Region of Waterloo & Grand River Transit

Using GIS in the Implementation of New Transit Technologies

URISA Ontario Chapter
Municipal Update

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November 8, 2005

Agenda

- Introductions
- Region of Waterloo / Grand River Transit
- UTSP Project
- Transit Technology Project Overview
- GIS & Transit
- GIS Data Requirements for Transit Technology & Data Analysis
- Expected Project Benefits
- Closing Remarks

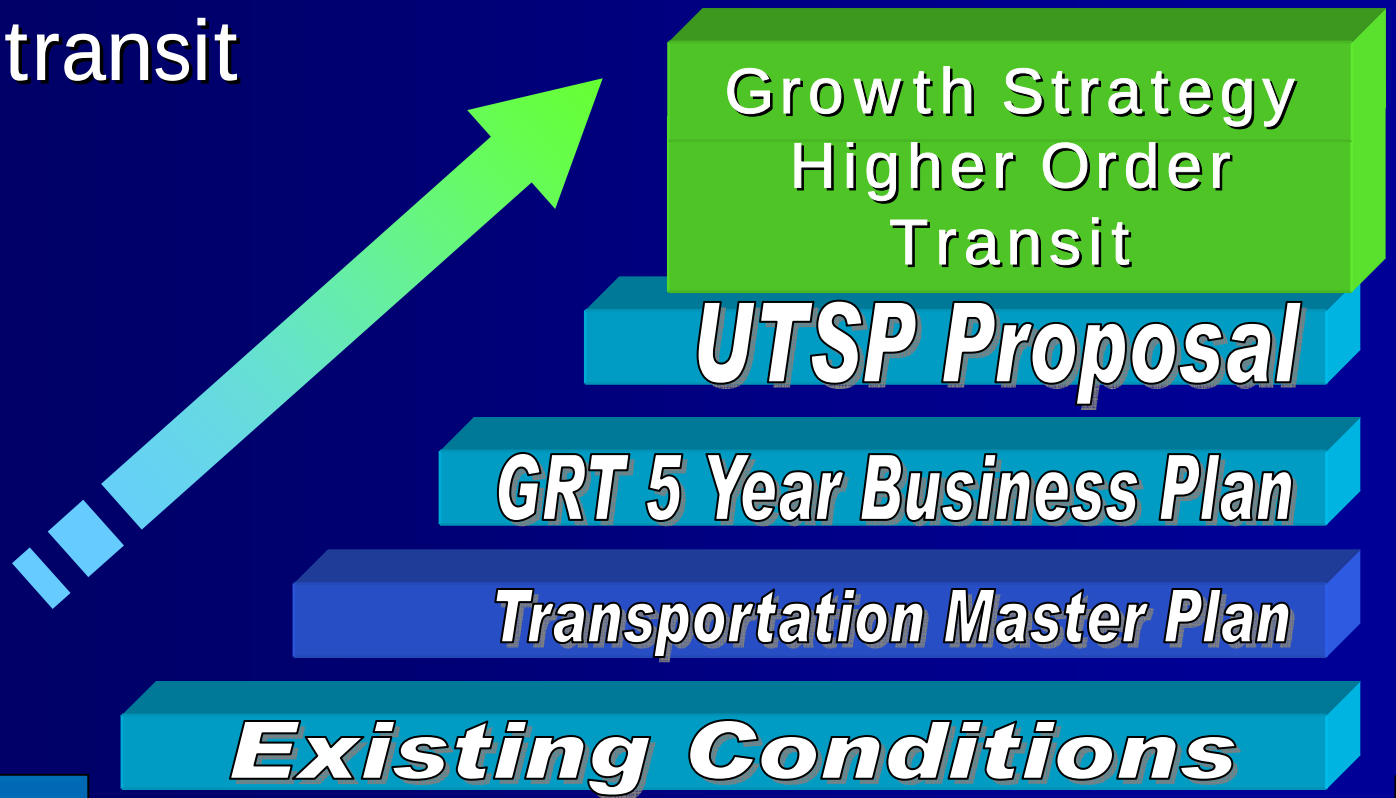
UTSP – What is it?

- Urban Transportation Showcase Program
  - Showcase initiatives that reduce greenhouse gas emissions by reducing single occupant vehicles
  - 8 projects selected out of 48 across Canada
    - Halifax, NS
    - Greater Vancouver
    - Whitehorse, Yukon
  - Program runs from 2004 to March 2007
  - Transport Canada
    - http://www.tc.gc.ca/programs/environment/UTSP/menu.htm

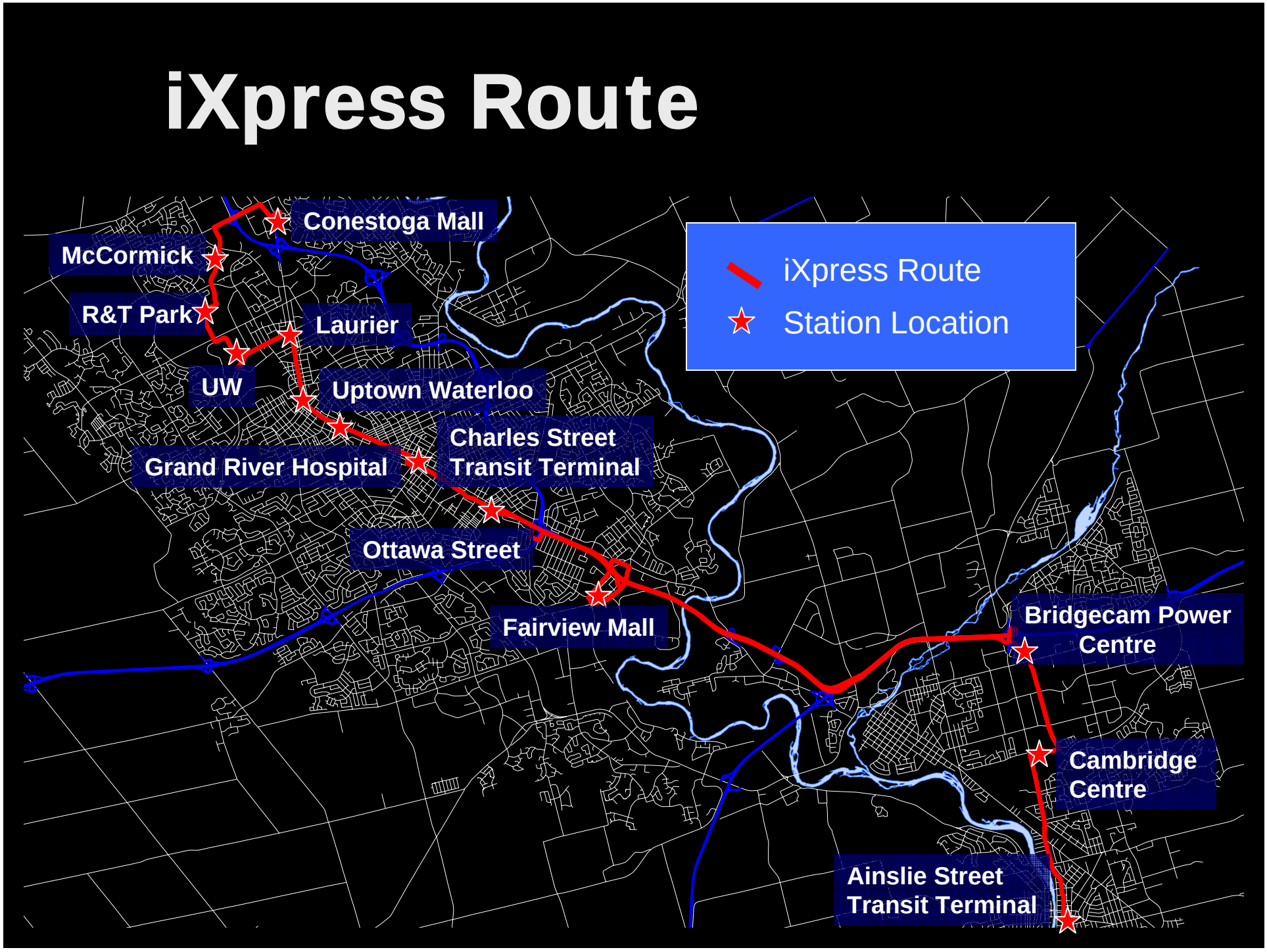
GRT Transport Canada Transports Canada Ontario

Project Objectives

- One step towards future higher order transit



iXpress Route



Objectives: *Transit Technology*

- Implementation of Intelligent Transportation System (ITS) technologies
  - To reduce transit travel times (reduction of delays at intersections)
  - Improve mode share through enhanced customer information (including new media & formats)
  - Enhance data collection & information processing for improved service planning & market research

The Case for New Technology

- What are the main things that need to be improved:
  - service policies and schedules?
  - communications and control technology?
  - passenger information?
- Identify the technology changes required to successfully implement and operate new ITS technologies and systems

GIS and Transit

- Base map attributes that support transit applications:
  - Centerline and topology
  - Street names, address ranges, Unique ID, PC, direction (one- or two-way)
  - Street name alias table
  - Road restrictions (height, weight, direction of travel)
  - Road classification, speed limits and number of lanes
  - Political boundaries
  - Transfer points to other modes (e.g. rail service transfer points)

GIS and Transit

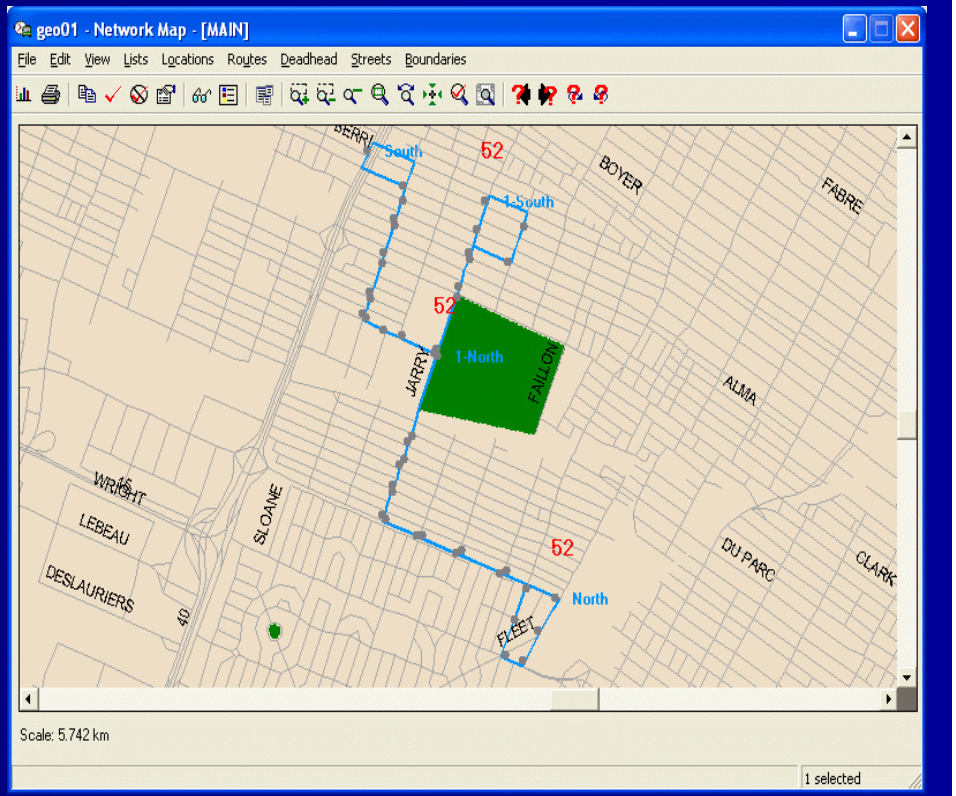
- Additional attributes:
  - Walking paths with obstacles to walking and curb cut locations
  - Bicycle paths
  - Rail alignment and tracks
  - Turn impedances
  - Grade
  - Landmarks
  - Demographics and land use by political boundary

Data Requirements for Key Transit Technologies

- Route Planning & Scheduling
- Bus Stop Database
- Transit Signal Priority
- Automatic Passenger Counting
- Passenger Information
  - Real-time and Message Signs
  - Web-Based Trip Planning
- Service & Capital Planning

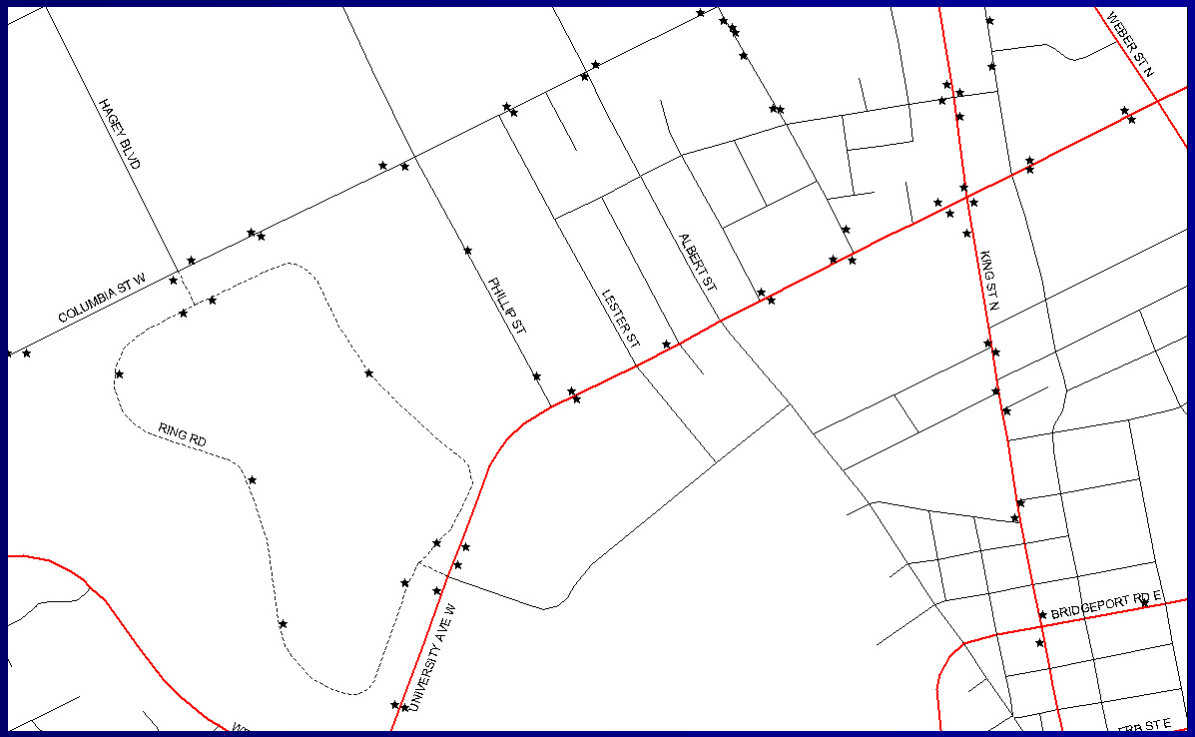
Route Planning & Scheduling

- HASTUS
- GIS Data Requirements
  - Single Line Street Network
  - Bus stop database



Bus Stop Database

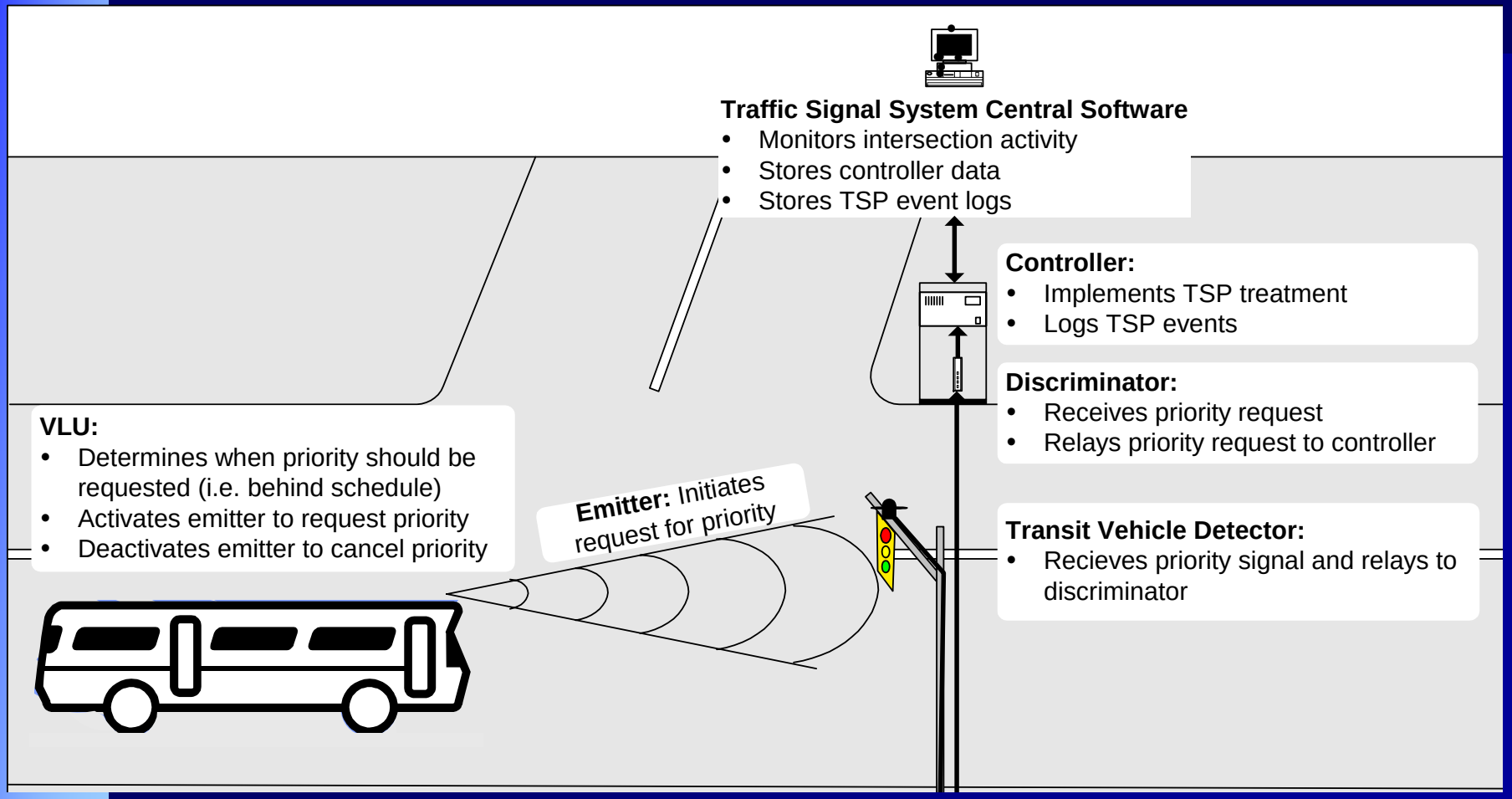
- Over 2500 GRT stops on almost 60 routes using approximately 200 vehicles



Transit Signal Priority

- GIS Application / Function
  - Determine need for priority treatment (based on schedule adherence, load, etc.)
- Transit Features
  - Single Line Street Network
  - Time Service Desired and Time Estimated Departure
  - Intersection (signal) stop bar
  - Location of end of queue
  - Need for priority treatment criteria (schedule adherence; load, etc.)
  - Traffic impedance

TSP – System Overview



Automatic Passenger Counters

- Count passengers as they board and alight
- Reduced data collection cost
- Increased quality (and quantity) of data
- Interface with Automatic Vehicle Locator (AVL)

Automatic Passenger Counters

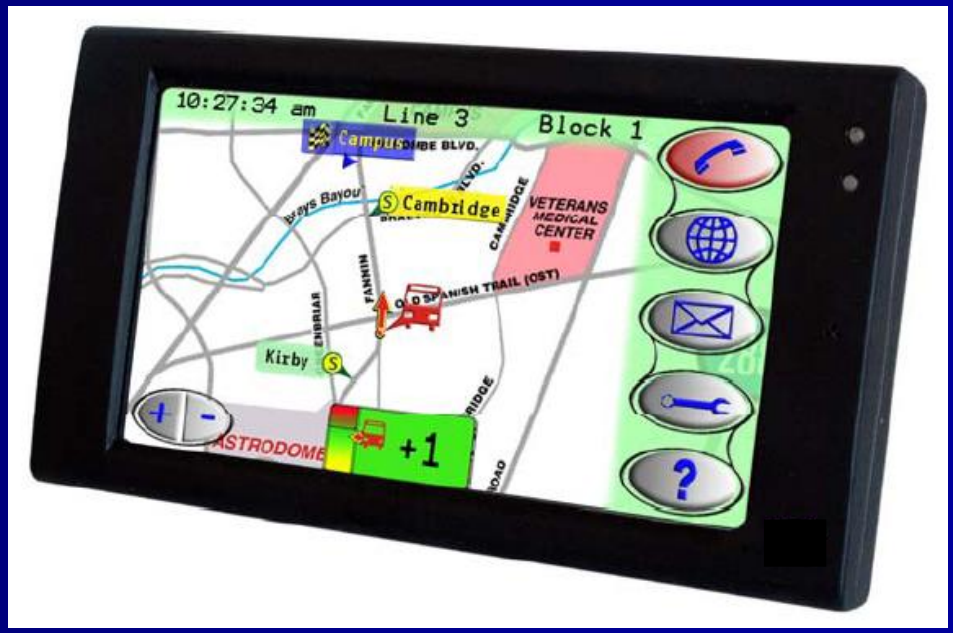
- GIS Application / Why Collect APC data?
  - Aggregate boarding and alighting information at bus stop location and other locations.
  - Provide load information between stops (intervals along route).
  - Identify peak load location.
  - Marketing
- Transit Features
  - Roads
  - Bus stop location/area
  - Route pattern
  - Trip (vehicle assignment or operator)

Real-Time Information

- Computer Aided Dispatch / Automatic Vehicle Location (CAD/AVL)
- Interactive Voice Response (IVR) System
- Mobile Data Terminal
- Variable Message Signs (VMS)
- Real-Time Information on Mobile Devices
- Web-Based Trip Planner

Mobile Data Terminal

- Communication between transit centre and vehicle operators via digital display panel



Variable Message Signs

- Multi-line signs showing all arrivals or departures listed in order of time and showing the scheduled and actual time for the activity.

Real-Time Information on Mobile Devices

- Wireless phones
- Web-enabled PDAs
- Other devices (two-way pagers, Blackberry)

Web-Based Trip Planner

- Provides real-time information via the internet
- Operates in conjunction with AVL, IVR, etc.
- Examples of information that can be displayed:
  - Static schedules for Rapid Transit Buses;
  - Static schedules for Local Buses;
  - Fare Information;
  - Route Maps with Stop locations; and
  - Other (lost & found location, static tourist information [e.g. area attractions])

Web-Based Trip Planning

- Other Data Requirements
  - Amenities @ stops
  - Transfer Points
  - Patterns / Routes
  - Address Ranges
  - Landmarks
  - Parking
  - Walking distances
  - Accessibility
  - Obstacles to walking
  - Fares
  - Schedules

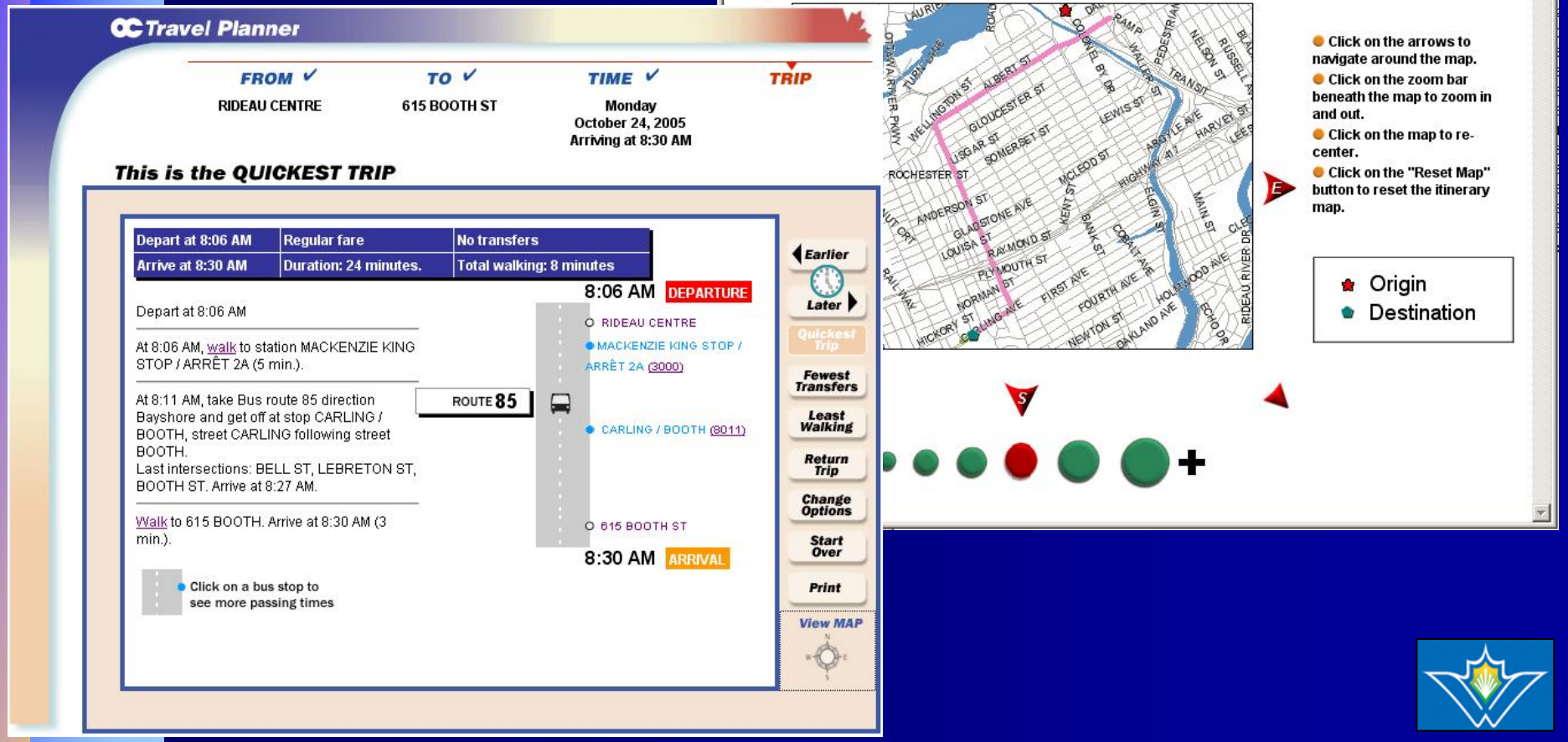
Web-Based Trip Planning

- Required data in place
  - Streets & address ranges
  - Bus Stops (amenities in progress)
  - Routes / patterns (from HASTUS)
  - Schedules
  - Parking

Web-Based Trip Planning

- Required data to be (being) collected
  - Landmarks (attractions, offices, sports venues, etc). Partial list used in GIS Locator already exists
  - Walking distances (based on road segments)
  - Obstacles to walking
    - Attribute on road segment “walking permitted – yes/no”
  - Pedestrian pathways
  - Accessibility (Curb cuts, etc)

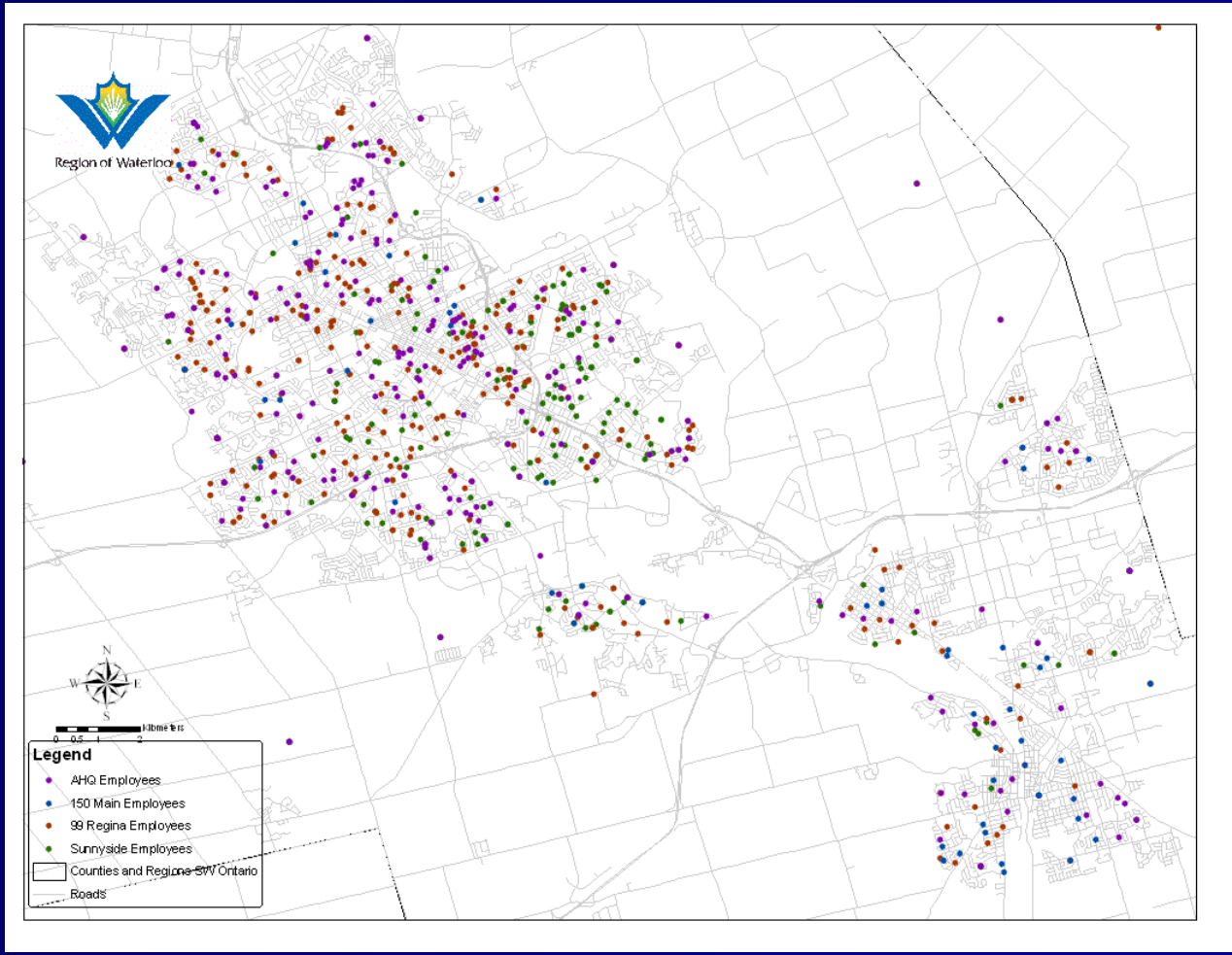
Web-Based Trip Planning



Service & Capital Planning

- Produce service change materials.
- Presentations to Council, community groups.
- Prepare analyses of the service operating environment for use in planning changes to transit service.

Service & Capital Planning



Overall Project Benefits

- Improved transit service with enhanced customer information
- Reduction in greenhouse gas emissions
- Improvements to public safety and quality of life

Integrated Strategy

GHG Reductions due to modal shift

Closing Remarks

- This project represents a Multi-departmental GIS related project
- Demonstration of the important contribution of GIS data creation and analysis for transit planning and development
- Seamless (to the customer) integration of GIS technologies into amenities used by the public (trip planner, etc.)