BUSINESS CASE
REGION OF WATERLOO
RAPID TRANSIT PROJECT
EXECUTIVE SUMMARY
EXECUTIVE SUMMARY
1 INTRODUCTION

Once every few decades comes a project with the ability to fundamentally transform a community’s economic, social, and built environment. The Region of Waterloo rapid transit project is such a project.

Identified since the 1970s, rapid transit in Waterloo Region will be an essential catalyst in achieving the goals set out in the Region’s Growth Management Strategy. The Strategy is designed to encourage intensification of the linear urban corridor formed by the Cities of Cambridge, Kitchener and Waterloo. The Strategy envisions the Central Transit Corridor, housing a higher-order rapid transit facility connecting many of the growing commercial, residential, employment and institutional nodes in a central spine.

Growth management is critical as the Region continues to plan for significant population and employment growth over the next two decades. The Provincial Growth Plan for the Greater Golden Horseshoe projects that the Region’s population will increase by 45 per cent to 729,000 people by 2031, and that employment will increase by 44 per cent to 366,000 by 2031. A rapid transit system has the potential to encourage a more compact urban form, helping to prevent sprawl and protecting sensitive environmental landscapes and farmlands from urban encroachment. The rapid transit system that the Region is considering has the dual goals of 1) providing transportation choice and meeting future transportation needs and 2) building a viable, vibrant and sustainable community.

2 THE TRANSIT PROJECT

The Region has completed Phase 2 of an Individual EA, has identified a preferred rapid transit system, and is preparing to take the project through the new Transit Project Assessment Process approved by the Province of Ontario under Ontario Regulation 231/08. Under the new assessment process, the Project Team will be addressing provincially-significant issues and impacts and establishing mitigation measures for the staged implementation of rapid transit in Waterloo Region. For this business case, the transit project for funding consideration by the Government of Canada under the Building Canada Fund and by the Province of Ontario includes:

- Light Rail Transit from Conestoga Mall in Waterloo to Fairview Park Mall in Kitchener; and
- Adapted Bus Rapid Transit from Fairview Park Mall in Kitchener to the Ainslie Street bus terminal in Cambridge.

To complement the transit project, the Region will:

- Re-align Grand River Transit bus service to provide an expanded level of service to the rapid transit stations; and
- Provide express bus service, modeled after the current iXpress service (a limited-stop express service), to high ridership centres throughout the Region (i.e. Wilfrid Laurier University, Conestoga College, etc).
3 BENEFITS OF THE TRANSIT PROJECT

The rapid transit project will result in wide-ranging economic, social, and environmental benefits.

Reduced Congestion

The total number of trips on the region’s transportation system is forecast to increase more than 36 per cent by 2031. The increase in trips will place more demands on a transportation system that is already close to capacity. Symptoms of strain on the network include:

- growing congestion, which is increasingly affecting the ability to provide reliable, competitive transit service;
- the economic disruption from congestion and overall difficulty of getting around within the community;
- the impacts on the environment and public health; and
- the increasing personal and societal costs of transportation and mobility within the community.

The Regional Transportation Master Plan identifies key screenlines that measure the travel demand within the region. If the region continues with current trends of auto use, the road network will need to expand by at least 100 additional lanes of traffic across those screenlines by 2031. The rapid transit project is the centrepiece of an expanded transit network solution that will shift a substantial amount of future auto travel to transit. Achieving the transit ridership targets will not eliminate the need for road improvements, but will reduce the amount of road construction required to accommodate future travel demands – only 54 new lanes will be required, as opposed to at least 100, provided that transit ridership targets are met.

Increased Transit Ridership

The introduction of rapid transit in Waterloo Region will nearly triple transit ridership along the Central Transit Corridor. The proposed rapid transit system has expected daily passenger boardings of 27,000 on opening day in 2014, and 56,000 in the year 2031. The comparable figures for the corridor, without the project, are 11,000 in 2014 and 20,000 in 2031. Expected ridership on the rapid transit system compares favourably with systems already in place in such North American centres as Edmonton, Sacramento, St. Louis, Salt Lake City, Baltimore, and Phoenix.

Forecast Daily Boardings

![Graph showing forecast daily boardings for 2014 and 2031.](image-url)
Reduced Emissions
The Region’s rapid transit project will reduce greenhouse gas emissions and other pollutants, by shifting travel to transit and out of private cars. The shift away from auto usage will reduce annual greenhouse gas emissions by more than 9,000 tonnes in 2014 and more than 14,000 tonnes in 2031. In addition, the project will reduce annual Criteria Air Contaminants by 325 tonnes in 2031.

These pollutants contribute to poor air quality and damage human health. The reduction in pollutants with rapid transit will reduce hospital admissions, saving the health care system an estimated $10.5 million during the first 25 years of the project.

Improved Mobility
By serving major destinations, rapid transit will connect key nodes like the University of Waterloo, Wilfrid Laurier University and the Research and Technology Park with core areas and satellite campuses across the region. As a result, this intellectual sector can connect more readily to the business core, providing increased access to cultural, commercial and residential opportunities. People will be able to access an expanded pool of facilities via rapid transit, such as employment and training centres, community facilities, places of worship, health centres, retail, and parks.

Prosperous Community
Rapid transit will contribute to the creation of new jobs or increased employment through:

- Jobs associated with constructing, operating and maintaining the rapid transit system;
- Jobs arising as a result of the improved travel conditions; and
- Access by employees to jobs that were previously inaccessible by public transit and access by employers to a suitable workforce living within acceptable travel times and costs.

Using economic impact modelling, the multiple account evaluation estimated that the areas surrounding the stations will support more than 13,000 new residents and more than 18,000 new jobs, compared to anticipated development patterns without rapid transit in place. In addition, the construction of the project will generate more than 6,000 person-years of direct, indirect and imputed employment by 2031.

More broadly, the investment will help to establish the infrastructure required to support the knowledge-based economy in Waterloo Region. It will create an important physical link that will mirror the economic links among the universities, companies/business districts, and the labour force that together form one of Canada’s leading knowledge-based economies.
Reurbanization and Intensification

Rapid transit, as a strategic street-level system along the Central Transit Corridor, will be a significant catalyst for achieving reurbanization and economic and demographic intensification. Rapid transit will impact land access, image, value and desirability. Intensification and redevelopment resulting from rapid transit is expected to shape urban form in a more efficient manner and thereby avoid, delay or minimize the expansion of urban areas into the region’s valuable agricultural, environmental and rural areas, thereby protecting our community’s food and water supply and diverse economy.

The prospect of future rapid transit is already affecting real estate in the region. The Kitchener-Waterloo-Cambridge area has recently been identified as the top region in Ontario in which to invest in real estate, based on its high-tech industries, revitalization of downtowns, and planning for rapid transit.

Improved Public Safety and Security

Strategic investment in transit through the implementation of rapid transit will improve public safety and security. The risk of fatality for a car passenger is 20 times higher than for a transit passenger making the same trip. For rapid transit in particular, fixed rail operation reduces vehicle conflicts resulting from transit driver error, and offers security and comfort during transportation. The dedicated transit passageway further reduces the potential for vehicle conflicts. A single light rail vehicle removes 125 cars from the road making neighbourhoods safer for other modes of transportation.

EXECUTIVE SUMMARY

AN INVESTMENT IN A SUSTAINABLE FUTURE

Changing the pattern of development is critical to accommodate growth in the region in an environmentally sustainable and economically viable manner. Investment in rapid transit in Waterloo Region is part of a fundamental change in the way that the region will accommodate increased demand for travel, and part of a broader strategy to encourage compact, transit-supportive communities.

It is time for Waterloo Region to join the ranks of Canadian cities whose urban core areas are more functional and prosperous as a result of rapid transit. By investing in rapid transit at this critical point in the region’s evolution, the opportunity exists to make a substantial difference in the economic, social, and environmental health of the region for decades to come.
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PART A
BACKGROUND
PART A BACKGROUND
1 PLACES TO GROW – GROWTH PLAN FOR THE GREATER GOLDEN HORSESHOE

The Central Transit Corridor, following the linear urban corridor formed by the region’s three Cities of Cambridge, Kitchener and Waterloo, was first identified in the Region’s first Official Plan in 1976. The Central Transit Corridor has appeared consistently in each Official Plan since then.

Council adopted the newest Regional Official Plan in June 2009. The provision of rapid transit and the accompanying reurbanization is the basis for many new policies in the Plan, and reflects the Region’s status in managing transit. As the owner and operator of the transit system since 2000, the Region is in a key position to move forward on these intentions. The new Official Plan includes detailed policy and implementation initiatives regarding rapid transit and future development within the Central Transit Corridor.

Within the broader context, rapid transit in Waterloo Region is a central element in a variety of Regional and Provincial policy documents, described in Sections 1 through 6.

1 PLACES TO GROW – GROWTH PLAN FOR THE GREATER GOLDEN HORSESHOE

The Provincial Growth Plan for the Greater Golden Horseshoe projects that the Region’s population will increase by 45 per cent to 729,000 people by 2031, and that employment will increase by 44 per cent to 366,000 by 2031. The Places to Grow Act, 2005 provides “a framework for implementing the Government of Ontario’s vision for building stronger, prosperous communities by better managing growth in this region to 2031”. The Act guides decisions on a wide range of issues – transportation, infrastructure planning, land-use planning, urban form, housing, natural heritage and resource protection – in the interest of promoting economic prosperity. The Growth Plan establishes transit as a priority for infrastructure investment and identifies higher order transit in Waterloo Region as a feature of the Plan. There are three urban growth centres proposed in the Act in Waterloo Region – downtown Cambridge, downtown Kitchener and uptown Waterloo – where growth will take place and rapid transit is identified to connect the urban centres to encourage a more sustainable growth pattern and minimize automobile use. Figure 1 shows the urban growth centres in relation to the rapid transit route and stations.
Figure 1: Urban Growth Centres in Relation to Rapid Transit Route and Stations

Note: Base map is from Council-Adopted Regional Official Plan.
Since its beginning, Waterloo Region has consistently ranked as one of the fastest growing communities in Canada. Since 2000, the region’s population has increased by approximately eight per cent, or more than 6,300 people, per year. With a current population of more than 520,000, the region is the 11th largest urban area in Canada and the fifth largest in Ontario.

Given this tremendous growth and the challenges that it is creating, in 2003 Waterloo Region developed the Regional Growth Management Strategy (RGMS) entitled Planning Our Future. This innovative strategy identifies where, when and how additional residents and jobs should be located to focus growth in a sustainable manner. Consistent with the Province’s “Smart Growth” principles, the strategy focuses on the growth for the next 25 to 35 years in urban areas and rural communities in ways that will preserve and enhance the high quality of life currently enjoyed in these communities. The RGMS includes six major goals for the Region:

- Enhancing our natural environment;
- Building vibrant urban places;
- Providing greater transportation choice;
- Protecting our countryside;
- Fostering a strong economy; and
- Ensuring overall coordination and cooperation.

To achieve these goals, the Region has adopted new approaches to reurbanize and intensify the linear urban corridor formed by its three cities. In reshaping this urban environment, the Region must consider its demographic shift towards a maturing population, increased ethnic mix, increasing density forms and an increased number of people who do not or cannot travel by private automobile. Some of the benefits to this reshaped urban environment will be reduced congestion, increased transit ridership, reduced air pollution, improved mobility, a healthier economy, improved public health, improved public safety and security, and the long-term protection of ecological systems and precious rural lands and agricultural resources.

The Region considers the establishment of a rapid transit system in the region’s primary reurbanization area to be an essential catalyst in achieving the goals set out in the RGMS. The RGMS envisions the Central Transit Corridor housing a higher-order rapid transit facility connecting many of the growing commercial, residential, employment and institutional nodes in a central spine.
3 REGIONAL OFFICIAL PLAN

In June 2009, Regional Council approved the new Regional Official Plan. The Plan sets out the policies that will guide development in the region through 2029. The overall goal of the Plan in terms of its approach is to “promote balanced growth by directing a greater share of urban development towards the existing built-up area and by contributing to the creation of complete communities in urban and township designated greenfield areas.”

Key to this objective, and to many of the related policies of the Plan, is the implementation of the Regional rapid transit system. The rapid transit system is identified as a central structural element in the Plan. The Plan includes a series of transit-supportive planning policies to ensure that the rapid transit system and rapid transit station areas are focal points for higher density development. In particular, the Plan contains a series of special policies to be applied to lands in proximity to rapid transit stations and/or high-frequency transit service. These policies include:

- an interconnected and multi-modal street pattern that encourages walking, cycling or the use of transit and supports mixed-use development;
- a more compact urban form that locates the majority of transit-supportive uses within a comfortable walking distance of the transit stop or major transit station area;
- an appropriate mix of land uses, including a range of food destinations, that allows people to walk or take transit to work, and also provides for a variety of services and amenities that foster vibrant, transit-supportive neighbourhoods;
- medium and higher density development as close as possible to the transit stop to support higher frequency transit service and optimize transit rider convenience;
- pedestrian-friendly environments that allow walking to be a safe, comfortable, barrier-free and convenient form of urban travel;
- a high quality public realm to enhance the identity of the area and create gathering points for social interaction, community events and other activities; and
- access from various transportation modes to the transit facility, including consideration of pedestrian, bicycle parking, and where applicable, passenger transfer and commuter pick-up/drop-off areas.
4 REGIONAL TRANSPORTATION MASTER PLAN

The Region is currently developing a new Regional Transportation Master Plan (RTMP). The new RTMP provides a comprehensive, forward-looking strategy focused on sustainable forms of transportation and building on other Regional policies, such as the Region’s Pedestrian Charter, Regional Cycling Master Plan, and the RGMS, while continuing with strategic road improvements. The new RTMP also plans for the implementation of the rapid transit system in the Central Transit Corridor as part of its “transit oriented” approach.

The RTMP integrates rapid transit in the corridor with other public transit services such as Grand River Transit (GRT) buses, intercity bus services, park ‘n’ ride, VIA Rail service and future GO Transit (including the proposed Georgetown to Kitchener GO Train expansion by 2011 and a possible future extension of the Milton GO Train to Cambridge). The system approach also calls for integration of rapid transit with other transportation modes such as pedestrian travel and cycling.

5 OTHER REGIONAL INITIATIVES SUPPORTIVE OF THE RAPID TRANSIT INITIATIVE

The Region has set in place a number of other policies, programs, and publications that support the proposed rapid transit system, including:

- the Transportation Demand Management program, promoting a shift away from auto dependency;
- the Regional Pedestrian Charter, promoting walkability;
- the Regional Cycling Master Plan, promoting recreational and utilitarian cycling;
- Station Area Planning initiatives, looking at infrastructure requirements in station areas as well as land use patterns; and
- the Corporate Strategic Plan, in which Regional Council has identified a strategic focus that includes goals to protect and enhance the environment, manage and shape growth to ensure a livable, healthy, thriving and sustainable Waterloo Region, and provide high quality infrastructure and asset management to meet current needs and future growth.
6 PROJECT SPECIFIC STUDIES

The rapid transit Project Team prepared technical studies for a contemplated rapid transit project in 2004 to 2005, prior to the commencement of the rapid transit Environmental Assessment (EA). The studies included a detailed cost-benefit analysis that the Region submitted to the Provincial and Federal Governments in November 2005. The technical studies concluded that rapid transit is a feasible transportation alternative and a strategic financial investment that will support the region’s economy, competitiveness and prosperity over the next 30 years, while meeting Provincial and Regional planning goals.

The Region subsequently entered into the EA process in 2006. At the time, the EA Terms of Reference bound the proponent to completing a typical three-phase individual EA process. The Region has completed Phases 1 and 2. The Region intends to transition to the new Ontario Regulation 231/08 in late 2009.

During Phases 1 and 2, the Project Team developed and evaluated a number of alternatives to identify the best possible rapid transit system for Waterloo Region. Three years of study and analysis concluded with a multiple account evaluation. Appendix A contains the Multiple Account Evaluation Report. The evaluation measured the benefits and costs of a Light Rail Transit (LRT) system and a Bus Rapid Transit System (BRT), and examined two potential route variations within the Central Transit Corridor. The results of the evaluation indicate that:

- LRT delivers the greatest transportation, environmental, land-use, economic, social and community benefits to the Region;
- LRT best supports the objectives of the RGMS;
- BRT is less expensive, but delivers significantly lower benefits;
- The projected ridership and intensification potential along the route is significantly higher in the north (Conestoga Mall to Fairview Park Mall) than in the south (Fairview Park Mall to the Ainslie Street bus terminal);
- BRT would reach capacity around 2030 on the north portion of the route because of operational difficulties associated with high frequency buses; and
- The construction costs for a full LRT system would be almost evenly split between the north portion of the route and the south portion.
The Project Team concluded that an LRT system from Conestoga Mall in Waterloo to the Ainslie Street bus terminal in Cambridge provides the best long-term, environmentally sustainable solution to manage our community’s future growth and transportation needs. However, the Project Team also recognized that ridership, development potential and costs vary along the route. A staged approach to implementing a full LRT system will allow the Region to most cost-effectively match transit technology with current and projected ridership and development potential. The first stage includes a combination of LRT in the north part of the route and an adapted BRT (aBRT) system in the south. The aBRT will share lanes with other traffic rather than having an exclusive passageway. The next stage includes a shift from the aBRT technology to LRT in the south once rapid transit has developed more ridership and land uses have intensified south of Fairview Park Mall.

In June 2009, Regional Council approved LRT as the preferred rapid transit technology in the long run, and approved the initial stage (a combination of LRT and aBRT) of the staged implementation approach. The initial stage forms the basis for this business case under the Government of Canada’s Building Canada Fund.
I’m excited by the plan and can’t wait to see it come to fruition. Coupled with the plans for improved inter-regional transit, which will hopefully be well coordinated with the rapid transit system, our region is poised to meet, head-on, a future where the car is no longer king."
BUSINESS CASE
REGION OF WATERLOO
RAPID TRANSIT PROJECT

PART B
PROJECT DESCRIPTION
1 BASIC ELIGIBILITY

Section 1 demonstrates that the Region’s rapid transit project, a combination of LRT and aBRT, is eligible for funding under the Major Infrastructure Component of the Building Canada Fund.

1.1 Eligible Transit Project Subcategory

The Region’s rapid transit project will include:

- Transit infrastructure, including rail and bus rapid transit systems;
- Intelligent Transport Systems, compliant with the Intelligent System Transportation System Architecture for Canada and the Border Information Flow Architecture, to ensure bus priority at signals for the aBRT portion of the project; and
- Transit queue-jump lanes, reserved bus lanes, turning lanes, storage and maintenance facilities.

1.2 Funding Recipient Eligibility

As a Regional government under Provincial statute, The Regional Municipality of Waterloo is eligible to receive funding from the Building Canada Fund.

1.3 Overview of Project Design and Work

Section 1.3 outlines the location, characteristics and phases of the Region’s rapid transit project.

1.3.1 Project Location

1.3.1.1 Route Location

The map in Figure 2 identifies the rapid transit route, including 19 kilometres of LRT and 16 kilometres of aBRT, as follows:

- Beginning at Conestoga Mall, the route follows King Street and Northfield Drive, then the Region-owned rail spurline from Northfield Drive through the Research and Technology Park and the University of Waterloo, to uptown Waterloo;
- In uptown Waterloo, the route splits into a one-way system northbound on King Street and southbound on Caroline Street and Allen Street. The route rejoins as a two-way system along King Street between uptown Waterloo and downtown Kitchener;
- In downtown Kitchener, the route splits into a one-way system northbound on Duke Street and southbound on Charles Street, then back to a two-way system at Frederick Street. From downtown Kitchener, the route follows Charles Street, Ottawa Street, the CN rail corridor, Hayward Avenue, Courtland Avenue and Fairway Road (or an adjacent hydro corridor) to Fairview Park Mall; and
- From Fairview Park Mall, the aBRT route follows Highways 8 and 401, using bus by-pass shoulder lanes to avoid congestion, then Hespeler Road and Water Street to the Ainslie Street bus terminal in downtown Cambridge.
Figure 2: Rapid Transit Preferred Implementation Staging Plan
1.3.1.2 Station Locations

The map in Figure 2 also identifies the rapid transit station locations. Potential station locations have existing transit-supportive uses and considerable potential for reurbanization. In identifying station locations, the Project Team considered:

- reurbanization potential;
- transit interchange opportunities;
- activity centres;
- environmental constraints;
- sensitive land uses such as stable, low-density residential areas;
- availability of public land for the station footprint;
- consultation with area municipalities, agencies and the public through workshops and public consultation centres; and
- functional design.

The rapid transit route includes 21 stations. Typically, stations will be located at or adjacent to a signalized intersection with convenient pedestrian access to the platform(s). Detailed station area planning will identify specific works in station areas such as bicycle pathways, bicycle lockers/locking posts, and sidewalks. The Functional Design Report contains details of passenger boards/alights and land use patterns for each station.

Station location and layout will facilitate convenient transfer between rapid transit, GRT, park ‘n’ ride facilities, and GO Transit. In particular, the Province’s Class EA for the Georgetown to Kitchener GO Train expansion recommends that the ultimate location of the GO station in downtown Kitchener be integrated with the Region’s proposed rapid transit station on King Street at Victoria Street. GO Transit feels that this downtown station is central to its ridership market for the Kitchener area.

Stations will be normally unattended and low maintenance. Their design will stress passenger safety, convenience, comfort, and accessibility. Stations will allow convenient, step-free access by pedestrians, cyclists and persons with disabilities. Boulevard space near most stations will include cycling amenities.

Station spacing will allow the majority of walk-in passengers to walk less than five to six minutes to and from the station; however, some passengers can be expected to walk upwards of eight to nine minutes. This provision results in station spacing between 1 and 1.5 km.

Each station will house fare collection equipment, signage and system maps and information. The predictability and consistency of this information will enhance passenger experience.
Typical station geometry includes a platform 3.5 metres wide and 60 metres long. This allows for double berthing of light rail vehicles in LRT segments and adequate loading/unloading area for multiple buses in aBRT segments. Possible platform configurations include:

- Side-loading, either adjacent platforms (platforms across the roadway from each other) or staggered platforms (one platform near side and the other platform far side of an intersection);
- Centre-loading (median island with tracks on either side); and
- Terminus stations (e.g., Fairview Park Mall, Conestoga Mall).

1.3.1.3 Park ‘n’ Ride Locations
As shown in Figure 3, the Project Team has identified six park ‘n’ ride locations including:

- Northfield Drive/Weber Street North area, Waterloo – near the interchange with Conestoga Parkway;
- Conestoga Mall, Waterloo – near the interchange of King Street North and Conestoga Parkway;
- Fairview Park Mall, Kitchener – near the interchange of Fairway Road and Highway 8;
- Sportsworld – near the interchange with Highway 8;
- Bridgecam Power Centre – near the interchange of Hespeler Road and Highway 401; and
- Downtown Cambridge – near the Ainslie Street bus terminal.

Of the six locations, Northfield (40 spaces), Fairview Park Mall (90 spaces), and Sportsworld (200 spaces) are the most key locations and are proposed for initial construction. Northfield provides access for townships to the north, Fairview Park Mall is the interface between the LRT and the aBRT, and Sportsworld is conveniently located near Highway 401 for commuters living east and west of Waterloo Region.
PART B  PROJECT DESCRIPTION
1  BASIC ELIGIBILITY

Figure 3: Park 'n' Ride Locations

Legend
- Green: Proposed for Initial Construction
- Orange: Other Potential Park 'n' Ride Locations
1.3.1.4 Maintenance Yard and Storage Facility Location
A maintenance yard and storage facility could potentially be located in one of the following areas:

- In Waterloo, adjacent to the Waterloo railway spur and near the Research and Technology Park Station; or
- In Kitchener, adjacent to the Huron Park spur and near the Courtland Avenue/Block Line Station.

The selection of the maintenance yard location will consider the site’s ability to accommodate a light rail yard and shop complex. The site should incorporate convenient double-track access to a storage area with sufficient storage track length as well as a loop track to avoid the need for reverse moves. The main entry and exit location should minimize impact on external traffic flow and have adequate sight distances for transit vehicles entering and exiting the site.

Maintenance facility design will consider:

- Two service tracks (inside building), complete with full length pits;
- One repair track (inside building), complete with full length pit;
- One paint booth (inside building), complete with air handling system, make-up air, filtration, task lighting;
- One prep booth (inside building), complete with air handling system, make-up air, filtration, task lighting;
- Four storage tracks, outside, each with 120m (four-car) capacity;
- One maintenance equipment track;
- Crew office;
- Dispatch centre;
- Machine shop;
- Administration office;
- Stores;
- Employee/visitor parking; and
- Outside material storage for signals, track and traction power supplies.
1.3.2 Project Characteristics

1.3.2.1 Functional Design Overview

Appendix B contains the preliminary Functional Design Report detailing rapid transit capital works and platform locations.

As part of the EA process, Phase 2 Step 1 identified all possible route alternatives in Waterloo Region in the seven segments along the Central Transit Corridor. Phase 2 Step 2 evaluated the long list of route alternatives and shortlisted the top-ranked alternatives for each segment. Phase 2 Step 3 joined the top-ranked segment alternatives into continuous BRT and LRT system alternatives.

The Project Team prepared functional designs for the continuous system alternatives. The functional designs identify the general impact of route alternatives on adjacent properties and illustrate the integration of the rapid transit system with the existing railway corridors and road network.

1.3.2.2 Design Assumptions

Key assumptions for the functional design include:

- A rapid transit passageway width of 8.0 metres for two-way on-road rapid transit;
- A rapid transit passageway width of 4.0 metres for one-way on-road rapid transit;
- Outside of downtown cores, a two-way rapid transit passageway in the centre of the roadway (centre-running);
- In downtown cores where the road allowances are narrow, a one-way rapid transit passageway in the curbside lane or in boulevard space;
- A vertical separation of the centre-running rapid transit passageway from adjacent traffic lanes, e.g., raised median;
- No vertical separation of the curbside rapid transit passageway (rapid transit flush with the roadway) to enable crossing of the transit passageway and access to driveways along the same side of the street;
- For existing four or six-lane roadways, no road widening to replace travel or parking lanes, if the lanes are removed to accommodate rapid transit; and
- For centre-running segments on existing two or three-lane roadways, a road widening to accommodate 8.0 metres of rapid transit passageway and two 4.8 metre traffic lanes, with one traffic lane on each side of the rapid transit passageway. In downtown cores with curbside LRT passageway, minimal road widening is anticipated.
1.3.2.3 Roadway Cross-Sections

Figures 4 and 5 illustrate typical cross-sections for two and four-lane roadways incorporating centre-running rapid transit. Figures 6 and 7 illustrate typical cross-sections for two and four-lane roadways incorporating curbside rapid transit. The cross-sections show the rapid transit passageway, traffic lanes, curbs, inner boulevards, sidewalks and outer boulevards. The width of these elements is dependent on the width of the road allowance.

For curbside rapid transit, visual means such as painted lines or textured, coloured concrete will delineate the rapid transit passageway from the adjacent lane.
PART B  PROJECT DESCRIPTION

1  BASIC ELIGIBILITY

Figure 4: Two-Lane Median Cross-Section

Figure 5: Four-Lane Median Cross-Section
Figure 6: Two-Lane Loop Cross-Section

Figure 7: Four-Lane Loop Cross-Section
1.3.2.4 Geometric Constraints
Geometric constraints include narrow road allowances, historically significant buildings located close to an existing road, tight curves and corner radii, and steep grades. Locations with challenging grades include:

- King Street from Victoria Street to Louisa Street;
- Ottawa Street from Charles Street to Dundas Avenue;
- Courtland Avenue from the future Block Line Road to Shelley Drive; and
- Water Street from Samuelson Street to Park Hill Road.

Beyond the specific steep-grade locations listed above, road profiles have not been developed for the system alternatives.

1.3.2.5 Property
The functional plans roughly identify property requirements along the rapid transit alignment. The functional design included a review of cross-sections, horizontal and vertical alignments within the road allowance to reduce the impact that the rapid transit passageway will have on adjacent properties. Preliminary design will further refine and establish the actual property impacts.

1.3.2.6 Civil
The underlying principle of the functional design is that the on-road rapid transit passageway will displace existing general purpose traffic lanes. Exceptions to this principle include railway and highway corridors.

Railway corridors will require complete relocation of the existing freight railway track and a specific physical separation to the adjacent rapid transit tracks.

Highway corridors will include bus bypass shoulders, approved by the Ministry of Transportation of Ontario (MTO), similar to the current operation of GO Transit service along Highway 403 in Mississauga. The rapid transit system will operate in the highway corridor with prescript rules as described in the MTO Operating Protocol for Bus Bypass Shoulders.

Surface drainage has been assumed in all open drainage locations while piped drainage has been assumed for urban arterial roads.

1.3.2.7 Structures
Bridge engineers visited potential road, rail, and river crossings for the rapid transit route and identified a replacement/expansion program and order of magnitude cost estimate for each structure. The preliminary recommendations for each structure are listed in Figure 8.
### Part B  Project Description

#### 1  Basic Eligibility

---

**Figure 8: Proposed Work for Current Structures**

<table>
<thead>
<tr>
<th>LRT System</th>
<th>Structure</th>
<th>Proposed Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>King Street N under the Conestoga Parkway</td>
<td>No structural work required</td>
</tr>
<tr>
<td></td>
<td>Pedestrian crossing over King Street</td>
<td>New structure for pedestrians</td>
</tr>
<tr>
<td></td>
<td>Northfield Drive W level crossing @ Waterloo Spur</td>
<td>No structural work required</td>
</tr>
<tr>
<td></td>
<td>Waterloo Spur under Weber Street N</td>
<td>Move freight track to East span, Install Crash Walls along piers, Possible utility relocation</td>
</tr>
<tr>
<td></td>
<td>Waterloo Spur over Silver Lake/Laurel Creek</td>
<td>Existing structure to be removed, New structure for all three tracks, Pedestrian bridge to remain</td>
</tr>
<tr>
<td></td>
<td>King Street W grade separation @ CN Guelph Subdivision (Victoria Street N)</td>
<td>New semi-grade separated crossing with rapid transit under CN Guelph Subdivision and general purpose lanes at level crossing</td>
</tr>
<tr>
<td></td>
<td>CN Huron Park Spur under the Conestoga Parkway</td>
<td>Complete structure replacement with new single span bridge for three tracks</td>
</tr>
<tr>
<td></td>
<td>CN Huron Park Spur over Schneider Creek</td>
<td>New bridge of same or similar construction adjacent to existing bridge</td>
</tr>
<tr>
<td></td>
<td>Pedestrian crossing over Fairway Road</td>
<td>New Structure for pedestrians</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>aBRT System</th>
<th>Structure</th>
<th>Proposed Work</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Highway 8 over the Grand River</td>
<td>MTO is currently designing the widening of Highway 401 over this bridge</td>
</tr>
<tr>
<td></td>
<td>Highway 8 over King Street E</td>
<td>Widening might be part of the MTO’s Grand River Bridge widening project</td>
</tr>
<tr>
<td></td>
<td>Highway 8 over Sportsworld Drive</td>
<td>No structural work required</td>
</tr>
<tr>
<td></td>
<td>Highway 8 Flyover to Highway 401</td>
<td>No structural work required</td>
</tr>
<tr>
<td></td>
<td>Highway 401 under Fountain Street</td>
<td>No structural work required</td>
</tr>
<tr>
<td></td>
<td>Highway 401 over CPR Waterloo Subdivision</td>
<td>No structural work required</td>
</tr>
<tr>
<td></td>
<td>Highway 401 under Speedsville Road</td>
<td>Might be possible to create an rapid transit lane in bay between pier and abutment, Pier protection would be required, *This may become a pinch point for BBS lanes</td>
</tr>
<tr>
<td></td>
<td>Highway 401 over Speed River and Tributaries</td>
<td>No structural work required</td>
</tr>
<tr>
<td></td>
<td>Highway 401 over CN Fergus Spur</td>
<td>Rapid transit on-ramp would be shared with existing on-ramp at Highway 401</td>
</tr>
</tbody>
</table>
1.3.2.8 Utilities
On most streets along the rapid transit route, the rapid transit passageway will be located along the centre of the asphalt roadway with utilities primarily running under the traffic lanes. Placing the utilities outside of the rapid transit passageway will minimize delays or inconveniences for the rapid transit system during utility maintenance. Some utilities may be located under transit station footprints or under the LRT. These utilities will likely be enclosed in conduits to protect them from surface works and to facilitate repairs without surface disruption.

The staged implementation of LRT will end at Fairview Park Mall with no new crossing of the Grand River. Given that reconstruction of Highway 8 is underway, it is not likely that aBRT construction will affect the Grand River either. If construction were to impact the crossing of the Grand River, this would necessitate a review of utilities within the flood plain boundaries with the Grand River Conservation Authority as well as other Provincial and Federal organizations such as the Ontario Ministry of Natural Resources, the Department of Fisheries and Oceans, and the Canadian Coast Guard. Construction affecting the Grand River is not likely an issue until LRT is constructed in the southern portion of the region from Fairview Park Mall to the Ainslie Street bus terminal.

1.2.3.9 Vehicles
Final vehicle selection is not complete. The functional design assumed conservative design criteria that best suit the majority of vehicles that may be considered for this project. The functional design report includes a list of the proposed design criteria to accommodate both LRT and BRT vehicles. The LRT design criteria typically govern the functional design because light rail vehicles are generally more restrictive.

It is anticipated that the Province will provide funding for the rapid transit project. Accordingly, the Region will ensure compliance with the MTO Canadian Content for Transit Vehicle Procurement Policy. The Region will likely coordinate the procurement process with other major rapid transit projects in the Greater Toronto Area, for efficiency and cost effectiveness. The Region will consider joint vehicle purchases with other agencies, if feasible.

Vehicle specifications will be identified at the detailed design stage of the project.

1.3.2.10 Construction Staging
Rapid transit construction staging will be coordinated to minimize economic/financial hardships for business owners. The Region will develop a communication plan to notify the public of the construction schedule, road closures and detours.
1.3.3 Project Phases

As noted in Part A of this business case, the rapid transit project includes two stages. The first stage includes a combination of LRT in the north part of the route and aBRT in the south. The next stage includes a shift from the aBRT technology to LRT in the south once rapid transit has developed more ridership and land uses have intensified south of Fairview Park Mall.

The first stage, which forms the basis for this business case, includes:

- LRT from Conestoga Mall in Waterloo to Fairview Park Mall in Kitchener; and
- aBRT from Fairview Park Mall in Kitchener to the Ainslie Street bus terminal in Cambridge, considering:
  - Bus bypass shoulders on Hwy 8 and 401;
  - High Occupancy Vehicle (HOV) lanes on Hespeler Road;
  - Queue jump lanes;
  - Traffic signal priority;
  - Additional/enhanced stations; and
  - Enhanced ticketing/passenger information.

To complement this transit project, the Region will:

- Re-align GRT bus service to provide an expanded level of service along primary feeder routes to the rapid transit stations; and
- Provide express bus service, modeled after the current iXpress service (a limited-stop express service), to high ridership centres throughout the region (e.g. Wilfrid Laurier University, Conestoga College, etc).
1.4 Estimated Start and Completion Dates

Subject to expeditious funding commitments by the Federal and Provincial governments, the rapid transit project will proceed immediately to construction in 2012. A three-year construction period is envisioned, with the system opening in late 2014.

Figure 9 outlines the anticipated scheduling of the major project components.

**Figure 9: Anticipated Project Schedule**

<table>
<thead>
<tr>
<th>Component</th>
<th>Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property</td>
<td>2010 – 2011</td>
</tr>
<tr>
<td>Civil Works / Maintenance Yard</td>
<td>2012 – 2014</td>
</tr>
<tr>
<td>Structure / Tunnel</td>
<td></td>
</tr>
<tr>
<td>Utility</td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td></td>
</tr>
<tr>
<td>Stations</td>
<td></td>
</tr>
<tr>
<td>Signals / Communications</td>
<td></td>
</tr>
<tr>
<td>Soft Costs</td>
<td></td>
</tr>
</tbody>
</table>
"I have been using public transportation as my primary mode of transportation since I moved to Waterloo Region from the GTA in 1998. I am very excited about the proposed LRT route as I would be able to use it every day to get to work at Research In Motion. I also hope that its greater speed, comfort, and convenience would help to motivate some of my coworkers to use it as well."
2 FINANCIAL AND LEGAL REQUIREMENTS

Section 2 outlines the project components, their estimated costs, and eligibility under the Building Canada Fund. It outlines the status of the cost estimates and reviews the various steps and consultation undertaken as part of the rapid transit EA, initiated in 2006.

2.1 Project Components and Estimated Costs

Figure 10 outlines the capital costs of the rapid transit project in 2009 dollars.

<table>
<thead>
<tr>
<th>Hard Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Acquisition</td>
<td>$20 M</td>
</tr>
<tr>
<td>Civil Works</td>
<td>$108 M</td>
</tr>
<tr>
<td>Staging/Enabling Works</td>
<td>$70 M</td>
</tr>
<tr>
<td>Maintenance Yard</td>
<td>$47 M</td>
</tr>
<tr>
<td>Parking; Park and Ride Lots</td>
<td>$12 M</td>
</tr>
<tr>
<td>Structures</td>
<td>$23 M</td>
</tr>
<tr>
<td>Utility Relocation</td>
<td>$98 M</td>
</tr>
<tr>
<td>Stations</td>
<td>$18 M</td>
</tr>
<tr>
<td>Traction Power</td>
<td>$18 M</td>
</tr>
<tr>
<td>Hydro Supply</td>
<td>$29 M</td>
</tr>
<tr>
<td>Substation Electrical</td>
<td>$14 M</td>
</tr>
<tr>
<td>Line Electrical</td>
<td>$2 M</td>
</tr>
<tr>
<td>Signals</td>
<td>$14 M</td>
</tr>
<tr>
<td>Communications and Supervisory Control</td>
<td></td>
</tr>
<tr>
<td>Data and Data Acquisition (SCADA) System</td>
<td>$12 M</td>
</tr>
<tr>
<td><strong>SUB TOTAL:</strong></td>
<td><strong>$485 M</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Soft Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Design</td>
<td>$48 M</td>
</tr>
<tr>
<td>Construction Management</td>
<td>$39 M</td>
</tr>
<tr>
<td>Design Support (Construction)</td>
<td>$10 M</td>
</tr>
<tr>
<td>Construction Change Order Contingency</td>
<td>$48 M</td>
</tr>
<tr>
<td>Agency Costs</td>
<td>$29 M</td>
</tr>
<tr>
<td>Project Reserve</td>
<td>$48 M</td>
</tr>
<tr>
<td>Program Management</td>
<td>$15 M</td>
</tr>
<tr>
<td><strong>SUB TOTAL:</strong></td>
<td><strong>$237 M</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vehicle Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Vehicle Costs (2014)</td>
<td>$68 M</td>
</tr>
<tr>
<td>Capital Vehicle Costs (2031)</td>
<td>$29 M</td>
</tr>
<tr>
<td><strong>SUB TOTAL:</strong></td>
<td><strong>$97 M</strong></td>
</tr>
</tbody>
</table>

**GRAND TOTAL CAPITAL EXPENDITURE:** **$819 M**
2.2 Funding Sources and Expenditure Profile

The capital costs of the project are proposed to be funded two-thirds by the Province of Ontario, and one-third by the Government of Canada, through the Building Canada Fund. The Provincial Government stated in their 2008 budget that “Waterloo Region is one of Ontario’s fastest growing and most innovative communities. The Government is committed to working with its municipal, regional and federal partners to complete technical studies and the environmental assessment for a new rapid transit system and to supporting up to two-thirds of the project costs.” In July 2008, the Federal Government announced that “The Governments of Canada and Ontario also identified…rapid transit in Kitchener-Waterloo as initial priorities that the two governments will work together on under Building Canada.” Figure 11 summarizes the anticipated distribution of eligible cost expenditures based on the work completed in the multiple account evaluation. The evaluation assumed a four-year construction program, however, the Region is now contemplating a more aggressive three-year construction program.

**Figure 11: Anticipated Capital Expenditure by Component and Year (2009 $M)**

<table>
<thead>
<tr>
<th>Component</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property – Route</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property – Maintenance Yard</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil Works / Yard Construction</td>
<td>79</td>
<td>79</td>
<td>67</td>
</tr>
<tr>
<td>Structure / Tunnel</td>
<td>8</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Utility</td>
<td>34</td>
<td>34</td>
<td>30</td>
</tr>
<tr>
<td>Electrical</td>
<td>21</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Stations</td>
<td>9</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Signals / Communications</td>
<td>8</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Vehicles1</td>
<td>0</td>
<td>0</td>
<td>68</td>
</tr>
<tr>
<td>Soft Costs</td>
<td>83</td>
<td>83</td>
<td>71</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>242</td>
<td>245</td>
<td>281</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>768</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 includes costs for the number of vehicles required at project start in 2014.
The Region will fund the ineligible annual operating costs of the project, forecast to be $483 million over the first 20 years of the project. The Region will also fund the costs of property acquisition, consultant fees, legal fees, employee wages and benefits, and overhead costs because they are not eligible for the Building Canada Fund. Property acquisition costs are estimated at $23 million, including both hard and soft costs.

Figure 12 shows the daily ridership, annual revenues, and annual operation and maintenance costs for the project, over the next 30 years. It is anticipated that the net operating cost will decrease because ridership revenues will increase faster than costs.

Figure 12: Forecast Operating Costs and Revenues

<table>
<thead>
<tr>
<th></th>
<th>2014</th>
<th>2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Ridership</td>
<td>26,850</td>
<td>56,250</td>
</tr>
<tr>
<td>Annual Revenues</td>
<td>$8 M</td>
<td>$16 M</td>
</tr>
<tr>
<td>Annual Operation &amp; Maintenance</td>
<td>$18 M</td>
<td>$20 M</td>
</tr>
</tbody>
</table>

Note: Costs and revenue numbers do not take inflation into account.
2.3 Level of Confidence, Degree of Accuracy and Level of Contingency of Cost Estimates

The Association for the Advancement of Cost Engineering (AACE) International Recommended Practice 17R-97 Cost Estimate Classification System is an ANSI standard document, recognized internationally in the field of cost estimation. This standard document contains the following description of Level of Project Definition:

This characteristic is based upon per cent complete of project definition (roughly corresponding to per cent complete of engineering). The level of project definition defines maturity or the extent and types of input information available to the estimating process. Such inputs include project scope definition, requirements documents, specifications, project plans, drawings, calculations, learnings from past projects, reconnaissance data, and other information that must be developed to define the project.

The AACE states that the single, most significant, factor contributing to the level of classification is the Project Definition. All other factors are secondary after Project Definition. A Class 4 estimate has a Project Definition range of one to 15 per cent.

The capital cost estimates in Figure 10 are AACE Class 4 estimates, appropriate for the project definition stage. The level of project definition is in the magnitude of five to 10 per cent, while the associated level of expected accuracy for the estimate is in the range of +50 to -25 per cent.

The soft costs, including contingency, that are currently included in the capital expenditures are listed below, along with their amount in terms of per cent of hard capital costs:

- Engineering Design – ten per cent;
- Construction Management – eight per cent;
- Design Support (Construction) – two per cent;
- Construction Change-Order Contingency – ten per cent;
- Agency Costs – six per cent;
- Project Reserve – ten per cent; and
- Program Management – three per cent.
2.4 Capacity to Operate and Maintain the Service
As a Regional Municipality, the Region of Waterloo operates a variety of public services funded through a combination of taxation, fees, and other revenues. In the case of public transit, the Region recovers a significant portion of costs through earned revenue – including the farebox and advertising on vehicles, shelters, and benches. The Region will operate rapid transit services on a sustainable long-term basis through municipal subsidy.

2.5 Federal Legislation, Permits and Authorizations
Through ongoing dialogue with Transport Canada, the Region will ensure that the project adheres to all applicable Federal legislation and that all necessary Federal permits and authorizations are identified and obtained prior to construction and operation of the system.

2.6 Status of Environmental Assessment and First Nations Consultations
Section 2.6 outlines the status and work completed on the EA to date, and future steps to complete through the Province’s new expedited Transit Project Assessment Process, Ontario Regulation 231/08.

2.6.1 Phase 1: Identification of Transportation Strategy
Phase 1 of the EA, completed in July 2006, identified rapid transit as the preferred transportation strategy for Waterloo Region as compared to expanding the road network or improving conventional transit. Using 15 criteria based on the RGMS, the evaluation lead to the conclusion that rapid transit:

- Best achieves the goals of the RGMS;
- Is consistent with the Provincial Policy Statement and conforms with the Provincial Growth Plan for the Greater Golden Horseshoe;
- Supports reurbanization objectives, downtown revitalization and innovative urban design;
- Increases transportation choice and transit ridership;
- Is the least expensive form of motorized transportation when considering personal transportation costs;
- Contributes to the Region’s countryside protection goal by facilitating reurbanization and reducing the pressure to expand urban boundaries;
- Provides a safe mode of transportation and promotes an active and healthier lifestyle; and
- Utilizes the least amount of land and minimizes the impact on air quality and greenhouse gas emissions.
The Project Team held two public consultation centres in April 2006, attended by 145 individuals. The public feedback from these sessions indicated that the majority who provided comment recognized the rapid transit initiative as the most effective transportation strategy for meeting the Region’s RGMS goals and future transportation needs. Regional Council approved rapid transit as the Region’s transportation strategy in July 2006.

2.6.2 Phase 2 Steps 1, 2 and 3: Alternative Technologies and Route Design

Step 1
Phase 2 Step 1 began with a public information session and workshop in September 2006 to discuss potential rapid transit destinations, routes and station locations, as well as those characteristics of rapid transit that the public feels are most important. More than 140 community members came together to provide ideas.

Using the EA Terms of Reference and the input from the September 2006 workshop, the Project Team developed criteria to evaluate 10 rapid transit technologies and their associated route designs. Based on the results of the evaluation, the Project Team short-listed BRT and LRT operating generally at-grade in a dedicated passageway on a mix of on/off-road route designs because they had the greatest potential to:

- Support the Region’s redevelopment and intensification objectives;
- Optimize the use of existing off-road routes and serve major destinations using on-road routes; and
- Be compatible with existing and planned neighbourhoods.

At a series of public consultation centres and presentations throughout January 2007, the Project Team presented the results of the evaluation and the short list of rapid transit technologies and route designs to the public and stakeholder groups for input. More than 350 community members attended the centres and took the opportunity to review the information presented. The majority of those who provided comments agreed with the results of the evaluation and the proposed short list or stated a preference for BRT or LRT.

In February 2007, Regional Council approved BRT and LRT operating generally at grade in a dedicated passageway on a mix of on/off-road route designs as the short list for further evaluation.
**Step 2**

Phase 2 Step 2 began in March 2007 with a public workshop. The workshop helped to identify the list of route and station location alternatives to be evaluated for both BRT and LRT in terms of the greatest benefits (e.g. reurbanization potential, ridership, travel time savings, ability to serve concentrations of employment) and lowest impacts. More than 450 community members came together to provide ideas, with more than half identifying themselves as property owners along routes. Of those who commented, more than 60 per cent agreed with the proposed route and station locations.

In consultation with the area municipalities and the public, the Project Team finalized a list of 91 route, station location and technology alternatives in the seven segments of the study area. The Project Team then began an in-depth evaluation based on 21 different criteria approved in the Terms of Reference by the Ontario Minister of the Environment. These criteria were grouped in four different categories:

- Transportation;
- Social and cultural environment;
- Natural environment; and
- Economic impact.

The evaluation resulted in more than 5,000 individual pieces of data using different units of measurement (hectares, dollars, ridership, greenhouse gas emissions). The Project Team used the results to rank each alternative. The results of the ranking demonstrate how each route and technology alternative perform against the other alternatives in the same segment in each of the four broad categories. Those alternatives that provided the greatest benefits and the fewest impacts were ranked highest.

The Project Team then presented the rankings at a series of public consultation centres in January 2008, which were attended by approximately 1,350 people. The majority of public comments indicated general support for the top-ranked route alternatives, a strong preference for LRT technology over BRT technology, and the importance of servicing core areas and areas of high employment, commercial, retail and institutional land uses.
Step 3a
In Phase 2 Step 3a, the Project Team used combinations of the top-ranked route and technology options from Step 2 to assemble a short list of complete BRT and LRT system alternatives for the entire study area, along with staging options. The Project Team accomplished this short list through a series of transportation planning and engineering feasibility studies, together with public input and a multiple account evaluation.

Each system alternative had a number of route variations. The feasibility studies included a field review along each variation to identify engineering considerations that could pose obstacles to construction or implementation of a final system. The purpose of this review was to look for engineering challenges that could impact the feasibility of the rapid transit system alternatives. The short list eliminated from further consideration those rapid transit route variations that had multiple challenges or severe constraints considered too great to reasonably overcome.

The Project Team presented the details of the technical analysis and the shortlisted LRT and BRT system alternatives at a series of three public consultation centres in June 2008. Approximately 880 people attended the public consultation centres. The majority of public comments indicated support for the rapid transit initiative and a strong preference for LRT over BRT. In August 2008, the Project Team presented to Regional Council the final short list, which included one BRT option and one LRT option.

Step 3b
The Project Team completed the technical analysis and public consultation for Phase 2 Step 3b of the rapid transit EA and identified a rapid transit system and implementation staging plan.

As part of Phase 2 Step 3b, the Project Team completed a multiple account evaluation to evaluate the costs and benefits of the four rapid transit systems short-listed in Step 3a. The purpose of this evaluation was to determine which rapid transit system will best meet the goals of the RGMS and provide the greatest transportation, environmental, land-use, economic, social and community benefits to the region. The multiple account evaluation established the preferred project alternative as a staged implementation of a rapid transit system with the initial stage consisting of a combination of LRT and aBRT, paving the way to a future stage of full LRT through the Central Transit Corridor.

In June 2009, Regional Council approved the preferred project alternative and implementation plan.
PART B PROJECT DESCRIPTION

2 FINANCIAL AND LEGAL REQUIREMENTS

2.6.3 Transition to Ontario Regulation 231/08 Transit Project Assessment Process

In June 2008, the Province approved Ontario Regulation 231/08 for a new expedited Transit Project Assessment Process. In August 2008, the Region notified the Ontario Ministry of the Environment (MOE) to advise that the Region would transition the rapid transit initiative from the individual EA to the expedited process at the appropriate time, to take advantage of the significant time savings afforded to proponents from commencement of the new process to approval. The process established by the new regulation is intended to allow a proponent to obtain approval for a transit project from the MOE in as little as six months according to the following timelines:

- Consultation and completion of documentation and project report – four months;
- Final public and agency review and submission of objections – one month; and
- MOE decision-making (if necessary) – 35 days.

With the approval of the recommended rapid transit system and implementation staging plan, the Region is in a position to identify a rapid transit project as defined by the new regulation. The Region has identified the first stage of the implementation staging plan, a combination of LRT and aBRT, as its first project in its rapid transit initiative and will seek approval for that project under Ontario Regulation 231/08. The Region intends to start the expedited EA process in the fall of 2009.

The Transit Project Assessment Process involves the following steps, shown together with anticipated milestone dates.

- Identification of provincially significant impacts and mitigation measures – fall 2009;
- Notice of commencement – late 2009;
- Consultation – early 2010;
- Preparation of an Environmental Project Report – early 2010; and
- Notice of Completion – spring 2010.

Regional staff will work closely with the MOE to ensure compliance with the new regulation and to continue to foster a strong working relationship with MOE staff. This is particularly important because the Region will be among the first proponents in Ontario to enter into the new process.

The impact definition and development of mitigation measures will be based on the functional design for the rapid transit system, completed in 2008 and 2009. Stakeholder consultation will continue throughout the expedited approval process. Opportunities will exist to explore and resolve minor routing details and/or station locations to improve the integration of the rapid transit system into the streetscape and improve performance.
2.6.4 Summary of Public Consultation During the EA Process

Over the past three years, the Project Team has undertaken extensive outreach to and consultation with the public, agencies, community stakeholders, property owners, and the business community both within and outside of the EA process using a variety of formats. Below is a summary of the public consultation process from 2006 to early 2009:

- The Project Team sent rapid transit newsletters to more than 250,000 residential and business addresses on four different occasions;
- The Rapid Transit InfoLine (phone), the Rapid Transit infobox (e-mail rtinfo@region.waterloo.on.ca) and the Rapid Transit website (www.region.waterloo.on.ca/rapidtransit) are advertised widely on all communications related to the project. The public is encouraged to contact the Region with their questions and comments. The Rapid Transit website has an average of approximately 40 to 50 new visitors each day, and the infobox has received more than 2,000 e-mails;
- The Rapid Transit Facebook page has more than 190 Fans: 11 per cent are aged 13 to 17, 40 per cent are aged 18 to 24, 25 per cent are aged 25 to 34, and 24 per cent are over 35;
- Rapid Transit videos appear on YouTube and the Kitchener-Waterloo Record’s website;
- There have been 66 newspaper news stories, features, editorials and letters to the editor since the EA began in 2005;
- Total attendance at all 33 public consultation centres has topped 3,500 people;
- Workshops and focused consultation events resulted in 1,039 official formal comments; and
- The Project Team has provided information about the rapid transit initiative at an additional 63 different public outreach events such as community stakeholder meetings, public events, presentations to groups, and educational displays where attendance was not recorded.

In addition to the various points of public contact conducted within the EA process as described above, the Project Team initiated a concurrent outreach program to groups who may be more directly impacted by the implementation of a rapid transit system, including the business community and property owners and tenants located along the short-listed routes.
The Project Team first carried out a Business Outreach Program in July and August 2007 and again from May through August 2008. The program consisted of personal door-to-door visits to all businesses directly along the proposed short-listed rapid transit routes, in addition to those businesses located within a 200-metre radius of proposed rapid transit stations. An effort was made to speak with the owner or manager of each business at each visit, and a comprehensive information package was left with employees if the owner or manager was not present. The Project Team contacted more than 2,500 businesses within Cambridge, Kitchener and Waterloo and Woolwich Township.

During September 2008, the Project Team conducted focused public consultation meetings to increase awareness of the rapid transit EA and facilitate participation in the consultation process on the part of property owners and tenants living and/or working directly adjacent to the short-listed rapid transit routes released in June 2008. The Project Team conducted 12 such meetings, four in each of the three cities. The Project Team offered sessions in both mornings and evenings, to better accommodate the schedules of local business owners. More than 9,500 property owners and residential and business tenants received invitations.

The Project Team undertook an even more extensive public consultation process as the project approached the selection of preferred option, in May to July 2009. The details of the preferred rapid transit system and staged implementation plan were presented for public input at a series of three public consultation centres in May 2009. The centres were held from 2 to 8 p.m. in the following locations:

- St. Andrew's Presbyterian Church, Kitchener: 123 attendees;
- The United Kingdom Club, Cambridge: 47 attendees; and
- First United Church, Waterloo: 350 attendees.

The public consultation centre dates were widely advertised throughout the region through notices in the Kitchener-Waterloo Record, Waterloo Chronicle and Cambridge Times newspapers, the Rapid Transit Website, e-mail and mail notices to all members of the rapid transit contact list, road signs and a newsletter sent via e-mail and mail to all households within the region.

The Project Team also presented the results of the multiple account evaluation to the Municipal Councils of the Cities of Cambridge, Kitchener and Waterloo and the Township of Woolwich.
In addition, the Project Team enhanced the Rapid Transit website with a consultation portal that allowed the public to:

- Participate in online discussions about the rapid transit initiative and the latest study reports with other members of the public;
- Get updates on the project through videos; and
- Participate in web-based surveys about rapid transit that were used to stimulate discussion about recommendations on the preferred system.

In May and June 2009, the Project Team provided rapid transit displays at the following community events:

- Uptown Waterloo Public Square Opening Ceremony at King Street and Willis Way, Waterloo;
- Cambridge Riverfest at Riverbluffs Park, George Street, Cambridge;
- City of Waterloo Annual Open House at the City of Waterloo Service Centre Yards; and
- K-W Multicultural Festival, Victoria Park, Kitchener.

To provide additional opportunities for business and property owners along the propose route to ask questions and provide comments, the Project Team hosted three “storefront” locations during the months of June and July at:

- 44 King St. S., Waterloo;
- 150 King St. W., Kitchener; and
- 30 Main St., Cambridge.

The Project Team posted regular office hours at each location and on the Rapid Transit website, and used sidewalk signs to encourage drop-in visitors. Input gathered at the storefronts was considered in the rapid transit EA recommendations.
2.6.5 Consultation with First Nations
(Six Nations of the Grand River)

Throughout the EA process, the Project Team corresponded with representatives of the Six Nations of the Grand River regarding study updates and public information centre invitations. The Project Team has met with Six Nations representatives on several occasions and made presentations of the project status.

The most recent meetings with Six Nations occurred in May 2009, when the Project Team outlined the preferred alternative, outstanding issues, and next steps for the project.

2.7 Contract Award Process

The Region, through its procurement policies and procedures, practices competitive, fair, and transparent tendering for capital projects. While the contract award process has not yet been established for the proposed rapid transit project, competitive tender is anticipated as the procurement procedure. The Region is currently undertaking a public-private partnership screen to identify the most appropriate procurement process for the project. (See Section 5.2 for more information). The Region does not anticipate any conflicts with the Agreement on Internal Trade.
Rapid Transit is one of those investments we need to make. It will help us respond to the pressures outside of our control. It’s also a critical investment for the future that we, as a community, have been defining over the last decade."
3 PROJECT BENEFITS

The Region is set to deliver 366,000 jobs and grow from 520,000 people today to 729,000 over the next 20 years. Rapid transit can help to facilitate a large proportion of this growth by providing a new street-level link serving major urban centres of Cambridge, Kitchener and Waterloo. It is key to delivering the growth capacity that the Region needs, while helping to ensure that the quality of life and economic prosperity is maintained and enhanced.

Rapid transit will provide a new transport facility for millions of trips annually, and has been designed to benefit the maximum number of people. It will stimulate intensification, particularly in the Central Transit Corridor, while providing greater transportation choice to the region’s residents, businesses and institutions moving within and among the region’s major urban areas.

3.1 Demonstration of Project Benefits

The Region’s rapid transit initiative will achieve all of the desired outcomes for public transit projects identified by the Government of Canada in the Project Description Requirements for Public Transit Projects. The rapid transit project will increase transit ridership, reduce emissions of air pollutants and greenhouse gases, and improve mobility, resulting in economic growth, a cleaner environment and a stronger, more prosperous regional community.

Rapid transit will advance the goals of the Province’s Growth Plan for the Greater Golden Horseshoe. The Plan designates downtown Cambridge, downtown Kitchener and uptown Waterloo as urban growth centres, where much of the anticipated future population and employment growth will be directed, and calls for the development of a rapid transit system to connect the identified urban growth centres to the larger provincial transportation network.

Building and widening roads alone is not a practical or affordable solution to meet the anticipated demands on the region’s transportation system. Rapid transit will help address existing congestion and aid in preventing even greater levels of congestion in the future by providing greater transportation choice. In addition, rapid transit will help focus residential and commercial development around rapid transit stations. This will help the Region to achieve Provincial and Regional targets for increased reurbanization, and for the protection of agricultural and sensitive environmental areas against urban population and expansion pressure.
3.1.1 Reduced Congestion
The region’s transportation system is already close to capacity. Symptoms of strain on the network include:

- Growing congestion, which is increasingly affecting the ability to provide reliable, competitive transit service. For example, the existing iXpress bus service experiences significant congestion delays ranging from nine to 10 minutes on Highway 8 between Fairway Road and Sportsworld Drive. This time translates to annual operating costs that are higher by $180,000 because additional buses are required to maintain service frequency;

- Economic disruption from congestion and overall difficulty of accessibility within the community. For example, emergency travel times for ambulances in the three cities have increased more than 18 per cent in the last decade. While some of the increase is because of building intensification, most is caused by increased traffic congestion. The Region is presently enhancing signal pre-emption infrastructure to allow emergency vehicles more rapid travel across congested intersections;

- Impacts on the environment. Within Waterloo Region, a significant percentage of pollutants and emissions are associated with road traffic and transport as well as idling, indicating that poor air quality is not solely about trans-boundary pollution. In fact, for some pollutants, transportation is the largest single source of air emissions such as some smog precursors and carbon dioxide (primary greenhouse gas). Traffic emissions often dominate air pollution levels within 50 to 200 metres from major roads and highways;

- Impacts on public health. Deteriorating air quality impacts respiratory and cardiovascular health (especially for those with asthma, heart disease and diabetes), can lead to adverse pregnancy outcomes, and impedes healthy lung development in children. In 2005, more than 2,000 emergency room visits were as a result of air pollution in Waterloo Region;

- Increasing personal and societal costs of transportation and mobility within the community. Commuting times can affect the amount of time that is available for extracurricular activities for children, for recreation/rejuvenation time after work, for community involvement activities, and for family time. Research indicates that time spent alone in cars translates directly into a loss of social capital. Overall civic involvement declines in a community as the average commuting time of its citizens rises.
The total number of trips on the region’s transportation system is forecast to increase more than 36 per cent by 2031, placing even more demands on the transportation system.

The Regional Transportation Master Plan identifies key screenlines that measure the travel demand within the region. If the region continues with current trends of auto use, the road network will need to expand by at least 100 additional lanes of traffic across those screenlines by 2031 to maintain an acceptable level of service. The current scenario fundamentally fosters urban sprawl where road network expansion and auto travel are necessary outcomes of accommodating growth through the development of traditional urban transportation infrastructure.

The rapid transit project is the centrepiece of an expanded transit network solution that will shift a substantial amount of future travel to transit. Achieving the transit ridership targets will not eliminate the need for road improvements, but will reduce the amount of road construction required to accommodate future travel demands – only 54 new lanes will be required, as opposed to at least 100, provided that transit ridership targets are met. Moreover, rapid transit will facilitate improved travel conditions via reduced travel times, lower travel costs, improved journey quality, and improved reliability. The net effect is a change in patterns of accessibility, extending the distances that people will be prepared to travel, reducing the costs of existing travel, and easing the movement of people and goods in the region.

### 3.1.2 Increased Transit Ridership

The Regional transportation model was used to forecast ridership for a range of rapid transit system alternatives (e.g. BRT, LRT, and combination of these technologies) together with the “business as usual” scenario, which assumes gradual expansion of the existing iXpress bus service over the next 20 years. The findings indicate that the introduction of rapid transit in the region will nearly triple transit ridership along the Central Transit Corridor.

Figure 13 shows that the proposed rapid transit system will have expected daily passenger boardings of 27,000 on opening day in 2014, and 56,000 in the year 2031. The comparable figures for the corridor, without the project, are approximately 11,000 in 2014 and 20,000 in 2031.
As shown in Figure 14, expected ridership on the rapid transit system compares favourably with a number of other systems already in place in medium-size urban centres in North American centres such as Edmonton, Sacramento, St. Louis, Salt Lake City, Baltimore, and Phoenix.

<table>
<thead>
<tr>
<th>City</th>
<th>Average Daily Boardings</th>
<th>Route KM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sacramento</td>
<td>58,000</td>
<td>59</td>
</tr>
<tr>
<td>Waterloo Region (2031)</td>
<td>56,250</td>
<td>35</td>
</tr>
<tr>
<td>St. Louis</td>
<td>52,400</td>
<td>74</td>
</tr>
<tr>
<td>Edmonton</td>
<td>52,000</td>
<td>13</td>
</tr>
<tr>
<td>Salt Lake City</td>
<td>43,200</td>
<td>30</td>
</tr>
<tr>
<td>Houston</td>
<td>38,800</td>
<td>12</td>
</tr>
<tr>
<td>Jersey City</td>
<td>38,200</td>
<td>44</td>
</tr>
<tr>
<td>Baltimore</td>
<td>36,400</td>
<td>48</td>
</tr>
<tr>
<td>Phoenix</td>
<td>33,400</td>
<td>32</td>
</tr>
<tr>
<td>San Jose</td>
<td>32,900</td>
<td>68</td>
</tr>
<tr>
<td>Waterloo Region (2014)</td>
<td>27,000</td>
<td>35</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>26,500</td>
<td>19</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>25,000</td>
<td>40</td>
</tr>
</tbody>
</table>

(Ridership figures for others cities taken from first quarter of 2009)
The introduction of rapid transit will attract new users through increased travel speeds, higher frequency of service, greater reliability and enhanced passenger comfort and convenience. Improved consistency in transit service in the Central Transit Corridor will result in a significant modal shift to transit.

With rapid transit, increased ridership will result in a lower operating cost per passenger trip and a range of other socio-economic benefits, including reduced vehicle operating costs (based on the reduction in vehicle kilometres travelled), reduction in the number of traffic accidents (associated with transfer of travel to a much safer mode), and a range of other benefits.

### 3.1.3 Reduced Emissions

Transportation is one of the largest sources of air pollution in Canada and is also responsible for about 50 per cent of personal greenhouse gas emissions. According to the Canadian Urban Transit Association, urban passenger travel causes eight per cent of Canada’s national greenhouse gas emissions, but public transit operations cause less than 0.3 per cent. There is substantial potential for public transit to reduce national greenhouse gas emissions by shifting travel from the single-occupant vehicle to a more sustainable form of transportation.

The shift away from auto usage resulting from rapid transit in Waterloo Region will reduce annual greenhouse gas emissions (carbon dioxide) by more than 9,000 tonnes in 2014 and more than 14,000 tonnes in 2031. In addition, the project will reduce annual Criteria Air Contaminants by 325 tonnes in 2031. Figure 15 shows the annual reductions for Criteria Air Contaminants. These environmental benefits are similar to those documented for the rapid transit projects under the Metrolinx umbrella.

**Figure 15: Annual Reduction in Criteria Air Contaminants (tonnes)**

<table>
<thead>
<tr>
<th>Emission</th>
<th>2014</th>
<th>2031</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>85</td>
<td>245</td>
</tr>
<tr>
<td>Volatile Organic Compound</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>Nitrogen Oxide</td>
<td>20</td>
<td>50</td>
</tr>
</tbody>
</table>
The Ontario Medical Association report titled *The Illness Costs of Air Pollution* (2005) estimated that approximately 5,800 premature deaths were associated with exposure to air pollution in Ontario with an estimated 200 premature deaths in Waterloo Region alone. In addition, overall economic losses associated with air pollution exposure were expected to be approximately $19.9 million in Waterloo Region.

The reduction in air pollutants with rapid transit will reduce hospital admissions, saving the health care system an estimated $10.5 million during the first 25 years of the project. The number of hospital admissions avoided (e.g. respiratory ailments caused by poor air quality) was calculated using data from Region of Waterloo Public Health on the costs of poor air quality in the region. This information was then converted into an estimate of economic damage by calculating the percentage of air pollutants attributable to vehicle traffic in the region, and the identified change in emissions resulting from the rapid transit system.

### 3.1.4 Improved Mobility

The rapid transit route has been designed to serve major trip generators throughout the region, including:

- Conestoga Mall;
- University of Waterloo;
- Wilfrid Laurier University;
- Uptown Waterloo (shopping centre and historic downtown);
- Grand River Hospital;
- University of Waterloo School of Pharmacy/ McMaster School of Medicine Satellite;
- Downtown Kitchener;
- Kitchener Market;
- Fairview Park Mall;
- Cambridge SmartCentres (shopping centre);
- Cambridge Centre (shopping centre);
- Cambridge YMCA; and
- Downtown Cambridge (Galt).
By serving major destinations, rapid transit will connect key nodes such as the University of Waterloo with its main Waterloo campus and the Research and Technology Park, as well as the downtown Kitchener Health Sciences campus and the downtown Cambridge School of Architecture. As a result, the intellectual sector can connect more readily to the business core, providing increased access to cultural, commercial and residential opportunities. The rapid transit design will accommodate those who have a disability or are mobility-impaired (for example, by using low-floor vehicles and step-free access at stations). The increased mobility and accessibility made available by the rapid transit system will make the central transit corridor an attractive place to locate for both businesses and residents, fostering business investment and contributing to the region’s economic growth.

People will also be able to access an expanded pool of resources and facilities via rapid transit. This will relate not only to a range of new employment and training opportunities, but also to services such as nurseries, community facilities, places of worship, health centres and retail in addition to leisure facilities, local events and activities, gyms, parks and open spaces.

As shown in Figure 16, the rapid transit project will produce extensive travel time savings for transit passengers. The travel time savings for transit passengers are forecast at 11,200 minutes in the AM peak hour in 2014, and 31,800 minutes in the AM peak hour in 2031. This translates to roughly 1.6 million hours saved in 2031, with a consumer benefit value of $16.5 million annually.

Figure 16: Travel Time Savings Resulting from the Project
Improved travel conditions will be achieved via reduced journey times, reduced journey costs, improved journey quality, and improved journey reliability. The net effect is a change in patterns of accessibility, extending the distances people will be prepared to travel, reducing the costs of existing travel, and easing the movement of goods.

3.1.5 Prosperous Community

Our cities are the engines of prosperity and economic growth, and effective, efficient transportation is an important factor in providing a competitive advantage. Waterloo Region’s economy has consistently been one of the strongest in Canada. Waterloo Region possesses a prominent, globally-recognized high-technology cluster of more than 400 firms, lead by Research in Motion (RIM); a significant insurance and services sector with companies like Manulife, Sun Life, Economical, Gore Mutual and Equitable Life; three outstanding post-secondary institutions (University of Waterloo, Wilfrid Laurier University and Conestoga College); and three globally-oriented think tanks (the Perimeter Institute for Theoretical Physics, the Centre for International Governance Innovation (CIGI), and the Academic Council on United Nations System). Strategic investment in rapid transit will provide significant opportunities to encourage and stimulate additional economic productivity locally that will have lasting and long-term economic impacts on the provincial and national economies.

The existing resident and working populations who underpin the region’s economic strengths are highly dependent on an efficient and effective transport network that is able to convey the workforce across the region and beyond. Investment in the region’s transport infrastructure in the Central Transit Corridor is therefore critical. Inadequate investment in public transport infrastructure will compromise the region’s attractiveness as one of the leading knowledge-based economies in the country.
Access to and affordability of transport is a significant factor in connecting people to job opportunities. Rapid transit will deliver both employer and employee benefits:

- Employers will generally have improved access to an expanded pool of labour; and
- Residents in areas previously inaccessible by public transit will be able to access more employment opportunities.

Rapid transit will contribute to the creation of new jobs or increased employment through:

- Jobs associated with constructing, operating and maintaining the rapid transit system;
- Jobs arising as a result of the improved travel conditions; and
- Access by employees to jobs that were previously inaccessible by public transit and access by employers to a suitable workforce living within acceptable travel times and costs.

Using standard economic impact modelling (input-output modelling), the multiple account evaluation estimated that the areas surrounding the stations will support more than 13,000 new residents and more than 18,000 new jobs, compared to anticipated development patterns without rapid transit in place. In addition, the construction of the project will generate more than 6,000 person-years of direct, indirect and imputed employment by 2031.

### 3.1.6 Reurbanization and Intensification

Rapid transit, as a strategic street-level system along the Central Transit Corridor, will be a significant catalyst for achieving reurbanization and economic and demographic intensification. Rapid transit will impact land access, image, value and desirability. This in turn will help transform and re-brand areas along its route, with positive “ripple” effects spreading into the wider suburban areas of Cambridge, Kitchener and Waterloo.

The prospect of future rapid transit is already affecting real estate in the region. The Project Team has received inquiries from real estate offices and investors as to the location and status of future LRT stations. Based on an October 2009 report by the Real Estate Investment Network, the Canadian Broadcasting Corporation identified the Kitchener-Waterloo-Cambridge area as the top region in Ontario in which to invest in real estate. The report notes that the area’s reputation as a technology hub is responsible in large part for its desirability, with RIM and high-tech industries continuing to grow and hire, and with revitalization of the downtown of the old cities of Cambridge and Kitchener and planning for LRT occurring.
Reurbanization supports the development of social capital by affecting commuting modes and times. Studies show that the amount of vehicular travel, both in the number of trips and in the distance travelled, is affected by the design of the built environment. Without strong transportation demand management, increased density could result in higher concentrations of traffic and congestion in close proximity to residential areas. Fortunately, rapid transit offers the combination of reducing vehicle usage while encouraging intensification.

The way that we physically design and build our communities can impact individuals’ abilities to adopt healthy behaviours and hence ultimately determine a community’s level of health. A healthy community is one that recognizes the interplay between people and their surroundings and takes steps to modify the environment in ways that make healthy options easier and mitigates harmful outcomes. Research suggests that neighbourhoods with higher densities, mixed uses and a significant amount of public space bring people into the streets and foster the development of community trust that translates into social capital. The more places to which residents are able to walk, the higher the level of social capital in the neighbourhood will be.

Neighbourhoods that are designed to make it easier and more convenient to walk result in healthier people who are walking as a regular part of their daily activities. A Region of Waterloo study that compared differences in physical activity, diet and health from inner-city neighbourhoods and suburban neighbourhoods found a strong link between time spent driving and obesity: more time spent in the car translates to a greater chance of being obese.

Intensification and redevelopment resulting from rapid transit is expected to shape urban form in a more efficient manner and thereby avoid, delay or minimize the expansion of urban areas into the region’s valuable agricultural, environmental and rural areas. Waterloo Region has some of the most productive agricultural lands not only in Ontario, but in the country. These agricultural lands support a diverse and productive agricultural sector that creates jobs and promotes economic vitality. They are also an integral part of the environment and a key element of a healthy regional community. By acting as a catalyst for reurbanization, rapid transit will also help direct future development away from the Waterloo Moraine and other precious ground water recharge areas surrounding the north, west and south sides of the region’s three major cities. These recharge areas sustain a variety of deep aquifers that provide approximately three quarters of the Region’s municipal drinking-water supply. Protecting these valuable recharge and agricultural areas from development is critical to the region’s long-term health and economic prosperity.
3.1.7 Improved Public Safety and Security

Strategic investment in transit through the implementation of rapid transit will improve public safety and security.

According to the Canadian Urban Transit Association, motor vehicle crashes kill almost 3,000 Canadians each year — nearly half of all accidental deaths — and are the most common cause of death for people under the age of 35. Another 220,000 are injured each year by car crashes, which cost our health care system at least $10 billion annually. Transit contributes to road safety in our cities by being the safest mode of urban transportation. The risk of fatality for a car passenger is 20 times higher than for a transit passenger making the same trip.

For rapid transit in particular, fixed rail operation reduces vehicle conflicts resulting from transit driver error, and offers security and comfort during transportation. The dedicated transit passageway further reduces the potential for vehicle conflicts. A single light rail vehicle can remove 125 cars from the road, making neighbourhoods safer for other modes of transportation.

In addition to road safety, the design principles that will be used to integrate rapid transit stations into the urban environments along the Central Transit Corridor will allow us to rehabilitate the streetside pedestrian environment, thereby enhancing the safety and security for pedestrians and residents. Increased pedestrian activity associated with the stations will provide additional "eyes on the street", which helps create vibrant and safe places to live. While walking or using transit, passengers have a chance to interact with one another, creating a stronger community and greater sense of security. Station designs will consider closed-circuit TVs linked to a central monitoring control room and call-for-help points for passengers. Implementation will include improved pedestrian signage, lighting, crossing facilities and walkway surfaces, all aimed at improving the pedestrian experience in general and pedestrian access to stops in particular.
“I support the proposal to build an electrified light rail transit system in Waterloo Region. The move to curb urban sprawl, and doing something to control gridlock by helping people get out of their cars is an excellent one.”
4 RISK MITIGATION

4.1 Risks and Mitigation

In planning and executing a complex undertaking such as the Region’s rapid transit project, it is crucial to take into account the risk exposure to the Region as well as its stakeholders throughout the process to maximize the project’s chance for success and minimize potential negative impacts. Section 4.1 examines the key risks inherent in the rapid transit project and how they may be addressed or mitigated through different business/delivery models.

4.1.1 Identification of Risks

In the fall of 2008, the Project Team assessed the key risks inherent in the project and explored the role that the private sector may play in assisting the Region in managing or mitigating some of the risks. The Region held a risk assessment workshop with a select group of participants who have experience in implementing public transit projects using various forms of public-private partnership (P3). The group explored risks in the following categories:

- Project planning and budget risks, including route alignment, station location, station area planning, land use policies, EA findings and approvals, funding commitment and confidence in capital budget;
- Property acquisition, purchase and road allowance risks, including expropriation, purchase price fluctuation, negotiated price and road allowance widths;
- Infrastructure design and technology specification risks, including safety, equipment functionality, signalling and integration risks;
- Procurement and construction risks, including contracting, completion, budgeting and scheduling risks;
- Operations risks, including performance reliability, customer satisfaction, demand, revenue and operating expenses risks;
- Maintenance risks, including performance reliability, safety and lifecycle risks; and
- Ownership and concession management risks, including liability and transaction risks.

The risks can be further categorized based on the lifecycle of the rapid transit project from planning to implementation to ongoing operation. The Project Team has identified, assessed, and either resolved or put plans in place to manage many of the risks related to planning such as technology selection, route alignment and overall feasibility. Based on the data available thus far, the selected technology and route alignment have appropriately addressed the issues related to infrastructure design and technology.

As the rapid transit project proceeds to implementation and ongoing operation, the other risks will become more critical to the project’s overall success. The Project Team has identified and assessed these risks and examined various business models for their effectiveness in addressing and mitigating these risks.
4.1.2 Risk Assessment

In evaluating the risks to the rapid transit project, the Region has set out to clearly articulate, from the Region’s perspective, an appropriate measure of success and the value brought by the project to its stakeholders. The most serious risks in this context are those that would potentially jeopardize the delivery of a successful project and the expected value to the community. These risks vary from stage to stage during the development of the project.

The approach to risk assessment employed for the purpose of the Region’s rapid transit project involves an analysis of the likelihood of a risk occurring and the severity of the consequence when the risk does occur. For example, a highly likely risk with negligible consequence such as construction cost increases could be managed through transferring the risk to a third party who is in a better position than the Region to reduce the risk likelihood. On the other hand, an unlikely risk with serious consequence such as failing to secure capital funding for the project is perhaps best handled by the Region instead of any other entity.

4.1.3 Planning Phase

The planning phase did not identify any significant design, environmental or planning risks that would prevent the project from proceeding to the next phase of implementation.

While the Region has already approved and committed to going forward with the project, approval and financial support from the Province and the Federal Government is the next priority. The consequence of the project not being approved and supported by the Province and/or the Federal Government would result in the project not proceeding, given the scale of the capital costs involved.
4.1.4 Implementation Phase

The implementation phase involves work along the alignment of the rapid transit project, including design, construction and testing of guideway, stations, and vehicles. At this stage, the most serious financial risk is the impact of insufficient funding, which could result in termination of the project or an indefinite delay; the less serious and generally the more manageable risks are those that result in budget and/or schedule overruns. To examine the implementation phase of the rapid transit project, the Project Team considered risk in the context of the following major physical components: the alignment (primarily within existing rail corridors), the vehicles (technologies and designs), the stations (planned for major commercial, institutional, employment, and residential nodes) and the facilities (maintenance, repair and inspection yards). These same components are also relevant in the Operations Phase; for example, the selection of vehicles will have an impact on operating reliability, lifecycle costs and operating expenses. Risks related to the operation of the rapid transit project are discussed in Section 4.1.5. Section 4.1.4 focuses on the capital portion of the project.

4.1.4.1 Alignment

The proposed alignment of the rapid transit project contemplates the use of a combination of existing rail corridors, on-road alignments, and newly constructed guideway. This will require some property acquisition through expropriation, which exposes the Region to a financial risk in the event of land assembly costs that are higher than planned, or of unforeseen legal entanglements. The Project Team has included financial contingencies to account for this assembly risk. Extensive due diligence through sequential processes of further refinements of the design will ensure mitigation of design-related risks for the guideway and structures. Signal systems being contemplated are based on reliable and tested technology that will comply with all Canadian standards and legislation. No major environmental impact is expected to cause any significant negative consequence on the rapid transit project as a result of the contemplated alignment.

4.1.4.2 Vehicles

The contemplated vehicular technology is a low-floor light rail vehicle, which is a proven and tested technology that can be procured from a well-established producer. Manufacturer warranties and supplier agreements will mitigate vehicle performance specification risk. The Project Team carried out significant study and analysis during the planning phase of the initiative and does not consider vehicle performance risk to be material.
4.1.4.3 Stations
The planning process identified station locations based on the criteria set out in Section 1.3.1.2. Regional Council has approved these locations. The design of the stations, like the vehicles being visible in nature, forms an important part of the rapid transit project’s brand. Design and construction risk will be addressed in the design and construction contracts.

4.1.4.4 Facilities
The facilities as well as the maintenance procedures are important in ensuring the safety of the tracks, vehicles and stations as the means of delivering the rapid transit service to the region. At the same time, the functioning of the facilities as determined by the design and the construction needs to place safety as a high priority. Maintenance work is often complex and involves multiple disciplines; therefore, significant emphasis in the planning phase is placed on ensuring that appropriate protocols, designs and structures are put in place to mitigate the impacts of associated risk. Furthermore, it is likely that through the P3 arrangements that a private operator will manage this component of the work with the result that risks will be allocated to the party best positioned to manage the inherent risks of being “in the business” of light rail vehicle maintenance.

No new or untested maintenance facilities or equipment designs are contemplated and the performance criteria for the planned facilities and maintenance equipment will follow conventional safety and efficiency standards. No major facilities risks have been identified that could be expected to result in a material negative consequence on the rapid transit project.

4.1.5 Operations Phase
Once the rapid transit project is built and ready for ongoing operations, the project enters into the operations phase and encounters a new set of risks. Again, safety related risks are of the utmost importance. The planning for this phase of the initiative will ensure that appropriate performance specifications are in place such that the safety and security requirements of the system are met. Regardless of whether the Region directly operates the rapid transit project or outsources the operations to the private sector, the safety standards will be established by the performance specifications and will be in conformity with Canadian safety and security protocols and legislation.

The risks during the operations phase can be categorized into those related to performance (e.g., reliability, punctuality, comfort, customer service) and financial (e.g., revenue, ridership, operating costs, maintenance costs). While the consequences of the performance-related risks would probably not lead to much more than inconvenience, the credibility and reputation of the rapid transit project is dependent on its performance. Much of the value expected by the stakeholders
is related to performance. Therefore, the Region needs to ensure that performance standards are strictly adhered to with an appropriate reward/penalty system for enforcement.

The financial risks during the operations phase could potentially seriously impede the delivery of the project to the stakeholders. The likelihood of the financial risks is also relatively high because of the uncertainty associated with the current economy. It is critical for the Region to ensure that the rapid transit project remains financially feasible throughout the operations phase.

Many of the financial risks are related to ridership – the higher the ridership, the higher the revenue, the less pressure on the overall financial situation for the rapid transit project. However, revenue is also dependent on the fare policy, which in most cases has an inverse relationship with ridership – the higher the fare, the lower the ridership. The fare policy needs to be grounded in affordability for the community and for attracting new riders while balancing the need to recover as much as of the costs as possible. Further scenario and sensitivity analysis of the financial pro-forma for the rapid transit project is necessary to determine the potential likelihood and impact of the financial risks to the Region.

4.1.6 Funding and Financing

Financial risks as related to capital budgeting, procurement and scheduling could have a potentially serious impact on the rapid transit project. The two major factors that could impact this initiative are the Federal and Provincial funding agreements, and the availability of financing for private sector partners in a P3 arrangement.

Federal and Provincial funding are essential to the success of the initiative and are considered necessary to the successful implementation of a P3 arrangement. While it is unlikely to have financial risks that would permanently bring the project to a halt if funding is committed, financial risks have the potential to seriously jeopardize the Region’s ability to deliver what it has promised to its stakeholders. All budgeting by definition is based on estimates, which are by their very nature imprecise. The business model being contemplated by the Region is selected based on optimal risk allocation. For example, a fixed price contract is reasonable for construction provided that the Region is able to specify what it requires for the rapid transit project and still give the contractor a level of flexibility to be innovative to save costs. At this time, the assessment of cost implications is still high level and further analysis is required to determine the risk tolerance level of the Region before selecting a business model to work with the private sector in implementing the rapid transit project.

Ownership of the rapid transit project may affect the ownership of some of the risks (e.g., from total private ownership in the case of Highway...
407 to transit operations outsourcing in the case of York Region Transit). Regardless of the ownership arrangement, it is unlikely that the rapid transit project being a public service with public funding will be seen as something completely separate from the Region. Even in the case where the Region transfers the majority of the responsibility associated with the construction, operation and maintenance of the rapid transit project to the private sector, the Region fully understands that the risk of managing the private sector to deliver satisfactory rapid transit service to the community remains with the Region. As such, the Region is prepared to maintain an oversight role to ensure the delivery of value to stakeholders throughout the rapid transit project.

A significant external risk is inflationary cost increases, either due to general inflationary conditions in the broader economy, or specific cost increases in construction materials, transportation equipment, or related sectors. The Region cannot control these, however, we note that most measures of inflation in the broader Canadian economy are currently at historically low levels, although the risk exists of more inflationary conditions in coming years associated with recent monetary stimulus measures and the anticipated economic recovery.
5 MINIMUM FEDERAL REQUIREMENTS

5.1 Accessibility
The rapid transit project envisions low-floor and/or kneeling LRT and aBRT vehicle technology that is fully accessible for persons with disabilities. Construction of the stations will, wherever possible, be fully accessible and meet the requirements of the Canadian Standards Association Technical Standard Accessible Design for the Built Environment (CAN/CSA B651-04) for new construction.

5.2 P3 Approach
The Project Team reviewed potential public-private partnership (P3) models for implementation of the rapid transit project. The Project Team is assessing the key risks inherent in the project and exploring the role that the private sector may play in assisting the Region in managing or mitigating some of the risks through P3 implementation.

Modelling of P3 models and associated risks has now been established and a public sector comparator is being developed to assess potential implementation partnerships. The work is ongoing and will proceed to a decision point pending resolution of the status of senior government funding for the project.