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# **iXpress:** **Central Transit Corridor** **Express Project**

*Urban Transportation Showcase  
Program Final Report*

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**December 2009**  
**Regional Municipality of Waterloo**



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## Executive Summary

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### Introduction

The Regional Municipality of Waterloo is a medium-sized urban area in southern Ontario comprising three municipalities and four townships. The Region's population has relied primarily on automobile use, which has negative impacts on transportation infrastructure, air quality, and the production of environmentally damaging greenhouse gases. Because the Region is growing rapidly, these negative impacts are expected to intensify in the future.

In 2003, the Region was awarded funding under Transport Canada's Urban Transportation Showcase Program to develop an express transit service for the Region's central transit corridor. The purpose of this showcase project was to shift modal share from single-occupant motor vehicle use to transit use, thereby reducing greenhouse gas emissions, improving air quality, enhancing safety, reducing operating costs, and preparing the Region's population for higher-order transit.

The project involved the collaboration and contributions of Transport Canada, the Province of Ontario, the Region of Waterloo, and the University of Waterloo.

### Project Description

#### iXpress service

The showcase project developed by the Region of Waterloo features a high-quality, limited-stop transit service, branded as the iXpress service, which provides access to the central corridor of Waterloo Region. The 37-kilometre route runs from north Waterloo to south Cambridge and connects four major shopping centres, three downtowns, two universities, many office complexes, and a regional hospital. Operated as part of Grand River Transit (GRT), the regional transit system, iXpress service was launched in 2005, with buses arriving every 30 minutes (every 15 minutes in peak periods), and has been updated regularly to meet increasing ridership demand.

The route's 13 stations are spaced much farther apart than those on conventional GRT routes in order to reduce delays and increase speed. Station locations were chosen primarily to attract riders from three segments of the population: post-secondary students, downtown-core employees, and retail and service customers.

The iXpress service is provided by standard buses distinguished from the rest of the GRT fleet by external markings consistent with iXpress branding. The buses also feature several unique technological components, described in the next section.

#### Advanced transit technology

Designing and implementing advanced transit technology was a critical component of the iXpress Project. To improve transit management and operational control of iXpress buses, the Region designed and implemented several technologies:

- **Transit signal priority measures:** These were implemented at 17 signalized intersections along the iXpress route and enable transit vehicles to move through the intersections more efficiently.
- **Automated vehicle location system:** This system, installed on iXpress buses, communicates a bus' position and status to the dispatch centre, allows controllers to monitor the schedule adherence of each bus, and is used by dispatchers to short-turn and detour buses. Also, the system is connected to mobile data terminals onboard buses, which improves drivers' operational control.
- **Automatic passenger counting system:** This system, installed on iXpress buses, provides data about boardings, alightings, and ridership traffic at each station. This data helps planners to manage resources effectively.

To provide enhanced information for potential and current riders, the Region designed and implemented a suite of technologies branded as the easyGO Traveller Information System. This system includes the following:

- **Web-based trip-planning system:** This system permits transit users to develop a personalized, optimized itinerary before they travel.
- **Automated telephone and text-messaging systems:** These systems provide next-bus departure times and other scheduling information specific to any bus stop or station.

- Automated electronic signs at iXpress stations and transit terminals, as well as automated visual and audible announcements onboard iXpress buses: These signs and announcements provide schedule information to travellers, including real-time information for iXpress buses.

### Intermodal integration

The project also involved efforts to integrate the iXpress service with sustainable modes of travel, specifically walking, cycling, and other transit services:

- To maximize travellers' comfort while waiting for a bus, iXpress stations were created with a variety of amenities, including shelters, lighting, seating, and electronic signs.
- To improve pedestrian access to and from iXpress stations, changes were made to the areas surrounding some stations, including road markings, sidewalk extensions across driveways, newly paved walkways, and installed steps.
- To improve the integration of transit and cycling, all GRT buses were outfitted with bicycle racks early in 2005. Bike racks and lockers were installed at select iXpress stations, new bike lanes have been constructed, and new cycling signage has been posted.
- iXpress stations were selected carefully for maximum integration of the express service with other local and intercity transit services.

### Marketing and outreach

The fourth component of the iXpress Project involved the branding and marketing of the service. The brands "iXpress" and "easyGO" and the tagline "Connecting You" were created to align with the contemporary, technologically enhanced nature of the service. They project the service's ease of use and its ability to address a variety of individual travel needs.

The traditional but extensive umbrella marketing campaign included:

- regular updates to stakeholders and Region employees,
- pre-launch efforts to gain feedback about the service's proposed route and features, to raise excitement and interest about the service, and to glean important traveller data,
- media launches involving representatives from multiple levels of government, and
- post-launch efforts to promote the service.



The project also included an individualized marketing pilot project, where customized information and incentives were used to change travel behaviour.

#### Project monitoring and assessment of impact

The final component of the iXpress Project involved monitoring and assessing the impact of the other project components. It included research before the launch of the express service to establish baseline conditions, a variety of post-launch data collection activities, and analysis of this data to illustrate the impact of the express service.

#### Project budget

The capital expenditures and in-kind costs of the iXpress Project were estimated to be \$9.237 million. Transport Canada contributed one third of the funding. The Province of Ontario contributed almost \$2 million, and the Region provided the remaining capital costs and most of the in-kind contributions. The University of Waterloo also provided some in-kind resources towards the project's monitoring and assessment component.

### Project Monitoring and Assessment of Impact

#### Ridership and modal shift to transit

Since being launched four years ago, the iXpress service has consistently attracted riders beyond targeted levels, peaking at well over 8000 average daily boardings in 2009. The predominant demographic among iXpress riders is post-secondary students.

Survey results indicate that about 15-19% of trip makers are shifting to iXpress bus from an auto mode; moreover, 13% of riders have chosen to use the express service despite having a vehicle available for the trip. The iXpress Project has thus been successful in shifting modal share from automobile use to transit use.

#### Reasons for shift in travel behaviour

Riders have indicated through onboard surveys that the primary reason for shifting to iXpress bus from another mode is its faster travel speed. For riders who previously used auto, the high cost of gas was another significant factor influencing modal shift.

The shift in travel behaviour may also be linked to other aspects of the iXpress service:

- **Schedule adherence:** The transit technologies implemented to improve transit management and operational control has improved the schedule adherence and reliability of iXpress buses. According to one four-month study of the afternoon peak

period, 85% of iXpress buses arrive early or on time, as compared to 69% of local buses.

- **Enhanced traveller information:** Users identify all components of the easyGO Traveller Information System, particularly the electronic signs at stations and onboard buses, as both helpful and easy to use. The automated telephone system is used more than 3000 times daily. Usage of the text messaging system and the web-based trip planner is growing steadily and currently averages 500-1000 uses daily.
- **Integration with other travel modes:** iXpress riders use a variety of modes to access the express service. An average of 52% of iXpress riders walk and 39% transfer from a local bus to the iXpress service. The bike racks on GRT buses are used frequently.
- **Individualized marketing:** The Region's individualized marketing intervention had a positive impact on those who received customized information. These trip makers increased their use of environmentally friendly modes of travel (from 16.7% to 18.8%) and decreased their use of auto-based modes (from 83.3% to 81.2%).

### Greenhouse gas emissions

The regional modal shift from auto to transit, as described above, translates into an annual GHG savings of approximately 3,650 tonnes, a substantial reduction in the carbon footprint associated with mobility. As iXpress ridership increases, the per-passenger carbon footprint of transit service will decline, and the annual reductions in emissions will increase.

### Other project benefits

The iXpress Project has also increased safety for bus operators and riders due to real time location capability, reduced GRT operating costs due to automated data collection and reduced fuel consumption, and improved transportation choice and convenience across the Region.

## Successes, Challenges, and Lessons Learned

### Successes

The Region of Waterloo is proud of its accomplishments on the iXpress Project. It celebrates consistent iXpress ridership growth beyond targets, the visibility and community awareness of the iXpress service, the project team's ability to accomplish the project within budget, its development of cross-departmental collaboration and in-house expertise, and its strengthening of stakeholder relationships and community partnerships.



Through these many successes, the Region identifies several important lessons related to large transportation initiatives such as the iXpress Project:

- obtain buy-in from large community organizations to encourage ridership growth,
- distinguish a distinct transit service with a distinct brand,
- reallocate resources when necessary to remain on budget,
- create a multi-disciplinary team to administer and implement large transportation initiatives,
- involve external experts when necessary to guide staff and to develop in-house expertise,
- consult with the public as part of effective transit planning, and
- keep stakeholders informed and involved throughout planning and implementation phases.

### Challenges

In addition to these successes, the Region was able to effectively address the challenges it encountered throughout the project. These challenges include the technological complexity of the project, the complexity of jurisdictions involved in the project, the need to manage diverse expectations, and the need to manage staff resources.

Through addressing these challenges, the Region identifies several lessons:

- To implement technology successfully, be flexible with budget and schedule, and use expertise.
- Budget time to collaborate with the multiple parties involved in station development.
- Communicate expectations and goals effectively to build consensus.
- For large multifaceted initiatives, allocate some staff resources exclusively to project activities.

## Future initiatives and directions

The Region of Waterloo is now using the insights gained and work accomplished during the iXpress Project to further develop a transit culture within Waterloo Region. The Region is improving GRT services by:

- fine-tuning and improving the iXpress service,
- expanding the individualized marketing program to additional neighbourhoods as part of Transport Canada's ecoMOBILITY program,
- integrating data collection technology with a data analysis system, and
- extending the iXpress service concept and amenities to other transit corridors.

The success of the iXpress service demonstrates that the Region is ready for higher-order transit. Accordingly, the Region has also approved the development of a higher-order transit system combining light-rail transit and adapted bus rapid transit that will ultimately replace the iXpress service. If funding is secured from provincial and federal governments, construction will begin in 2012.

## Conclusion

In medium-sized Canadian cities, transit services have traditionally been used by travellers without automobile access. The iXpress Project demonstrates that it is possible to create a competitive transit service that attracts a greater share of riders, including those who have access to a car but choose transit instead.

# 1 Introduction

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## 1.1 Overview of Urban Transportation Showcase Program

The Urban Transportation Showcase Program (UTSP) was launched in June 2001 by Transport Canada under the Government of Canada's *Action Plan 2000 on Climate Change*. Its purpose is to support and showcase projects that both reduce greenhouse gas (GHG) emissions resulting from urban transportation and attract citizens to sustainable transportation options. (In Canada, urban areas generate two thirds of the national transportation-related GHG emissions, which in turn account for one quarter of the total national GHG emissions). UTSP funding has been awarded to eight municipalities and regions across Canada whose initiatives:

- are innovative in both planning and implementation,
- demonstrate integrated strategies to achieve GHG emission reductions,
- have potential to be replicated elsewhere in Canada, and
- promise to offer valuable information about GHG emission reduction and sustainable urban transportation.

## 1.2 Background and goals of iXpress Project

The Region of Waterloo was awarded UTSP funding of \$3 million in 2003 for its proposal to create a Central Transit Corridor (CTC) Express service, which was eventually branded as the iXpress service. The purpose of the iXpress Project was to shift modal share from single-occupant motor vehicle use to transit use, thereby reducing GHG emissions, improving air quality, enhancing safety, reducing operating costs, and preparing the Region's population for higher-order transit. To accomplish these objectives, the project involved the following:

- The creation of a high-quality express bus service serving a CTC that links many major trip generators across the region, such as universities and shopping malls.
- Development of transit priority measures to decrease travel time on iXpress buses by 25% when compared to times on conventional transit.

- Greatly improved customer information, including real-time next bus departure displays, digital signage at iXpress stations, and a web-based trip planning system.
- High integration of the iXpress service with other transit services and other sustainable modes of travel such as walking and cycling.
- Promotion of the iXpress service through branding and marketing and support of the service through municipal policies and practices.
- Monitoring and assessment of the impact of these changes.

The iXpress Project was designed to address challenges faced by many medium-sized urban areas across Canada.

This project was designed in response to two related challenges faced by the Region of Waterloo. The first challenge is an over-reliance on automobile travel that has a negative impact on the environment due to the creation of greenhouse gases. The Region is characterized by low-to-medium density land-use patterns developed over the past three decades; ubiquitous auto ownership; traffic congestion in limited daily periods; generally very favourable travel times by automobile; and free or inexpensive parking facilities. As of 2003, more than 80% of the regional workforce reported commuting to work alone by auto.

This challenge, common to many similar medium-sized urban areas across Canada, is compounded in the Region of Waterloo due to tremendous growth. The Region, comprising the cities of Cambridge, Kitchener, and Waterloo and the townships of North Dumfries, Wellesley, Wilmot, and Woolwich (see Figure 1), is expected to grow from 456,000 in 2001 to 729,000 in 2031, which will greatly intensify regional transportation's negative impact on infrastructure, air quality, and the production of greenhouse gases if the transit modal share remains unchanged.

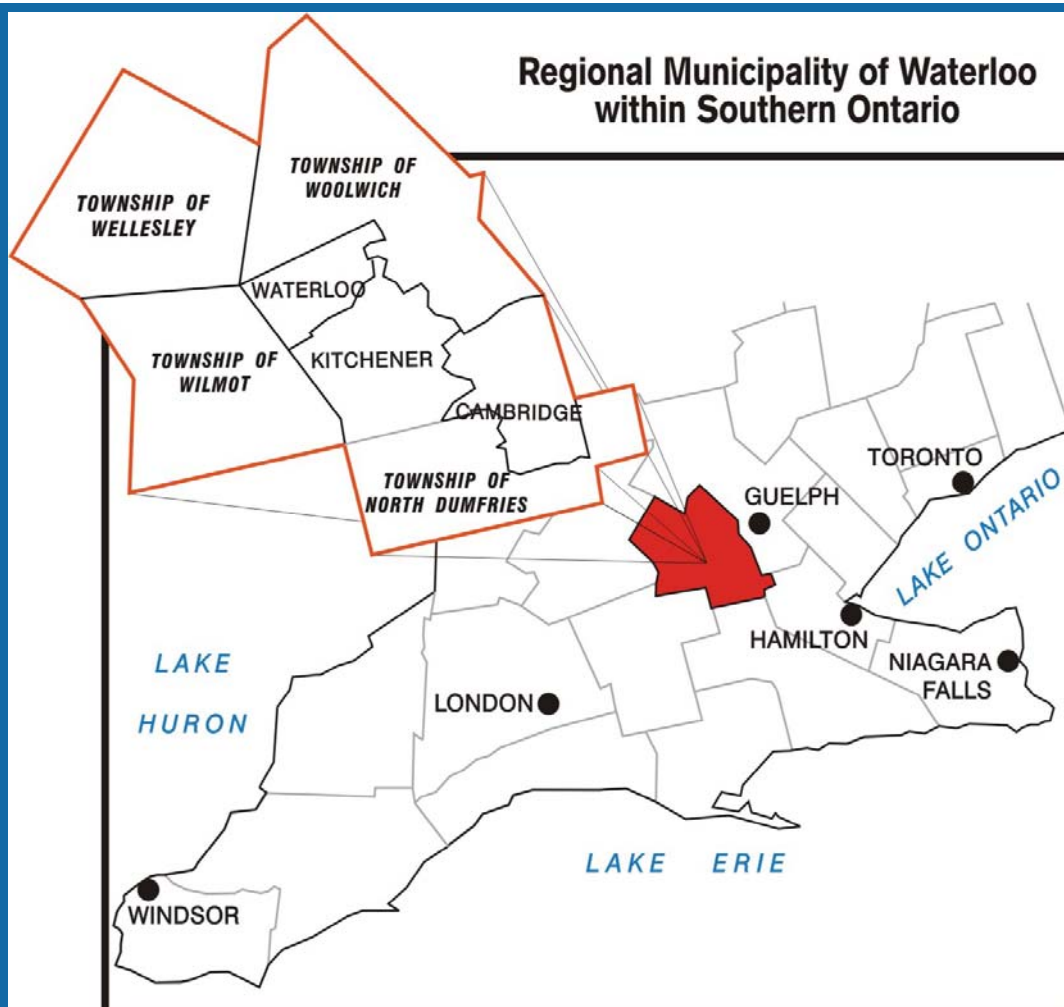


Figure 1: Map of the Regional Municipality of Waterloo

The Waterloo Region is a mid-sized urban area in southern Ontario comprising three cities and four townships.

As demonstrated in the following timeline, the iXpress Project aligns closely with regional policies and land-use development plans, which focus on compact re-urbanization.

1970s	Regional Council defines a regional CTC beginning in north Waterloo and ending in south Cambridge.
1999	<i>Regional Transportation Master Plan</i> outlines an auto-reduction strategy to reduce the share of auto travel during the morning peak hour from 84% to 77% by 2016.

2000	A regional transit system, Grand River Transit (GRT), is established through the merging of Cambridge Transit and Kitchener Transit. GRT's <i>Five-Year Business Plan</i> calls for an annual growth rate of 6% for transit service hours, a 30% expansion of the bus fleet, and significant investment in the expansion and modernization of bus and passenger facilities.
2001	<i>Regional Growth Management Strategy</i> calls for accommodating growth through a compact urban form rather than sprawl, which will eventually require implementation of higher-order transit along CTC. An express bus service along CTC is seen as an appropriate way to increase transit use to a level sufficient to sustain such higher-order transit.
2003	<p>Consultations regarding the UTSP proposal (eight public open houses and a community roundtable discussion involving twenty key stakeholders) produce an overwhelming consensus: express service would be successful in attracting new ridership from current auto users and existing transit riders.</p> <p>In May, <i>Central Transit Corridor Express Project Proposal</i> is submitted to Transport Canada's UTSP.</p> <p>In November, UTSP funding is awarded to iXpress Project.</p>
2004	<p>In July, Transport Canada and Region of Waterloo sign Contribution Agreement.</p> <p>In October, Region and University of Waterloo sign agreement regarding the project's monitoring and assessment component.</p>
2005	In September, iXpress service is launched.

### 1.3 Project partners

The iXpress Project has involved the financial contributions and collaboration of four partners: Transport Canada, Province of Ontario, Region of Waterloo, and University of Waterloo.



The federal government funded one third of the project (about \$3 million) through Transport Canada's Urban Transportation Showcase Program. Transport Canada also coordinates the dissemination of information about all showcase projects.



The provincial government contributed almost \$2 million towards the project, specifically its vehicle and technology components, through Ontario's Golden Horseshoe Transit Investment Partnerships Program.



The Region of Waterloo provided the remaining capital contributions to the project and most of the in-kind contributions. The Transportation Planning Division of the Region of Waterloo, which reports regularly to the Planning and Works Committee of Regional Council, managed the administration and implementation of the iXpress Project. The administrators and operators of GRT, a service managed by the Region's Transit Services Division, were integrally involved in the decision-making and implementation processes of the iXpress Project. iXpress service has been fully integrated with GRT's other services.



The University of Waterloo provided in-kind contributions to the project. Faculty and student researchers monitored GHG emissions and assessed the impact of the project. The university community also both assisted with marketing efforts targeted at students and provided campus transit facilities and amenities.



The iXpress Project has also benefited from the cooperation and involvement of several other organizations:

- the cities of Waterloo, Kitchener, and Cambridge, particularly their traffic operations, emergency services, and fire services staff,
- Wilfrid Laurier University,
- Grand River Hospital,
- local companies producing advanced technologies, and
- major employers along the iXpress transit corridor.

#### 1.4 Goals and overview of final report

This report summarizes the work accomplished on the iXpress Project (Chapter 2); evaluates its impact on the Region of Waterloo and the environment (Chapter 3); and reflects on the lessons learned through both successes and challenges (Chapter 4). It also demonstrates that the iXpress Project has prepared the region for further transportation initiatives (Chapter 5). This report has been created:

- to meet the requirements stipulated by Transport Canada in its Contribution Agreement with the Region of Waterloo,
- to serve as a resource for other municipalities and regions interested in a comparable transportation project, and
- to provide information to all project participants and community members.

## 2 Project Description

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This chapter summarizes the work accomplished on the five components of the iXpress Project:

- iXpress service (2.1)
- Advanced transit technology (2.2)
- Intermodal integration (2.3)
- Marketing and community outreach (2.4)
- Monitoring and assessment (2.5)

The chapter's final section (2.6) outlines the project budget. Chapter 3 details the impact of these components on the success of the project, and Chapter 4 reflects on the successes, challenges, and lessons learned throughout the project.

### 2.1 iXpress service

The iXpress service is a high-quality, limited-stop transit service that provides access to the central corridor of Waterloo Region. This section describes the route, stations, vehicles, and fares that comprise the iXpress service.

#### 2.1.1 Route

The iXpress bus runs along a 37-kilometre route from north Waterloo to south Cambridge (see Figure 2). The route connects four major shopping centres, three downtowns, two universities, many office complexes, and a regional hospital.

The general corridor and destinations to be served by iXpress buses were established during the proposal stage using the Central Transit Corridor drafted by the Region in the 1970s. Once showcase funding was secured, four distinct route and schedule options were developed with the input of many staff groups, including transit supervisors, schedulers, planners, and

operators. The exact route and station locations were finalized in March 2005 using input from:

- questionnaires distributed to Grand River Transit (GRT) operators and information staff,
- an online survey posted on the GRT website, and
- community round-table discussions and open houses.

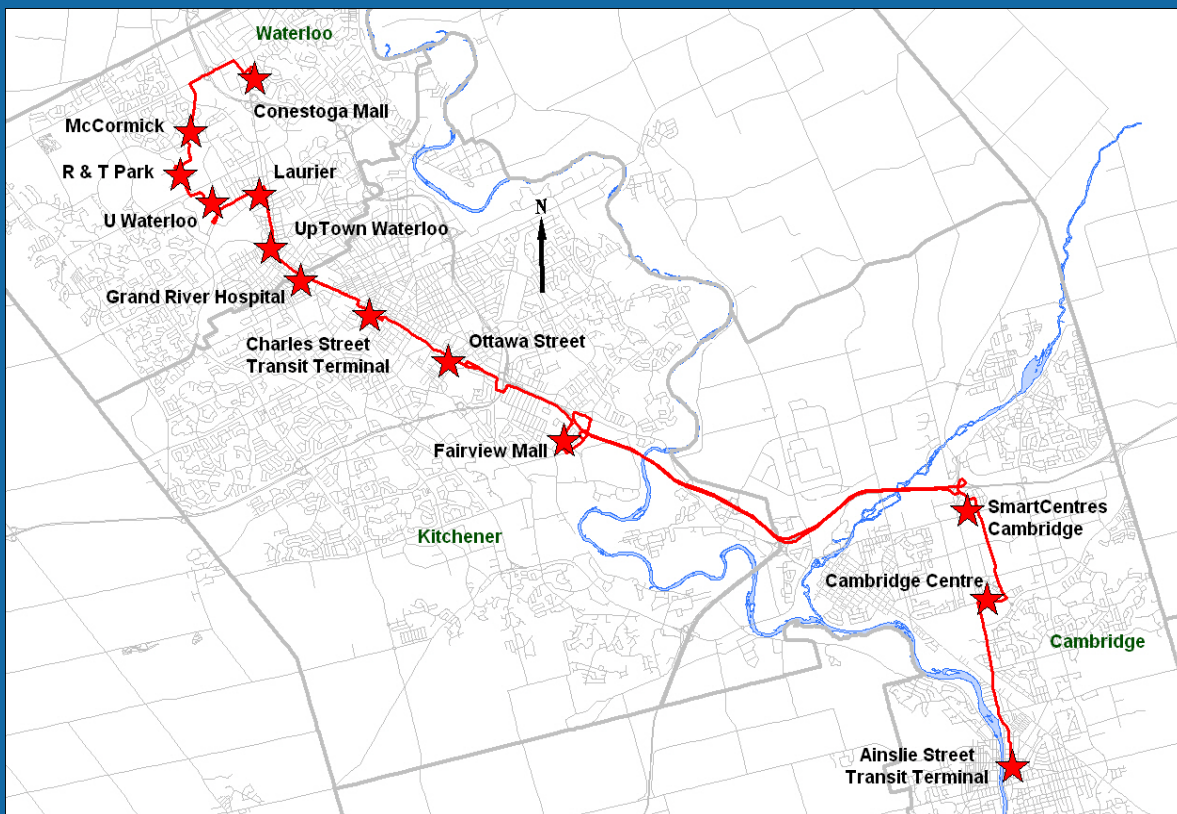


Figure 2: iXpress route

Running from north Waterloo to south Cambridge, the iXpress route links four major shopping centres, three downtown areas, two universities, many office complexes, and one regional hospital.

iXpress service began operations in September 2005 during weekdays between 6:00 a.m. and 7:00 p.m., with a 15 minute frequency in peak periods and 30 minutes at other times. As rider demand has increased, so too has iXpress service increased, as outlined in Table 1.

Table 1: Changes to iXpress service schedule

The iXpress service schedule has been updated based on user demand.

Date	Monday to Friday	Saturday	Sunday
September 2003 (Partial express route)	6-9 AM, 3-6 PM Every 15 min		
September 2005	6 AM to 7 PM		
June 2007	Every 30 min Every 15 min in AM/PM peak	8 AM to 7 PM Every 30 min	10 AM to 5 PM Every 30 min
September 2007	Extended to 10 PM		
September 2008	Every 15 min during midday		
September 2009		Every 15 min between Conestoga and Fairview	

### 2.1.2 Stations

The iXpress route has 13 stations (see Figure 3). These stations are spaced much farther apart than the conventional-route average of 250 metres in order to reduce delays and increase the speed of the service. In urban areas, stations are an average of 1700 metres apart. Because the iXpress service offers limited stops, it complements rather than replaces several conventional transit routes to which it runs parallel.

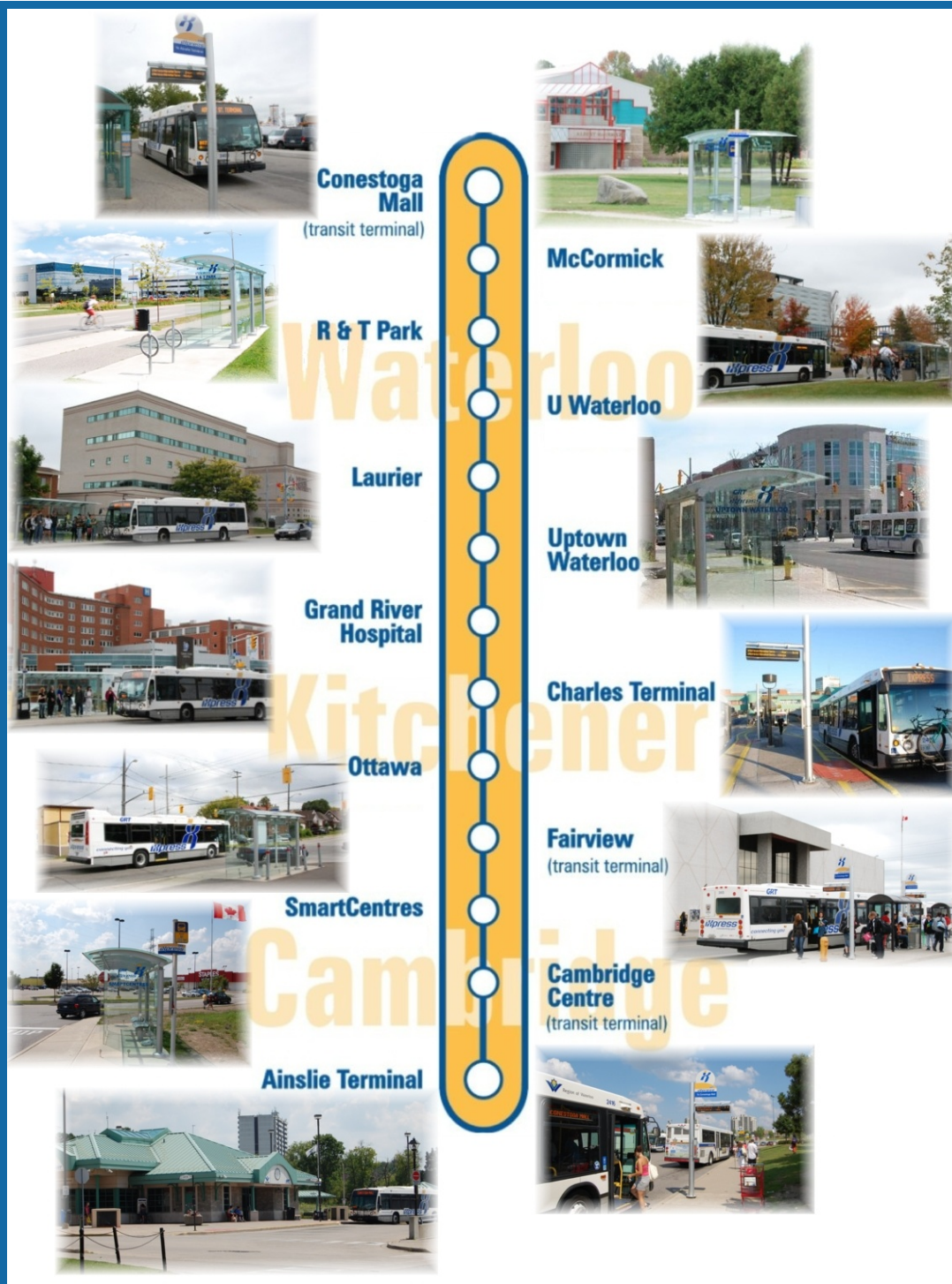


Figure 3: iXpress stations

The iXpress stations are located in a variety of urban and suburban areas.

The location of each station was selected primarily to attract those currently using auto (and conventional transit) from three specific segments of the regional population:

- Employees working in the downtown cores of Waterloo, Kitchener, and Cambridge (Galt), as well as at other major activity centres along the corridor such as Grand River Hospital and regional malls;
- Students and employees at University of Waterloo and Wilfrid Laurier University; and
- Customers of commercial and service establishments in downtown cores and regional malls along the route.

The stations were selected also to ensure maximum integration with local and intercity transit services. Table 2 provides information specific to each station.

**Table 2: Rationale for station locations**

Locations were chosen strategically to attract a variety of users.

Station Name	Reason for Station	
	Trip Generator	Integration with other transit services
Conestoga Mall	Shopping centre: 84 stores, 60,958 sq. m. (656,149 sq. ft.)	8 GRT routes (7, 9, 12, 14, 21, 31, 32, 35) GRT busPLUS van service
McCormick	Higher-density residential area including significant student population Community centre and municipal library branch	2 GRT routes (9, 73)
Research and Technology Park	49-hectare (120-acre) research park being developed Current occupancy 2,000 employees (Sybase, Open Text, Accelerator Centre, Tech Town, Research Advancement Centre) Ability to accommodate 1.2 million sq. ft. (111,483 sq. m.) of office space	N/A
University of Waterloo	University: 28,000 students; 2,800 employees	6 GRT routes (7, 8, 9, 12, 13, 31)
Wilfrid Laurier University	University: 12,500 students; 1000 employees	4 GRT routes (7, 8, 9, 12)
Uptown Waterloo	Downtown core (Waterloo) 6,921 employees	3 GRT routes (5, 7, 35)



Grand River Hospital	Regional hospital: 2,500 employees; 800 volunteers Sun Life Financial: 2,000 employees	2 GRT routes (4, 7)
Charles Street Transit Terminal	Downtown core (Kitchener) 10,570 employees	16 GRT routes (1, 2, 3, 4, 6, 7, 8, 11, 15, 18, 19, 20, 22, 23, 24, 25) Intercity transit
Ottawa Street	Older industrial area with strong redevelopment possibilities	2 GRT routes (7, 8) Will intersect with cross-town bus routes being planned for Ottawa Street
Fairview Park Mall	Shopping centre: 120 stores; 67,819 sq. m (730,000 sq. ft.) High-density residential area with 5,000 residents within a five-minute walk	9 GRT routes (7, 8, 10, 12, 17, 23, 27, 52, 110)
SmartCentres Cambridge	Power centre: 36 stores; 65,987 sq. m. (710,280 sq. ft.) (including Canadian Tire)	2 GRT routes (51, 67)
Cambridge Centre	Shopping centre: 152 stores; 66,797 sq. m. (719,000 sq. ft.)	7 GRT routes (51, 56, 60, 61, 64, 67, 75)
Ainslie Street Transit Terminal	Downtown core (Cambridge - Galt) 3,933 employees	11 GRT routes (51, 52, 53, 54, 55, 57, 58, 59, 62, 63, 111) Intercity transit

### 2.1.3 Vehicles

The iXpress service is delivered by standard forty-foot, low-floor Nova buses differentiated from the rest of the GRT fleet by unique exterior markings (see Figure 4). Like all GRT buses, each iXpress bus is outfitted with a dual-position bicycle rack (see 2.3.2). Onboard, the iXpress buses look similar to other GRT buses, but they feature some important technological additions (see 2.1.4):

- Automated vehicle location system,
- Automatic passenger counting system,
- Automated digital sign that displays each upcoming station (mounted on ceiling behind bus operator), and
- Automated audible announcement of each upcoming station.





Figure 4: iXpress bus markings

All iXpress vehicles feature unique markings that distinguish them from the conventional GRT fleet.

#### 2.1.4 Fares

iXpress service is fully integrated with all other GRT services. Valid fares and transfers are identical for both conventional GRT and iXpress service. This policy simplifies the fare process and facilitates trips that are much farther than those possible on any local GRT route.

## 2.2 Advanced transit technology

Deploying advanced transit technology, or an Intelligent Transportation System (ITS), was a critical component of the iXpress Project. In general, an ITS increases the safety and efficiency of a surface transportation system through the integrated application of advanced electronics, communications strategies, and management strategies. Specifically, the ITS developed for the iXpress Project had several objectives:

- to reduce travel times, particularly by reducing delays at intersections,
- to make the service more reliable and thus more attractive to riders,
- to attract new riders by offering service information in new formats, and

- to enhance data collection and information processing for improved service planning and market research.

In sum, the use of ITS in the iXpress Project was intended both to improve transit management and operational control (2.2.1) and to provide enhanced traveller information (2.2.2). The components of this project included:

- transit signal priority (TSP) measures (2.2.1.1),
- an automated vehicle location (AVL) system (2.2.1.2),
- an automatic passenger counting (APC) system (2.2.1.3),
- a web-based trip-planning system (2.2.2.1),
- interactive voice response (IVR) and text-messaging systems (2.2.2.2), and
- automated digital signs, electronic visual displays, and audible next-stop announcements (2.2.2.3).

Due to the complexity and necessary integration of these technology components, the Region hired an external consultant to assist staff in:

- developing system architecture, functional requirements, and technical specifications,
- preparing requests for proposals,
- selecting vendors, and
- managing the project.

The project's technological developments proceeded according to the following timeline:

2004	In October, selection of external consultant is approved.
	In November, background paper is prepared to outline the state of the industry for the proposed technologies. Stakeholder workshop is held to inform stakeholders about ITS and to assess system needs.

2005	<p>In June, request for proposals (to plan, design, supply, and install the technologies) is issued with closing in August. Vendors are reviewed during the fall.</p> <p>In September, iXpress service (including unconditional TSP system) is launched.</p>
2006	In February, vendor selection is approved. In April, Region and vendor sign Notice to Proceed. In June, Region and vendor sign formal contract.
2007	<p>In May, AVL and APC systems, real-time digital signs at iXpress stations, and onboard visual and audible next-stop announcements become fully operational. Conditional TSP is enabled.</p> <p>In June, flat-panel displays are installed at terminals.</p>
2008	In June, web-based trip planner and telephone/text-messaging systems are launched.

### 2.2.1 Transit management and operational control

The technologies described below were developed and installed to improve transit management and operational control.

#### 2.2.1.1 Transit priority measures

To reduce delays in iXpress travel and to improve schedule adherence, transit signal priority (TSP) was implemented at 17 intersections along three sections of the iXpress corridor, representing about one quarter of the route's signal-controlled intersections (see Figure 5). TSP enables transit vehicles to move through signalized intersections more efficiently: as a bus approaches an intersection outfitted with TSP, it emits a signal detected by the traffic control system, which then initiates the appropriate TSP signal phasing, either extending the green or truncating the red to minimize the bus's delay.

When iXpress service was first launched, the TSP was unconditional, meaning that it occurred each time a bus approached a TSP intersection, regardless of the bus's schedule adherence. After the AVL system was completed (see 2.2.1.2), the TSP became conditional, such that TSP is now activated only when a bus is running behind schedule by a pre-determined number of minutes (currently set at one minute).

The three TSP corridors on the iXpress route were chosen based on extensive research of existing traffic volumes and turning movements, signal phasing and cycle lengths, bus volumes, and stop locations. The research also included a simulation exercise (using VISSIM traffic modelling software) to identify intersections that would be most likely to pose delay issues. According to one 2007 study, the TSP system installed on the iXpress route reduces iXpress travel time by up to 94 seconds per trip in off-peak periods.

In addition to TSP, the Region explored at length the use of queue-jump lanes. After selecting the locations at which queue-jump lanes would be most helpful in reducing iXpress travel times, the Region determined that installing these lanes would require significant property acquisition and/or removal of vehicle lanes. It was then decided that this option would be pursued within the Rapid Transit initiative (see Section 5.2).



Figure 5: Locations of transit signal priority (TSP)

TSP has been implemented in three heavily congested sections of the iXpress corridor to reduce delays at intersections and to improve schedule adherence.

#### *2.2.1.2 Automated vehicle location system*

A GPS-based, automated vehicle location (AVL) system has been installed on iXpress buses. This system communicates a bus's position (within ten-metre accuracy) and status (such as schedule adherence, block number and operator name) to the dispatch centre. Thus, it enables controllers to monitor each bus's schedule adherence and is used by dispatchers to short-turn and detour buses in the event a traffic accident or other major bottleneck. The AVL system is also connected to a mobile data terminal on each bus, a device that improves drivers' operational control by:

- showing how many minutes the bus is behind or ahead of schedule,
- listing the bus's scheduled arrival time for the next three stations (so that drivers do not need to consult a paper schedule),
- reminding drivers both visually and audibly to depart a station, and
- enabling drivers to communicate via text messages with dispatch.

The AVL system also provides the basis for all real-time traveller information (see 2.2.2).

#### *2.2.1.3 Automatic passenger counting system*

An automatic passenger counting (APC) system has been installed on iXpress buses. This system:

- counts the number of passengers boarding and alighting at each station, separately for each doorway,
- maintains the current vehicle occupancy, based on the cumulative boardings and alightings, and
- assigns ridership counts to each station, using the AVL system (see 2.2.1.2).

The APC system provides large volumes of data that help to monitor and evaluate ridership activity and running times. Used in tandem with the AVL system (see 2.2.1.2), this system enables planners to review passenger loads, determine the busiest trips and times of day, and map the busiest stations and locations of schedule delays. APC data can help planners to effectively allocate additional resources including vehicles and passenger amenities.

### 2.2.2 Enhanced traveller information

In addition to the technologies described above, the iXpress Project involved the implementation of technologies that provide enhanced information to potential and current riders, facilitate use of transit services, and reassure customers of the reliability of transit services. Although some of these technological improvements involve primarily iXpress buses, many enhance the information available to users of all Grand River Transit (GRT) services.

Branded as the easyGO Traveller Information System, these technologies offer information at all points in a transit trip:

- beforehand (web-based trip-planning system),
- at its start (automated telephone and text-messaging systems), and
- at bus stations and onboard (automated electronic signs and automated announcements).

#### *2.2.2.1 Web-based trip-planning system*

The web-based trip-planning system permits transit users to develop a personalized, optimized itinerary using all GRT routes. They input origin and destination (street address, intersection, landmark, or map location) and the date and time of travel (see Figure 6). The trip planner in turn calculates which bus routes the transit users should take to reach their destination as well as departure times from each transfer point (see Figure 7). Users can customize their searches to minimize their walk time or number of transfers.



HASTINFO - Plan a trip - Mozilla Firefox

File Edit View History Bookmarks Tools Help

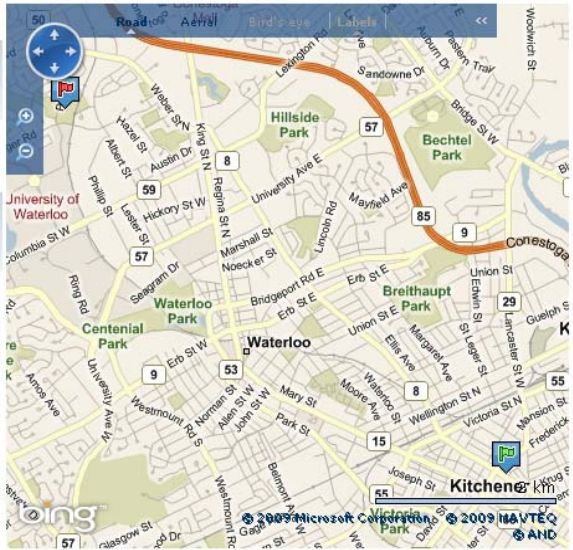
http://192.237.29.245/HastinfoWeb/TVPOptions.aspx?moniker=Q3JlYXRlVFZQOIRWUE9wdGlvbnM6YjgyOGUOMGETNWM3MCOOMDEwLWFZIDctMDAwYzQ0: ☆

**GRT** **easyGO** **Trip Planner** Style: None Default

Home Help Plan a trip View a timetable

**Plan a trip**

- 1 Origin**  
Landmark: Stop Intersection Address Recent  
City:  Clear  
Type:   
Landmark:
- 2 Destination**  
Landmark: Stop Intersection Address Recent  
City:  Clear  
Type:   
Landmark:
- 3 When**  
Date: July 30 2009  
☒ Departure at 03:00 AM ☐ PM ☐ approximately  
☐ Earliest trip  
☐ Latest trip
- 4 Travel options**  
☒ Fastest trip ☐ Accessible ☐ Bicycles  
☐ Fewest transfers  
☐ Shortest walk

A map showing the route from Kitchener to Waterloo. The route is highlighted in orange, starting from Kitchener and ending in Waterloo. The map includes labels for various streets and landmarks such as University of Waterloo, Hillside Park, Bechtel Park, and Breithaupt Park.


A green button with a right-pointing arrow and the text "Show trip plan".

Figure 6: easyGO web-based trip planner (Screen 1)

The “Plan a trip” screen asks users to input their travel information.



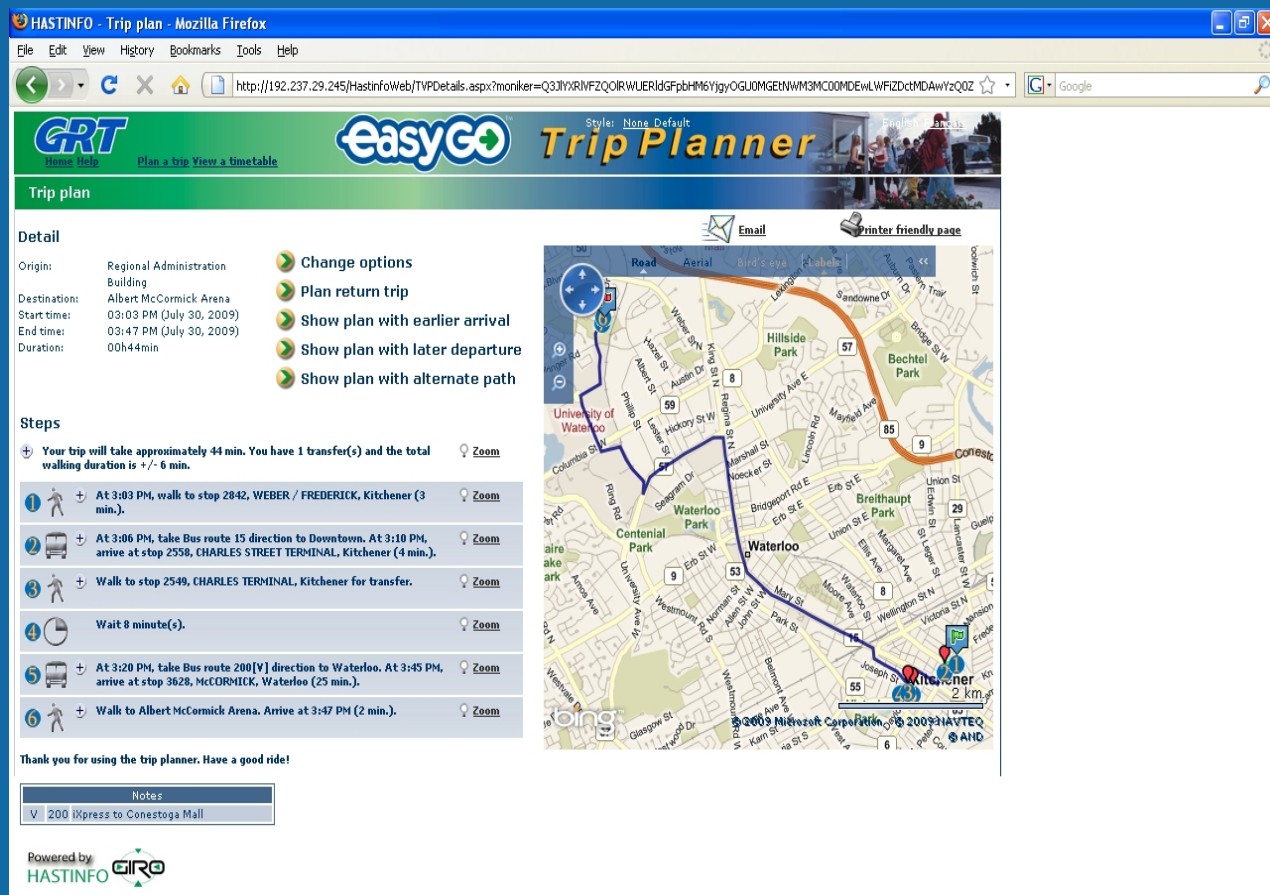


Figure 7: easyGO web-based trip planner (Screen 2)

The “Trip plan” screen gives a list of steps by which to complete the desired trip.

#### 2.2.2.2 Automated telephone and text-messaging systems

The easyGO system offers “next bus departure” information via an automated Interactive Voice Response (IVR) system. The IVR system was implemented for all GRT transit services, replacing GRT’s antiquated TeleRider system. Individuals call a single number then input the four-digit number unique to the bus stop or station in which they are interested (see Figure 8). The system offers an automated menu for stop and station information, information for out-of-town and para-transit services, and live agents. The iXpress information is based on real-time data from the AVL system (see 2.2.1.2), whereas information for conventional routes is based on scheduled times.

Schedule information for specific bus stops can also be retrieved via text messaging (see Figure 8).



Figure 8: easyGO telephone and text-messaging systems

Users can get next-bus and other schedule information by calling the easyGO automated telephone system or by sending a text message.

#### 2.2.2.3 Automated electronic signs and announcements

The easyGO system includes a variety of electronic signs (see Figure 9) to reassure travellers who are waiting for a bus, to help those transferring between routes, and to assist riders onboard. Automated digital signs at each iXpress station offer real-time “next bus departure” information. Flat-panel electronic displays at the Conestoga Mall station and the Charles Street and Ainslie Street Transit Terminals offer real-time departure times for iXpress buses and scheduled bus departure times for conventional routes, as well as transit alert messages, public service announcements, weather information, and advertising. Automated digital signs mounted onboard iXpress buses, on the ceiling just behind the bus driver, visually display the upcoming station.

Also, once a bus is within 500 metres of the next station, an automated voice audibly announces the upcoming station to riders.

All real-time information is enabled by the AVL system described in 2.2.1.2.



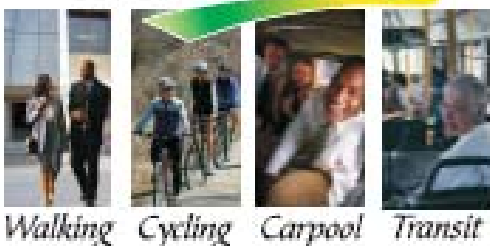
Figure 9: easyGO electronic signs

Electronic signs posted at iXpress stations and onboard iXpress buses provide a variety of information to travellers, including real-time next-bus departure times for iXpress buses, scheduled departure times for local buses, and next-station information.

## 2.3 Intermodal integration

In addition to providing a high-quality, limited-stop service (see 2.1) enhanced by advanced technologies (see 2.2), the iXpress Project involved providing facilities and amenities that encourage multi-modal trips and enhance non-auto travel modes. This section describes what was accomplished to integrate the iXpress service with sustainable modes of travel, specifically walking, cycling, and other transit services.

### TRAVELwise



These initiatives were implemented in conjunction with the Region's "Travelwise" program, a suite of services offered in order to reduce traffic congestion, take action on climate change, and manage growth through

transportation efficiency. Travelwise helps local employers and commuters explore travel options such as transit, cycling, walking, and ride-sharing (carpooling and car-sharing); shifting travel times; and eliminating the need for travel by tele-working.

### 2.3.1 Improvements for pedestrians

Because transit trips are not door-to-door, it was important to ensure that travellers would be comfortable while waiting for iXpress buses and could conveniently walk to and from iXpress stations.

To increase travellers' comfort at iXpress stations, the stations were developed with more amenities than available at most regular GRT bus stops. They feature a unique cantilevered-roof shelter designed to fit with the iXpress branding strategy (see 2.4.1), seating, lighting, and real-time customer information (see 2.2.2.3). Many stations have ring-and-post bicycle racks (see 2.3.2), and two transit terminals on the route feature bicycle lockers (see 2.3.2).

To improve pedestrian access to and from select iXpress stations, the areas surrounding some stations were physically enhanced, including the following changes (see Figure 10):

- extending sidewalks across driveways,
- installing ladder crosswalks at busy intersections and adding other road markings,
- improving landing areas with additional curb ramps and sidewalk in-fill,
- paving the walkway over a set of railroad tracks, and
- installing a set of stairs with handrail where a worn path had previously existed.

These improvements were implemented based on a series of pedestrian accessibility audits, which led to the critical examination of sidewalks, curb ramps, curb radii, traffic signals, crosswalks, landscaping, garbage receptacles, lighting, and shelters. The audit process began with a 2004 workshop in which a walkable-communities expert led Region staff and about 100 community members around three potential iXpress stations. Following this informative workshop, Region staff and students at the University of Waterloo completed audits of all stations and surrounding areas (diameter of 800 metres) by late spring 2005. The first several audits were completed using a tool developed for the City of Madison, Wisconsin; the remaining audits used a modified, more time-efficient version of this tool.



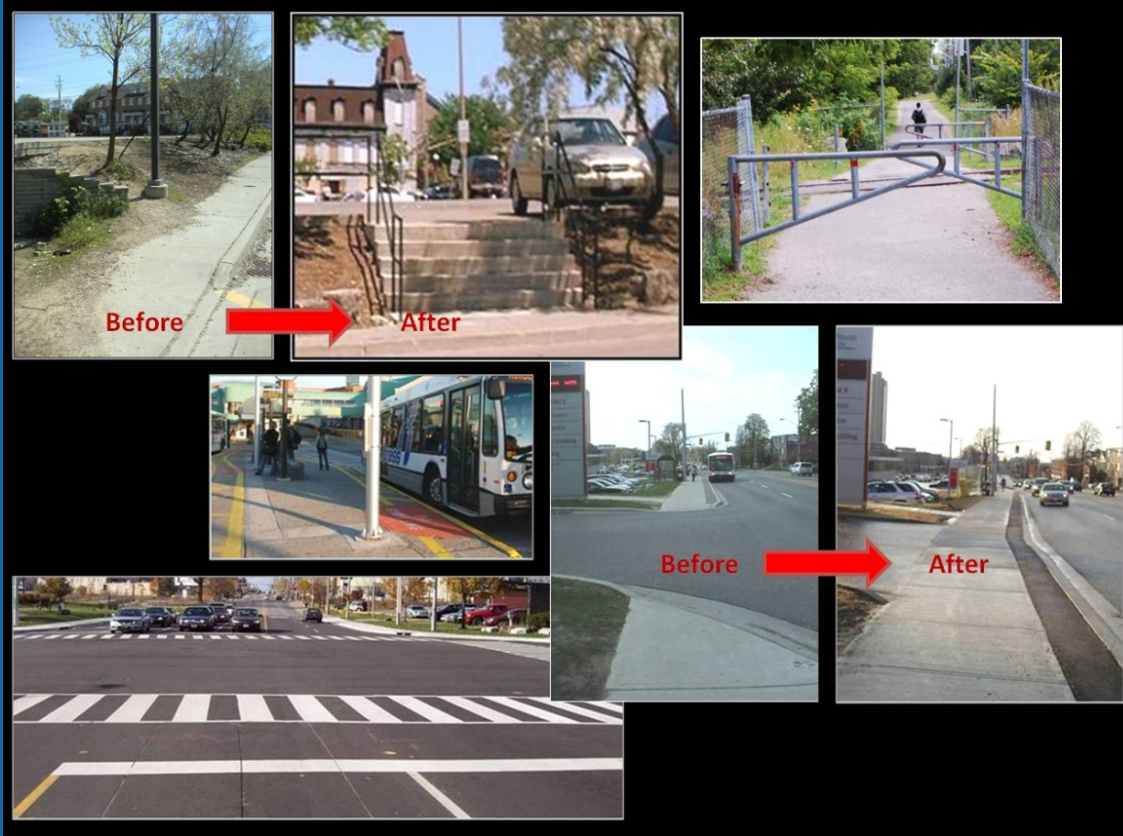


Figure 10: Changes to improve pedestrian access to/from iXpress stations

These changes included (clockwise from top left) improved access steps and paths, sidewalk extensions, and enhanced road markings.

### 2.3.2 Bicycle access

In addition to improving travellers' comfort at iXpress stations and pedestrian access to and from the stations, the Region worked to promote and facilitate cycling as an alternative mode of transportation, particularly in conjunction with transit use (see Figure 11).

Waterloo Region was one of the first Canadian communities to offer bicycle racks on all of its buses.

One major related initiative was the installation of bicycle racks on all GRT buses in the first few months of 2005. These racks, which allow two bikes to be transported on the front of each bus, were also installed on all new iXpress buses. The racks extend the service coverage of the transit network beyond the typical five-minute walk from transit stops; they also enable cyclists to travel by bus during inclement weather.

To further encourage cycling and to integrate cycling and transit, ring-and-post bike racks were installed at many iXpress stations. The southbound station at Grand River Hospital has become one of the hubs for a local organization's bike-share program, meaning that one of the two iXpress racks at this station is used to store up to two bike-share bicycles.

In addition, bike lockers were installed at the two downtown transit terminals to allow for long-term bicycle storage. Each set of lockers can store up to four bicycles and features a "view-through" component on the door and exterior sides to address concerns regarding appropriate contents being stored in the lockers. Region staff has discussed with some local companies the possibility of having similar lockers installed at their locations. They have also approached a local bicycle retailer about promoting the lockers.

Another initiative to facilitate the use of bicycles is the ongoing construction of cycling links throughout the Region, particularly on roads connecting to the iXpress route. This construction occurs mostly when roads undergo scheduled improvements. This initiative has also involved the posting of "Share the Road" and bike-lane signs.



Figure 11: Bicycle amenities

Amenities for cyclists include (from left to right) ring-and-post racks at many iXpress stations and lockers at two terminals, as well as bike racks on every GRT bus. Improving cyclist access also included posting "Share the Road" and bicycle-lane signs and constructing many new bicycle lanes.

### 2.3.3 Integration with local transit and intercity coach services

The Region has expended efforts to integrate iXpress service not only with walking and cycling travel modes but also with other transit services. Express buses serve the Central Transit Corridor of Waterloo Region, but iXpress stations are strategically located to maximize the route's integration both with local transit services reaching other areas of the Region and with intercity transit services. Table 2 in Section 2.1.2 details the transit-network connectivity of each iXpress station.

## 2.4 Marketing and outreach

Although most of the iXpress Project budget was dedicated to the project's service and technology components, iXpress service could not be successful without creating awareness, differentiating the service, and encouraging its use. So the fourth component of the iXpress Project involved the branding and marketing of the iXpress service, along with an outreach campaign designed to change attitudes and travel behaviour. This section outlines the Region's accomplishments in these areas.

### 2.4.1 Branding

Two components of the Region's express service required effective branding:

- the express service itself (see 2.1), and
- the traveller information system (see 2.2.2).



The express service was branded with the name "iXpress" and the tagline "Connecting you." The "i" indicates both the potential for personalized travel and the availability of technologically enhanced information. The "Xpress" foregrounds the faster, limited-stop nature of the service and plays on the notion that using the *express*

service is one way to *express* oneself by choosing a responsible travel mode. This brand also maintained some continuity with the tagline "Express yourself" used in advertisements and community discussions during the early consultation phase.

The tagline "Connecting you" builds on two ideas: first, the iXpress service connects travellers to people and places important to them; and second, it enables riders to connect to their various life roles while en route (by studying for a test, reviewing work reports, reading a book, making phone calls, chatting with fellow travellers, and so on).



The graphic design of the iXpress brand features contemporary fonts and styling to reflect the service's advanced technology elements and Waterloo Region's high-tech nature. The logo and colour scheme are featured on all buses, sign posts, stations, and marketing material.



The traveller information system was given the brand “easyGO,” which foregrounds how straightforward the system is to use and how effectively it facilitates transit travel. The easyGO colours coordinate well with the Grand River Transit (GRT) colour scheme, and the logo is featured extensively on buses, promotional material, and the GRT website.

These branding strategies were developed by a local marketing and communications firm based on research of transit users and non-users and feedback from focus groups.

#### 2.4.2 Umbrella marketing campaign

Both before iXpress service began and after it was operational, the Region engaged in a traditional but extensive umbrella marketing campaign. The campaign was designed and implemented in cooperation with an external consultant. As the sections below indicate, the campaign involved both internal and external communication.

##### *2.4.2.1 Communication with employees and stakeholders*

It was important that throughout the process Region employees and project stakeholders would feel informed and up-to-date on all aspects of the iXpress Project. Accordingly, the project team developed a database of regional partners, employers, institutions, and other stakeholders that was updated throughout the project. Those entered into the database, as well as Region employees, received regular updates via a “Trackin’ the Express” newsletter.

##### *2.4.2.2 Pre-launch outreach to the public*

Before iXpress service began, marketing efforts featured the theme “Express Yourself” and were directed in two ways:

- soliciting feedback about route options, travel behaviour, and other information relevant to the new service; and
- raising awareness and excitement about the new service.

Public feedback was solicited via an online survey, 13 open houses, and displays at three shopping malls and two transit terminals. Comment forms were also included in some direct mailings.

A major pre-implementation Attitude and Awareness Survey was completed in January 2005. This survey helped to address marketing needs and contributed to the understanding of baseline conditions for the benefit measurement program. It focused on identifying barriers to sustainable travel choices through five focus groups involving 58 participants and a public attitude survey of 1,000 transit and non-transit users.

In addition to these requests for feedback, awareness and excitement about iXpress service were generated using the following:

- Web pages specific to iXpress service on the GRT website;
- Brochures sent by direct mail to targeted households, businesses, and institutions along the iXpress route;
- Articles in the Region's *EnviroNews* publication, a regional newsletter distributed to almost 180,000 households across the region; and
- Other print ads, posters, and rider alerts.

Work was also completed to examine and revise GRT's existing Customer Relationship Database to ensure that it served as an effective, reliable, and valuable tool for storing feedback from e-mail, phone, and fax.

#### *2.4.2.3 Media launches*

Because components of the iXpress Project rolled out progressively rather than all at once, there were three official media launches (see Figure 12).

The iXpress launch ceremony was held on September 29, 2005, with federal, provincial, and local dignitaries in attendance. In celebration of the launch, the public was offered free rides on iXpress buses that day.

The installation of bicycle racks on all GRT buses was celebrated with a launch of the Bus-n-Bike program. The launch took place in the spring of 2005 in front of Grand River Hospital, a large local employer that would be the site of one of the iXpress stations. The hospital was an appropriate launching site for Bus-n-Bike, as it started an employer-based Commuter Options program in 2002 with the assistance of the Region.

The third major media event marked the launch of the easyGO Traveller Information System on June 6, 2008. This launch involved all three levels of government.



Figure 12: Media launches related to iXpress Project

Representatives of multiple levels of government were invited to participate in official launches of the Bus-n-Bike initiative in spring 2005 (top and bottom left), the iXpress service in September 2005 (top right), and the easyGO Traveller Information System in June 2008 (bottom right).

#### 2.4.2.4 Post-launch promotion of service

Following the launch of the iXpress service in September 2005, marketing efforts continued to focus on raising awareness about the service. Promotional materials also provided updates about schedule enhancements and upcoming services. Particularly promoted were two specific aspects of the iXpress Project: Bus-n-Bike (see 2.3.2) and easyGO (see 2.2.2). Marketing efforts included the following (see Figure 13):

- print advertisements and articles in publications such as *EnviroNews*, *TransitTALK* (a GRT customer newsletter distributed onboard buses), municipal leisure/activity publications, and university newspapers,
- posters at major trip generators and transit stations,

- flyers mailed to universities and major employers,
- distribution of iXpress timetable pamphlets,
- bus wraps advertising easyGO,
- audio advertisements on local radio stations,
- regularly updated iXpress webpage on GRT website,
- promotional items such as bus cut-outs, fridge magnets, frisbees, spot-remover sticks, reflector straps, and “My favourite easyGO stop number” wallet cards,
- public information displays at malls and events such as university orientation week and student life fairs, Car Free Week, and Eco Home and Garden Show, and
- demonstrations of the bus bicycle rack (using a demonstration unit purchased from the bike-rack vendor) at events such as Earth Day, Manulife Bike and Hike for Heart, the Cambridge Tour de Grande, and Commuter Challenge.



Figure 13: Promotional materials and activities

Materials and activities to promote iXpress service included (clockwise from top left) spot-remover sticks, bus wraps, Bus-n-Bike pamphlets, *Environews* and *TransitTALK* articles, frisbees, magnets, Bus-n-Bike reflector straps, cut-out buses, mall information displays, and timetable pamphlets.



### 2.4.3 Individualized marketing

In addition to marketing the express service to the general public, the iXpress Project also involved an individualized marketing (IM) program designed to help a specific group of residents learn to use alternatives to the single-occupant vehicle, particularly for their commuter trips. This component was intended to be a pilot project that would explore whether the use of customized information and incentives was effective in changing travel behaviour. This section outlines the Region's IM activities.

For this pilot project, the Region selected neighbourhoods near the Ainslie Street Transit Terminal, the southernmost station on the iXpress route. It purchased from the White Pages a phone-number database of the neighbourhoods within approximately 1500 metres of the terminal. This target area was selected because:

- the Ainslie Terminal has a relatively good network of sidewalks and is a main hub with many feeder bus routes,
- the area features an urban design, density, and land-use mix that encourage travel modes other than driving, and
- the area has a relatively typical demographic makeup for the entire iXpress service corridor.

After completing a small test project involving 250 households in the target area, the Region randomly selected 1925 households for the full-scale pilot project.

The IM pilot project involved three phases:

- before/baseline survey,
- individualized intervention, and
- after/follow-up survey.

In September 2006, the baseline survey was distributed. The 1925 randomly selected households received two letters from the Region: first a letter of introduction to the project, then one week later another letter with a link to the online survey as well as a paper copy of the survey. The goal of this Before Survey, which asked for household profile information, household member information, and trip information on a specified day of the week, was to establish a baseline measure for evaluating the impacts of IM. Of the 794 surveys submitted, 757 surveys were considered complete and were used by the Region to establish baseline travel behaviour. The survey revealed that personal auto was the dominant mode of choice,

even for relatively short trips, and that car ownership is generally understood to be a strong determinant of mode choice.

In April 2007, the intervention phase began. Those who had expressed interest in receiving IM information—306 trip makers representing 204 households—received information packages, along with incentives hand-delivered in a cotton bag, and were offered assistance in identifying alternate travel choices for their individual travel needs. This group included 109 trip makers who already used transit regularly and 197 trip makers who used auto but were interested in using transit.

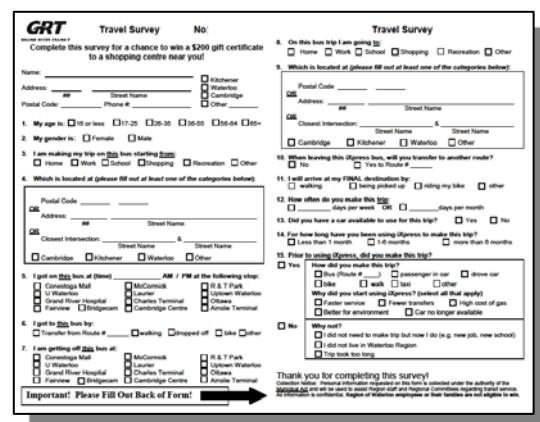
In September 2007, the After Survey was distributed, in order to identify and quantify the impact of the IM intervention on the travel patterns of the participating households. A control group was also surveyed so as to distinguish between the effects of IM and the effect of external factors (e.g., changes in transit service, price of gasoline, etc.) on travel behaviour. The findings of the IM pilot project are outlined in Section 3.2.5.

## 2.5 Project monitoring and assessment of impact

The final component of the iXpress Project involved monitoring and assessing its impact. Early in the project, measurements focused on understanding and establishing baseline conditions. Later in the project, activities focused on assessing how the showcase project impacted travel behaviour within the Region of Waterloo.

A variety of data were collected, including the following:

- transit schedule adherence on local routes and on iXpress route,
- transit vehicle intersection delay prior to and after implementation of transit priority measures,
- general traffic delay prior to transit priority measures,
- transit travel times on local routes and on iXpress route,
- frequency and type of transit customer complaints,





- iXpress bus fuel consumption and emissions,
- transit ridership in Central Transit Corridor,
- use of web-based trip planner,
- cycling activity and use of bike racks on buses,
- ridership travel information, and
- public awareness of GRT services.

The findings of the data collection activities are discussed in Chapter 3.

## 2.6 Project budget

The iXpress Project had a budget of \$9.237 million for capital and in-kind costs, as outlined in Figure 14. As described in Section 1.3, the capital costs were shared by the federal and provincial governments and the Region of Waterloo. The Region also received some in-kind contributions from the University of Waterloo.

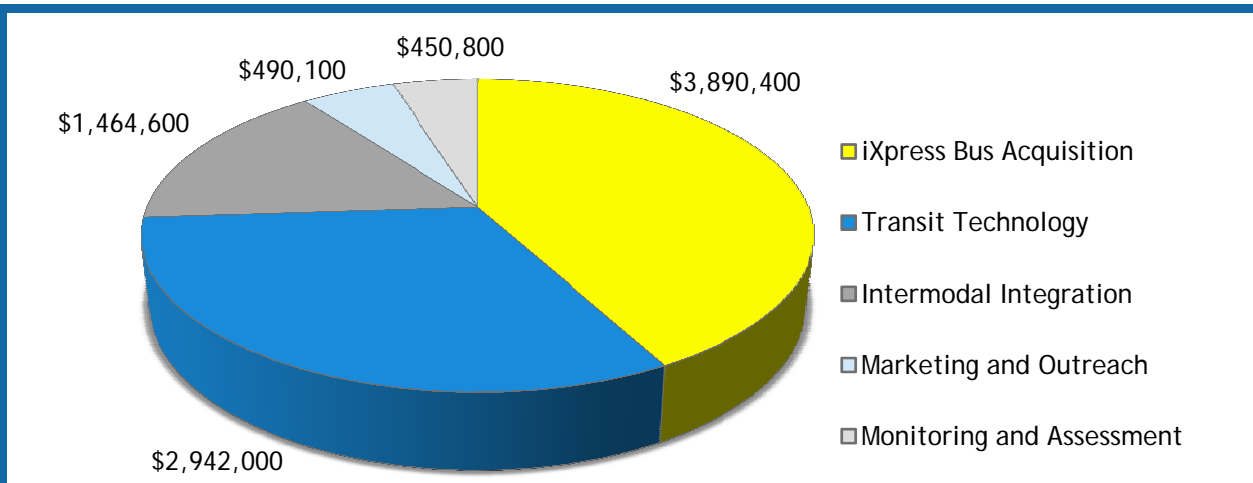


Figure 14: Project budget

The five project components were budgeted to cost \$9.237 million. This figure includes capital and in-kind expenditures, not ongoing operating costs.

### 3 Project Monitoring and Assessment of Impact

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The overarching goal of the iXpress Project was to change travel behaviour in the Region of Waterloo, creating a shift from single-user auto trips to trips using transit and/or active modes of transportation. This modal shift would importantly reduce greenhouse gas emissions and improve air quality. It was also hoped that the project would produce other benefits, such as:

- An increase in safety, due to improved access to and from stations and the automatic vehicle location system;
- A reduction in transit operating costs, due primarily to better fuel efficiency and the implementation of cost-effective, automatic data-gathering technologies; and
- An increase in transportation choice, due primarily to improvements in pedestrian and cyclist access and the introduction of express transit service.

This chapter addresses the monitoring and assessment of these aspects:

- Ridership and modal shift to transit (3.1);
- Reasons for modal shift (3.2);
- Decrease in greenhouse gas emissions (3.3); and
- Other benefits of the project (3.4).

#### 3.1 Ridership and modal shift to transit

It was the Region's intent to demonstrate through the iXpress Project that a high-quality, highly integrated, limited-stop express service linking major trip destinations—like the iXpress service—is able to increase transit ridership in medium-sized urban areas. This section demonstrates that the iXpress has indeed contributed significantly to the development of a transit culture in Waterloo Region. Specifically, it shows that ridership levels on iXpress buses continue to grow beyond project target levels and that these levels involve a demonstrated modal shift from auto to transit.

### 3.1.1 Ridership levels on iXpress buses

The iXpress service has been successful in attracting riders. Ridership has grown consistently over the four years since the service was introduced, and the number of boardings has exceeded targets (see Figure 15). Overall ridership in the central transit corridor (iXpress and local routes) has grown at twice the rate of overall system ridership.

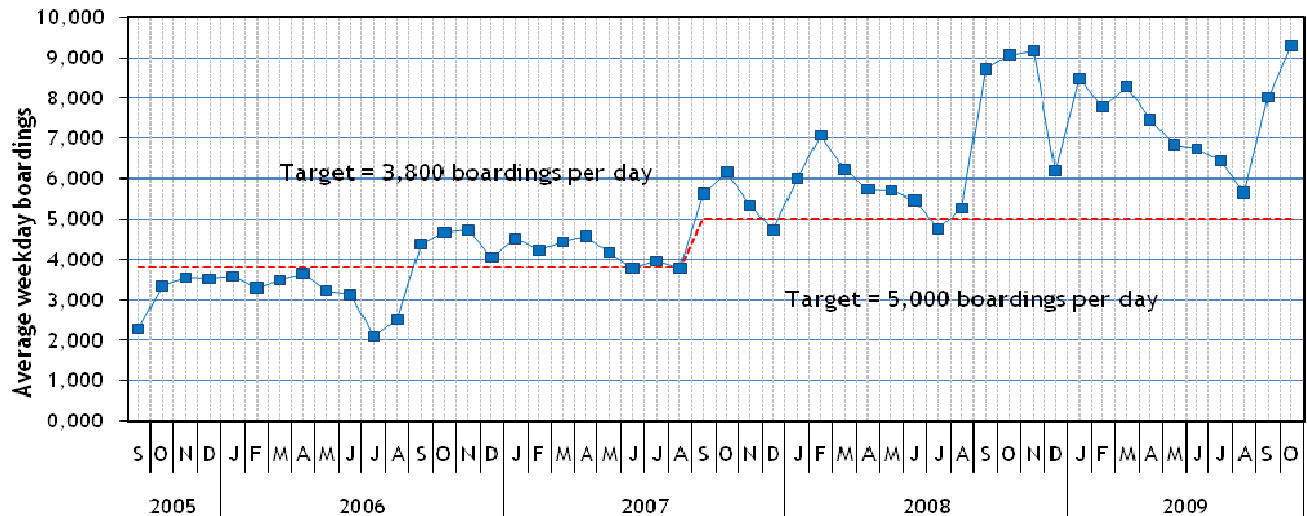


Figure 15: Ridership levels on iXpress buses

Onboard surveys distributed in February 2006, March 2007, and March 2008 reveals a variety of information about iXpress riders:

- They are predominantly young, with about 60% 25 years of age or younger (see Figure 16). Whereas most demographic categories remained at consistent levels across the three surveys, the number of riders between the ages of 17-25 increased significantly in 2008 (from 52-53% to 60%). This increase is due most likely to the fact that a universal bus pass for students was introduced at Wilfrid Laurier University (WLU) in 2005 and the University of Waterloo (UW) in 2007.
- On average, 47% are male, 53% female (see Figure 17). Small variations were observed between the three surveys but these differences are not statistically significant.
- In 2008, riders paid with a variety of fare types, the most common of which was a UW or WLU pass (see Figure 18). These data confirm that approximately 46% of iXpress riders are college or university students.

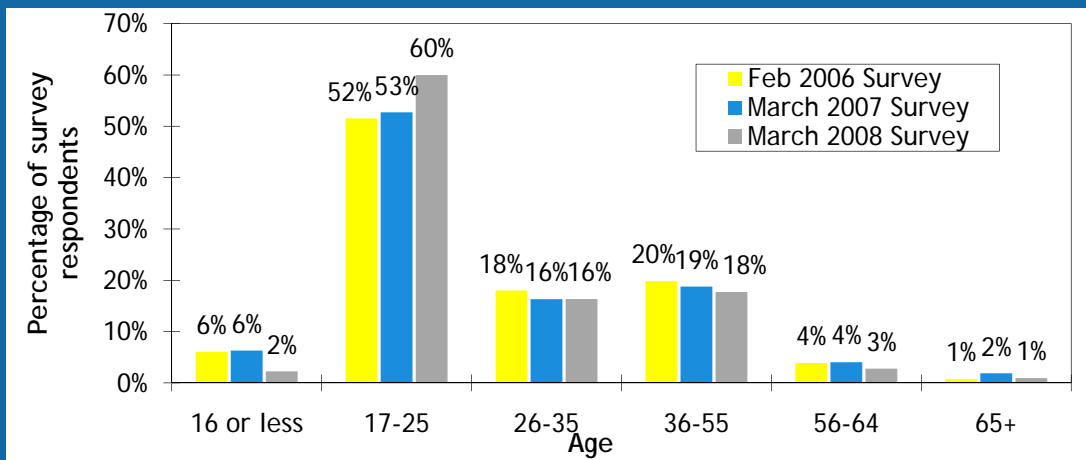


Figure 16: Distribution of ixpress riders by age

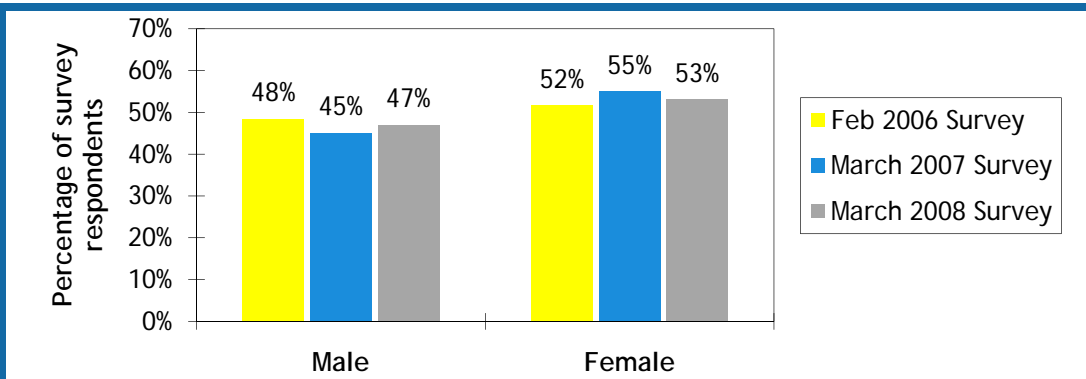


Figure 17: Distribution of ixpress riders by gender

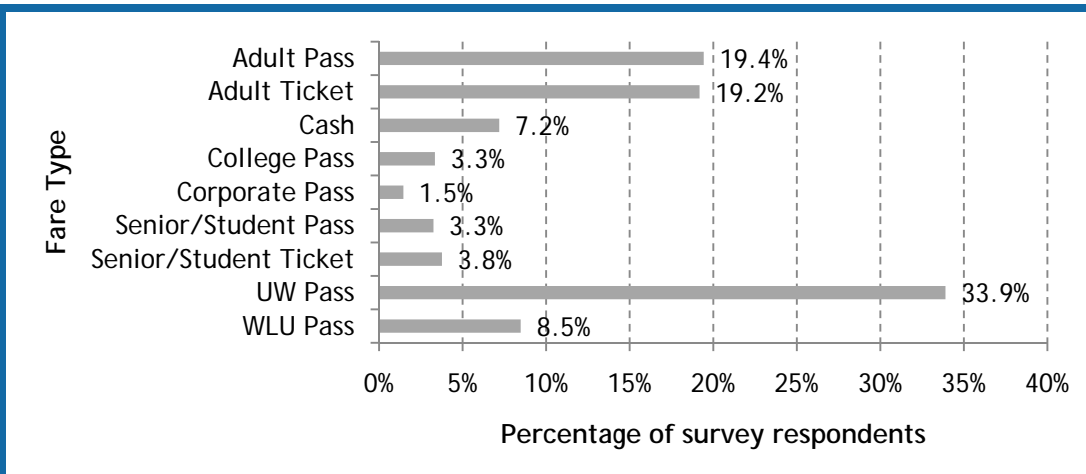


Figure 18: Distribution of ixpress riders by fare type (2008 only)

### 3.1.2 Modal shift from auto to iXpress bus

High ridership levels on iXpress buses, as outlined in the previous section, are a necessary indicator of the showcase project's success. Just as important, however, is evidence that iXpress service is helping travellers within the Region to shift from auto use to transit use. Survey results demonstrate that whereas most riders, as could be expected, are shifting to iXpress bus from other transit or active modes, a significant number of trip makers (15-19%) are shifting to iXpress bus from an auto mode, either as drivers or as passengers (see Figure 19). Also, although most iXpress riders have no vehicle available to them, about 13% of survey respondents did choose iXpress service despite having a vehicle available for the trip (see Figure 20).

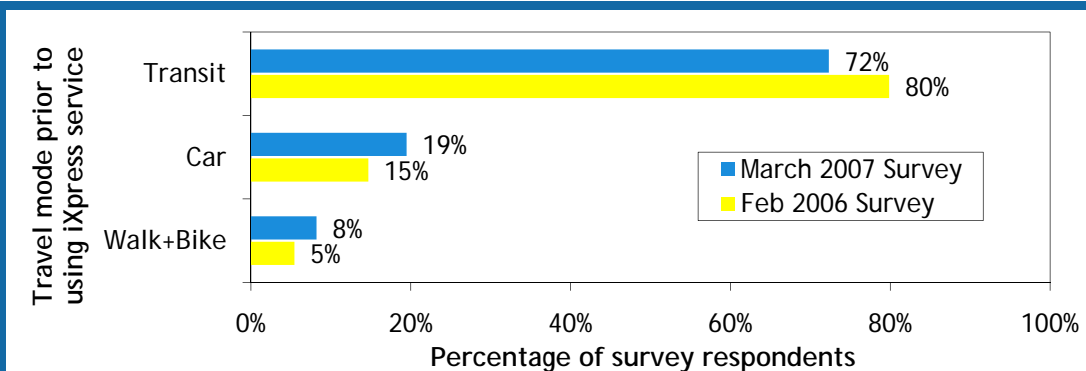


Figure 19: Travel choice of riders prior to using iXpress service

Riders were asked: Prior to using iXpress service, how did you make this same trip? The 2008 survey did not include this question.

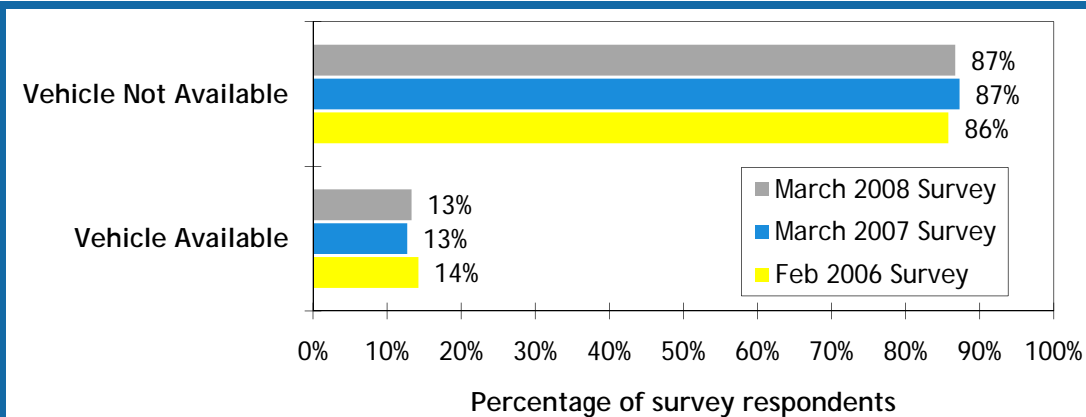


Figure 20: Distribution of iXpress riders by availability of vehicle

Riders were asked: Did you have a car available for this trip?

### 3.2 Reasons for shift in travel behaviour

To discern why iXpress ridership levels are strong and continue to grow and why some travellers are choosing to use iXpress bus instead of auto, the Region has distributed several travel surveys. The Region also infers that the public's positive reception of iXpress service is related to its speed, reliability, and easy access. This section summarizes the monitoring of the various components of the iXpress Project, as related to modal shift:

- rider-identified reasons for using iXpress service,
- transit technology for transit management and operational control,
- easyGO traveller information system,
- intermodal integration, and
- individualized marketing.

#### 3.2.1 Rider-identified reasons for using iXpress service

In a 2007 survey, iXpress users who had previously made the same trip using another mode were asked why they had shifted to the express service. The results indicate that the iXpress's faster service was the most significant factor in causing modal change (52%) (see Figure 21).

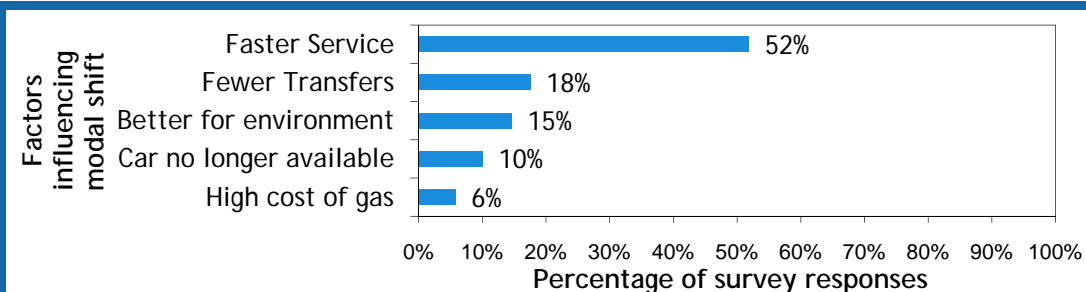


Figure 21: Factors influencing modal shift to iXpress service, Part 1

Riders were asked: Why did you start using iXpress service? This question was included only in the 2007 survey.

Two examples of how the iXpress route provides shorter travel times within the central corridor of the Region are as follows:

- Before iXpress service was launched, a trip by transit from the Region's north end (Conestoga Mall) to its south end (Ainslie Street Transit Terminal) would take 112



minutes, with one transfer; on an iXpress bus, the same trip takes 71 minutes without transfers, a savings of 41 minutes (37%).

- A trip on transit from Cambridge Centre to the Charles Street Transit Terminal in Kitchener used to take 102 minutes with two transfers, whereas that trip is now possible on an iXpress bus in 30 minutes without transfers, a savings of 72 minutes (71%).

Although faster speed was significant to many riders, a traveller's reasons for shifting to transit varied according to which travel modes were available to the traveller (see Figure 22). For example, the improved speed of the iXpress service was particularly important to iXpress riders who had shifted from using local transit but was much less important to riders who had shifted from an auto mode (see Figure 22a). Conversely, the high cost of gas was an important factor in stimulating change of travel behaviour for auto drivers but not for travellers using other modes, including auto passengers (see Figure 22c).

The same survey reveals some useful information related to length of trip (distance) (see Figure 23). As might be expected, the iXpress trips previously made on foot or bicycle are shorter than those previously made by auto: people typically travel farther by car than by active modes. Worth noting, however, is that some of the iXpress trips previously made by auto are quite long in distance; this information indicates that the enhanced transit service with its faster speed is seen as competitive with the auto mode.

Even more interesting are the cases in which travellers using iXpress service had not previously made the trip. The average length of these trips is the same as the average length of trips made previously by auto. It can be speculated that these trips were not previously made because they took too long using local transit. Only now, with the introduction of iXpress service, have these relatively long trips become attractive or possible. Thus iXpress service has improved mobility and access within the central corridor of Waterloo Region.

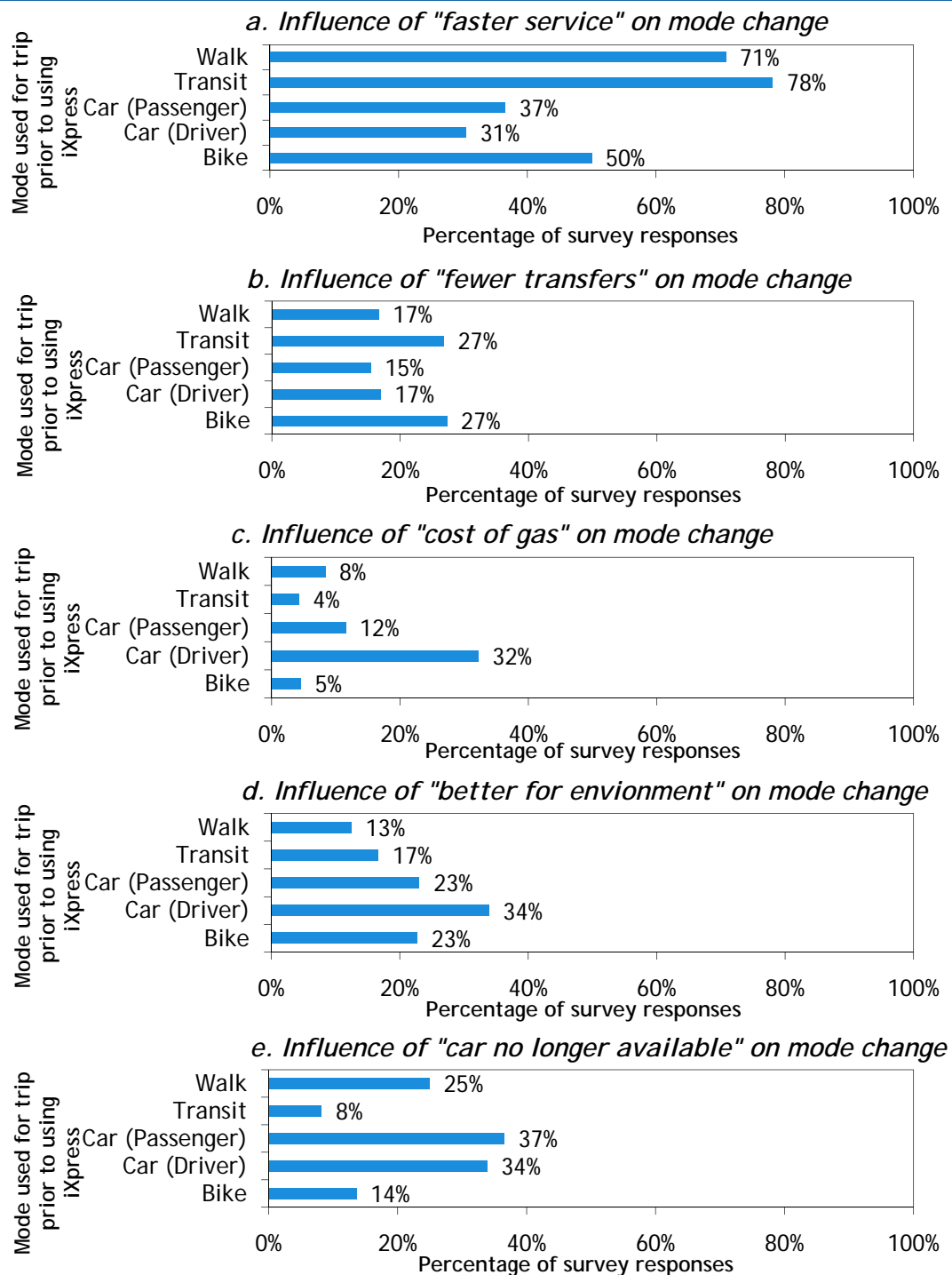


Figure 22: Factors influencing modal shift to iXpress service, Part 2

Using the same data as Figure 21, these charts relate the factors influencing modal shift to the mode previously used for the same trip.

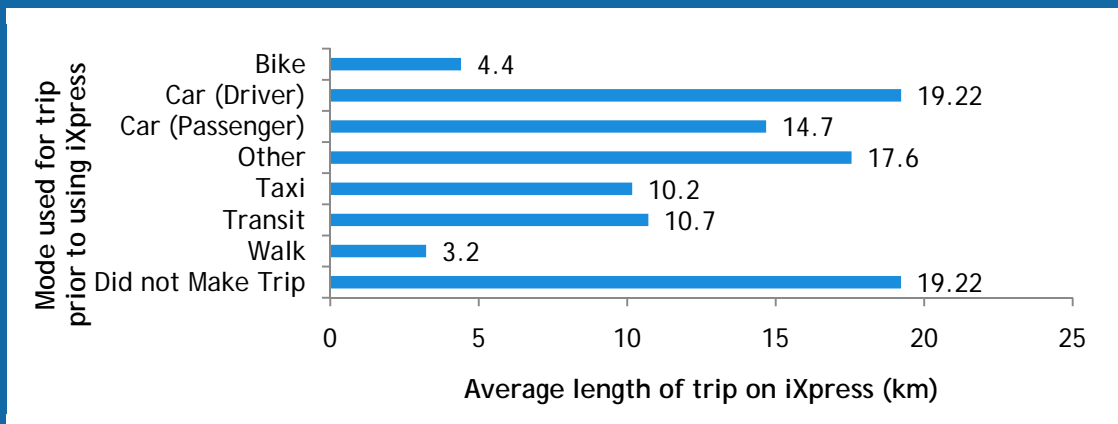


Figure 23: The length of iXpress trips previously made by other modes

### 3.2.2 Transit technology for transit management and operational control

The schedule adherence of a transit service affects the quality of service and consequently influences ridership. Poor schedule adherence introduces uncertainty and variability in transit trip times and acts as a deterrent to modal shift toward transit.

The schedule adherence of iXpress buses was influenced by several project components, including transit signal priority (TSP) measures (2.2.1.1), automated vehicle location (AVL) system (2.2.1.2), and automatic passenger counting (APC) system (2.2.1.3). TSP was expected to have the greatest short-term impact, as TSP actively reduces signal-induced delay to transit vehicles, particularly those running behind schedule. AVLS and APCs could potentially improve schedule adherence indirectly by providing more and better data for transit service planning including schedule development.

Analysis of schedule adherence indicates that the iXpress route experiences better on-time performance than routes without TSP or AVL systems. Buses are more likely to arrive early or on time to iXpress stations than to stops on local routes. For example, according to the data compiled during the afternoon peak period at selected stops over four months (see Figure 24), 85% of iXpress buses arrive early or on time (i.e., no more than three minutes after scheduled arrival time), as compared to 69% of local buses; only 7% of iXpress buses (100% minus 93%) are more than five minutes late, as compared to 15% (100% minus 85%) of local buses.

Furthermore, as compared to buses on local routes, iXpress buses have a significantly better on-time performance for both morning and afternoon peak periods (see Figure 25). This difference represents an improvement in schedule adherence of more than 20% in the morning peak and more than 30% in the afternoon peak period (see Figure 26).

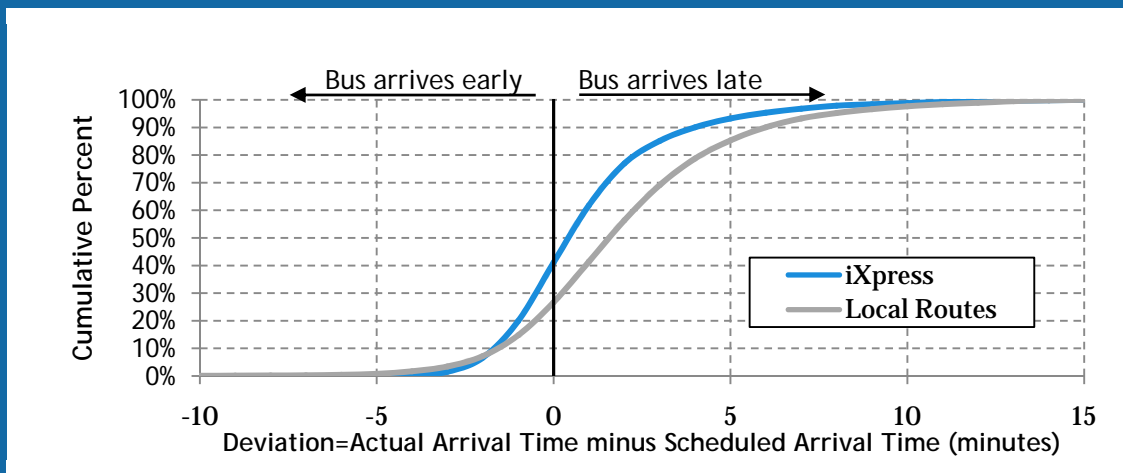


Figure 24: Schedule deviations for iXpress route and local routes

Compared here are the schedule deviations during the afternoon peak period. Buses are considered on time if they arrive less than three minutes after their scheduled arrival time.

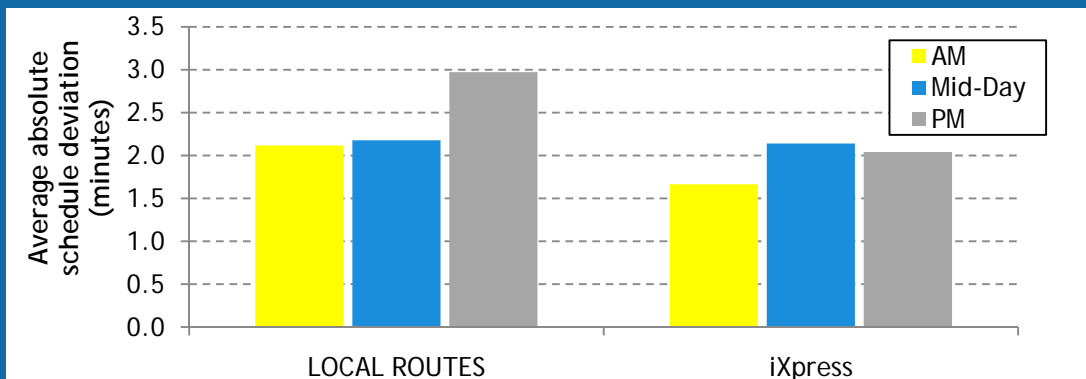


Figure 25: Schedule deviation at different times of day for local buses and iXpress buses

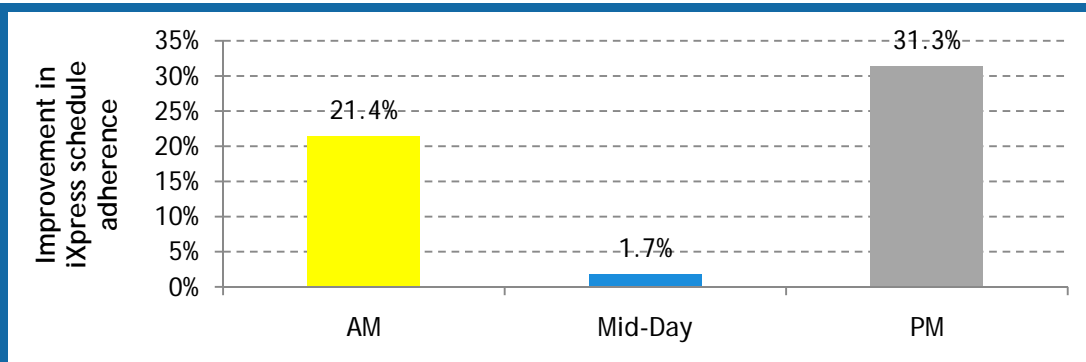


Figure 26: Improvements in schedule adherence on iXpress route as compared to local routes

One way to evaluate the impact of the iXpress service is to calculate the generalized cost of using transit within the iXpress corridor both before and after the express service was implemented. Generalized cost is a concept developed by transportation engineers involving several important travel elements:

- out-of-pocket cost (e.g., transit fare or auto parking fees),
- in-vehicle travel time,
- waiting time,
- access time (i.e., time to walk to the boarding transit station),
- egress time (i.e., time to walk from the alighting station to the trip destination), and
- a modal bias coefficient (which accounts for other modal attributes such as perceptions of personal safety, comfort, etc.).

This analysis demonstrates that the iXpress service reduces the generalized cost by 31% in the corridor's northern section (Conestoga to Fairview) and by 39% in the corridor's southern section (Fairview to Ainslie). These reductions increase the attractiveness of the express service as a travel mode option relative to other modes (including local transit routes, auto, and active modes).

### 3.2.3 easyGO traveller information system

The easyGO traveller information system was intended to improve and thus to increase users' interaction with iXpress and other transit services. It has in fact been quite popular with transit users, as demonstrated both by survey responses and by increased use of various components.

In a 2008 online survey, all easyGO components received user satisfaction scores averaging more than 7.9 out of 10 (see Figure 27). The electronic displays at iXpress stations (2.2.2.3) received the highest rating, followed closely by the electronic displays and enunciators onboard iXpress buses (2.2.2.3). A 2009 online survey confirmed that users find easyGO services helpful and easy to use. Again, the automated electronic signs at stations and terminals and onboard buses received the highest ratings.

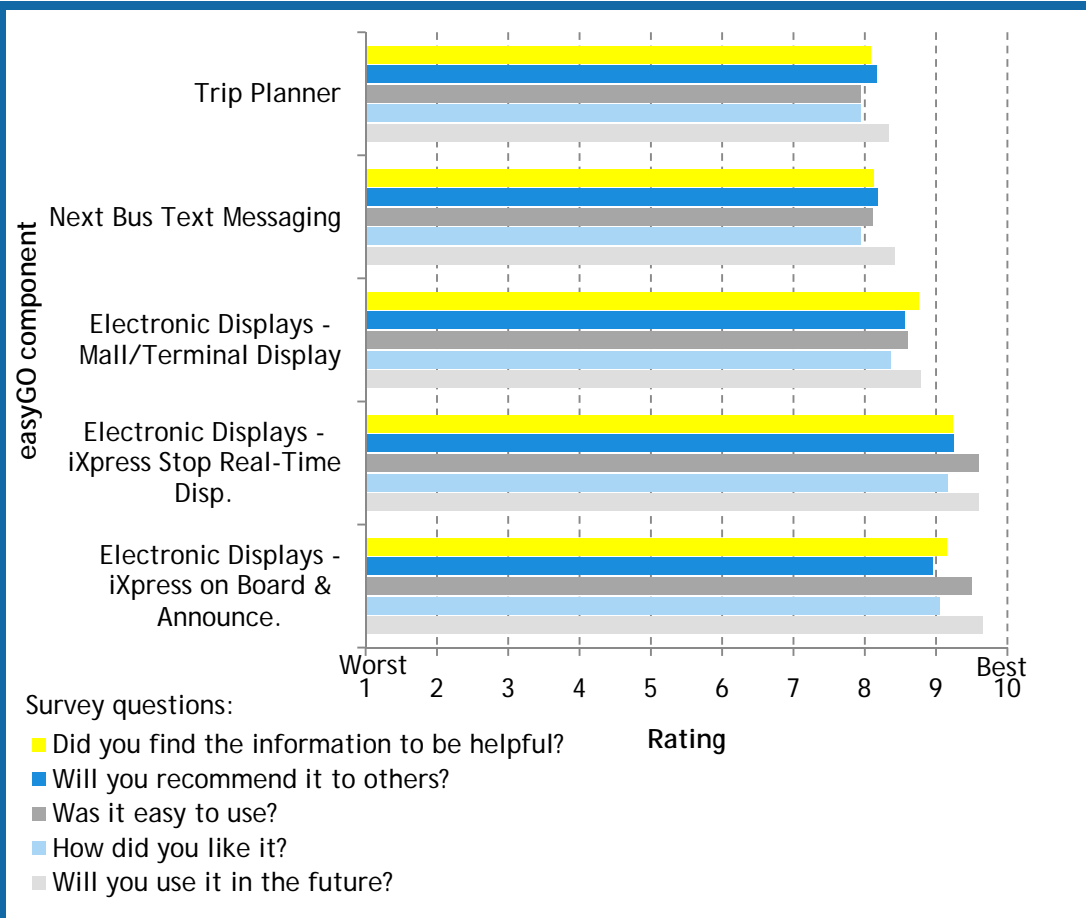


Figure 27: Survey responses to easyGO components

In addition to being well rated by survey respondents, components of the easyGO system are being used more and more (see Figure 28), indicating that residents are becoming increasingly aware of the system and value the information it provides. The Interactive Voice Recognition (IVR) telephone system (2.2.2.2) has been particularly well used, approximately three times more than either the trip planner or the text message system (2.2.2.2). The IVR system was used most in September 2008 (an average of almost 3,200 uses per day), with a moderate decline in usage during the following months and another peak in January 2009. This usage trend is likely related to the post-secondary academic calendar: when college and university students begin new academic schedules in September and January, they use the IVR system to investigate travel options for the newly required trips. It is thus expected that a similar trend will occur each year, particularly given the large number of students who use the iXpress service.



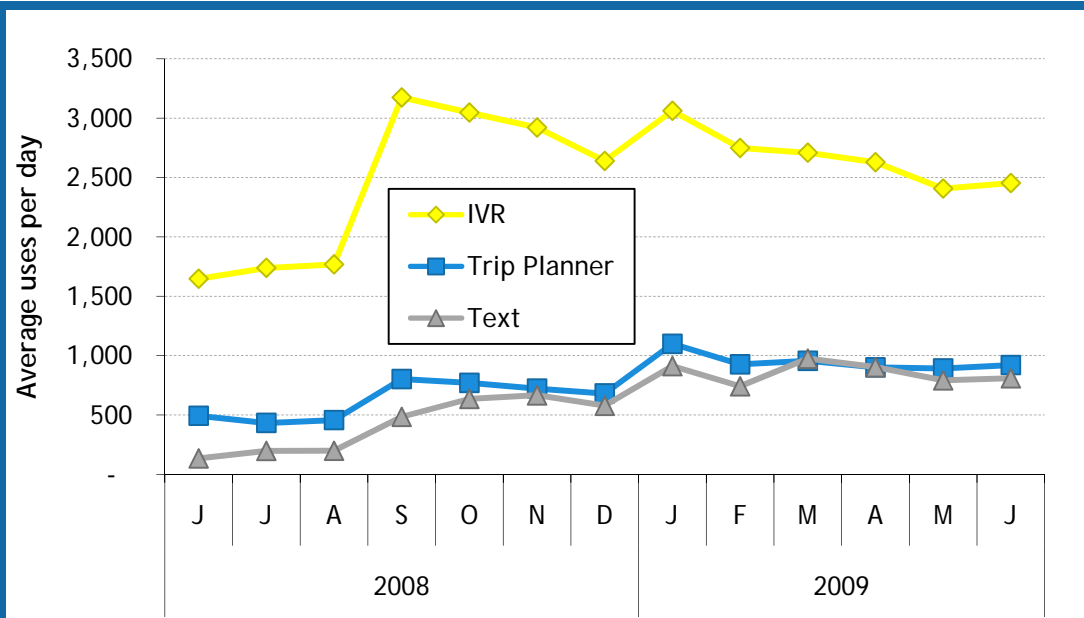


Figure 28: Use of easyGO traveller information system components

### 3.2.4 Intermodal integration

Although it is difficult to measure the impact of the iXpress Project's efforts toward intermodal integration (see 2.3), the Region has two sets of data related to these efforts.

First, the Region has monitored how iXpress users access their boarding stations. A 2007 onboard survey indicates that the mode used to access boarding stations varies considerably by rider and by station (see Figure 29). Riders access stations by walking, transit transfers, being dropped off, and by other means such as biking. An average of 52% of iXpress users walk to their boarding station, but this amount varies considerably by station: from only 19% at SmartCentres Cambridge, which is located near a provincial highway in an industrial area with poor pedestrian accessibility, to 88% at Grand River Hospital, which is surrounded by residential areas and many large employers. As expected, a high proportion of iXpress riders who board at transit terminals (Conestoga, Charles, Fairview, Cambridge Centre, and Ainslie) are transferring from another transit route.

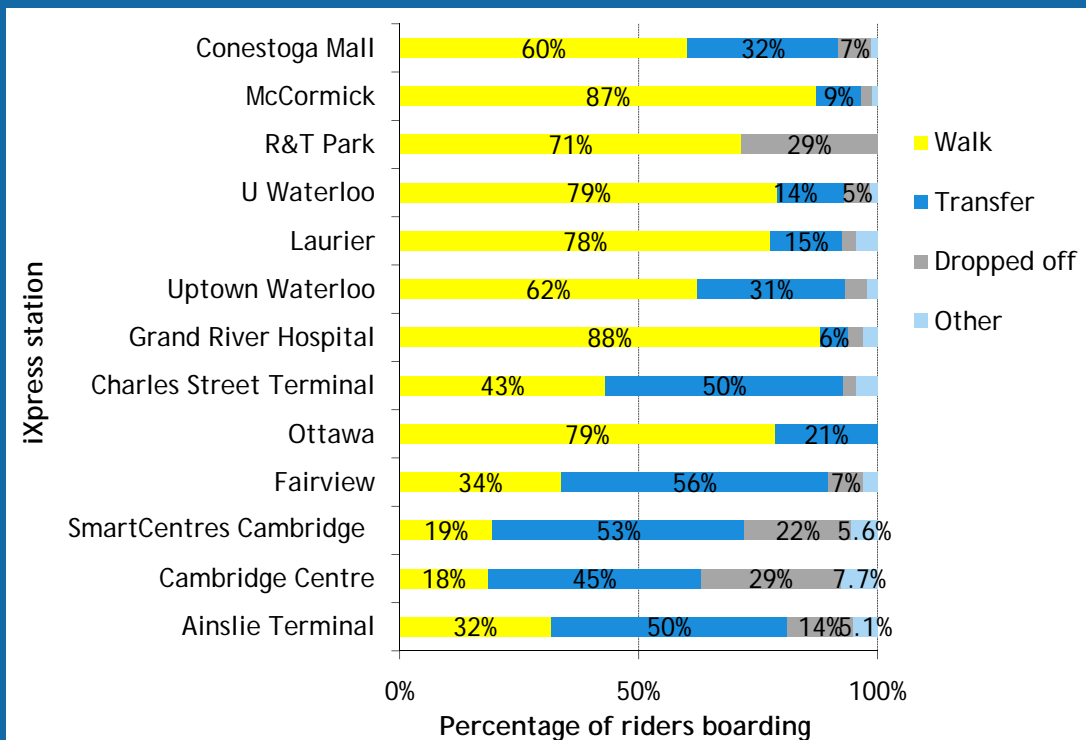


Figure 29: Modes used to access each iXpress station

Second, the Region has attempted to record the use of bicycle racks on iXpress buses to estimate the impact of the Bus-n-Bike marketing efforts (see 2.3.2). Unfortunately, the results of these studies were deemed too unreliable to include here. The 2006, 2007, 2008 onboard surveys do indicate some use of bicycles before and after riding iXpress buses, but these numbers are very low (less than 1% of all modes used) due to the fact that the surveys were distributed during the snowy, cold months of February and March. Anecdotal evidence suggests that the use of bicycle racks is much higher during the non-winter months, but no study has been completed to verify this hypothesis.

### 3.2.5 Individualized marketing

The goal of the iXpress Project's individualized marketing (IM) pilot project (2.4.3) was to explore the effectiveness of IM in shifting modal share from auto-based modes to transit and other environmentally friendly modes of travel. Analysis of the data collected from the Before Survey and the After Survey indicates that IM intervention did affect individual travel modes. See Figure 30 to compare the percentage of trips made with each mode before and after IM, and see Figure 31 for the relative change in mode use after IM. Except for the increase of

40.4% in transit use, these changes were found to be statistically insignificant. However, if environmentally friendly modes (i.e., transit, walk, and bike) are differentiated from auto-based modes (i.e., car driver, car passenger, taxi, and other), as demonstrated in Figure 32, then the impact of IM does become statistically significant: the use of environmentally friendly modes of travel increased from 16.7% to 18.8% (a relative increase of 12.5%) and the use of auto-based modes decreased from 83.3% to 81.2% (a relative decrease of 2.5%). Important to note is that this impact applies only to households or trip makers who were receptive to IM intervention (between 11% and 27% of the target group); consequently, the expected net impact of IM on increasing transit ridership is estimated between 4% and 11%.

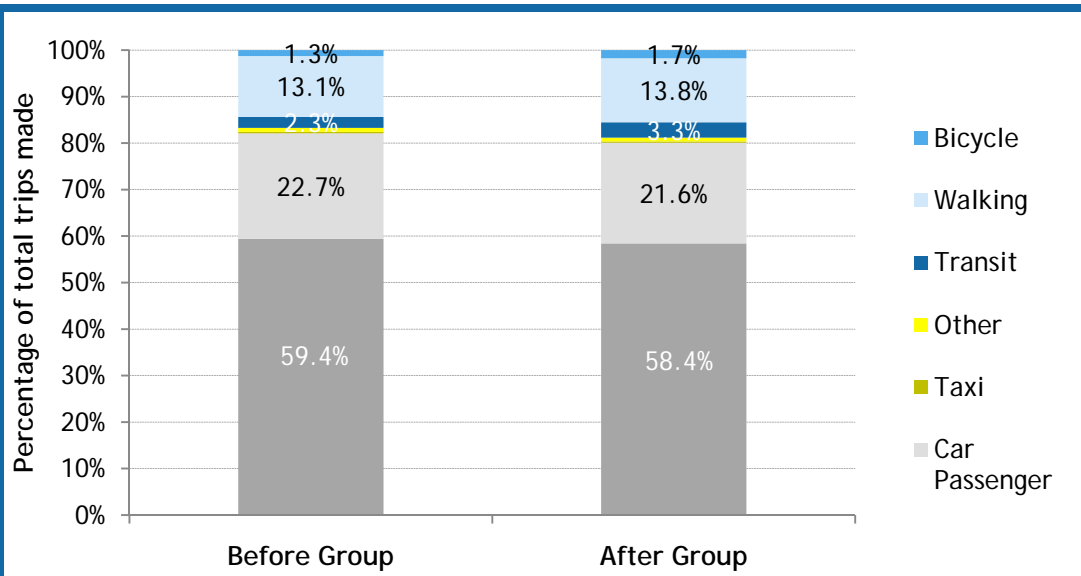


Figure 30: Comparison of travel mode use before and after IM intervention

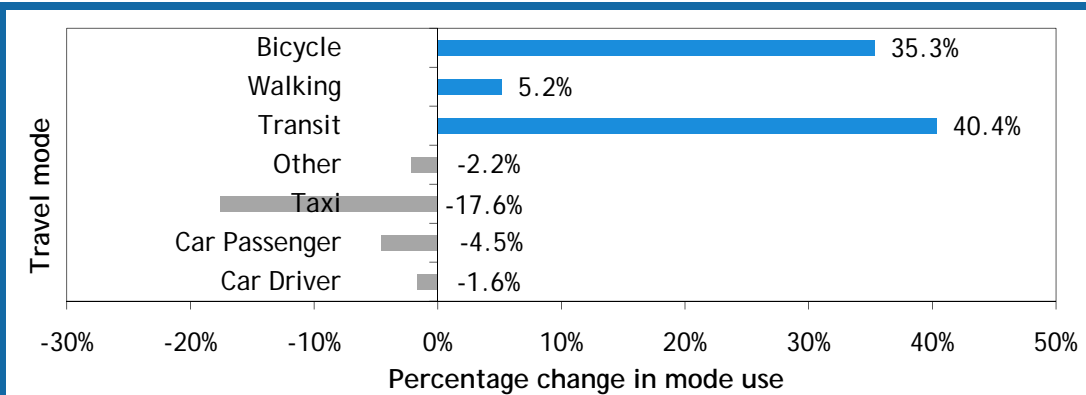


Figure 31: Relative change in travel mode use after IM intervention

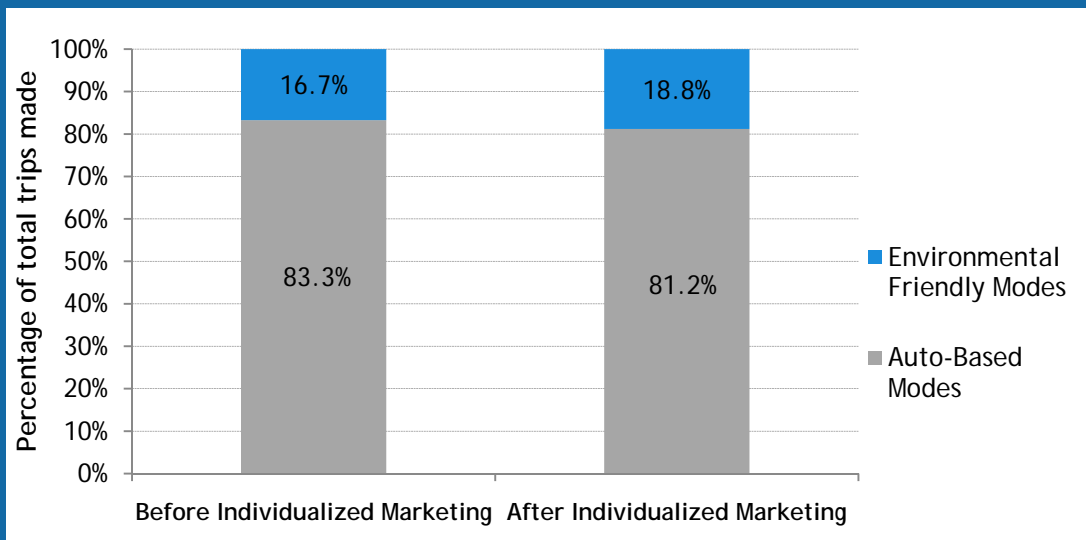


Figure 32: Comparison of travel modes used before and after IM intervention

### 3.3 Greenhouse gas emissions

Previous sections in this report have described the impact of the iXpress service and its supporting technologies on travel behaviour within Waterloo Region. The net impact of this change in terms of the generation of greenhouse gas (GHG) emissions can be quantified.

One way to do so is to determine the GHG emissions produced per passenger-kilometre for the iXpress service and compare this to the GHG emissions produced by auto users. Figure 33 shows this comparison using iXpress average passenger trip length and weekday ridership data from 2008, fuel consumption data, and Ontario personal vehicle fleet data. These results show that on a passenger-kilometre basis, the iXpress service produces only one third of the GHG emissions produced by passenger cars. This difference represents an annual GHG savings of approximately 3,650 tonnes, a substantial reduction in the carbon footprint associated with mobility. Furthermore, unlike the use of passenger cars, the per-passenger carbon footprint of transit service typically declines with increased use. It is expected that as a result of continued increased iXpress ridership, the GHG emission rate for the weekday iXpress service will decline by approximately 20% during 2009.

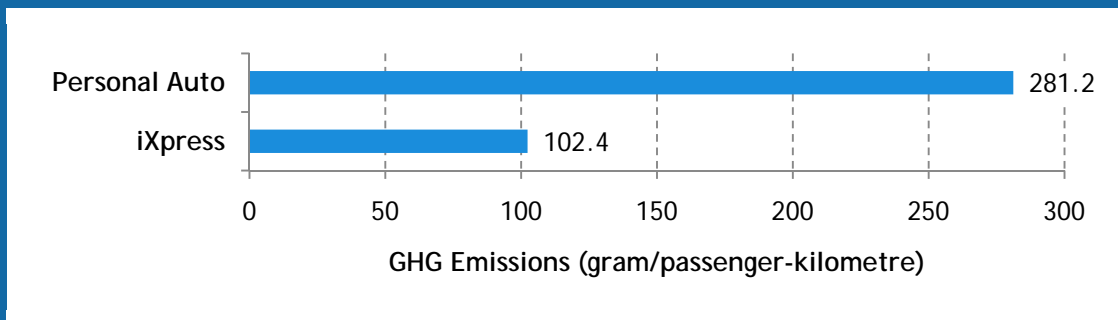


Figure 33: Comparison of greenhouse gas emissions by travel mode (2008)

### 3.4 Other project benefits

In addition to producing a modal shift that reduces the production of environmentally damaging emissions, the iXpress Project has achieved several other benefits for the Region of Waterloo, including an increase in safety, reduced operating costs, and an increase in transportation choice and convenience.

#### 3.4.1 Increased safety

The iXpress Project has increased the safety of both drivers and riders. Because the automated vehicle location (AVL) system (see 2.2.1.2) allows Grand River Transit (GRT) staff to pinpoint exactly the location of iXpress vehicles, drivers and riders can be located more quickly in the case of an emergency. If bus operators press a silent emergency button, their vehicle's precise location is communicated to controllers. In addition, the physical changes to improve pedestrian access (see 2.3.1) and to facilitate cycling (see 2.3.2) have increased the safety of those travelling to and from iXpress stations.

#### 3.4.2 Reduced operating costs

The iXpress Project has reduced GRT operating costs in two ways: the decreased use of fuel and the implementation of more cost-effective data collection methods.

First, the project included the purchase of eight diesel-powered buses for the iXpress service. These buses provide improved fuel consumption and emissions compared to existing older diesel buses within the GRT fleet. Furthermore, because iXpress stations are spaced much farther apart than the conventional average (see 2.1.2), iXpress buses have a higher average speed and less idling time at stations and intersections than do buses on conventional routes.

Second, the project involved implementing automatic passenger counting and automated vehicle location systems (see 2.2.1), which provide continuous data for the iXpress service. Manual data collection is expensive and is usually undertaken for only short periods of time, which means that the resulting data does not always indicate clearly the variations in passenger loading and travel times across a day, week, or year. The iXpress automated systems, in contrast, provide accurate, thorough data and will enable transit planners to account for variability of transit demand and travel times when adjusting and improving iXpress service. The implementation of these systems thus has the potential to reduce costs, not only in data collection but also in reduced fleet requirements and/or reduced transit vehicle-kilometres travelled resulting from the creation of more efficient routes and/or schedules.

#### 3.4.3 Increased transportation choice and convenience

By creating a regional express service that is well integrated with cycling and walking routes, the iXpress Project has increased the transportation options available to the residents of Waterloo Region and has made active and/or sustainable transportation modes more attractive and convenient.



## 4 Successes, Challenges, and Lessons Learned

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The iXpress service made possible with funding from Transport Canada's Urban Transportation Showcase Program has been a welcome and well-used addition to the Grand River Transit (GRT) system. In order to assist those seeking to implement a similar express service in other urban areas across Canada, this chapter describes the many project successes celebrated by the Region of Waterloo (4.1) and outlines the challenges encountered and addressed during the project (4.2). The chapter also highlights (in blue text boxes) various lessons learned by the Region that may be useful to others.

### 4.1 Successes

The iXpress Project has been immensely successful, due in large part to:

- consistent ridership growth beyond targets (4.1.1);
- the visibility and community awareness of iXpress service (4.1.2);
- the project team's ability to stay on budget (4.1.3);
- cross-departmental collaboration and development of in-house expertise (4.1.4); and
- stakeholder relationships and community partnerships (4.1.5).

#### 4.1.1 Consistent ridership growth beyond targets

The iXpress bus has been a popular addition to the services offered by GRT, and ridership levels have consistently exceeded projected targets (see 3.1.1). iXpress service has thus proven to be a significant component in the development of a transit culture in Waterloo Region and an important stepping stone towards rapid transit (see 5.2).

##### *TIP FROM THE REGION*

Obtain buy-in from large community organizations to encourage ridership growth.

One factor significant to the consistent growth of iXpress ridership is the introduction of a universal bus pass at both Wilfrid Laurier University (WLU) (graduate and undergraduate) and University of Waterloo (UW) (undergraduate) around the time that iXpress service began. Instituted in September 2005 at WLU and in

September 2007 at UW, these semester passes are paid for by student fees and allow students unlimited use of GRT bus services. Post-secondary students use iXpress buses frequently (see 3.1.1).

#### 4.1.2 Visibility and community awareness of iXpress service

The iXpress service is well known within Waterloo Region and boasts a positive community profile. Critical to this visibility was the iXpress branding strategy (see 2.4.1), which involved a distinct look for iXpress vehicles and stations and a name and logo that have been well received by the public. Also significant is that the regional newspaper has been very supportive in its coverage of the express service. Furthermore, large community organizations such as University of Waterloo, Wilfrid Laurier University, and Grand River Hospital have promoted the iXpress service to their constituencies.

##### *TIP FROM THE REGION*

Distinguish a distinct transit service with a distinct brand.

#### 4.1.3 Ability to stay on budget

The iXpress Project was completed within budget, a significant accomplishment for a project costing more than \$9 million. Remaining on budget occasionally required reallocating resources from one project component to another, such as from Intermodal Integration (see 2.3) to Advanced Transit Technology (see 2.2). The \$9 million invested in regional transportation infrastructure has resulted in a very successful route carrying up to 9000 or more daily trips.

##### *TIP FROM THE REGION*

Reallocate resources when necessary to remain on budget.

#### 4.1.4 Cross-departmental collaboration and development of in-house expertise

One factor contributing to the success of the iXpress Project is that it was coordinated and implemented by a multi-disciplinary team. This team offered extensive experience in public consultation, innovation, technology, transit planning, transit operations, transportation demand management, traffic operations, impact assessment and monitoring, project management, marketing, and community outreach. Each of the five project components (see Chapter 2) were completed by a team involving staff from both Transportation Planning and Transit Services. The Transit Technology component (see 2.2) also involved staff from the divisions of Transportation, Design and Construction, and Information Services. The Monitoring and Assessing component (see 2.5) was led by a researcher from

##### *TIP FROM THE REGION*

Create a multi-disciplinary team to administer and implement large transportation initiatives.

University of Waterloo. Although this team approach was challenging at times, as it required individuals to look beyond their own operational concerns to larger issues, it also created new dialogues among people who had never worked together closely and allowed new collective understandings to develop.

The project's success was dependent on the ability of team members to coordinate their many specialties, but it was also related to the expertise offered by members of many community and government organizations and particularly by several consultants hired by the Region. These external experts have in turn significantly increased the expertise of in-house staff on such aspects as advanced transit technologies, marketing initiatives, and station accessibility.

*TIP FROM THE REGION*

Involve external experts when necessary to guide staff and to develop in-house expertise.

Project team members now possess insights that will improve the Region's ability to develop and implement similar initiatives in the future. For example, the individualized marketing project (see 2.4.3) was implemented collaboratively by the Region and an external consultant. By being involved in almost all steps of the project, Region staff learned the intricate details of this marketing approach and will be able to implement similar projects beyond the timeframe of the showcase program with less assistance from outside organizations (for example, see discussion of ecoMOBILITY in 5.1).

#### 4.1.5 Stakeholder relationships and community partnerships

Another factor contributing to the project's success is that the project team worked both to strengthen relationships with all project stakeholders and to develop partnerships with community organizations.

One example of these efforts came early in the implementation phase, when the project team presented several iXpress route options to the community for feedback. Some members of the

*TIP FROM THE REGION*

Consult with the public as part of effective transit planning.

public expressed concern about the possible introduction of transit service on streets where none had previously existed, Region staff responded by engaging in additional public consultations, fieldwork, and analysis. Although these efforts took more time and resources than had been allocated initially to this aspect of the project, all parties were ultimately satisfied by the outcome, which demonstrates the value of consultation with all involved parties.

Another highlight was the stakeholder workshop about the project's technological components. At this meeting held in November 2004, the project team informed affected departments about the technology components to be implemented. The team asked for staff

*TIP FROM THE REGION*

Keep stakeholders informed and involved throughout planning and implementation phases.

input on a needs assessment and discussed with them the technology's potential impacts on other systems, as well as barriers to implementing the technologies. By engaging a diverse set of participants early in the process, the technology team increased awareness of the project and became better prepared to deal with barriers that later arose.

An exciting outcome of the project is that the Region has developed positive relationships with a diverse set of government and community organizations, including the three urban municipalities in the region, University of Waterloo, Wilfrid Laurier University, Grand River Hospital, regional shopping centres, and local businesses. These relationships were particularly crucial in iXpress station development (see 2.1.2), improvements to pedestrian station access (see 2.3.1), and promotion of iXpress service (see 2.4.2).

## 4.2 Challenges

Perhaps one of the most fundamental successes of the iXpress Project is that the Region was able to address effectively the various challenges encountered throughout the project. These challenges included:

- the technological complexity of the project (4.2.1);
- the Complexity of jurisdiction (4.2.2);
- managing diverse expectations (4.2.3); and
- managing staff resources (4.2.4).

### 4.2.1 Technological complexity

The iXpress Project was challenging in that it involved the planning and implementation of a large integrated and complex transit management and traveller information system. Typical

*TIP FROM THE REGION*

To successfully implement technology, be flexible with budget and schedule, and use expertise.

of large technology projects, costs were greater than budget and implementation took longer than scheduled. As a result, overall project resources were reprioritized and technology components were rolled out in stages.

To effectively address the complexity and size of the technology components, the Region hired an expert in the field to guide them through the design and consultation process, bidding process, and

implementation phases. As described above (see 4.1.4), this expert helped project staff develop new expertise that will be useful in future initiatives.

#### 4.2.2 Complexity of jurisdiction

As mentioned above (see 4.1.5), the implementation of the iXpress Project required the Region to work together with many community organizations and various levels of government. Although it was a highlight to strengthen these relationships, the Region's lack of direct jurisdiction in some situations did complicate the implementation of various project components.

##### *TIP FROM THE REGION*

Budget time to collaborate with multiple stakeholders involved in station development.

For example, in order to construct the iXpress stations (see 2.3.1) and to obtain the electrical power necessary for the automated displays at each station (see 2.2.2.3), the Region required the cooperation—and, in some cases, the property—of various businesses and organizations. Obtaining this cooperation was a worthwhile endeavour, but it was also time-consuming and at times complicated. The project team discovered that every station had its own unique challenges, and overcoming these challenges required significant negotiation and communication with adjacent businesses and organizations.

Implementing proposed changes to improve pedestrian accessibility (see 2.3.1) was also time-consuming and complicated, due at least partially to the multiple levels of government: the changes required the involvement of not only Region staff but also three separate groups of engineering and design/construction staff, one set for each municipality.

#### 4.2.3 Managing diverse expectations

Challenges arise in any project when the project vision, goals, and values are not communicated effectively to all stakeholders. The Region worked hard to involve all stakeholders in the various aspects of the iXpress Project so as to achieve consensus (see 4.1.5), but disagreements still arose occasionally due to varying expectations about the project. These disagreements were quickly resolved once expectations were again clarified and consensus was renewed.

##### *TIP FROM THE REGION*

Communicate expectations and goals effectively so as to build consensus.

For example, differing opinions arose about whether the iXpress shelters should have a contemporary or Victorian-style design. Once it was understood that the express service had a contemporary branding strategy and would be routed through urban areas that

emphasized innovation and cutting-edge technology, the contemporary design emerged as the preferred alternative.

#### 4.2.4 Managing staff resources

Most aspects of the iXpress Project were carried out by Region employees who had other projects and responsibilities competing for their attention. Thus, for the duration of the

project, staff resources were often stretched to their limit. This challenge was overcome partially by hiring short-term employees for aspects of the project such as the individualized marketing activities (see 2.4.3). In addition, one two-year contract position fully dedicated to the project was established. The project's accomplishments required considerable effort and cooperation on everyone's part.

##### *TIP FROM THE REGION*

For large multifaceted initiatives, allocate some staff resources exclusively to project activities.



## 5 Future initiatives and directions

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Having reached the end of the showcase period, the Region of Waterloo is using the insights gained and work accomplished during the iXpress Project to further develop a transit culture within Waterloo Region. Regional initiatives are proceeding in two related directions:

- further development and expansion of iXpress initiatives within existing Grand River Transit (GRT) services (5.1); and
- further exploration and development of rapid transit (5.2).

### 5.1 Expansion within transit services

Now that iXpress service is established in the community, the Region will continue to improve the service with research and activities such as:

- considering potential locations for additional stations,
- improving service levels by increasing the frequency at which buses run in peak periods (from every 15 minutes to every 10 minutes),
- continuing to integrate schedules of local routes and iXpress route to minimize transfer delay,
- fine-tuning and expanding transit signal priority measures,
- determining the impact of adding bypass lanes to further reduce iXpress travel times,
- adding flat-panel electronic displays in additional locations such as universities and malls, and
- making the easyGO trip-planning system available to PDAs such as the Blackberry.

The Region has received ecoMOBILITY funding to expand its use of individualized marketing.

Building on knowledge gained through the iXpress Project, the Region is expanding its individualized marketing efforts to additional neighbourhoods. Specifically, the Region has received funding from Transport Canada under its ecoMOBILITY Program to

use individualized marketing techniques to promote transit to residents in a suburban community where transit is newly available and to employers and businesses in a compact, mixed-use core area. This initiative also involves piloting a transferable transit pass and helping the Region's three municipalities develop parking management tools.

An additional development is the integration of the automatic passenger counting (APC) system with a data analysis system being developed with researchers at the University of Waterloo. This integration will make it possible to generate regular daily, weekly, and monthly reports. These reports will reveal schedule problems and other such issues more clearly than reports generated only by ad hoc requests. Thus they will better assist staff with service development.

Furthermore, the Region is exploring the possibility of extending certain iXpress initiatives to local transit services. For example, APC and automated vehicle location systems were installed on 19 non-iXpress buses in 2007. The Region is exploring the impact of deploying these and other iXpress technologies across the system; installation of these technologies on some additional local buses is likely. Also, the success of transit priority measures along the iXpress route supports the potential expansion of similar measures to other transit corridors in the region. In particular, queue-jump lanes may be implemented at a reasonable cost on certain local routes.

## 5.2 Rapid transit initiatives

The iXpress project has significantly increased the ridership in the central transit corridor and contributed to a transit culture in the community that is supportive of rapid transit. Regional Council recently approved the development of a rapid transit (RT) system that will ultimately replace the iXpress service. The initiative involves light rail transit (LRT) and adapted bus rapid transit (aBRT).

The system will be implemented in two stages:

- |         |  |
|---------|--|
| Stage 1 | <ul style="list-style-type: none"> <li>• LRT running from Conestoga Mall to Fairview Park Mall (northern portion of route)</li> <li>• aBRT from Fairview Park Mall to Ainslie Street Transit Terminal (southern portion of route)</li> </ul> |
| Stage 2 | <ul style="list-style-type: none"> <li>• continue LRT from Fairview Park Mall to Ainslie Street Transit Terminal (southern portion)</li> <li>• (to follow Stage 1 as soon as possible)</li> </ul>  |

The ultimate goal of the iXpress Project has been achieved: it has prepared the way for higher-order transit.

The approved RT system will cost approximately \$790 million. An additional \$1 million annually has been allocated for an initial ten-year period to implement strategies to build transit ridership in the southern portion of the RT route (Cambridge). The Region is now negotiating funding agreements with provincial and federal governments, after which it will explore and decide upon the RT system's final design. Construction of the LRT is scheduled to launch in 2012, with the system opening late in 2014. Development of the aBRT could start as early as 2011.

The Region is currently working with researchers at the University of Waterloo to comprehensively redesign the GRT transit network so that it would be fully integrated with the RT system so as to maximize overall transit service quality and efficiency. This redesign is based largely on data gained through the automatic passenger counting system (see 2.2.1.3) and the automated vehicle location system (see 2.2.1.2) developed as part of the iXpress Project.

As part of this redesign, the Region is exploring a more extensive network of limited-stop, high-frequency express routes similar to the iXpress service that would be fully integrated with the future north-south RT route. These will provide additional higher-speed, high-quality transit services to regional residents. The insights gained during the iXpress Project will assist in the development of these high-frequency routes.

## 6 Conclusion

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In medium-sized Canadian cities, transit services have traditionally been used by travellers without automobile access. The iXpress Project, implemented as part of Transport Canada's Urban Transportation Showcase Program, demonstrates the potential for providing a competitive transit service that can attract a greater share of riders, including those who have access to a car but choose transit instead. Within the Region of Waterloo, the iXpress service has:

- reduced trips by auto,
- enhanced mobility options, and
- reduced greenhouse gas emissions.

Integral to the successful development and implementation of such a service is:

- the strategic use of technologies that ensure faster speeds and reliable schedules and that facilitate convenient trip planning,
- effective collaboration among all stakeholders and people involved in the project, and
- appropriate and effective branding and marketing strategies.

Such elements are critical if public transit is to be perceived as a viable alternative to the automobile for residents negotiating among various lifestyle priorities.

## Appendix: Abbreviations

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aBRT	Adapted bus rapid transit (see 5.2)
AVL	Automated vehicle location (see 2.2.1.2)
APC	Automatic passenger counting (see 2.2.1.3)
CTC	Central Transit Corridor (see 2.1.1)
GHG	Greenhouse gas (see Chapter 1 and 3.3)
GRT	Grand River Transit (see 1.2 and 1.3)
IM	Individualized marketing (see 2.4.3)
ITS	Intelligent transportation system (see 2.2)
LRT	Light rail transit (see 5.2)
RT	Rapid transit (see 5.2)
TSP	Transit signal priority (see 2.2.1.1)
UTSP	Urban Transportation Showcase Program (see 1.1)