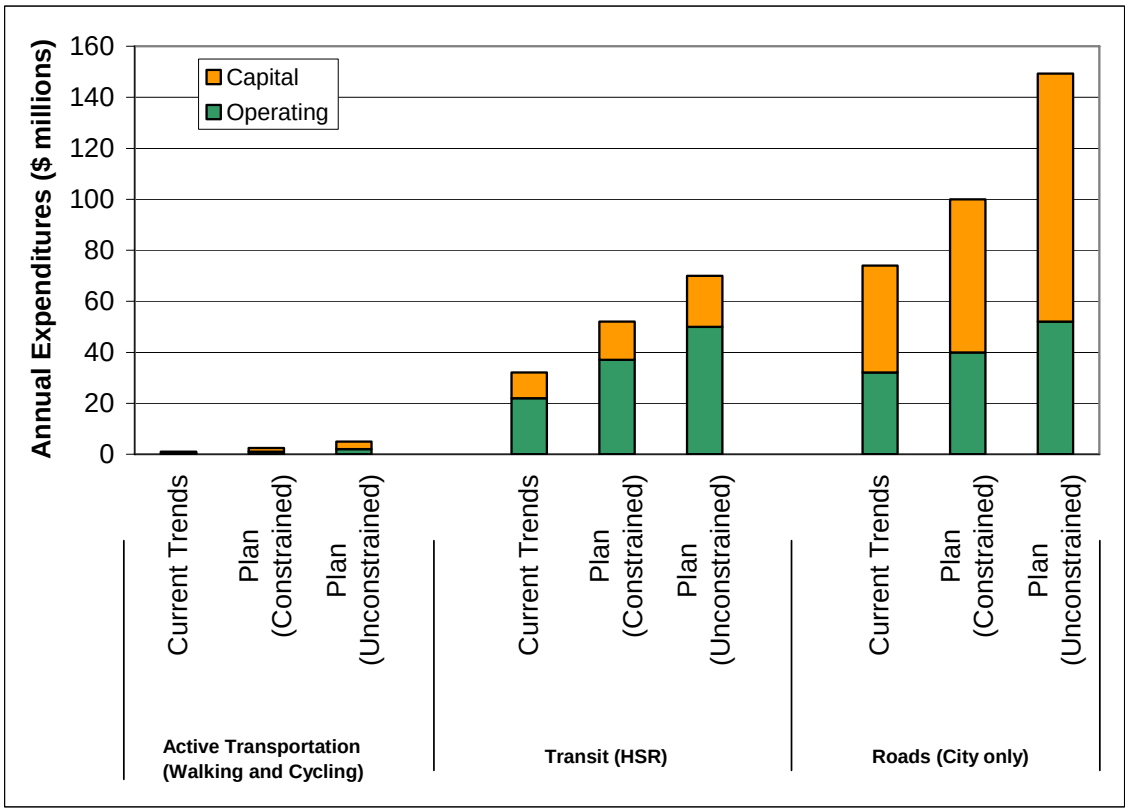
8. IMPLEMENTATION AND MONITORING

8.1 Funding Strategy

Exhibit 8.1 provides a summary of the estimated capital and operating costs in 2031 required to support the Transportation Master Plan, as well as on-going transportation needs. These costs represent gross costs exclusive of federal and provincial grants, gas taxes and development charges. Three scenarios are presented:

- A **Current Trends** scenario reflective of spending over past 5 years
- A **Plan (Constrained)** scenario representing the minimum expenditures required to implement the plan
- A **Plan (Unconstrained)** scenario representing the targeted funding required to address existing road rehabilitation needs and to fully implement desired transit improvements.

Exhibit 8.1: Financial Impacts (Potential Long Term Scenarios)



The unconstrained financial projections are based on the requirements for active transportation, transit and roads as outlined in Chapter 7 and include the following capital investments:

- A doubling of transit capital expenditures from $10 million per year to $20 million per year

- Increasing road capital expenditures from $42 million per year to up to $90 million per year to address the backlog of capital projects while investing an average of $16.7 million per year to improve and expand the road network, the bulk of which are required in the short to medium term

- Increasing the expenditures on walking and cycling improvements with a target capital investment of $3 million per year

Although these represent the long term funding targets, it is important that funding for priority areas including transit, active transportation and road maintenance be identified as early priorities so that appropriate adjustment can be made to capital budgets and that the "funding gap" can be identified.

In considering these funding requirements, Council will need to look beyond infrastructure's immediate impacts on economic development, and recognize that transportation infrastructure can be a tool to shape long-term development and influence travel in ways that ultimately reduce the overall cost of that infrastructure. For example, a target of increasing transit funding by $5 per capita per year over the next 10 years could be established to move towards the desired funding levels.

Federal and provincial governments must also share responsibility for funding transportation infrastructure. Accordingly, Hamilton must pursue programs such as the Canadian Strategic Infrastructure Fund (CSIF) that are available to cover major costs related to transit infrastructure. Unfortunately, these programs do not cover on-going operating costs and as such it will be necessary to identify other funding sources such as user fees and innovative taxation structures that minimize the burden on Hamilton's residents, but still provide stable and adequate funding.

8.2 Road Classification Policies

Road systems are typically classified according to a hierarchy that recognizes different types of roads serve different purposes. A roadway hierarchy is intended to reflect variations in design standards, flow characteristics, traffic volumes, traffic control, access control, vehicle type and abutting land uses. A road classification system consists of two basic elements - a list of defined roadway types and a list of corresponding characteristics of each roadway type.

As part of the Phase 2 Policy Papers, a separate discussion of Road Classification Policies was developed and a proposed road classification system was established. The resulting classifications are closely aligned with the established practices from the Transportation Association of Canada's (TAC) ***Geometric Design Guide for Canadian Roads*** (1999). In addition to provincial highways, six types are proposed for urban roads and three different roadway types are proposed for rural roads as follows:

Provincial Highways

Urban Roads

- Major Arterial

- Minor Arterial

- Industrial/Commercial Collector

- Residential Collector
- Industrial/Commercial Local
- Residential Local

Rural Roads

- Rural Arterial
- Rural Collector
- Rural Local

The defining characteristics of each of these roadways are described in the Road Classification Policy Paper and are summarized below. It should be noted that due to the long history over which the Hamilton road network has evolved, these criteria cannot be applied rigidly in all cases. For example, many of the major streets in the lower City have a 20 m right-of-way. The designation of these streets as arterials should not in any way suggest that these streets would be widened to satisfy the suggested road classification policies. In addition, certain circumstances may warrant, at the discretion of the municipality, an increase or decrease to the right-of-way widths listed herein. Such circumstances could include the characteristics of the surrounding land use, or the inclusion of strategic transportation infrastructure such as Bus Rapid Transit.

Provincial Highways

The following general policies shall apply to Provincial Highways:

1. There are two primary provincial highways located within the City – Highway 403 and the QEW. Additionally, Highway 6, Highway 8, Highway 5, Highway 6 are provincially owned facilities and have unique classifications. Development which falls within the Ministry of Transportation's permit control area is subject to the requirements of the Ministry of Transportation.
2. New entrances or the upgrading of entrances within the Ministry of Transportation's permit control area of a provincial highway shall be subject to the approval of the Ministry of Transportation. This may increase the access and traffic signal spacing requirements outlined for Major Arterial, Minor Arterial, Major Collector, Minor Collector and Local Roads that intersect with a provincial highway.
3. The City and the Ministry of Transportation will work cooperatively with respect to the planning of land development and associated access connections within the Ministry of Transportation's permit control area adjacent to all provincial highways and interchanges within the City, to protect the future capacity and operation of both the provincial highway network and the City's transportation facilities.

Major Arterial Roads (Urban)

The following general policies shall apply to Major Arterial Roads:

1. The primary function of a Major Arterial Road is to carry relatively high volumes of intra municipal and inter-regional traffic through the City in association with other types of roads, although land accesses are permitted they are under rigid controls;
2. The basic minimum right of way widths for Major Arterial Roads shall typically range from 26 to 36 metres, with 36 metres being the preferred minimum;

3. The right of way widths of Major Arterial Roads at major intersections should include left turn lanes. Right turn lanes may also be required to be provided at major intersections;
4. Traffic signals will be well spaced and at least 400 metres apart;
5. Major arterial roads will typically service up to 10,000 vehicles per day under uninterrupted flow conditions (except at signals), with an average running speed of 60-80 km/h, though be designed for 70-100 km/h;
6. Major Arterial roads should generally be organized in a grid pattern with collectors, arterials parkways and provincial highways;
7. All vehicle types, including trucks (subject to truck route network) and buses, are permitted, wider lanes or separate facilities should be in place to accommodate cyclists and sidewalks should be present on both sides for pedestrians, buffered with a 1.5-3.0 metre boulevard; and,
8. Parking should be prohibited or at minimum be restricted in the peak hours.

Minor Arterial Roads (Urban)

The following general policies shall apply to Minor Arterial Roads:

1. The main function of a Minor Arterial Road is to carry moderate volumes of intra municipal and inter-regional traffic through the City in association with other types of roads, but land accesses are permitted under some controls;
2. The basic minimum right of way widths for Major Arterial Roads shall typically range from 20 to 36 metres;
3. Traffic signals will be well-spaced and at least 200 metres apart;
4. They will typically service between 5,000 and 20,000 vehicles per day under predominantly uninterrupted flow conditions, with an average running speed of 50-60 km/h, though be designed for 70km/h;
5. Minor Arterial roads should generally be organized in a grid pattern with collectors, arterials parkways and provincial highways;
6. All vehicle types, including trucks (subject to truck route network) and buses, are permitted; wider lanes or separate facilities should be in place to accommodate cyclists and sidewalks should be present on both sides for pedestrians, buffered with a 1.5-3.0 metre boulevard;
7. Parking should be restricted in the peak hours; and
8. Gateway traffic calming features may be implemented where required.

Urban Industrial / Commercial Collector

The following general policies shall apply to Urban Industrial / Commercial Collector Roads:

1. The function of an Industrial / Commercial Collector is equally shared between providing direct land accesses and the movement of moderate volumes of traffic within and through industrial or commercial areas and connecting these areas to Minor Arterial Roads and Major Arterial Roads;
2. The basic minimum right of way widths for Urban Industrial / Commercial Collector Roads shall typically range from 20 to 26 metres;
3. Traffic signals will be well spaced and at least 60 metres apart;

4. They will typically service fewer than 12,000 vehicles per day under interrupted flow conditions, with an average running speed of 60 km/h;
5. All vehicle types, including trucks and buses, are permitted, wider lanes or separate facilities should be in place to accommodate cyclists and sidewalks should be present on both sides in commercial areas and where required in industrial areas for pedestrians;
6. Parking should be restricted only in the peak hours.

Urban Residential Collector

The following general policies shall apply to Urban Residential Collector Roads:

1. The function of a Residential Collector is equally shared between providing direct land accesses and the movement of moderate volumes of traffic within and through residential areas and connecting these areas to Minor Arterial Roads and Major Arterial Roads;
2. The basic minimum right of way widths for Urban Residential Collector Roads shall typically range from 20 to 26 metres;
3. Traffic signals will be well spaced and at least 60 metres apart;
4. They will typically service fewer than 8,000 vehicles per day under interrupted flow conditions, with an average running speed of 50-60 km/h, though be designed for 60km/h;
5. Passenger and service vehicle types are permitted, wider lanes or separate facilities should be in place to accommodate cyclists and sidewalks should be present on both sides for pedestrians, buffered with a 1.5-3.0 metre boulevard;
6. Parking should be restricted only in the peak hours; and,
7. Horizontal traffic calming features should be provided where required.

Urban Industrial / Commercial Local Road

The following general policies shall apply to Urban Industrial / Commercial Local Roads:

1. The primary function of an Industrial / Commercial Local Road is to provide direct land accesses, while the movement of low volumes of traffic to Collector Roads is secondary;
2. The basic minimum right of way widths for Urban Industrial / Commercial Collector Roads shall typically range from 20 to 26 metres;
3. Traffic signals will be well spaced and at least 60 metres apart;
4. They will typically service fewer than 3,000 vehicles per day under interrupted flow conditions, with an average running speed of 50 km/h, though be designed for 60km/h;
5. All vehicle types, including trucks, are permitted though transit service should be generally avoided, wider lanes should be in place to accommodate cyclists and sidewalks should be present on both sides in commercial areas and where required in industrial areas for pedestrians, buffered with a 1.5-2.5 metre boulevard;
6. Parking should not be restricted or should be restricted to one side.

Urban Residential Local Road

The following general policies shall apply to Urban Residential Local Roads:

1. The primary function of an Urban Residential Local Road is to provide direct land accesses, while the movement of low volumes of traffic to Collector Roads is secondary;

2. The basic minimum right of way widths for Urban Residential Local Roads shall typically be 20 metres;
3. Traffic signals will be well spaced and at least 60 metres apart;
4. They will typically service fewer than 1,000 vehicles per day under interrupted flow conditions, with an average running speed of 40-50 km/h, though be designed for 50km/h;
5. Passenger and Service vehicle types are permitted, no special facilities are required for cyclists and sidewalks should be present on one or both sides for pedestrians, buffered with a 1.5-2.5 metre boulevard;
6. Parking should not be restricted or should be restricted to one side; and,
7. Traffic calming may be implemented where required.

Rural Arterial Road

The following general policies shall apply to Rural Arterial Roads:

1. The primary function of a Rural Arterial Road is to carry relatively high volumes of intra municipal and inter-regional traffic through the rural area in association with other types of roads; land accesses are permitted but should be considered a secondary consideration;
2. The basic minimum right of way widths for Major Arterial Roads shall typically range from 20 to 36 metres;
3. They will typically service over 5,000 vehicles per day under uninterrupted flow conditions (except at signals), with an average running speed of 60-80 km/h, though be designed for 80-100 km/h;
4. Major Arterial roads should generally be organized in a grid pattern with collectors, arterials, freeways and provincial highways;
5. All vehicle types, including trucks and buses, are permitted, paved shoulders should be in place to accommodate cyclists and pedestrians; and
6. Parking should be prohibited.

Rural Collector Road

The following general policies shall apply to Rural Collector Roads:

1. The function of a Collector Road is equally shared between carrying moderate volumes of intra municipal and inter-regional traffic through the rural area and providing direct property accesses;
2. The basic minimum right of way widths for Collector Roads shall typically range from 20 to 26 metres;
3. They will typically service up to 5,000 vehicles per day under interrupted flow conditions with an average running speed of 60-80 km/h, though be designed for 80-100 km/h;
4. Collector Roads should generally be connected with locals, collectors and arterials;
5. Passenger and service vehicle types are permitted, paved shoulders should be in place to accommodate cyclists if the vehicle volume is above 1,000 vehicles per day, and sidewalks should be in place for pedestrians on one side if it connects a rural settlement to a school or community facility less than 2.5 km away; and
6. Parking should be prohibited.

Rural Local Road

The following general policies shall apply to Rural Local Roads:

1. The primary function of a Local Road is providing direct property accesses, while the secondary function is to move low volumes of traffic to Collector Roads;
2. The basic minimum right of way widths for Local Roads shall typically range from 20 to 26 metres;
3. They will typically service up to 1,000 vehicles per day under interrupted flow conditions with an average running speed of 50-70 km/h, though be designed for 60-80 km/h;
4. Local Roads should generally connected with other local roads and collectors;
5. Passenger and service vehicle types are permitted, no special features are required for cyclists and pedestrians; and,
6. Parking should be prohibited.

In addition to the core classification elements outlined for each roadway type above, there are several other roadway features that could apply to particular road sections including:

- higher order transit system features
- special character roads, heritage roads, and scenic routes
- truck routes
- culs-de-sacs
- sub-categories of roadways types within the Core Road Classification

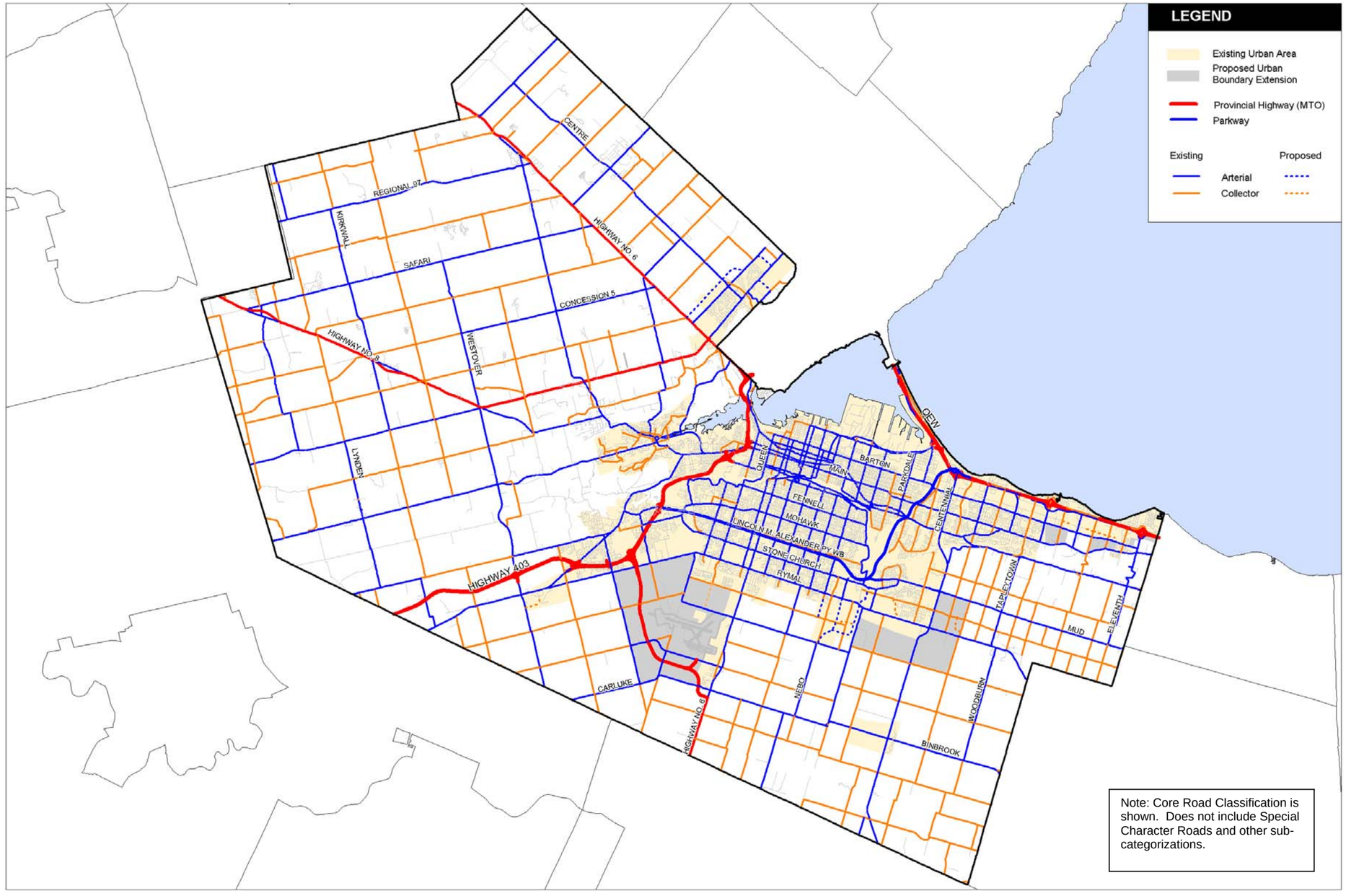
It is proposed that these features be considered on an "as justified" basis and be addressed through special studies either previously undertaken or to be undertaken in the future. An example of this variation in the road classification system would be Old Dundas Road, which has been identified as a **Special Character Road** in previous studies. Other examples include **Primary Mobility Streets** and **Neighbourhood Mobility Streets** identified in the Setting Sail Plan. The intent of the current Transportation Master Plan designations is not to over-ride these previously identified designations, but rather to provide an overall framework for further refinement.

Exhibit 8.2 shows the proposed functional road classification for arterial and collector roadways. This classification system was developed largely by examining the existing road classification system as defined in the Regional Official Plan and Official Plans for the six former local municipalities. This classification system should be considered as a Draft as the final designations will not be applied until the adoption of the Official Plan.

Further, it is noted that designations shown represent future roadway classifications. For example, the Waterdown/Aldershot Transportation Master Plan has identified the need to widen Waterdown Road to a four lane arterial road, whereas the current two-lane roadway is classified as a collector road.

In general, roads not specifically designated in the map would be considered local roads. Roads outside of the existing and proposed urban boundary would be considered rural and roads within the urban boundary urban. Similarly, roads through existing or future employment areas would be given an industrial/commercial classification. Further refinement will be required to classify arterial roads into major and minor roads, and to overlay special policy designations.

Exhibit 8.2: Proposed Roadway Classifications



It is also recommended that the City undertake further work, in consultation with affected residents, to determine an appropriate approach for balancing mobility objectives for vehicular movement and property access with liveability objectives for community design, landscape character, and non-auto modes. This could include the development of arterial road design guidelines, as well as design guidelines for proposed higher order transit facilities.

8.3 Performance Measurement

Performance measurement is necessary to gauge the effectiveness of the policies, programs and infrastructure improvements in achieving the Transportation Vision, objectives and targets as defined in Section 2. The performance measurement program provides a framework for the City to track changes in land use patterns, demographic characteristics, system performance and mode choice over time. This information will allow the City to assess the success of actions taken and provide guidance in further implementation of the Plan.

A proposed performance measurement framework is outlined in Exhibit 8.3, structured according to the seven strategic objectives of the Transportation Master Plan. This list represents a desirable set of indicators for monitoring the implementation of the TMP and resulting transportation performance. It is recognized that many of these indicators require extensive data collection and all may not be achievable given current data and staffing resources.

In general, comprehensive performance measurement should be conducted every 5 years in conjunction with updates to this Transportation Master Plan. Some indicators may be monitored more frequently given the nature of the data and their collection methods. Moreover, corridor and area-specific monitoring may be warranted to monitor localized changes from key strategic projects (e.g., Bus Rapid Transit corridors).

Proper reporting is a key aspect of performance measurement, because the knowledge generated by monitoring and analysis is only useful if decision makers and stakeholders are aware of it. Reports presenting readable information in a way that effectively communicates successes and ongoing challenges can capture the attention of community groups and the media, helping to raise public awareness of results achieved and the need for continued action. A report card should be developed based on the performance measurement framework providing simple rating for progress towards each objective (e.g., very good progress, good progress, little change, negative progress, very negative progress). A similar approach was adopted in the evaluation of policy options in the Policy Papers, where each option was assessed and rated (✚, +, 0, -, —) based on its application to a variety of social, economic, and environmental factors.

In some instances, the indicators may need to be interpreted in conjunction with other indicators. For example, improvements in road levels of service should be achieved as a result of mode shifts to transit.

Exhibit 8.3: Proposed Performance Measurement Framework

INDICATOR GROUP	Performance Indicator
Objective 1: Offer safe and convenient access for individuals to meet their daily needs	
Road Level of Service	Number of signalized intersections operating at LOS C or better
	Average AM peak period auto trip travel time (minutes)
Transit Supply and Level of Service	AM peak period transit supply (AM peak period transit seat-km per capita)
	All day transit supply (24-hr transit seat-km per capita)
	Completion of rapid transit network (%)
	Average AM peak period transit trip travel time (minutes)
Bicycle and Walking Facility Supply	Sidewalk coverage (percent of collector and arterial roads with sidewalks or pathways on both sides)
	Bicycle facility supply (kilometres of bicycle lanes, shoulder lanes, and multi-use paths)
	Completion of bicycle network (%)
Safety	Road injuries (number)
	Road fatalities (number)
	Reported pedestrian collisions (number)
	Reported cyclist collisions (number)
Objective 2: Offer a choice of integrated travel modes, emphasizing active transportation, public transit and carpooling.	
Auto Ownership & Use	AM peak period & all day auto mode share
	Automobile ownership (automobiles per capita)
	AM peak period & all day auto occupancy
Transit Use & Accessibility	AM peak period & all day transit mode share
	Transit use (Transit trips per 1,000 capita)
	Residential transit accessibility (proportion of households within 400 m of Transit Stops)
	Employment transit accessibility (proportion of employment within 400 m of Transit Stops)
Bicycle Use	AM peak period & all day bicycle mode share
Pedestrian Activity	AM peak period & all day walk mode share
Objective 3: Enhance the liveability of neighbourhoods and rural areas.	
Neighbourhood traffic issues	Neighbourhood traffic complaints received (number)
Objective 4: Encourage a more compact urban form, land use intensification and transit-supportive node and corridor development.	
Population Distribution	Population density (population per ha)
Employment Distribution	Employment density (employment per ha)
	Employment self-containment (% of employed labour force working in Hamilton)
	Home-based workers (number per 1,000 capita)
	Average journey to work trip distance (km)

Exhibit 8.2: Proposed Performance Measurement Framework (Cont'd)

INDICATOR GROUP	Performance Indicator
Objective 5: Protect the environment by minimizing impacts on air, water, land and natural resources.	
Land and Stormwater Runoff	Land consumption (occupied urban land by type of transportation infrastructure/total urbanized land)
Air Emissions	Greenhouse gas intensity of travel (CO_2e emissions/ person-trip)
	Air pollutant intensity of travel (NO_x, SO_2, CO, PM_{10}, $PM_{2.5}$, TPM, VOC emissions/ person-trip)
	Greenhouse gas emissions from personal travel (total CO_2e emissions from personal travel in Hamilton)
	Air pollutant emissions from personal travel (NO_x, SO_2, CO, PM_{10}, $PM_{2.5}$, TPM, VOC emissions from personal travel in Hamilton)
Objective 6: Support local businesses and the community's economic development.	
Goods Movement Conditions	Off-peak road congestion (volume/capacity)
Business-Employee Accessibility	Average auto commute time (minutes)
	Average transit commute time (minutes)
Objective 7: Operate efficiently and be affordable to the City and its citizens.	
Transit Network Efficiency	Transit vehicle utilization (passenger-km per vehicle-km)
	Transit off-peak period utilization (100% - % of daily transit person trips in AM & PM peak periods)
Road Network Efficiency	Road off-peak period utilization (100% - % of daily automobile person trips in AM & PM peak periods)
Transit Affordability	Increase in transit fare (%)
Transportation Funding	Capital investment in municipal transportation projects ($/capita) • Roads • Transit (facilities and fleet) • Pedestrian facilities • Cycling facilities
	Operating investment in municipal transportation projects ($/capita) • Roads • Transit (facilities and fleet) • Pedestrian facilities • Cycling facilities

8.4 Transportation Master Plan Review and Updating

Regular reviews and updates of the TMP will allow for the on-going assessment of its effectiveness and relevance. Establishing a stable transportation planning cycle ensures the Plan strategies remain flexible to respond to unforeseen developments and imprecise assumptions. The performance of the Plan in achieving the Transportation Vision can also be reviewed, and necessary adjustments in strategy made. The Municipal Class EA recommends that master plans be reviewed every five years to determine the need for a formal review and/or update.

The Planning Act requires the City to assess the need for an update to its Official Plan every five years. That review process provides a timely opportunity to revisit the assumptions of the TMP and consider the need for an update. The monitoring program discussed above will also provide an indication of the need for a review.

Over the time period preceding the formal review, Council decisions on transportation issues will have the inevitable effect of amending, deleting, replacing or complementing some of the recommendations in the TMP. For this reason, individuals must consider this plan in conjunction with the record of subsequent Council decisions to obtain a complete understanding of current policy and plans.

Appendix A: Infrastructure Summary Tables

Exhibit A.1: Proposed Road Infrastructure Improvements

Road Name	From	To	Description of Works	Anticipated Timing	Total Project Costs (Millions)	EA Schedule
Airport Access Facility	Red Hill Valley Parkway	Hwy 6	New Road	2007-2011	TBD	C
Ancaster Development (Trinity @ Wilson)						
New E/W Road (Ancaster)	Tradewind Drive / Cormorant Road	Trinity Road	New Road	2007-2011	$2.40	C
New Mid-block Collector (Ancaster)	Cormorant Road	Tradewind Drive	New Road	2007-2011		
Arvin Avenue	McNeilly Road	just east of Lewis Road	New Road	2007-2011	$3.89	C
Arvin Avenue	Jones Road	existing end	New Road	2007-2011		
Arvin Avenue	existing end	extend to McNeilly Road	New Road	2007-2011		
Barton Street	Fruitland	Glover Road	Two-way Left-turn Lane	Beyond 2021	$12.57	C
Barton Street	Glover Road	Fifty Road	Two-way Left-turn Lane	Beyond 2021		
Baseline Road	Winona Road	North Service Road	Two-way Left-turn Lane	2007-2011	$1.48	B
Binbrook Road	Fletchers Road	3 km west of Hwy 56	Road Widening	2012-2021	$7.80	C
Binbrook Road	E and W of Hwy 56		Intersection Improvements	2012-2021		
Bold St	Queen Street	James Street	Two-way conversion from one-way	2007-2011	$0.10	B
Centre Road/Hamilton Street						
Centre Road	Northlawn Avenue	Parkside Drive	Two-way Left-turn Lane	2012-2021	$2.12	B
Hamilton Street	Parkside Drive	John Street	Two-way Left-turn Lane	2012-2021		
Community Avenue	Stoney Creek limits	Teal Avenue	Conversion to urban cross-section	2012-2021	$0.99	A
Dartnall Road	Rymal Road	Dickenson Road	New Road	2007-2011	$8.97	C
Dartnall Road	Stone Church Road	Rymal Road	Road Widening and Two-way Left-turn Lane	2007-2011		
Dickenson Road E.	west of Nebo Road	west of Glover Road	Conversion to urban cross-section	2012-2021	$12.35	B
Dickenson Road E.	east of Hwy 6	west of Nebo Road	Addition of Left turn lanes	2012-2021		
Dickenson Road W.	west of Hwy 6	Glancaster Road	Conversion to urban cross-section	2012-2021		
Duke St	Queen Street	James Street	Two-way conversion from one-way	2007-2011	$0.10	B
Falcon Road	Fifty Road	West limits	Conversion to urban cross-section	2007-2011	$0.19	A
Fifty Road	QEW	Hwy 8	Road Widening	Beyond 2021	$2.32	C
Fletcher Road	Rymal Road	Binbrook Road	Addition of Left turn lanes	2012-2021	$8.10	B
Fruitland Road	Arvin Avenue	Barton Street	Road Widening	Beyond 2021	$0.79	C
Garden Avenue	Teal Avenue	Pinelands Avenue	Conversion to urban cross-section	2007-2011	$0.48	A
Garner Road						
Garner Road	50m east of Miller Drive	50m west of Southcote Road	Road Widening and Two-way Left-turn Lane	2012-2021	$28.95	C
Garner Road	Hwy 2	50m west of Shaver Road	Road Widening and Two-way Left-turn Lane	2012-2021		

Road Name	From	To	Description of Works	Anticipated Timing	Total Project Costs (Millions)	EA Schedule
Garner Road	50m west of Fiddlers Green Road	50m east of Fiddlers Green Road	Road Widening and Two-way Left-turn Lane	2012-2021		
Garner Road	50m east of Fiddlers Green Road	50m west of Miller Drive	Road Widening and Two-way Left-turn Lane	2012-2021		
Garner Road	50m east of Southcote Road	50m west of Kitty Murray La	Road Widening and Two-way Left-turn Lane	2012-2021		
Garner Road	50m east of Kitty Murray La	50m west of Glancaster Road	Road Widening and Two-way Left-turn Lane	2012-2021		
Garner Road	50m east of Glancaster Road	Old Hamilton boundary	Road Widening and Two-way Left-turn Lane	2012-2021		
Garner Road	50m west of Miller Drive	50m east of Miller Drive	Road Widening	2012-2021		
Garner Road	50m west of Kitty Murray Lane	50m west of Kitty Murray La	Road Widening	2012-2021		
Garner Road	West of Shaver Road	50m east of Shaver Road	Two-way Left-turn Lane	2012-2021		
Garner Road	50m west of Southcote Road	50m east of Southcote Road	Two-way Left-turn Lane	2012-2021		
Garner Road	50m west of Glancaster Road	50m east of Glancaster Road	Two-way Left-turn Lane	2012-2021		
Garner Road	50 m east of Shaver Road	50m west of Fiddlers Green Road	Road Widening and Two-way Left-turn Lane	2012-2021		
Wilson Street / Hwy 2	Hwy 52	Hwy 53	Two-way Left-turn Lane	2012-2021		
Garth Street	Stone Church Road	Rymal Road	Two-way Left-turn Lane	2007-2011	$1.60	C
Garth Street Extension	Twenty Road	Dickenson Road	New Road	Beyond 2021	$3.06	C
Glancaster Road	Hwy 53	Twenty Road	Addition of Left turn lanes	2007-2011	$1.56	B
Glover Access Road (Stoney Creek)	Glover Road	North Service Road	Conversion to urban cross-section	2007-2011	$0.75	A
Glover Road (Hamilton)	Rymal Road	Dickenson Road	Conversion to urban cross-section	2007-2011	$6.26	A
Golf Links Road	McNiven Road	Kitty Murray La	Two-way Left-turn Lane	2012-2021	$2.07	C
Governor's Road	Creighton Drive	Bridlewood Drive	Two-way Left-turn Lane	2012-2021	$5.23	C
Governor's Road	Creighton Drive	Osler Drive	Road Widening	2012-2021		
Hamilton Drive	Hwy 403	0.35km south	Intersection Improvements	2007-2011	$0.65	A
Hwy 20	Ridge Road	300m south of Ridge Road	Intersection Improvements	2012-2021	$4.65	C
Hwy 20	100m south of Green Mountain	800m south of Gm Mtn	Two-way Left-turn Lane	2012-2021		
Hwy 20	350m south of Mud Street	830 m south of Mud Street	Two-way Left-turn Lane	2012-2021		
Hwy 8	Hillcrest Avenue	Park Street	Two-way Left-turn Lane	Beyond 2021	$1.97	C
Hwy 8	Bond Street	Dundas Limits	Two-way Left-turn Lane	Beyond 2021	$6.27	C
Hwy 8	Fruitland Road	Hamilton Boundary	Road Widening	Beyond 2021	$10.54	C
Hwy 8	Dewitt Road	Fruitland Road	Road Widening and Two-way Left-	Beyond 2021		

Road Name	From	To	Description of Works	Anticipated Timing	Total Project Costs (Millions)	EA Schedule
			turn Lane			
Hwy 5 / Hwy 6	East of Hwy 6	West of Hwy 6	Intersection Improvements	2012-2021	$16.90	
Jerseyville Road	Martin Road	Lloyminn Avenue	Two-way Left-turn Lane	2012-2021	$6.99	C
Jerseyville Road	Shaver Road	Martin Road	Two-way Left-turn Lane	2012-2021		
Jerseyville Road	Wilson Street	Lloyminn Avenue	Two-way Left-turn Lane	2012-2021		
Jones Road	Barton Street	South Service Road	Conversion to urban cross-section	2012-2021	$1.94	A
Kenmore Avenue	Arvin Avenue	Barton Street	Conversion to urban cross-section	2012-2021	$0.86	A
King St	Queen Street	Wellington Street	Two-way conversion from one-way	2007-2011	$2.98	C
Leaside Avenue	Arvin Avenue	Barton Street	Conversion to urban cross-section	2012-2021	$0.65	A
Lewis Road	Barton Street	South Service Road	Conversion to urban cross-section	2007-2011	$1.75	A
MacNab St	Cannon Street	Guise Street	Two-way conversion from one-way	2007-2011	$0.25	C
McNeilly Road	Barton Street	South Service Road	Conversion to urban cross-section	2007-2011	$1.87	A
McNiven Road	Rousseaux Street	Golf Links Road	Road Widening	2007-2011	$1.72	C
Millen Road	South Service Road	Hwy 8	Two-way Left-turn Lane	2012-2021	$4.92	C
Mohawk Road	McNiven Road	Hwy 403	Road Widening	2007-2011	$3.55	C
Nebo Road	Rymal Road	Former Hamilton Limits	Two-way Left-turn Lane	2012-2021	$5.50	C
Nebo Road	Former Hamilton Limits	Dickenson Road	Conversion to urban cross-section	2012-2021		
North Service Road	Grays Road	Green Road	Road Widening	2007-2011	$18.94	C
North Service Road	Green Road	East City Limits	Conversion to urban cross-section	2007-2011		
Oriole Avenue	South Service Road	Winona Road	Conversion to urban cross-section	2007-2011	$1.08	A
Parkside Drive	Braeheid Avenue	East part of industrial section	Two-way Left-turn Lane	2012-2021	$9.12	C
Parkside Drive	Hwy 6	Braeheid Avenue	Road Widening	2012-2021		
Pinelands Avenue	Community Avenue	South Service Road	Conversion to urban cross-section	2007-2011	$0.65	A
Queen St	Cannon Street	Stuart Street	Road Narrowing	2012-2021	$0.42	B
Regional Road 56	Community Core	North Limits	Road Widening and Two-way Left-turn Lane	2012-2021	$21.72	C
Regional Road 56	Community Core	South Limits	Road Widening and Two-way Left-turn Lane	2012-2021		
Regional Road 56	South Limits of ROPA 9	Binbrook Road	Road Widening	2012-2021		
Regional Road 56	Rymal Road	Street M	Road Widening	2012-2021		
Rymal Road	Ryckmans Street	Trinity Church Road	Road Widening	2012-2021	$39.55	C
Rymal Road	Trinity Church Road	Hwy 20	Road Widening	2012-2021		
Rymal Road	Garth Street	West 5th	Road Widening	2012-2021		
Rymal Road	Upper Paradise Road	Garth Street	Road Widening	2012-2021		
Rymal Road	former west Hamilton limits	Upper Paradise Road	Road Widening	2012-2021		
Rymal Road	West 5th Street	Upper James Street	Road Widening	2012-2021		
Scenic Drive	Old City limits	Lavender Drive South Leg	Two-way Left-turn Lane	2007-2011	$3.05	C

Road Name	From	To	Description of Works	Anticipated Timing	Total Project Costs (Millions)	EA Schedule
Seabreeze Crescent	Glover Road	McNeilly Road	Conversion to urban cross-section	2007-2011	$1.35	A
Seaman Street	South Service Road	Dewitt Road	Conversion to urban cross-section	2007-2011	$1.30	A
Shaver Road	Wilson Street	Garner Road	Two-way Left-turn Lane	2012-2021	$4.08	C
Shaver Road	Hwy 403	Wilson Street	Conversion to urban cross-section	2012-2021		
South Service Road	Millen Road	Grays Road	Road Widening	2012-2021	$6.44	C
Southcote Road	Golf Links Road	Garner Road	Road Widening	2012-2021	$5.73	C
Springbrook Road	Meadowlands Blvd	Garner Road	Two-way Left-turn Lane	2012-2021	$2.40	C
Stone Church Road	Pritchard Road	Winterberry Drive	Two-way Left-turn Lane	2012-2021	$2.73	C
Stone Church Road	East of Garth Street	West 5th Street	Two-way Left-turn Lane	2007-2011	$3.25	C
Stone Church Road	Upper Wellington Street	Upper James Street	Two-way Left-turn Lane	2007-2011		
Sulphur Springs Road	Wilson Street	Mansfield Drive	Conversion to urban cross-section	2012-2021	$0.75	A
Sunnyhurst Avenue	Barton Street	North end	Conversion to urban cross-section	2012-2021	$1.12	A
Teal Avenue	Garden Avenue	South Service Road	Conversion to urban cross-section	2012-2021	$0.65	A
Trinity Church Road	Rymal Road	Golf Club Road	Conversion to urban cross-section	2012-2021	$12.38	C
Trinity Church Road	Golf Club Road	Binbrook Road	Addition of Left turn lanes	2012-2021		
Trinity Church Road Extension	Rymal Road	Stone Church Road	New Road	2007-2011		
Trinity Neighbourhood / ROPA 9 Collector Road	Second Road West	Highland Road	New Road	2007-2011	$2.23	
Trinity Road	1 km S of Wilson Street	Hwy 403	Road Widening	Beyond 2021	$6.28	C
Twenty Road	Glancaster Road	Glover Road	Two-way Left-turn Lane	2012-2021	$9.76	C
Twenty Road Extension	Glover Road	Trinity Church Road	New Road	2012-2021		
Upper Gage Avenue	Mohawk Road	Thorley Drive/Edwina Pl.	Two-way Left-turn Lane	2007-2011	$2.40	C
Upper James Street	Rymal Road	Former South Hamilton Limits	Two-way Left-turn Lane	2012-2021	$1.92	C
Upper Mount Albion Road	Rymal Road	Mud Street	Two-way Left-turn Lane	2012-2021	$4.75	C
Upper Mount Albion Road	Rymal Road	Highland Road	Road Closure	2012-2021		
Upper Ottawa Street Extension	Former City Hamilton Limits	Twenty Road	New Road	2012-2021	$2.05	C
Upper Sherman Avenue	Stone Church Road	Rymal Road	Two-way Left-turn Lane	2012-2021	$4.67	C
Upper Sherman Avenue	Stone Church Road	Lincoln Alexander Parkway	Two-way Left-turn Lane	2007-2011		
Upper Wellington Street	Rymal Road	Stone Church Road	Two-way Left-turn Lane	2012-2021	$5.63	C
Upper Wellington Street	Limeridge Road	Stone Church Road	Road Widening and Two-way Left-turn Lane	2012-2021		
Waterdown New East-West Link						
New East West Link/Hwy 6 (Waterdown)	West of Hwy 6	East of Hwy 6	Intersection Improvements	2012-2021	$18.02	C
New East-West Link (north of Parkside)	Hwy 6	Churchill Avenue (at Parkside)	New Road	2012-2021		
New East-West Link/Centre St (Waterdown)	North of New East West Link	South of New East West Link	Intersection Improvements	2012-2021		

Road Name	From	To	Description of Works	Anticipated Timing	Total Project Costs (Millions)	EA Schedule
Parkside Drive	Churchill Avenue (at Parkside)	New N-S Link (East of Upcountry Boundary)	Road Widening	2012-2021		
New North-South Link (E of Upcountry Boundary)	Parkside Drive	Dundas Street	New Road	2012-2021		
Dundas Street/New North-South Link (Waterdown)	West of New N-S Link (Waterdown)	East of New N-S Link (Waterdown)	Intersection Improvements	2012-2021		
Dundas Street	New N-S Road (Waterdown South)	Hamilton Boundary	Road Widening	2012-2021		
Waterdown Road						
Waterdown Road	Mountain Brow Road	Hwy 403	Road Widening	2012-2021	$18.20	C
Mountain Brow Road	Waterdown Road	New North-South Road	Road Widening	2012-2021		
New North-South Link (Waterdown South)	Mountain Brow Road	Dundas Street	New Road	2012-2021		
Weir's Lane	Hwy 8	Escarpment	Conversion to urban cross-section	2007-2011	$2.81	A
Wellington St	Hunter Street	Young Street	Road Narrowing	2007-2011	$0.31	B
West 5th Street	Stone Church Road	Rymal Road	Two-way Left-turn Lane	2012-2021	$5.02	C
West 5th Street	Limeridge Road	Stone Church Road	Two-way Left-turn Lane	2012-2021		
Wilson Street	Hamilton Drive	just west of Halson Street	Road Widening	2012-2021	$7.10	C
York Blvd / Wilson St	Bay Street	Wellington Street	Two-way conversion from one-way	2012-2021	$2.28	C
Total					**$418.19**	

Exhibit A.2: Proposed On-Street Cycling Infrastructure, 2007-2021

Facility	Cross Streets	Type	Length (km)	Estimated Cost	Timing
Barton Street	Locke Street - Wellington Street	BL	2.1	$120,750	Short
Bond Street	Hatt Street - King Street W	BL	0.3	$17,250	Short
Brock Road	Hwy 8 - 4th Concession Road	Shoulder	4.4	$253,000	Long
Cannon Street	Sherman Avenue - Brittania Avenue	BL	2.9	$166,750	Short
Caroline Street	York Blvd - Markland Street	BL	1.3	$74,750	Short
Centre Road	Carlisle Road-Parkside Drive	Shoulder	8.6	$494,500	Long
Dundas Street-Governor's Road	Cootes Drive - Castlewood Blvd	BL	2.9	$166,750	Medium
Ferguson Avenue	Dock Service Road - Strachan Street	BL	1	$57,500	Short
Ferguson Avenue	Barton Street - Hunter Street	BL	1.2	$69,000	Short
Gage Avenue	Cumberland Avenue - Burlington Street	BL	2.6	$149,500	Medium
Garner Road	Hwy 52 - Ancaster Boundary	Shoulder	8.2	$471,500	Long
Hatt Street	Main Street - Bond Street	BL	1.6	$92,000	Short
Hunter Street	Queen Street - Wellington Street	BL	1.7	$97,750	Short
Hwy 8	Dewitt Road - Fruitland Road	Shoulder	0.8	$46,000	Short
Hwy 8	Fruitland Road - Hamilton Boundary	Shoulder	6.2	$356,500	Long
King Street E	Lawrence Road - Pontruff Road	BL	0.5	$28,750	Medium
King Street E	Nash Road - Grays Road	BL	2.6	$149,500	Medium
King Street W	Sterling Street - Macklin Street	BL	0.5	$28,750	Short
King Street W	Dundurn Street - Caroline Street	BL	1.1	$63,250	Short
King Street/Hwy 8	Bond Street - Brock Road	BL	1.7	$97,750	Medium
Leander Drive, Guise Street, Dock Service Road		BL	1.1	$63,250	Medium
Locke Street	Tecumseh Street - Herkimer Street	BL	1.8	$103,500	Short
Longwood Road	King Street W - Aberdeen Avenue	BL	1.1	$63,250	Short
Main Street	Parkside Drive-Flamboro Road	BL	1.7	$97,750	Medium
Melvin Avenue	Shelby Avenue - Red Hill Valley Parkway	BL	2	$115,000	Short
Millen Road	Frances Avenue - CN Rail	BL	0.8	$46,000	Long
Mohawk Road	Lincoln Alexander Parkway - Rice Avenue	BL	1.5	$86,250	Short
North Service Road	Jones Road - McNeilly Road	Shoulder	1.7	$97,750	Short
Olympic Drive-York Road	Cootes Drive - Maryvale Avenue	Shoulder	5.3	$304,750	Medium
Parkside Drive	Hollybush - Boulding	BL	3.3	$189,750	Medium
Rymal Road	Ancaster Boundary - Trinity Church Road	BL	9.3	$534,750	Medium
Scenic Drive	Mohawk Road - Ancaster Boundary	BL	1.4	$80,500	Short
Sherman Avenue	Wilson Street - Cannon Street	BL	0.1	$5,750	Medium
Southcote Road/Golf Links Road	Garner Road - Onondaga Road	Shoulder	2.5	$143,750	Short
Stone Church Road	Garth Street - Upper Wellington Street	BL	2.5	$143,750	Short
Stone Church Road	Pritchard Road - Winterberry Drive	BL	1.1	$63,250	Short
Sulphur Springs Road/Lover's Lane	Mineral Springs Road - Jerseyville Road	Shoulder	2.4	$138,000	Short
Trinity Church Road	Stone Church Road - Rymal Road	BL	1.1	$63,250	Long

Facility	Cross Streets	Type	Length (km)	Estimated Cost	Timing
Twenty Road	Glancaster Road - Trinity Church Road	Shoulder	9.3	$534,750	Long
Upper Sherman Avenue	Lincoln Alexander Pkwy - Rymal Road	BL	1.9	$109,250	Medium
Upper Wellington Street	Lincoln Alexander Pkwy - Rymal Road	BL	1.9	$109,250	Medium
Upper Wentworth Street	Concession Street - Mohawk Road	BL	2.1	$120,750	Medium
West 5th Street	Limeridge Road - Rymal Road	BL	2.1	$120,750	Medium
West 5th Street	Brantdale Avenue - Tyrone Drive	BL	2	$115,000	Short
Wilson Street	James Street - Sherman Avenue	BL	2.6	$149,500	Short
Wilson Street	Garner Road - Hwy 52	Shoulder	1.3	$74,750	Long
Wilson Street W	Amberly Blvd - Fiddler's Green Road	BL	1.3	$74,750	Long
Wilson Street W	Rousseaux Street - Halson Street	BL	0.8	$46,000	Medium
Winterberry Drive	Mud Street - Paramount Drive	BL	0.4	$23,000	Medium
Woodward Avenue	Melvin Avenue - Brampton Street	BL	1	$57,500	Long
York Boulevard	Dundurn Street N - Burlington Boundary	BL	2.8	$161,000	Short
York Boulevard	Dundurn Street N - James Street	BL	1.7	$97,750	Short
			Total	$7,136,000	

Notes

- BL = On-street bike lane. In certain cases, such as some areas Downtown, there may be insufficient space for on-street bicycle lanes, and a lane in each direction will need to be specified as a ‘Shared Lane’ in order to accommodate bicycles.
- Shoulder = Paved shoulder.
- Short-term = present-2011
- Medium-term = 2012-2016
- Long-term = 2017-2021
- Costs are estimated based on an average unit cost of $57,500/km, which assumes 25% of improvements require street widening, while the remainder require little work beyond changes in signage and pavement markings. The Cycling Network Strategy also presents cost estimates assuming 50% of improvements require street widening, corresponding to an average unit cost of $95,000/km.