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”. 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.

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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

LEGEND
- Proposed Primary BRT Corridor
- Proposed Transit Priority Corridor/Future BRT Route
- Existing HSR Transit Service
- Existing/Proposed Transit Node
- Existing GO Rail
- Future Inter-Regional Transit
- Intermodal Interchange
- Transit Service Expansion Area
- Existing Urban Area
- Existing/Proposed Employment Area
- Potential Urban Boundary Expansion
- Niagara Escarpment
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.\footnote{Transport Canada, 98 B-Line Bus Rapid Transit Evaluation Study, September 2003, \url{www.itscanada.ca/english/documents/98B_Eval_Final.pdf}}

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.

\footnote{New paint scheme for BLIne Hybrid Buses put service in Spring 2007}
### Exhibit 7.2: Preliminary Evaluation of BRT Routings - East-West Lower City Corridor

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

**Legend:**
- Least Responsive
- Moderate Responsive
- Most Responsive

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

<table>
<thead>
<tr>
<th>EVALUATION CRITERIA</th>
<th>James Street and Upper James via Mohawk College</th>
<th>Victoria/Wellington/Upper James</th>
</tr>
</thead>
<tbody>
<tr>
<td>DESCRIPTION</td>
<td>Routing would consist of James St, James Mountain Rd, West 9th, Fennell and Upper James to north of Rymal Road</td>
<td>Routing would consist of Wellington St/Victoria St, Claremont Access, West 9th, Fennell and Upper James to north of Rymal Road</td>
</tr>
<tr>
<td>NATURAL ENVIRONMENT FACTORS</td>
<td>- Implemented using existing roadways, - Improved transit service reduces air emissions</td>
<td>- Implemented using existing roadways, - Improved transit service reduces air emissions</td>
</tr>
<tr>
<td>SOCIO-CULTURAL FACTORS</td>
<td>- Most direct connection between Upper and Lower City</td>
<td>- 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</td>
</tr>
<tr>
<td>ECONOMIC FACTORS</td>
<td>- 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</td>
<td>- Requires new traffic signals, - Costs depend on degree of segregation of buses</td>
</tr>
<tr>
<td>TECHNICAL FACTORS</td>
<td>- Buses may experience congestion on James St unless dedicated lanes are provided, - Further assessment is required to determine cross-section for Upper James</td>
<td>- Wellington and Victoria do not connect with existing/proposed transit terminals, - Wellington and Victoria have excess capacity to accommodate transit lanes</td>
</tr>
<tr>
<td>OVERALL ASSESSMENT</td>
<td>![Assessment Icon]</td>
<td>![Assessment Icon]</td>
</tr>
</tbody>
</table>

**Legend:**
- Least Responsive
- Moderate Responsive
- Most Responsive
Exhibit 7.4: Preliminary Evaluation of BRT Routings - Mountain East-West Corridor (Heritage Green – Meadowlands)

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

**LEGEND:**

Least Responsive ○ ○ ○ ○ Most Responsive
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

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

<table>
<thead>
<tr>
<th>Density Range (People+Jobs/Hectare)</th>
<th>Land Use Type</th>
<th>Transit Level of Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below 40</td>
<td>Low Density Suburban</td>
<td>Unable to support minimum level of bus service (30 minute headways). Opportunity for limited dial-a-bus service.</td>
</tr>
<tr>
<td>40-80</td>
<td>Medium Density Suburban</td>
<td>Minimal bus service, operating at 30 minute headways</td>
</tr>
<tr>
<td>80-120</td>
<td>Low Density Urban</td>
<td>Intermediate bus service (10-20 minute headways)</td>
</tr>
<tr>
<td>120-200</td>
<td>Urban Medium Density</td>
<td>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.</td>
</tr>
<tr>
<td>200+</td>
<td>Urban High Density</td>
<td>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.</td>
</tr>
</tbody>
</table>


### 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

Phase I – Demand Forecasting

2004 Base Case

Identified Roadway Improvements

Assess Roadway Requirements Based on Alternative Modal Split Targets

Consistent with 2031 City-wide Modal Split Targets

Reduction compared to trend scenario in each horizon year

Phase II – Phasing

2011 10% Transit/TDM

2021 10% Transit/TDM
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. 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.

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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.
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

LEGEND

Proposed Cycling Infrastructure
- Bike Lane
- Paved Shoulder/Shared Lane
- Multi-Use Path
- On-Street Bike Route

Existing Cycling Infrastructure
- Multi-Use Path
- Bike Lane
- On-Street Bike Route

Other Features
- Niagara Escarpment
- Existing Urban Area
- Potential Urban Boundary Expansion
- Existing/Proposed Employment Area

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HAMILTON TRANSPORTATION MASTER PLAN
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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

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 reiterated 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.