



York Region Transit

York Region Transit (YRT) Five-Year Conventional Transit Service Plan (2006 - 2010)

Draft Summary Report

November 28, 2005

*Excellence in
Transportation
Planning*



York Region

York Region Transit - Five-Year Conventional Transit Service Plan 2006-2010

Draft Summary Report

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1. Introduction

Following the amalgamation of transit services in York Region in 2001, YRT has shown dramatic increases in route coverage, service levels, span of service and, most important, ridership. Residents of York Region have responded to the rapid growth and expansion of the system by increased use their work, school and leisure travel.

Since amalgamation in 2001, ridership has grown from approximately 7.5 million passengers to almost 20 million projected for 2006. This ridership growth is unmatched any where in the country. The introduction of Viva services in the Yonge and Highway 7 corridors and connections to Don Mills and Downsview subway stations is just the latest and most dramatic example of service initiatives. As YRT moves into its second five years of operation, this Five-Year Plan is an opportunity to assess the current system and plot a strategic course for the next five years. This period from 2006 to 2010 will be a period where YRT services begin to mature, where growth in transit service catches up with rapid population growth, where services continue to expand in response to growth, and innovative service concepts and technology applications continue to develop, and York Region residents come to see their YRT transit service as a vital element of the transportation network in the Region.

This Five-Year Plan responds to the challenges of the next five years by refining the service standards into more effective planning tools, developing a comprehensive communication plan that ensures effective input from stakeholders, that outlines service initiatives and growth requirements, and explores new ways YRT can continue its innovative development with flexible services, smaller buses, express services, and community shuttles, all supporting and complementing an extensive network of Base Grid services, local routes, and Viva corridors.

1.1 Report Structure

This report includes a summary of the analysis, and is supported by additional detailed information in a series of Background Papers.

The separate Background Papers comprise:

1. Service Standards Technical Analysis
2. Service Standards Public Guidelines Document
3. Existing Service Review Details (including on-board Origin-Destination survey results)
4. Consultation and Communication Plan
5. Service Strategies
6. Fare Technology and Integration
7. Fleet and System Accessibility
8. Technology application details

2. Service Standards and Planning Process

2.1 The YRT Family of Services

The Transit Service Guidelines will be applied to the entire family of transit services being provided by YRT.

YRT presently provides six different service types as part of its conventional transit services. Each service type addresses ridership demands with a unique type of service delivery model, tailored to specific demographic, geographic, and customer needs. YRT also provides specialized door-to-door services for individuals in York Region with mobility related disabilities.

2.1.1 Viva Service

Viva is YRT's new bus rapid transit (BRT) system, operating in the Highway 7 and Yonge Street corridors and providing connections to Don Mills and Downsview subway stations. The service is designed to provide frequent, limited stop service using distinct vehicles, intelligent technology systems, off-board payment, upgraded station and queue-jump lanes, integrated with YRT's regular route service.

The service is intended to be the first phase of longer-term implementation that will include dedicated transitways to provide significantly faster travel times.

2.1.2 Base Grid Services throughout the Region

Throughout the YRT system, certain routes and services will be designated as Base Grid Services, to ensure a basic level of access throughout the service area. In the larger urban areas, Base Grid Services will form a basic grid route network of routes, connecting major trip origins and destinations. Base Grid Services will operate 7 days per week, in all operating periods. Base Grid Services are designated in the major east-west and north-south travel corridors on the main arterial roads to ensure that 90 per cent of all major residential and employment areas are within 1000 metres of transit service.

In the smaller urban areas, designated Base Grid services will operate in all service periods, but in addition to a conventional fixed route service, may take the form of one of the other YRT services, to ensure the balance of service effectiveness and cost-efficiency.

2.1.3 Local Routes

Fixed routes will provide the basic structure of the YRT system throughout the service area, particularly in the larger urban areas. In addition to the Base Grid, a support network of Local Routes will serve a feeder or neighbourhood circulation function in the transit system. They will operate within the various communities connecting these communities to the major local activity centres or corridors and to the arterial grid network for transfers between routes. In peak periods and other periods where warranted, these routes will bring service within 500 metres of major residential and employment areas.

Fixed routes designated as Base Services will operate primarily on major arterial roads, especially in the larger urban areas. Other fixed routes will operate mostly on minor arterial roads and collector roads to serve local destinations such as a transit focal point (Bernard Terminal for example) or main activity centre such as Beaver Creek. Local routes should only operate on minor

local roads when required for operational needs (such as a turn-around), or to serve major passenger destinations.

2.1.4 Express Routes

Express Routes will carry significant numbers of passengers between two distinct points, such as the subway and a major employer, and do not depend on activity along the route for their passengers. These Point Express Routes use the fastest route (in terms of overall travel time) between two points, which may vary from time to time.

Where ridership in a corridor warrants, Overlay Express routes may also be established to enhance customer service. For example, where buses are routinely filled to capacity at a certain point on a route, and most passengers are destined to a common point, such as the subway, consideration will be given to operating a bus in “express mode” from that point.

Fixed Route Express portions should be designed to ensure that 75 percent of the passengers within the corridor can take advantage of the express service, and that the express service can be scheduled to save at least 15 percent of the regular route travel time (minimum 5 minutes). Limited stop service may be used to meet the 75 percent passenger access requirements.

2.1.5 Shuttles

Shuttles will provide local service to GO Train stations, major Viva stations and other major destinations. Shuttles are designed with consideration for the specific schedule of train, Viva service or employment shifts. Shuttle routings are designed to be short and as direct as possible to maximize customer convenience. For shuttles to GO Stations, design should include meeting every peak period train departure or arrival, and the trip should not exceed 25 to 30 minutes.

The introduction of a Shuttle will depend on whether or not the station or destination is or can be easily served by a Local or Base Route.

2.1.6 Community Bus Services

Community Bus services will be fully accessible transit services typically designed for seniors and people with disabilities who can use fully accessible conventional transit. Rather than follow conventional routing patterns, they will be designed to provide better access to facilities oriented to this customer market, such as seniors’ residences, medical facilities, community centres and shopping areas.

Where population and transit demand is sufficient for fixed-route service, these routes should operate on arterial and collector roads, focused on a transit centre or main activity centre. Where the population served does not meet requirements for fixed-route service but does justify an alternative service, demand-responsive service could be provided, possibly as part of specialized service. This demand-responsive service could be marketed to both low demand areas and the specialized service market with the same service.

2.1.7 GO Fare Arrangements

In some communities, where transit connections between the communities of York Region are desired and necessary, YRT may enter into special fare arrangements with GO Transit to provide access to existing GO Bus services at the current YRT transit fare. This is a way of introducing transit connections in lower demand areas with lower cost and financial risk. This is described in more detail in Section 6.2.3.

2.1.8 Small Bus Services

Small bus services are not really a distinct service in the YRT family of services. However, these standards and guidelines include measures to help identify when a small bus can and should be used on a particular route.

2.2 Performance Measures

Performance of the YRT system is measured differently for system-wide performance and the performance of individual routes. At the system-wide level, the ridership per capita, cost-recovery ratio, and revenue-hours per capita are the three key indicators. These measures show how effective the service is at attracting customers to the system, how cost-effectively they are being run and how much service is being provided. The three measures must be considered together, not individually, with the goal to strike a balance between them, since improvements in one measure can often come at the expense of performance in the other.

The performance of individual routes is assessed on the basis of passenger boardings per vehicle-hour, meaning the total number of fare paying passengers, plus transfers, divided by the total number of vehicle-hours in service. Using boardings (including transfers) gives credit to a route that may carry an above average number of transfer passengers, which is generally a vital role in the performance of an effective transit network.

The transit services are scheduled and operated according to the following key performance indicators. Performance targets are assessed as part of a continuous quality improvement framework, and will be adjusted upward when consistently met.

Table 1
Performance Standards

<i>Indicator</i>	<i>Guideline</i>
Service Effectiveness	To maximize the transportation, environmental and mobility benefits of transit, YRT will strive to achieve a per capita target of 15 revenue passengers per capita (currently 15.5).
Economic Performance	To balance customer service, community benefits and affordability to both users and non-users, YRT will strive to achieve an overall cost-recovery ratio from fares in the range of 55 to 60 percent (currently 52).
Amount of Service	To ensure effective services with a growing population, YRT will achieve and maintain a level of 1.0 hours of service per capita (currently 0.80).
Service Design	Individual routes are assessed on the basis of passenger boardings per vehicle-hour (details in next section).

2.3 Service Standards

YRT Service Standards dealing with route coverage, service levels (frequencies), vehicle loading and route performance will be used for evaluating transit routes and will be the basis for making decisions about introducing new services.

2.3.1 Route Coverage

YRT will consider new or revised routes to serve residents, places of work, secondary and post-secondary schools, major shopping centres and public facilities in the urban area that are beyond the maximum walking distance standards as shown in Table 2.

*Table 2
Distance to a Bus Stop*

<i>Service Period</i>	<i>Maximum Walking Distance Standard</i>
Daytime, Monday through Saturday	500 metres of a bus stop
All other periods (Weekday evenings, Saturday evenings and all day Sundays and holidays)	1,000 metres of a bus stop

The objective of this standard is to provide service to approximately 90 percent of the population of urban areas.

2.3.2 Service Levels and Span of Service

Minimum span of service and service levels are defined for all Base services required to meet the route coverage requirements. For other services, minimum service levels are defined for each operating period, but whether or not these services operate in any given period is subject to the ridership performance levels, measured in terms of boardings per hour.

Minimum service frequencies and spans of service do not apply to Express or GO Shuttle routes, which are designed to meet specific schedules at the destinations. **Express Route** service will be determined by *Vehicle Loading* and *Route Performance* standards. Frequency of **Shuttle** routes will be determined by train or employment schedules, or contracts.

Table 3
Route Service Frequencies

Span of Service	Service Frequency (minutes) (minimum)				
	Viva	Base Route	Local Route	Community Bus (Base)	Community Bus (Other)
Weekdays					
6:00 to 9:00 am / 3:00 to 7:00 pm	10	20	30	60	60
9:00 am to 3:00 pm / 7:00 to 11:00 pm	15	30	60	120	120
Saturdays					
6:00 am to 11:00 pm	15	30	60	120	120
Sundays/Holidays					
9:00 am to 11:00 pm	15	60	60	120	120

Note: Span of service standard applies only to Base Services

The decision to operate a service other than a Base Route in any period is subject to achieving minimum performance requirements, described in the next section.

Clock-face headways are included as a service guideline for any route operating with a service interval wider than 10 minutes.

2.3.3 Route Performance

To meet system objectives, top-performing routes must be allowed to support other lower performing routes, ensuring that:

- ~ overall performance meets system objectives; and
- ~ minimum performance level is established and met for each route.

BASE SERVICES

Base Services are not required to meet minimum ridership levels, since their operation is mandated by the network service requirements. However, YRT shall always assess the Base Routes against the ridership measures to identify good and poor performing routes and examine ways to continuously improve performance.

LOCAL ROUTES

Local Routes should average 25 boardings per hour, with a minimum threshold of 8 boardings per hour, on average for all operating periods.

VIVA SERVICES

As major service components on the Base Grid corridors, Viva services are designed similar to Base routes, with defined spans of service and frequency levels. Since Viva routes are mandated to operate at defined service levels in all periods, they are also not required to meet minimum performance levels, but will be closely monitored to ensure effective and efficient performance.

EXPRESS ROUTES

Point Express Routes, by definition, serve specific connections, and are not available to in the corridors they serve. Therefore, these routes need to perform at a high standard to justify the service.

Overlay Route Expresses that operate as portion of a regular fixed route can be designed to be more widely available to everyone, and therefore can incorporate a wider range of performance.

SHUTTLES

Shuttle performance will vary depending on the purpose of the route design. If the route is introduced instead of a Fixed Route, then Fixed Route standards apply. If the Shuttle is started to provide enhanced service for a specific neighbourhood, a higher standard applies, similar to a Point Express Route, but adjusted to account for the more local nature of the route.

2.3.4 System Performance Targets

The peak and off-peak target boardings per hour for routes provided by YRT follow in Table 4. These values indicates performance targets for each route type, considered in aggregate, rather than for individual routes.

Table 4
Peak and Off-peak Performance Targets

Route Type	Weekday Peak	Other Times
Local Route	All routes averaging 30 passengers per service hour, with a minimum of 10 boardings per hour	All routes averaging 22 passengers per service hour, with a minimum of 7 boardings per hour
Express Route		
Overlay Express	All routes averaging 30 passengers per service hour, with a minimum of 10 boardings per hour	
Point Express	All routes averaging 35 passengers per service hour, with a minimum of 30 boardings per hour	
Shuttle	All routes averaging 25 passengers per service hour, with a minimum of 20 boardings per hour	
Community Bus		
Fixed-route	All routes averaging 15 passengers per service hour, with a minimum of 5 boardings per hour	All routes averaging 12 passengers per service hour, with a minimum of 4 boardings per hour
Demand-responsive	All routes averaging 10 passengers per hour, with a minimum of 5 boardings per hour	All routes averaging 8 passengers per hour, with a minimum of 3 boardings per hour

Overlay Express Routes are subject to the following conditions: introduction of an Overlay Express Route must maintain the performance levels of the remaining route at current levels; and projected performance of the new Overlay Express Route must be better than that of the current route.

2.3.5 Vehicle Loading

YRT will design its services to keep the number of passengers on its vehicles at a comfortable level, always within the limits of safety. In peak periods, this means that some passengers will be expected to stand for part of the trip – approximately 25 percent on average. In off-peak periods, services will be designed to try to provide a seat to all off-peak customers, given the less frequent service. Where services operate on a highway, services will be planned for all customers to be seated.

Consideration is given to matching the capacity of the vehicles to the ridership levels on the route to avoid unnecessary increases in service levels.

Passenger standards are calculated on the basis of an average over one hour in the peak period, at the busiest point on the route. For instance, if a service operates on a 15-minute schedule, then 4 buses would pass the busiest point in the hour. The average number of passengers for these 4 buses must fall within the service standards, even though any one bus may be more crowded than the average. If the standard is exceeded for the average calculation, YRT will consider larger vehicles, or more frequent service to improve the situation.

*Table 5
Vehicle Loading Standards*

<i>Route Type</i>	<i>Average Maximum Vehicle Load</i>
Base, Local and Express Routes	
60-foot Bus (Viva)	80 passengers per vehicle
40-foot Bus	55 passengers per vehicle
35-foot Bus	48 passengers per vehicle
30-foot Bus	40 passengers per vehicle
Express Route (high-speed or highway)	100% of seating capacity per vehicle
Shuttle	100% of seating capacity per vehicle
Community Bus	
Peak Period	100% of seating capacity over maximum 60 minutes
Off-peak Period	100% of seating capacity over a 60-minute period

Base, Local and most Express loads are based on average maximum passengers per vehicle at the peak point of the route, measured over the peak 60-minute period.

2.4 Establishing New Transit Service

2.4.1 Determining Whether Service is Warranted

Service warrants (i.e., whether a route should be provided or not) for **Local Routes**, **Express Routes** and **GO Shuttles** are determined by performance levels. Designating a route as Base Service will depend on the network coverage, and whether or not new designation is required to maintain the standard.

The introduction of a **School Special** is similar to that of a Shuttle. It depends on whether or not the school is or can be easily served by a regular service within the route network and the limits of the *Route Directness* guidelines for those routes.

Population targets for considering **Community Bus** services within small urban communities such as King City and Mount Albert are included as guidelines since a service in any community should be operated if it meets *Route Performance* standards. However, the designation of 15,000 population is an appropriate guideline for considering service, and should be used to identify communities where these standards will apply.

2.4.2 Service Expansion into New Areas

Services introduced in new areas not previously served should be guaranteed for a minimum 12 months of operation to ensure enough time for travel patterns to adjust and for recording of 4-season ridership patterns. At the end of the 12 months, the service must meet the minimum *Route Performance* thresholds required for its type of service.

Within this trial period, interim targets are set to ensure that a service that is clearly not capable of meeting the ultimate targets is identified as early as possible. Monitoring at 3, 6 and 9 months is completed to ensure that the new service is moving towards the appropriate standard. Targets for these interim periods are set at 25 percent, 50 percent and 75 percent of the ultimate target, respectively. If the performance at the end of each period has not reached at least 75 percent of the target value, the route should be re-examined to identify potential changes to improve its performance. If the same standard is not met in the next period, the changes should be recommended.

2.4.3 Service in New Operating Periods

Routes that introduce service in new operating periods where routes already exist, or modify the existing route are subject to similar evaluation, but over a shorter 6-month period. If the service change is substantial, staff may recommend a longer trial period at the service introduction stage. Interim targets are established at 2 months and 4 months, with target levels of 33 percent and 66 percent of the ultimate target.

2.5 Design Guidelines

YRT uses the guidelines in this section to help design the most effective services, and to ensure that the performance measures of each route and the system overall are met. If a particular route does not strictly adhere to these guidelines, remedial action is not necessarily required, but the situation is carefully monitored to ensure its effectiveness.

2.5.1 Route Directness

Route Directness is a measure of the amount the route deviates from the most direct feasible path between the start and end points of the route. The ratio of the actual route distance to the most direct feasible route within the corridor served indicates the maximum deviation experienced on the route (not all passengers will experience this maximum).

Each route type has a value range in this standard, reflecting the intent of the route type. Fixed Routes, designated as Base Services should have the lowest ratio, while other Local Routes and Community Bus ratios will likely be higher. The *Route Directness* measure should always be minimized for all services.

For instance, **Base** and **Local Routes** and **Viva** services should be designed to provide direct service, with deviations to serve local areas and major destinations only. **Shuttle** services can incorporate slightly more circuitous routings to increase the service area. For **Community Bus** services in larger urban communities, routes are also expected to be more circuitous to serve more area residences and community destinations. Where the route is intended to be a general-purpose route in low demand communities, more direct service should be considered.

*Table 6
Route Directness Measure*

<i>Route Type</i>	<i>Ratio</i>
Base Routes and Viva	1.0 to 1.1
Local Route	1.0 to 1.2
Overlay Express	Equal to or less than that of the underlying route. 1.0 within the express or limited stop portion of the route
Point Express Route	1.0 outside of any local service area. Local service areas should be limited to 5 stops or less
Shuttle	1.25 to 1.75
Community Bus	Less than 2.5. Less than 2.0 for Local Routes in small communities

Branches of a Base Route designed to serve specific destinations during peak periods should be considered Local routes, with those standards applied.

2.5.2 Route Deviations – When should a route deviate?

In combination with the *Route Directness* guideline, an additional design guideline provides assistance in determining the route structure for services to schools, GO stations, major employers or other major attractors. This measure considers the benefit of varying from a direct route to serve a major area versus the inconvenience to those passengers already on the route.

Route deviations must attract enough new passengers to the route (not merely reduce the walking distance for existing passengers) to make the change worthwhile. For example, if the additional

travel time means more service hours need to be added, the change should only be made if it improves the overall performance of the route (i.e., increased boardings per hour).

If the diversion can be achieved with the existing resources (typically less than a one- or two-minute increase in running time), the new ridership gained should be no less than 25 percent of the passengers affected by the detour.

2.5.3 Locating Bus Stops – Where should bus stops be located?

Bus stops should be placed at most intersections, passenger generators and transfer points subject to minimum spacing criteria. The spacing of stops should not normally be less than 250 metres in developed areas and 500 metres in undeveloped areas (specific major trip generators may require variances in stop spacing).

Development around the major stops should be encouraged at greater density and follow transit supportive design principles – closer to the street, favour pedestrian connections, and customer friendly uses in commercial areas such as coffee shops, or passenger amenities.

Viva stops should normally average at least 1 kilometre, and not normally be less than 1 kilometre, and be located at the far side of the intersection.

Bus stops at intersections should be located in the safest position, considering traffic and street conditions. Where possible, stops should be located close to signalized intersections. At Viva transfer points, local YRT stops on intersecting routes should be located at the near side of the intersection wherever possible to facilitate transfers.

Bus bays should be considered for stops located near major trip generators, transfer points, timing points or anywhere else where a bus is likely to have an extended stop time.

Priority factors in selecting bus stops as candidates for shelters include:

- ~ all terminals and transfer points;
- ~ high boarding locations (more than 35 passengers in peak periods);
- ~ unique exposure to inclement weather; and
- ~ proximity to senior residences and other institutional facilities.

Stops and the area around them should be made accessible to people with disabilities, including wheelchairs and other mobility aids. The long-term objective of YRT is to accommodate accessible features at all of its stops. Stops and the area around them should also have a high priority for snow clearing.

2.5.4 Locating Bus Stations/Terminals

Bus terminals and minor turnaround facilities will be located at transit nodes identified in the Transportation Master Plan and otherwise at the end of a line and convergence of two or more corridors, where local services such as shuttles also connect.

Development around the stations and terminals should incorporate transit-oriented development uses and design principles.

3. Planning Process Review

To assist YRT staff in meeting the objective of a fair and balanced appraisal of service requirements, based on sound technical analysis and effective consultation, a service review process has been developed, comprising a series of reviews and assessments of requests from a variety of sources. This process will provide staff with a consistent, objective framework to assess requests for new or revised services.

The framework has six critical elements:

- ~ service standards to assess new and existing services;
- ~ a series of three on-going route assessments comprising:
 - ~ regular route assessments as part of an on-going monitoring process;
 - ~ periodic service reviews to monitor the on-going performance of the system or respond to minor requests; and
 - ~ annual service reviews to assess major requests for new or revised services;
- ~ the data collection program required to support the review process; and
- ~ a comprehensive consultation process.

The review process is described in the following subsections. The consultation process is detailed in Section 4.

Additional details of the planning process are included in the Planning Process and Communication Plan Background Paper.

3.1 A Consistent Performance Standard

For the revised service review framework, it is recommended that YRT evaluate its services on the basis of boardings per vehicle-hour. It is important to assess boardings, or unlinked trips, so that routes that perform a high ratio transfer role are properly credited for that performance.

The boardings per vehicle-hour measure gives a standard measurement against which to assess new services and provides the basis for the assessment approach used in the short-term analysis to identify routes for remedial action. Existing routes that perform higher than the system average contribute to raising that average and should be maintained. New proposals with estimated performance (based on ridership projections) in this range can be recommended, subject to approval. Routes that have performance lower than the system average – the ‘below average’ routes are easily flagged and subjected to detailed assessment to determine if there are remedial measures which can improve the performance of the route. The third level of routes is the small group of routes with boardings per hour less than one-third the system average. These routes have a negative influence on the average system performance and should be examined quickly to identify a major change that will improve performance. If such a change cannot be identified, or attempted solutions have proven unsuccessful, the route is recommended to be discontinued.

Each route type should be examined separately, with its own set of performance thresholds, as described in the Service Standards Background Paper. These thresholds are based on existing

performance, with the goal of continuous improvement set to improve the level of each performance indicator over that of the previous year.

3.2 Service Reviews

3.2.1 Regular Service Reviews

Regular service reviews are conducted on an on-going basis to ensure the most effective allocation of resources to individual routes. Each route is assessed to ensure the adequacy of its operation against several standards including adequate frequency in all periods, appropriateness of start and finish times, adequate safety and other factors. For the largest of the Base Grid routes, a workshop process has been developed by staff to comprehensively address planning, operations and customer service issues on these routes.

Recommendations from this level of review can be implemented if they are minor or no cost, or if there is a specific budget allocation for them. Otherwise, recommendations are referred to the annual review process. Ideally, routes would be analyzed at regular intervals. Given YRT's size and level of operation, a thorough review of each route in a stable environment should occur at least once every two years. New routes or routes serving rapidly changing areas may require more frequent monitoring.

3.2.2 Periodic Service Reviews

Periodic service reviews are conducted as needed. Routes are assessed in response to customers' service requests or by staff as part of the on-going monitoring process. Service requests can fall into one or more of several categories described under the Annual Service Review.

Recommendations from this level of review can be implemented if they are minor or no cost, or if there is a specific budget allocation for them. Otherwise, recommendations are referred to the annual review process.

3.2.3 Annual Service Review

The Annual Service Review comprises an overall assessment of service proposals that have been deferred from the other review processes throughout the year, major proposals developed by staff, and proposals requested by municipalities or others as part of the consultation process.

Each proposal is assessed in terms of its:

- ~ ridership potential;
- ~ system accessibility; and
- ~ capital and operating cost.

Measurements in each area are made and priorities assessed. All proposals are considered together so that an effective priority list of projects can be considered. Annual budget availability is used to determine the number of proposals from the priority list that are recommended for implementation.

Each proposal is first assessed against a set of screening standards to ensure adherence to minimum operating standards then assessed for its economic performance. If an acceptable proposal does not require capital budget and there is sufficient operating budget available, it can be implemented in the next board period. If the proposal requires additional vehicles, or there is

insufficient operating budget for implementation, it is reviewed further in the Annual Service Review and compared against other proposals to ensure it is the most effective use of resources.

3.3 Data Collection Program Requirements

The cornerstone of the Service Review process is a comprehensive data collection program including data from both YRT's operation and other elements of the transportation system. The detailed plan includes a description of components required as part of a comprehensive data collection program, including:

- ~ On/Off Counts: recording the number of passengers boarding and alighting at each stop, along with supporting data such as time of day, arrival time.
- ~ Standing Counts: supplementary counts taken at a single point along the route. The count records route and run numbers, scheduled and actual arrival times, and arrival and departure loads.
- ~ Cordon Counts: specially coordinated standing counts designed to assess the system performance at any given time across a cordon.
- ~ Transfer Trace: specialty counts that collect transfer information at specific points or system-wide to determine transfer characteristics at specific points, time periods or to and from certain routes.
- ~ Automatic Passenger Counters: Viva buses are currently equipped with automatic passenger counters (APC). In addition to these routes, APCs can be installed on a small set of buses, typically just larger than the fleet required to operate the largest route, which, in YRT's case would be approximately 15 units. These buses can then be assigned to different routes on a rotating basis to ensure that the entire system is covered within the period of the regular count program. These vehicles can also be assigned to specific routes at specific times for specialty count purposes.

4. Consultation Plan

The purpose of the consultation plan is to formalize a process to ensure that YRT plans are communicated and that stakeholder and public input is considered during the planning phases for improvements.

Regular and ongoing communications with the general public, key community groups and agencies, individual businesses and business groups, school boards, area municipalities, elected representatives and customers is vital both to hear about issues and areas of concern from them and to provide valuable information and education for them. Conducting open and regular communication in a proactive fashion will create a level of trust and reliability that will help to reduce any controversial aspects of service delivery.

A defined consultation plan with timeframes, topics, locations and issues identified will enable YRT staff to focus on obtaining the broadest cross-section of public input in both an efficient and productive manner. Individual requests for meetings and consultation could then be referred to one or another of the various components of the plan, if possible. This would help to optimize the time currently being spent on reactive responses to individual requests for public consultation and participation.

At each point of consultation and communication, it is important to present (with various degrees of emphasis depending on the group) the objectives of YRT, benefits of YRT to the broader community, and the objectives of the specific encounter.

The components of a successful consultation plan are:

- ~ knowing who your stakeholders are;
- ~ defining the purpose of the consultation and communication;
- ~ establishing a regular program of contact; and
- ~ reporting to the community on accomplishments.

Consultation can be tailored to the needs or characteristics of the individual group and include:

- ~ issue-specific meetings with one or more stakeholders;
- ~ public meetings, forums or open houses;
- ~ written submissions;
- ~ workshops; or
- ~ regular newsletters and notices.

At each of the meetings, YRT will receive or present:

- ~ specific proposals for the short- and long-term strategies;
- ~ options in the context of the service standards; or
- ~ a comprehensive ranking of alternatives based on objectives of performance standards.

Meetings can also be designed for:

- ~ Area Municipalities - to obtain input for their preferences for service improvements and new services in their municipalities on an annual basis.
- ~ Areas Experiencing Change - to consult with the local area residents and businesses, and the elected representatives to develop specific proposals for change to services or the introduction of new services into their community, for areas of significant growth.
- ~ External Stakeholders - comprising community agencies, business groups, transportation management associations, residents' or ratepayers groups.
- ~ Neighbouring Municipalities and Transit Providers - to consult with the neighbouring municipalities and transit providers to ensure seamless services for those customers travelling beyond York Region.
- ~ General Public Consultation: two additional annual public consultation forums (north and south) are suggested for those stakeholders and members of the public that would not have had an opportunity to provide input through the other venues.

The Planning Process and Communication Plan Background Paper provides additional detail on the recommended organization and timing of these meetings.

5. Existing Service Review

This assessment of existing routes and short-term changes and adjustments was based on 2004 operational data and 2005 February and May monthly ridership report provided by YRT, the on/off passenger count conducted by YRT (2004 and 2005) and TTC (2003 and 2004), as well as the origin-destination survey conducted by ENTRA Consultants in May and June of 2005. The purpose of this review is to identify strengths and weaknesses in the existing system, and identify potential for short-term changes and adjustments that can improve the effectiveness and efficiency of the existing system.

Details of the performance evaluation and route-by-route assessment are included in the Existing Service Review Background Paper.

The Viva program implemented in September 2005 will have a significant impact on conventional routes intersecting with Viva routes, as well as the underlying routes in the same corridors, such as Route 1 and Route 77. In this assessment, this fact was only considered for suggested remedies for poor performing routes with such a connection. The impact of the Viva program could not be evaluated in this study, given the early stage of Viva service development. Further investigations will need to be conducted to address this impact once required data are available from stable Viva operations.

A travel pattern analysis was also conducted using 2001 TTS and total travel matrices generated by the Regional travel forecasting model to identify the existing and future travel pattern in the Region and adjacent municipalities. The detailed analysis and results are described in the Existing Service Review Background Paper.

5.1 Methodology

Routes were first reclassified into route categories based on their service area characteristics and route structure, consistent with the revised definition of a Base Grid route. As a result, several routes were reclassified as locals from Base Grid routes, while local Route 20 was reclassified from a local to a Base Grid route.

Benchmarks for each of the route type: Base Grid, local, express, and shuttles were then established. Benchmarks were established in four key performance indicators: the recommended boardings per vehicle-hour (bph), plus revenue passengers per vehicle-hour; revenue/cost ratio; and route directness. Routes were identified as good (more than average boardings per vehicle-hour), acceptable (average to half of average boardings per vehicle-hour, and poor (less than half of average boardings per vehicle-hour).

Averages of the Key performance indicators were calculated for the system overall, as well as for the route types separately.

Annual ridership, revenue and cost data for 2004 were used for calculations of R/C ratio. Monthly ridership data for February 2005 were used for the calculations of boardings per vehicle-hour and revenue passengers per vehicle-hour. Patterns were identified, where possible, from on/off passenger count data.

A preliminary review of data was used to identify the poorest performers, and then a more detailed review of route configuration data and time-of-day data, where available from the on/off

passenger count and origin-destination survey, was used to identify specific remedial action. Details of this analysis are included in Background Paper #3 – Existing Service Review.

5.2 YRT-TTC Route Operation Criteria

Currently, TTC operates most cross-boundary routes on major south-north corridor roads with an exception of routes to Finch Subway. ENTRA Consultants was requested to review the possible operational transfers between TTC and YRT of specific routes. Based on the discussion with YRT staff, the following criteria have been established for decisions on operating cross-boundary routes:

1. Proportion of customers crossing Steeles Avenue
 - ~ Less than 50 percent: consider YRT
 - ~ 50 percent or greater: consider TTC
2. Availability of logical YRT replacement route
 - ~ Yes: consider YRT
 - ~ NO: consider TTC
3. Ability to avoid extra fare for proportion of customers crossing Steeles Avenue (This includes examination of the distribution and concentration of destinations south of Steeles)
 - ~ 50 percent or greater: consider YRT
 - ~ Less than 50 percent: consider TTC
4. Need for operational control to meet specific schedules, such as school times or GO train schedules
5. Cost efficiency

If two of the first 4 criteria favour YRT, consideration should be given to YRT-operation, subject to consideration of capital and operating cost and vehicle availability. Cost savings should not be the single factor.

The criteria used are also summarized in Table 7.

Table 7
Criteria on Operating Cross-boundary Routes

Criteria	YRT Route	TTC Route
Proportion of customers crossing Steeles	< 50 %	>= 50%
Availability of logical YRT replacement	Yes	No
Ability to avoid extra fare for proportion of customers crossing Steeles Avenue	>= 50%	< 50%
Need for operational/schedule control	Yes	No

Once a route has been identified, specific timing for change will depend on fleet availability, full costing analysis and budget considerations.

6. Service Strategies

The YRT Service Standards outline the various types of services offered by YRT and the service levels and design characteristics for each. The preliminary service strategies draw on these service types, plus some additional service and fare options, to describe the expansion of services in the future. This section outlines the various strategies that can be applied and examines potential timeframes for service development throughout the Region.

6.1 2002 – 2006 Service Strategies in Review

The original 5-Year service plan for YRT covered the years 2002 through 2006 and addressed many amalgamation issues for the new Regional system. The review established strategies designed, not only to improve services but also to introduce new regional elements including consistent fare policy, coordinate the previous municipal systems and establish a base for moving forward.

As the first step in the development of strategies for the next five years, this review examined the existing strategies, identifying the progress that has been made and where the strategies have not been fully achieved, and confirms where the strategies remain appropriate or warrant revision or replacement. Details of this assessment are include in Background Paper #5 – Service Strategies.

The customer's perspective and objectives have also been identified throughout the discussion of the service strategies. To continuously improve and grow ridership, it is vital to maintain a strong focus on the customer needs and desires.

The original strategies include:

- ~ a modified grid network covering the main north-south and east-west arterial grid, with diversions to key destinations, and good levels of service in all time periods, and supported by a network of feeder services;
- ~ identifying Yonge Street and Highway 7 as corridors for higher-order transit;
- ~ north-south services in the south oriented to TTC subway, and coordinated with TTC routes;
- ~ route network in north and central areas oriented to Yonge Street;
- ~ peak hour bus connectors to GO stations in all major residential areas throughout the region;
- ~ highway-based express services;
- ~ student-focused services for both post-secondary and high school facilities;
- ~ maximizing accessibility of conventional fixed-route services and neighbourhood infrastructure; and
- ~ service to smaller communities with alternative service delivery methods.

Each of these strategies remains valid, with some modification, as described in the next section.

6.2 New and Revised Strategies

These new and revised strategies build on the original service strategies, with changes appropriate for a maturing system. In this section, we present the various strategies on the basis of the geographical areas or connection types, since these are beginning to differentiate themselves in the diverse network of YRT services.

6.2.1 Urban Area Strategies

Strategies for the larger urban areas, Newmarket, Aurora, Richmond Hill, Vaughan and Markham), comprise elements of the full range of YRT services, as described here.

VIVA

Evolution of Viva services in the existing corridors, established in September 2005 will comprise service frequency and span of service changes, which will be determined according to demonstrated demand following implementation. Planning for 2007 service changes will need to consider the first 9 months of implementation (September 2005 – May 2006) for this evaluation.

VIVA BEYOND 2007

In addition to major initiatives projected as part of Phase 2 of the Viva implementation, YRT should examine revisions to the existing network, including:

- ~ taking advantage of the TTC BRT facility between York University and Downsview Station, including consideration of modified fare policy to permit customers to pay second fare through YRT and permit access to fare paid areas at the station (2006 to 2007);
- ~ integrating services with Brampton AcceleRide (2007);
- ~ extending service from the current northern terminus in Newmarket; and
- ~ integrating with Durham Region Transit (2010+).

From the customers' perspective, Viva routes should continuously experience the highest level of service in terms of frequency, reliability, convenience, comfort and directness.

BASE GRID AND LOCAL ROUTES

Strategies for Base Grid services and local routes include:

- ~ revise service levels and operating periods to be consistent with Base Grid designation, ensuring Base Grid Services are operated in all periods (short-term);
- ~ continue to expand the Base Grid and Local route network to serve new development areas; and
- ~ review effectiveness of connections to Viva services to ensure routing and scheduling effectiveness (medium-term).

york region rapid transit route map



service frequency as of January 1st, 2006

key to lines

- Martin Grove/Richmond Hill/Cornell
- Finch/Richmond Hill/Unionville
- Don Mills/Unionville/Cornell
- Finch/Richmond Hill/Newmarket
- Martin Grove/York University/Downsview
- indicates future service
- hollow lines indicate peak service only
- multiRide machines located at this terminal
- frequency of vehicles, every 4 to 15 minutes*

peak off peak



* all times are approximate and are subject to weather and traffic conditions

EXPRESS

Express routes must be considered in the context of their role relative to Viva services in or near the Viva corridors. Point Express routes can be designed to be complementary to Viva services, serving point-to-point demand, such as subway to IBM or CGI (short- and medium-term).

Limited stop, overlay expresses should be considered for non-Viva corridors, to support Viva service and help identify potential for future Viva services (short- and medium-term). Limited stop design may also be considered for key Viva corridors, such as the Pink route from Finch to Unionville station.

SHUTTLES

Shuttles serving GO stations, Viva stations and major employment sites should be designed for as many of these locations as possible, within the applicable service standards. Routes should be direct, as short as possible, and scheduled specifically to transit connections or employee shift times (short- and medium-term).

Ideally, the customer should experience a service that is the most comparable to using their automobile to drive to these locations. For the customer, the choice to use the shuttle service would be based on similar total travel time, not having to walk from the parking spot, not having to deal with the traffic leaving the commuter parking lot, and reliable shuttle awaiting the return trip upon arrival of the higher order service or shift end.

Shuttles to GO stations should be designed to meet all trains, and to maximize customer convenience and choice (short- and medium-term).

COMMUNITY BUS

Community Bus – Fixed Route

Fixed-route community bus routes, such as those currently operated in Newmarket and Richmond Hill can be used to introduce new service, or improve the effectiveness of poor-performing fixed routes. These services can also be used to introduce services into new subdivisions, using a small accessible bus, in advance of the road network availability and demand levels to justify the mature fixed route.

Community Bus – Demand Response

Demand response community bus, operating as a zone bus (fixed schedule, dynamic route), or traditional dial-a-bus (flexible schedule and route) can be used in low demand areas, or low-demand operating periods. Where possible and practical, fixed-route community buses should be used where and as soon as demand warrants and make use of small accessible buses as much as possible.

Hybrid services might also be considered, where fixed-route community bus services are allowed to deviate on-demand to provide door-to-door access for eligible customers.

6.2.2 Smaller Urban Communities

BASE GRID SERVICES

Base Grid Services in the smaller urban communities should be designated once the community has reached a threshold to warrant service, based on population (see Service Standards).

In smaller urban communities, Base Grid services will differ from those of urban communities in their level of service and service delivery type, but not minimum span of service.

Actual service types may include local fixed routes or shuttles, community bus or combined with specialized services. Local services may also be part of a connector service to the larger urban areas.

LOCAL ROUTES

Local routes should be defined for service *within* the smaller urban communities, according to the approved service standards. Where traditional local routes are not warranted, community bus routes should be considered.

Conventional local routes are not expected to be common in many of the smaller urban communities, until a population threshold of approximately 15,000 is achieved.

COMMUNITY BUS

Community bus services in smaller urban areas can be designed in exactly the same way as in larger urban areas (see Section 6.2.1), but there is an expectation that services in the smaller urban areas would be more permanent, and less transitional than those in larger urban areas.

Potential applications for Community Bus in smaller urban areas include:

- ~ local service in Stouffville, with connections to Markham;
- ~ additional or replacement services in Sharon, Holland Landing or Keswick; and
- ~ new local services in Mount Albert, Sutton, Pefferlaw, Nobleton, or Schomberg.

SHUTTLES

Shuttles in smaller urban areas can be designed in exactly the same way as in larger urban areas (see Section 6.2.1), but in the case of smaller urban areas, Viva connectors are not anticipated, and employment shuttles may be similar to fixed-route community buses.

Potential applications for shuttles in smaller urban areas include:

- ~ GO train shuttle in Holland Landing, Sharon, Stouffville or Mount Albert; and
- ~ local shuttles in Sutton, Pefferlaw, Nobleton, Mount Albert or Schomberg.

6.2.3 Smaller Urban Community to Urban Anchor Connectors

These connector services as routes to meet demand for connections from smaller urban areas to major urban area, usually oriented towards anchor point for access to remainder of the system.

Anchor points should be a transit hub, including GO Station or Viva station where available. Connectors may be combined with local components of services in smaller urban communities, such as community bus routes, or shuttles, in all or some time periods.

Connectors should not automatically be considered as a Base Grid Service that is, not provided in all time periods, without regard for economic performance, except where designated by YRT to meet specific service objectives.

EXPRESS

Express Routes comprise direct service from a transit hub (or interlined with local service) in a smaller urban community to a transit anchor point in larger urban center. Services would only operate in periods warranted by demand, based on economic performance standard, unless designated as a Base Grid Service.

In several of the probable applications of connector services, the route might always operate as an express in practice, given the lack of demand in intervening areas. However, where there is potential for intervening stops, services may be specifically designated as an express where non-stop service is desirable.

Express routes could form the connector services from, for example:

- ~ Stouffville to Markham; or
- ~ Sutton to Keswick to Newmarket.

GO FARE STRATEGY

GO Transit has indicated a willingness to discuss fare agreements to allow spare capacity on these routes to be used for local regional transit. In this scenario, passengers would board the GO bus and pay a regular transit fare or use valid fare media. GO operators would record the trip, and YRT would be invoiced for the balance between the regular GO fare and the fare collected. At low demand levels, this can be an extremely cost-effective method of providing service, both in terms of operating and capital costs.

POTENTIAL APPLICATION

GO fare strategies might be applied for service between:

- ~ Markham and Stouffville;
- ~ Nobleton, Schomberg and Kleinburg; or
- ~ Sutton and Keswick to Newmarket (see illustration at right).

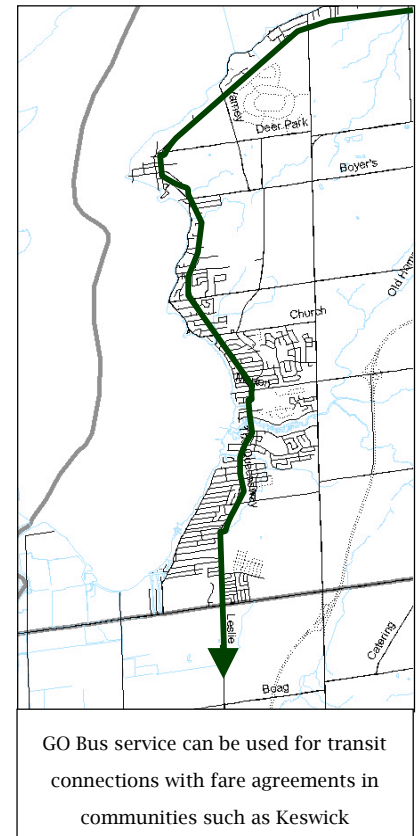
6.2.4 Inter-Regional Services

EXPRESS

Inter-regional expresses would operate similar to those in the urban connector context (see Section 6.2.3), but would include cost-sharing agreements with the neighbouring municipality, based on the local service components of the route. In some cases, this may also mean simply accommodating express routes from other municipalities in local terminals and transit facilities.

Express route potential exists to connect:

- ~ points in Durham Region to east Markham;
- ~ from UOIT (Durham College) to Viva and GO;
- ~ from the Taunton and Dundas corridors to Markham-Stouffville Hospital, Viva and GO Transit;



- ~ from Brampton to Viva (pre-Acceleride); and
- ~ from York Region to Pearson Airport.

GO FARE STRATEGY

GO fare strategies can be used for inter-regional connections in the same way as described for smaller urban area connectors, with the exception that there would be a cost-sharing agreement with the neighbouring region (see Section 6.2.3).

GO fare strategies might be applied for service between:

- ~ Sutton and Beaverton (in conjunction with Durham Regional Transit);
- ~ Stouffville and Uxbridge (in conjunction with Durham Regional Transit);
- ~ Nobleton and Bolton (Peel Region); and
- ~ Bradford-West Gwillimbury and Newmarket/Yonge Street (Simcoe County).

VIVA BEYOND 2007

Short extensions and service integration could expand the potential of the existing Viva services with cross-boundary connections.

Brampton Transit is embarking on the next phase of its Acceleride implementation, with an anticipated service launch in Fall 2007. From a customer perspective, it will be crucial to ensure the integration of these services, in much the same way as Route 77 services are integrated now.

VIVA/RAIL CONNECTOR

YRT should plan for inter-regional services providing access to GO and Viva stations within the Region, as well as connections to the Viva service, from both Brampton and Peel Region in the west and Durham Region in the east.

In the short-term, Viva connections could be established from Brampton, in cooperation with Brampton Transit and in advance of the launch of Acceleride services. In the short- to medium-term, DRT services from Durham will likely be extended from the Highway 2 and Taunton corridors to connections in York Region in east Markham to Markham-Stouffville Hospital as a destination as well as connections to the Viva and GO-Highway 407 services. Such a connection could also provide YRT customers with a connection to locations in Durham, particularly Durham College-UOIT.

6.3 Service Development Timeframes

The Five-Year Conventional Transit Service Plan examines the period for 2006 through 2010, and for the purpose of this strategy development has been divided into short-term, comprising 2006-2007 and the medium-term comprising 2007 through 2010. As part of this development, we have also considered the outlook for beyond 2010 to 2015, in terms of identifying potential development areas that may affect the need for transit service in the period beyond 5 years.

Figure 1 shows the anticipated areas of development where new routes or route extensions, or service developments such as additional periods of service are anticipated. These areas are defined for the short-term (1-2 years), medium-term (3-5 years) and beyond (to 10 years).

6.3.1 Short-term Strategies

Specific route and service recommendations for 2006 have been developed based on the deferred recommendations from the 2005 Annual Service Plan prepared by YRT, and additional changes recommended as a result of the service assessment completed in this study.

For Year 2 of the short-term timeframe (2007), route and service changes will need to respond to the continuing evolution of current developments and introduce new service in selected areas.

6.3.2 Medium-term Strategies

In the medium-term (3 to 5 years), demands will continue to grow from newly developing areas. Also during this timeframe, Viva services have the potential to expand, both in terms of service levels, as well as with route extensions, particularly in conjunction with *AcceleRide* development in Brampton to the west, and further development of the north-south service in or through Newmarket to the north.

7. Five- Year Plan

The Five-Year plan for 2006 to 2010 includes a number of service initiatives. These have been identified separately for the Short-Term, covering a period of one to two years and Medium-Term, covering a period of three to five years.

The map in Figure 1 shows the recommended development of the Base Grid system by the end of the Five-Year plan. The steps required to achieve this network are described in the following sub-sections. Figure 2 shows the development areas expected to be mostly complete within the Short-Term and Medium-Term (3 to 5 years). The development areas that are large enough to support transit service are addressed in each of the next two sub-sections.

Generally, as the system matures, YRT should plan to expand its system and service levels in line with population increases. Both new routes and additional vehicle-hours of service should be added at a minimum level equivalent to the population increase. In the short-term, higher levels of service increases may still be required to serve new areas and to support Viva service.

7.1 Short-Term (1 to 2 Years)

7.1.1 Route Modifications To Improve Service

Figure 1 shows the extent of the Base Grid required to achieve the coverage targets by the end of the Five-Year Plan. Figure 2 shows the extent of population and development growth within the same period.

In concert with on-going analysis by YRT staff, a series of route and service improvements has been identified for 2006 and 2007 to:

- ~ extend service to new areas;
- ~ complete the base grid expansion; and
- ~ improve service frequency and span of service to meet growth needs.

Table 8 shows a summary of these route and service changes for 2006. **Bolded** entries depict elements that contribute to achieving the Base Grid service.

Table 9 shows the recommend services for 2007, including service expansions and base grid development. Table 10 shows recommended service expansions for 2007.

The new route elements are not specifically recommended, but presented as potential changes for the purpose of identifying required resources.

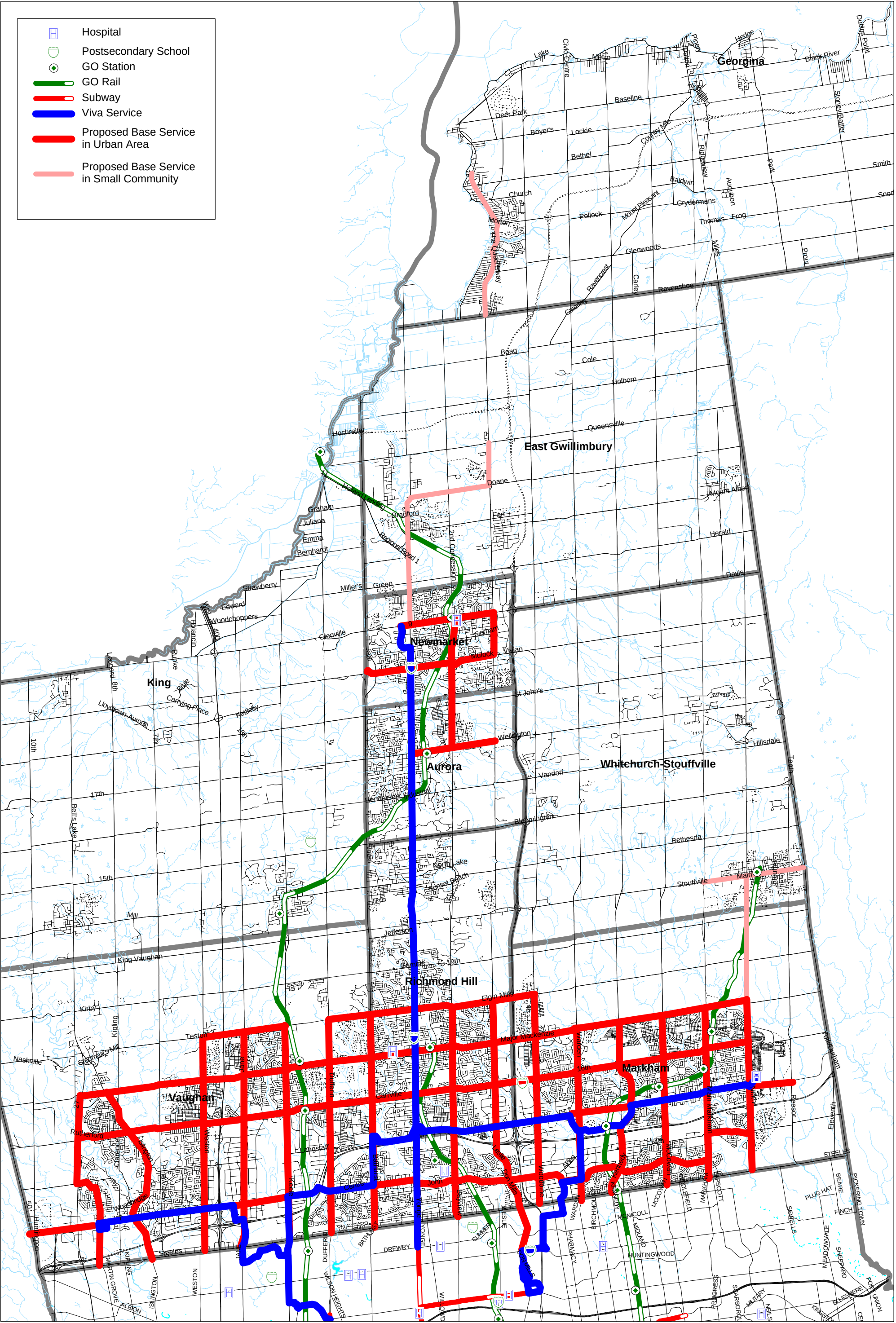


Figure 1 Five-Year Base Service Grid
York Region Transit (YRT) Five-Year Conventional Transit Service Plan
(2006-2010)



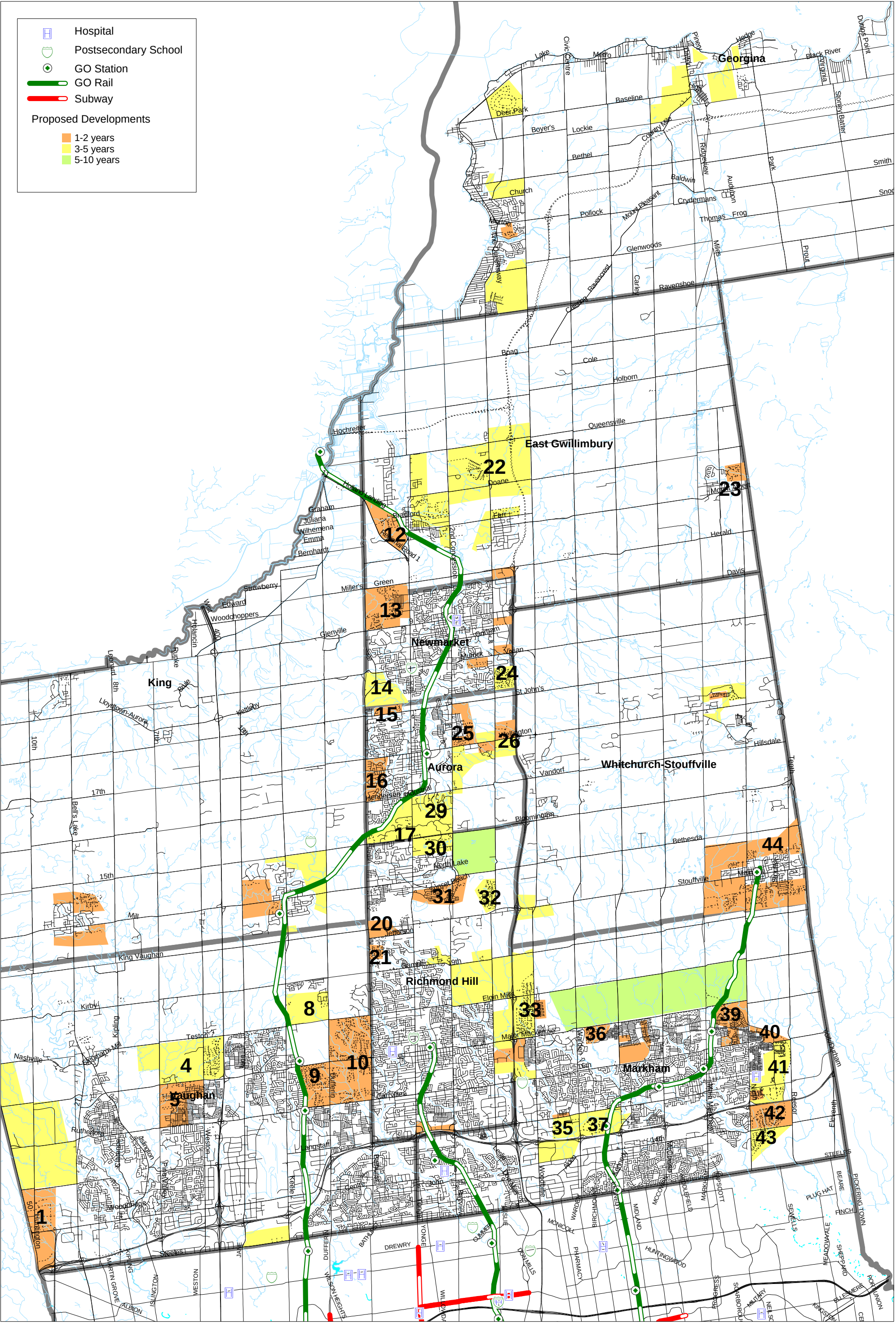


Figure 2 Future Service Growth Areas
York Region Transit (YRT) Five-Year Conventional Transit Service Plan
(2006-2010)



Table 8
2006 Recommended Service Improvements¹

Route	New Route or Service Extension	New Period of Operation	Frequency Improvement	Span of Service Improvement
1 - Highway 7		Late Evening	Reduce for VIVA Peak to Kleinburg	
13 - Islington			Branch improvement	
2 - Miliken			Peak	
2 - Miliken			Saturday/Sunday	Late Evening
2 - Miliken/2A 14th Avenue	Fairtree Extension		Sunday	
20 - Jane		Sunday Service		
22 - King City		Midday/Evening to Cathedral		
224 - Woodbine		Saturday/Sunday to Cathedral		
224 - Woodbine				
23 - Thornhill Woods	New Route to Finch Stn			
301 - Markham Express			AM/PM peak	
302 - Unionville Express			PM peak	
303 - Cornell Express			AM/PM peak	
31 - Aurora North		Sunday Service	Weekday Late evening	
32 - Aurora South		Sunday Service		
33 - State Farm	Service to State Farm			
40/41 - Unionville/Markham	New 40A branch-peak		AM/PM Peak/Sat/Sun	Weekday late Evening
42 - BridleWalk	New Route AM/PM peak			
45 - Mingay	New Route AM/PM peak			
4A - Major Mackenzie	4A Branch			
5 - Clark		Saturday Evening/Sunday		
50 - Queensway	Keswick peak Extension			
52 - Holland Landing			Saturday Late Evening	
54 - Bayview North		Sunday Service	Saturday Late Evening	
58 - Leslie North	Mount Albert Weekday/Saturday			
7 - Martin Grove		Sat/Sun to Humber		
8 - Kennedy			Saturday	Sunday Late Evening
82 - Valleymede/Spadina		Sunday Service		
83 - Trench		Sunday Service	Saturday Late Evening	
84 - Oak Ridges		Sunday Service		
85 - Rutherford	New 85c to Beaver Creek			Sat/Sun Late Evening
86 - Weldrick/Newkirk		Sunday Service		
87 - Langstaff		Sunday Service		
98 - Yonge North	extension to E.G. GO			
Airport Link	New route			
Aspen Ridge Local	New route			
R.H. Inspiration	New route Weekday/Sat			
TTC - 130 - Middlefield	Peak to 14th			
TTC - 21 - Brimley	Peak to 14th			
TTC 102D - Markham Rd			Saturday	
TTC 102D - Markham Rd.			Weekday midday	
TTC 105 Dufferin			Sunday	
TTC 165 - Weston				Sunday Evening
TTC 68B - Warden North			Saturday	

Service changes will be assessed annually according to the service standards and in consultation with stakeholders.

¹ Pending 2006 budget approval – recommended services not approved for implementation will be deferred to the following year, which may result in further deferrals from that year.

Table 9
2007 Recommended Service Improvements to Complete Base Grid²

<i>BASE GRID ROUTE</i>	<i>NEW ROUTE OR SERVICE EXTENSION</i>	<i>NEW PERIODS OF OPERATION</i>	<i>SPAN OF SERVICE CHANGE</i>	<i>FREQUENCY IMPROVEMENTS</i>
Route 7			Saturday AM	Saturday All periods
Route 8		-	Saturday AM	Late Evening
			Saturday PM	
Route 13		Sunday all day	Weekday Late Evening	Weekday All periods Saturday All periods
Route 54			Saturday AM	Weekday midday/evening Saturday All periods
Route 68b		-	-	Weekday Late Evening Saturday Late Evening
Route 85		-	-	Weekday Late Evening
Route 88		-	Weekday Late Evening	Weekday Evening Saturday All periods
Route 102d		-	Saturday AM	Weekday Evening
Route 129d		-	-	Weekday Late Evening
Route 24/224d				All periods

Service changes will be assessed annually according to the service standards and in consultation with stakeholders.

² Pending 2006 budget approval – recommended services not approved for implementation will be deferred to the following year, which may result in further deferrals from that year.

*Table 10
New Routes to Serve Development Areas - 2007³*

<i>Map Area</i>	<i>Potential Route</i>	<i>Operating Periods</i>	<i>Connections</i>
Vaughan			
1	Extend Route 27	Weekday AM/PM Peak	TTC
6	Re-configure Route 12	Weekday AM/PM peak/midday	TTC - Viva
7/9	Reconfigure Route 87	Weekday AM/PM peak/midday	Viva
10/11	Extend Route 23	Weekday AM/PM peak/midday	Viva
Markham			
42	Extend Route 2a	All Weekday Periods	TTC-Viva
Newmarket, Aurora, East Gwillimbury			
13	Extend Route 57a	All Weekday Periods	Viva
15	Reconfigure Route 31	All Weekday periods	Viva
32	Reconfigure Route 84	All Weekday Periods	Viva

Service changes will be assessed annually according to the service standards and in consultation with stakeholders.

7.1.2 Route Modifications To Support Viva

HIGHWAY 7 CORRIDOR

With the implementation of Viva service in Fall 2005 and completion of the first stages in January 2006, most routes have been reconfigured to enhance connections to the Viva network, and frequency changes implemented to support the service.

The exceptions to this are Route 1 - Highway 7 and Route 77 - Highway 7-Centre Street, which are still operating at their pre-Viva service levels, though short-turn trips were eliminated in September 2005. Staff have proposed service reductions for Route 1 - Highway 7, to be implemented in March 2006.

In addition to this service change, YRT should complete a full evaluation of the impacts of Viva service on Route 77 - Highway 7-Centre Street, in conjunction with Brampton Transit staff. The workshop format developed by staff for major route reviews should be applied in early 2006 to review this route and recommend appropriate changes. This review will need to consider continuing demand levels from Brampton, as well as emerging rapid transit plans in the Brampton portion of the corridor.

RICHMOND HILL CENTRE TERMINAL

Since the implementation of Viva, both Viva and local routes in the Highway 7 and Yonge Street corridors are diverting to service the Richmond Hill Center terminal to facilitate transfer connections, as well as trips destined to the Richmond Hill Center area.

³ Pending 2006 budget approval – recommended services not approved for implementation will be deferred to the following year, which may result in further deferrals from that year.

From both an operational and passenger perspective, this situation is not preferred, but has been made necessary by the location of the terminal, whose siting was considerably constrained by land use and transportation infrastructure in the area.

Route 99 operates at 10-minute intervals during peak periods and 30-minute periods during the midday. Viva services will operate at peak headways of approximately 5 minutes and off-peak headways of 10 minutes. This means that, during the peaks, a portion of each service could be diverted to the terminal, with a portion remaining on Yonge Street, and the service frequency on both portions of the route would remain within service standard requirements. For example, operating alternate buses Viva-blue into the terminal would result in Viva-blue service intervals of 10 minutes to the terminal and 10 minutes remaining on Yonge Street.

More detailed examination of the origin and destination of corridor passengers, as well as the scheduling requirements to ensure effective service schedules with such a diversion is required before recommending this option.

VIVA ROUTE OPTIONS

As the Viva services mature over the course of the Five-Year Plan, YRT should closely monitor ridership levels and patterns, with consideration for tailoring Viva services more closely to demand.

For example, a portion of the higher frequency service may be designated as express, or semi-express serving a limited number of high demand VIVA stations such as Richmond Hill Centre direct to York University.

In these cases, consideration must be given to ensuring the minimum standard service frequency at remaining stops, and ensuring adequate capacity throughout the route.

7.1.3 Introduction Of More Small Buses

ENTRA conducted a preliminary review of several low demand routes to identify the potential for small bus operation in specific or general operating periods. On many routes, the barrier to using small buses is encountered with large peak passenger loads during specific periods of the day or even on specific trips.

One alternative to this type of barrier is doubling up on the service with additional trips or “specials”, but this solution is often not cost effective since the cost of bringing out an additional vehicle for a short period of time is often prohibitive.

Another common alternative is operating the small vehicle during low demand periods, then replacing the small bus with a larger vehicle during the higher demand periods. This solution is often impractical due to the service interruption for the change-off, or the additional paid hours and deadhead costs required to change off a vehicle without interrupting service.

However, traditionally, these solutions are only examined at the individual route level, without consideration for the system-wide network opportunities to use creative scheduling techniques to solve a series of issues on different routes. ENTRA recommends that YRT conduct a more detailed assessment of these opportunities to identify opportunities for small bus applications throughout the network.

7.2 Medium-Term (3-5 Years)

7.2.1 Base Grid Improvements

With the span of service and frequency recommendations of the Short-Term bringing the existing Base Grid to service standards levels, the Medium-Term step for the Base Grid includes expansion of the Grid to keep pace with new development areas.

Route extensions required to maintain service coverage at service standard levels include:

- ~ Route 4/4A easterly to Highway 7/Ninth Line in all operating periods;
- ~ Route 4/4A westerly to Martin Grove in all operating period; and
- ~ Route 105 Dufferin extension northerly to Elgin Mills in all operating periods.

As Base Grid routes, these routes will operate in all operating periods, seven days per week at minimum standard levels of service.

7.2.2 Continued Expansion Into New Development Areas

Table 11

New Routes to Serve Development Areas - 2008⁴

Map Area	Potential Route	Operating Periods	Connections
Vaughan			
4	Reconfigure Route 4a	Weekday AM/PM Peak	Viva
8	Extend Route 23	Weekday AM/PM peak/midday	Viva
Markham			
43	Extend Route 2a	All Weekday Periods	TTC-Viva
Newmarket, Aurora, East Gwillimbury			
14	Reconfigure Route 31	All Weekday periods	Viva

Service changes will be assessed annually according to the service standards and in consultation with stakeholders.

7.2.3 Integration With Brampton Rapid Transit Initiatives

Brampton Transit is planning the implementation of an initial BRT service (*AcceleRide*) in the Queen Street/Highway 7 corridor, beginning in 2008. This service will allow further integration of YRT and Brampton Transit services in this corridor, and may require rationalization of service for Route 77 - Highway 7-Center Street.

⁴ Pending 2006 budget approval – recommended services not approved for implementation will be deferred to the following year, which may result in further deferrals from that year.

YRT staff should monitor the BRT developments in Brampton closely, and seek regular updates from Brampton Transit staff.

7.2.4 Potential Integration With Expanding Durham Services

Durham Region Transit (DRT) begins regional service in Durham on January 1, 2006. The initial five-year development plan for DRT includes connections from Durham to the Highway 7 corridor in York Region and the Steeles corridor (to TTC) in 2009 or 2010.

In the development of the transit terminal in east Markham, YRT staff should consider the needs of DRT to access the terminal and coordinate with both Viva and local services in the Highway 7 corridor.

7.2.5 Integration with GO Transit Services

GO Transit has demonstrated its willingness to cooperate with DRT and enter into fare agreements to permit regional travel at transit fares where GO Transit services operate. In these arrangements, where GO Transit has spare capacity in existing routes, regional transit passengers are able to board GO Transit services with payment of a regional transit fare or presentation of valid fare media. GO Transit records the transaction and bills the transit operator for the difference between the transit fare paid and the normal GO Transit fare.

In low demand areas, this can be a very effective way of introducing transit service, particularly where the chief demand is for connecting service similar to the commuter service that GO Transit provides. In the DRT example, high frequency service will be provided in this manner in the Highway 2 corridor, with the net DRT cost estimated at approximately 40 percent of the estimated net cost from operating similar levels of service internally.

Arrangement of this type could be applied to services such as:

- ~ Pefferlaw – Sutton – Keswick – Newmarket connections;
- ~ Highway 404 corridor service;
- ~ Stouffville – Markham connector service;
- ~ Nobleton – Kleinberg connector service;
- ~ Newmarket-Bradford connection (cooperatively with Simcoe County); and
- ~ Uxbridge-Stouffville connection (cooperatively with DRT).

7.3 Resource Requirements

Table 12 shows the summary of operating and capital costs for the recommended changes. The table shows the resource requirements in terms of vehicle requirements and revenue-vehicle hours.

*Table 12**Cost Summary⁵*

	2006	2007	2008	2009	2010
Additional Annualized Revenue Hours	280,000	82,000	70,000	59,000	61,000
Viva	190,000	712,000	15,000	14,000	16,000
YRT	90,000	70,000	55,000	45,000	45,000
Operating Cost	\$21 million	\$7.2 million	\$5.6 million	\$4.6 million	\$4.6 million
New Vehicles	22	9	14	14	14
Viva	5	5	4	5	5
YRT	17	13	10	9	9
Capital Cost	\$9.7 million	\$8.0 million	\$6.25 million	\$6.33 million	\$6.33 million
Total Annual Ridership	19,390,000	22,100,000	23,930,000	26,350,000	28,375,000
Viva	7,360,000	8,580,000	9,060,000	10,030,000	10,675,000
YRT	12,030,000	13,520,000	14,870,000	16,320,000	17,690,000

Notes to Table 12

Operating costs are based on 2006 projected costs of \$75 which represents an average of the direct operating contractor costs, including an allowance for deadhead mileage, fuel escalation and insurance, as applicable. Future costs are based on constant 2006 dollars.

Increases in Viva revenue hours for 2006-2010 are based on projected contract increase. 2006 increase includes first full year of operation following 2005 staged implementation.

2006 increases in YRT revenue hours are based on service increases detailed in Table 8.

2007 increases in YRT revenue hours are based on service increases detailed in Tables 9 and 10.

Increases in revenue hours for 2008 are based on the requirements for service increases detailed in Table 11, plus a 5 percent increase, consistent with projected population increases.

Increases in revenue hours for 2009 and 2010 are based on 5 percent increases, consistent with projected population increases.

Capital costs are based on a vehicle unit price of \$425,000 for conventional buses and \$500,000 for 40-foot equivalent Viva buses.

Capital requirements are based on specific service requirements in 2006-2008, and proportional to projected revenue hour increases in 2009 and 2010.

Ridership estimates were developed by YRT staff for the period 2006 to 2008. Estimates for 2009 and 2010 were based on these estimates and projected population increases.

⁵ Pending 2006 budget approval – recommended services not approved for implementation will be deferred to the following year, which may result in further deferrals from that year.

8. Other Operational and Policy Elements

8.1 Fare Technology Issues

8.1.1 Review of Fare Structure with GTA Smart Farecard

York Region and YRT are participating in the planning and development of a GTA Smart Farecard system, designed to integrate fare payment and settlement throughout the GTA, with pilot implementation expected in late-2007. YRT is expected to implement the GTA Smart Farecard system near the end of 2009.

Under the current GTA Smart Farecard Timetable, the initial pilot system will be launched in late-2007, comprising Mississauga Transit, GO Transit (single line) and TTC Union Station (proof-of-payment concept). The second phase will involve the same agencies with a full roll-out in late 2008.

The main third phase, involving YRT, will begin in 2009, with individual providers committing to implement the GTA Smart Farecard system. YRT is expected to be one of the first providers to sign on in this main phase, meaning that the GTA Smart Farecard should be in revenue service on YRT by the end of 2009. It is expected that GO Transit will commit to a system-wide rollout during 2009 and YRT's other integration partners, Brampton Transit and TTC, will commit to rollout in 2010 and 2011.

This means that for the first four years of the five-year Service Plan, YRT will operate using its current fare payment technology without the complication of needing to coordinate with a fare integration partner operating the GTA Smart Farecard system. In the final year of the five-year Service Plan, YRT will operate with the new GTA Smart Farecard system technology and will need to coordinate with GO Transit (expected to have implemented the system) and both Brampton Transit and TTC that are expected not to have implemented it.

In the farecard environment, all paper-based prepaid tickets and passes will be replaced by a smart card-based common electronic purse fare payment and smart card-based local period passes. Cash will still be accepted at on-board fareboxes and at off-board bus stop-located Ticket Vending Machines for single journey fare purchases, and limited cash purchase fare transaction data will be collected.

With respect to YRT, all aspects of YRT's current fare structure will be enabled technically and commercially by the GTA Smart Farecard system. A local progressive discounted fare loyalty system based on frequency of use will be established and may be implemented by YRT.

8.1.2 Fare Integration Issues

YRT must consider both structural and technological impacts on fare integration between YRT conventional bus and Viva services and for inter-regional travellers connecting to and from GO Transit, Brampton Transit and TTC.

When the GTA Smart Farecard system is launched at YRT, various system adaptations will be required including:

- ~ retrofitting existing YRT fareboxes to register a default adult fare for every cash drop (This may require some technology retrofits for any remaining different farebox technologies, including manual fareboxes on the mobility and some community buses);
- ~ de-rating the MultiRide vending machines to vend only single-journey tickets;
- ~ altering OneRide vending machines to have on-line communications; and
- ~ enabling OneRide and MultiRide vending machines with a smart card reader and antenna to reload value onto GTA smart cards.

8.2 Fare Structure Issues

8.2.1 Inter-regional Fare Structure Integration

SERVICE PLAN – 2006 - 2009

During the first four years of the current service plan, YRT's current fare integration strategies with its partners GO Transit, Brampton Transit and TTC will still be applicable. Since YRT and its partners are all expected to implement the GTA Smart Farecard system for all prepaid fare payments, it is recommended that any new fare integration strategies that require additional capital investment that will not be re-usable under the GTA Smart Farecard system be avoided.

SERVICE PLAN- 2010

During the fifth year of the service plan, according to the planned schedule, fare payment for trips involving GO Transit and YRT will be accomplished according to the GTA Smart Farecard transfer protocols.

For trips involving YRT and either Brampton Transit or TTC, cash paying passengers will receive a paper transfer from the initial bus driver or a single journey ticket from the OneRide machine that must be presented as a transfer during the time validity period to the second bus driver.

YRT passengers paying their fare on-board YRT conventional buses or off-board at Viva stops with their smart card electronic purse or by presenting their valid smart card period pass will be required to obtain a paper transfer from the YRT bus driver or the platform fare transaction processor to be presented as a transfer during the time validity period to the Brampton Transit or TTC bus driver.

Brampton Transit and TTC will not be able to accept YRT smart card passes for initial travel on their systems, based on the assumed implementation schedule. Also, YRT will no longer issue tickets that, prior to the fifth year, would have been acceptable by Brampton Transit and TTC for initial travel. This issue will need to be addressed in consultation with Brampton Transit and TTC prior to 2009.

There will be no additional method of reconciling payment for services with TTC or Brampton Transit, and the current requirement to pay a separate TTC fare when crossing the Toronto boundary will still apply.

8.2.2 Implications for Ridership and Revenue

GTA FARECARD IMPLEMENTATION

Impact on Ridership and Revenue

YRT can expect several benefits from the GTA farecard system:

- ~ YRT's current fare structure will be fully enabled by the GTA Smart Farecard system and therefore, inadvertent negative impacts on ridership and revenue should be avoided;
- ~ enriched ridership and fare purchase information available from the GTA Smart Farecard system will enable YRT to tune its service capacity finely to meet increased ridership demands with its current service fleet;
- ~ reduced cash handling costs due to increased pre-paid fares should improve YRT's economic performance by cutting base costs; and
- ~ simplified fare payment, eliminating the overt requirement to pay a second fare for travel across the Toronto boundary, should increase cross-boundary travel.

Consideration of Potential Fare Structures and Impact on Ridership and Revenue

Implementation of the GTA farecard will give YRT a variety of fare structure options that may be used to promote transit ridership among specific markets. Towards the end of the five-year service plan, YRT should consider options such as:

- ~ time-of-day pricing – considering off-peak discounts to build ridership during slow periods;
- ~ implementation of loyalty program tied to increased use of the smart card for fare purchases - this loyalty program should be designed to drive both ridership and revenue (this function is planned within the GTA Farecard structure);
- ~ establish a discounted large employer pass program similar to a U-Pass program – designed to drive ridership and revenue if employees are not current customers;
- ~ increase penetration of secondary student pass program;
- ~ special fares for special events; and
- ~ replace the multiple zone system with a simplified fare-by-distance fare structure that would require tagging out when alighting from a conventional bus or Viva.

OTHER FARE POLICY AND STRUCTURE ALTERNATIVES

The service standards analysis for the 2006-2010 Service Plan identified assumed targets for economic performance based on a cost recovery ratio ranging (or increasing) from 50 percent to 60 percent. This must be accomplished by increasing annual revenue at a rate greater than the rate at which corresponding costs increase, and can involve both increases in direct revenue through fare increases and increases in passenger per hour productivity.

YRT has also established an objective to increase overall ridership through the addition of significant capacity and the optimization of existing services. With respect to fare policy, the objectives of increasing ridership and economic performance at the same time can be competing objectives if not handled carefully. Fare increases, applied universally, are known to reduce overall ridership with a fare elasticity ranging from -0.2 to -0.3. This means that a 10 percent increase in

fares will result in a loss of ridership ranging from 2 to 3 percent. While there are no reliable data to clearly indicate the level of this elasticity in York Region's services and markets, a lower value is expected since a larger proportion of YRT's market is captive riders, who tend to be less sensitive to fare increases, and the increasing attractiveness of service increases and fare options also tends to reduce elasticity with respect to fares.

Impact on Ridership and Revenue

With the addition of Viva service in the fall of 2005 coupled with no corresponding reduction in conventional bus service, YRT will increase its capacity by 85 new buses added to its current 235 bus fleet. Once Viva services fully mature, approaching 30 percent could result. Given the relatively steep discount for Viva fares compared to GO Transit fares, provided Viva travel times are competitive with GO transit travel times, it is not unrealistic to expect a reasonable number of current GO Transit bus customers to switch to Viva for common destinations.

Options for Fare Structure Changes and Consideration of Impacts

YRT should consider the following medium term fare structure changes:

- ~ increasing flat cash fares significantly to provide a definitive financial incentive for passengers to pre-pay for their transit fares. This can be viable as long as a discounted fare alternative is available for transit dependent passengers who cannot finance a large prepaid purchase. Alternatives might include a five-ride ticket book sold only by commission sales agencies at a reduced discount rate than the ten-ride booklet;
- ~ introducing an east-west fare zone similar to the existing north-south structure. Fare zone boundaries could be considered at Highway 400 and Highway 404, when travel across *both* zone boundaries would require a fare surcharge. Trips that travel within the boundary, or only cross one boundary would pay the regular fare. Highway 400 and Highway 404 are natural breaks in the east-west corridor, and should appear as reasonable boundaries to customers. The wide separation of these two boundaries will also affect truly long distance travelers, as is the case in the north-south corridor;
- ~ increasing pre-paid ticket and pass fare by small increments each year, tied to investments and cost. Particularly as service capacity is being increased, the negative impact of fare increases will be reduced and what remains will be offset by ridership increases from capacity improvements;
- ~ establish a modified U-Pass program for post-secondary students offering a steeply discounted fare structure for 100 percent of the student body . This can be viable if current capacity is adequate to handle increased ridership load; and
- ~ establishing an H-Pass program for secondary students in York Region offering a steeply discounted fare structure for 100 percent of the student body under conditions similar to the U-Pass.

8.3 Fleet and System Accessibility

The objectives of this component of the review were to:

- ~ develop criteria to identify accessible routes;
- ~ review the existing fleet and network and identify potential short-term accessible routes;
- ~ identify where future vehicles should be assigned to make routes accessible; and
- ~ review facilities and provide guidelines for accessible routes.

Ultimately, all routes in the system should be accessible. With a variety of equipment in the fleet, it may be necessary to prioritize routes to create a base network on which to build. In the short-term, prior to full fleet accessibility anticipated by 2012.

Issues in identifying and providing accessible service on selected routes include:

- ~ identifying priority candidates for designation; and
- ~ establishing the criteria for accessible designation of a selected route.

8.3.1 Candidates for Accessible Route Identification

The first defining criteria for designated routes should be the identified Base Grid network. Base Grid routes are those identified in the service standards as operating in all periods to provide a basic level of transit access throughout the region.

Once the Base Grid network has been identified and designated other routes should be identified based on a variety of criteria. At the current time, YRT can not directly influence the assignment of particular vehicles on the routes operated under contract by the TTC. Base Grid network routes, and other primary candidates should be identified to the TTC with a request to consider these for accessible bus deployment, in advance of full TTC fleet accessibility.

Secondary candidates for accessible service are those routes outside the Base Grid network that enjoy high ridership or that serve specific groups such as seniors residences and hospitals should be considered as primary candidates for an accessible route designation. This same rational applies to routes that are major ridership generators such as retail outlets, entertainment and social facilities and medical centres.

From a practical standpoint, the decision to identify one route over another where all factors appear equal should prioritize those routes where the service can most easily be made accessible, meaning that the fleet is available, and that stops, shelters and approaches are either accessible or require a minimal amount of remedial work to achieve accessible standards.

8.3.2 Criteria for Accessible Route Identification

The criteria for designating a route as accessible should depend on two major criterion areas:

- ~ level of service provided with accessible vehicles; and
- ~ system accessibility, including stops, approaches and shelters.

SERVICE LEVELS

Designating a transit route as accessible need not require that all trips be accessible, though that would be the ultimate objective.

Generally, YRT should consider identifying routes as accessible where:

- ~ at least 50 percent of all bus trips are provided with accessible equipment; and
- ~ the resulting accessible vehicle headway conforms to the required minimum service standards level of service.

These policies should be identified clearly on any promotional or scheduling material prepared by York Region Transit.

SYSTEM ACCESS

Designating a route as accessible should also give the customer some assurance that they will be able to move comfortably between the bus and their origin and destination. Many of the barriers in this area are not entirely related to transit, but involve accessibility issues on Regional roads and municipal streets.

Within YRT's responsibility however, the ultimate goal should be to make all stops accessible. Current programs ensure that all new stops are accessible, and retrofit programs are being designed to address remedial needs. Until that time however, designating a route as accessible should depend on a majority of passengers being able to access the stop at both their origin and destination. Details of stop and shelter access requirements are included in the Accessibility Background Paper.

8.3.3 Information Requirements

Designating accessible routes must be supported by customer information indicating which portion of the service is accessible, which stops are accessible, and appropriate caveats so that customers do not expect service that cannot be delivered.

Individual route publications, including web pages, should indicate those routes that are fully accessible and partially accessible in terms of service. Separate logos could be designed for these two levels, so that passengers are aware at a glance that a route is fully accessible.

For partially accessible services, each accessible trip should be indicated on the schedule, similar to the designations currently used on the web pages (See Route 91 example at right).

Each web page, and the site generally should include a caveat that not all stops are fully accessible, and that patrons should call for information on their specific stops. This will require customer service staff to have information regarding the accessible status of each stop, and development of such a system is underway.

8.3.4 Other Requirements

In support of accessible conventional service, all YRT operators should receive orientation on dealing with people with disabilities, technical training on the accessible features of the vehicles, and YRT policy with respect to operations issues, such as what action to take if a wheelchair ramp will not deploy, or if no wheelchair position is available on a bus.

This orientation should be part of new operator training, as well as periodic refresher courses.

ACCESSIBLE SERVICE	BAYVIEW / SUBRISCO	BAYVIEW PLAZA	BAYVIEW / MAJOR MAC	BAYVIEW / 16TH AVE
	F	E		D
♿		5:25	5:27	5:30
♿		5:45	5:47	5:50
		6:15	6:18	6:23
♿	6:32	6:37	6:40	6:45
♿		6:50	6:54	7:00
♿		7:00	7:04	7:10
♿	7:03	7:08	7:12	7:18
♿		7:15	7:19	7:25
		7:21	7:25	7:31
		7:27	7:31	7:37
♿		7:33	7:37	7:43
	7:35	7:40	7:44	7:50
		7:50	7:54	8:00

8.4 Technology Options

8.4.1 York Region Transit ITS Background

Currently, the main driver of ITS in York Region is the suite of Viva BRT technologies and systems. ITS deployments to date for YRT conventional fleet have involved small-scale pilot projects for Automatic Vehicle Location (AVL) and Transit Signal Priority (TSP).

VIVA ITS

The ITS vision for the Bus Rapid Transit (BRT) Quick Start transit service has been fully developed and is currently being deployed, involving an integrated system of ITS technologies. Full deployment and acceptance of the system is anticipated for January 2006 after the full Viva system is in operation.

The Viva system will incorporate a multitude of ITS features for intelligent tracking, monitoring, and management of vehicles and service as part of a direction to provide a state-of-the-art transit system within the Region of York. These features are based on an infrastructure of technology and services not currently utilized by YRT.

As part of the Viva Rapid Transit project, the following ITS technologies have been deployed and integrated in to the overall system operation:

- ~ Computer Aided Dispatch (CAD)
- ~ Automatic Vehicle Location (AVL)
- ~ Passenger Information systems at stops using variable message signs (VMS)
- ~ Transit Signal Priority (TSP) – conditional TSP based on schedule adherence
- ~ Automatic Passenger Counters (APC)
- ~ Wireless communication from dispatch to vehicles through GSM/GPRS and WLAN.
- ~ Automatic Fare Collection systems and Revenue Management Systems (RMS) for the Viva off board fare payment system.
- ~ Passenger Information systems including Web and IVR
- ~ Scheduling software systems

YRT TRANSPORT CANADA ITS DEPLOYMENT PROJECT

YRT conventional fleet operations have been moving along a different path for the deployment of its ITS systems; limited systems to date have only been deployed on pilot and demonstration basis, and do not operate as an integrated unit. YRT has a vision for future upgrades and enhancements to their conventional fleet operations including features similar to those used for the BRT system. These enhancements will provide benefits such as an increased quality of service, improved tracking and dispatching, and a consistent level of functionality across BRT and YRT conventional fleets, and possibly YRT's specialized transit fleet (Mobility Plus).

Preliminary discussions for ITS deployments on the YRT conventional fleet include Computer Aided Dispatch and Automatic Vehicle Location (CAD/AVL) systems and TSP deployments on selected YRT routes. These directions will be rationalized and confirmed through the project undertaken. The goal of integration between the ITS deployments would allow more intelligent operations, management, and customer service.

8.4.2 ITS Technology Options

VEHICLE LOGIC UNIT

The vehicle logic unit (VLU) is essentially the on-board computer which manages the various ITS technologies which are integrated into the system. ITS systems may be deployed onboard a transit vehicle in an isolated manner, but integrating systems together provides for added functionality and the potential for future enhancements.

On the Viva system, each transit vehicles is equipped with a VLU. On YRT's conventional transit fleet there is not a VLU onboard. There has previously not been a need for a device as sophisticated as the VLU. The need for a VLU onboard a conventional YRT transit vehicle will depend on the ITS technologies deployed and the functionalities required.

TRANSIT SIGNAL PRIORITY (TSP)

The implementation of Transit Signal Priority at signalized intersections within the Region involves the cooperation and commitment of both YRT and the traffic department at the Region and/or local municipal governments depending on the transit route requiring TSP. There are various forms to Transit Priority Measures which may be implemented; TSP is merely one form, while others may include more passive approaches such as updated signal timing plans, or civil improvements along corridors or at intersections.

Considering the current level of traffic congestion along arterials within the Region during peak periods, it may be generally assumed that traffic signal timing plans have already been optimized. As such, passive TSP strategies involving traffic signal timing plans will not likely be possible, or will not be very effective altogether, without negatively affecting the overall traffic movement. The strategies remaining include active TSP operations and/or expensive civil improvements along transit corridors and at signalized intersections. With active TSP, TSP is only provided when required by a transit vehicle approaching an intersection on a conditional or unconditional basis. With unconditional TSP, service is always provided regardless of other factors. With conditional TSP, service is only provided when specific conditions, such as schedule adherence or passenger loads, are met.

The Viva system operates an active TSP system based on transit vehicle schedule adherence. The system, through the onboard vehicle logic unit, is able to cross reference the transit vehicle's location along a route (via GPS), time of day, and schedule to determine if TSP should be requested at the next signalized intersection. If the transit vehicle is ahead, on schedule, or less than three minutes late, no TSP service will be requested. If the vehicle is between three and five minutes late, TSP service will be requested. In the situation where the transit vehicle is more than five minutes late, a more aggressive TSP service will be requested. This configuration of TSP may be refined as needed.

The implementation of active TSP will likely be the only viable consideration, such that impacts to general traffic flows and capital budgets may be minimized. As such, the following TSP deployment options, based on leveraging existing technologies, may be rationalized:

1. Expand the existing Viva TSP, and associated ITS, system and operation to the YRT conventional transit fleet as priorities require.
2. Expand a limited version of the Viva TSP system with GPS and schedule adherence tracking only.

3. Provide unconditional TSP with the same technology components as those used on the Viva system for future integration.

COMPUTER AIDED DISPATCH (CAD)

With YRT's conventional transit fleet, dispatch operations are managed by the various contracted operators. YRT is not involved in the day-to-day dispatching and management of the transit vehicles on street. Necessary changes to transit schedules maybe communicated and coordinated between YRT and the contracted operator's dispatching staff.

With the Viva system, the YRT's contracted operator manages dispatch functions from a central operations centre located at YRT's head office. However, their dispatching operations are managed by a computer system which tracks the position of each Viva transit vehicle on street. The Viva service contracted dispatchers would only need to intervene as needed.

Existing practices allows YRT's contractors to manage their own staff and transit service. CAD would provide benefit to the service contractors, but YRT would have to provide the necessary interfaces into the central system, software, hardware, and training. Furthermore, AVL equipment and other associated hardware would have to be installed on each transit vehicle to facilitate the tracking of vehicle and the automate communication of instructions to the operators from the central system.

AUTOMATIC VEHICLE LOCATION (AVL)

AVL may be accomplished through various means, of which may include automated check-in at specific locations along a transit route, on board dead reckoning systems, and Global Positioning System tracking.

The Viva system utilizes a GPS-based tracking system coupled with dead reckoning technologies to supplement the GPS system in situations where GPS satellites are not visible. Each Viva vehicle is equipped with the required AVL technologies and supporting technologies (i.e. communications) to allow for near real-time tracking of each vehicle.

The expansion of the Viva AVL system onto the conventional YRT transit fleet, or a portion of, is a viable consideration. This provision would allow for YRT inspectors to monitor the movement of transit vehicles from a central site. This provision would also provide the linkages required to improve customer service initiatives. Under one ITS consideration, patrons may be able to view transit schedules and tracked vehicles from a website, or YRT customer service staff may be provided with "real-time" transit schedules. Several other ITS services may be considered as well, based on AVL.

SCHEDULE ADHERENCE AND TRANSFER PROTECTION

The transfer of transit passengers between routes is an important aspect of most urban transit service. Schedule adherence plays an important part in facilitating the effective transfer of passengers at various junctions and stations within the transit network. In the absence of advanced vehicle tracking technologies and efficient communications, transfer points are at the mercy of predefined schedules and anticipated traffic conditions.

With the introduction of AVL and efficient dispatcher to transit vehicle operator communications, passenger transfers at critical junctions may be better managed.

On the Viva system, transfer protection functions may be better managed by dispatchers through the CAD/AVL system. However, the conventional YRT fleet does not have the necessary technologies to complement the Viva service; as such passenger transfers between Viva and conventional YRT transit vehicles cannot be effectively and efficiently managed at this time. The integration of YRT conventional transit vehicles, coupled with appropriate adjustments to the management structure between YRT and its service contractors, would provide for enhanced transfer protection functions.

IN VEHICLE SECURITY / VIDEO SURVEILLANCE

Transit security is a growing issue, both internationally and locally. The security of patrons and infrastructure is a priority among many transit agencies in North America. With the growing use and introduction of new technologies, investments in respect to security infrastructures have become more reasonable.

The introduction of ITS technologies and facilities for the Viva system provide an excellent foundation for security system enhancements. Technologies used on transit vehicles and at terminals may be leveraged to provide security enhancements.

PASSENGER INFORMATION SYSTEMS AND REAL TIME INFORMATION

Providing transit patrons and customer service representatives with the latest transit service and schedule information would enhance YRT's overall service, customer satisfaction, and customer convenience. These technologies may include in-vehicle VMS, wayside VMS, website traveller information, interactive voice recognition (IVR) services, mobile device connectivity and services, and such.

YRT currently provides scheduled information through their customer service functions and online. However, these are only static schedules and do not reflect real on-street conditions. Additional technologies would have to be integrated into conventional transit vehicles and the central system to allow for real-time schedule information.

The Viva system provides the static transit schedule information through YRT's customer service representatives, the web, and an IVR system. Real-time schedule information (i.e. next bus departure times) are provided at Viva transit terminals and stops. Future enhancements to the existing system will include real-time schedule information through the customer service representatives, website, and IVR.

AUTOMATIC PASSENGER COUNTERS (APC)

Automated Passenger Counters are devices which count the number of patrons entering or exiting a defined barrier. This data may be used to analyze service utilization and patterns. The count data may also be used by other intelligent systems to manage various functions.

On the Viva system, APCs have been deployed on each vehicle to track service utilization and patterns. The conventional YRT transit fleet does not utilize such technologies at this time.

The use of APCs are not a direct benefit to transit customers, but provide valuable information to transit service planners and operators.

APC data collected may also be linked to the TSP system to provide for another form of conditional TSP. Under this system design consideration, TSP would be provided when transit vehicle loads have reached a specified threshold. The passenger count data may also be linked to

the transit vehicle's schedule adherence to provide conditional TSP based on passenger load and transit vehicle schedule adherence.

MOBILE DATA TERMINALS – DRIVER INFORMATION AND COMMUNICATIONS INTERFACE

A mobile data terminal is the interface between transit vehicle operators, ITS systems, and dispatchers.

On the Viva system, the MDT is the tool that the transit operator uses to manage vehicle functions, receive instructions from the central CAD system, initiate calls and alarms, and communicate with dispatchers.

8.4.3 Criteria for ITS Consideration

The implementation of ITS technologies and related services into an existing operational environment requires planning, coordination with other stakeholders, detailed design and deployment activities. As such, the implementation and utilization ITS may not be seen until Year 2 of the active service plan.

As a basis for consideration, the ITS recommendations for YRT's 5-year service plan should account for the following criteria:

- ~ leveraging and Integration with Viva ITS subsystems;
- ~ complimentary to YRT's forthcoming ITS Deployment Strategy;
- ~ planning initiation of practical (reasonable order-of-magnitude cost) initiatives within the first year, with a view to deployment and use in the second year;
- ~ assist in meeting transit service objectives; and
- ~ avoid/minimize throwaway technology initiatives.

Details of these criteria are explained more fully in the ITS Background Paper.

8.4.4 ITS Technologies and Strategies for Further Consideration

Based on the defined criteria, a list of ITS recommendations for the Short-term and the Medium-Term identified as "early winners" related to the ITS Strategic Plan to be developed later; however, these recommendations may need to be refined based on further discussions and planning relative to the strategic planning efforts.

EARLY WINNERS

The recommended initiatives are defined in the following subsections for the Short- and Medium-Term.

Short-Term Recommendations

- ~ Assessment and refinement of TSP parameters based on real collected data.

In the first year of TSP operation on the Viva transit system, a detailed evaluation and study of the TSP parameters used in the initial deployment should be completed. This will provide an opportunity for YRT to optimize Viva TSP operations. Through this refinement process, YRT would be in a better position to consider how TSP for conventional transit operating in the same corridor may affect Viva and general traffic operations. The study will also better guide TSP deployments in other transit corridors within the Region of York.

The recommended start of on-street data collection for this study is late spring of 2006 after a period of normalization for the integration of Viva services with YRT services. However, discussions among key stakeholders, the formulation of hypotheses, and the development of the evaluation framework may begin in earlier in the year.

- ~ AVL and VMS signing for YRT conventional transit Routes 99, 1, and 77 operating on Viva corridors for customer service enhancement.

Equip YRT transit vehicles with compatible AVL equipment to the Viva systems such that YRT Routes may also be signed on the VMS. The signing should occur at all Viva stops and terminals where YRT conventional transit vehicles would also make a stop. This initiative is a step towards a more seamless transit service within the Region.

TSP functionality is not being recommended at this time since TSP service for YRT vehicles will affect Viva service in some manner.

Medium-Term Recommendations

- ~ NT ITS 1 - Connection management with AVL equipped routes.

To enhance customer service through better connection management of transit vehicles between routes, an AVL system compatible with the Viva systems should be deployed on conventional YRT transit vehicles operating on intersecting routes with the Viva service. There are several routes throughout the Region which fit this description, as such these routes should be prioritized and AVL should be deployed by service priority.

- ~ NT ITS 2 - TSP on select YRT routes, route segments, or networks, as warranted.

Based on the results of the TSP assessment initiative in the Short-Term, YRT may consider expanding the TSP system onto conventional YRT routes, if feasible. Planning and design for this effort may begin in the Short-Term, if the timeline permits. The TSP system may operate differently than the Viva TSP system, but the technologies specified should be compatible to ensure future upgradeability.

- ~ NT ITS 3 - TSP on YRT routes along Viva corridors.

One cost effective enhancement to YRT conventional transit service along existing Viva corridors would be to equip these vehicles for TSP. An unconditional TSP operation may be readily deployed, and the equipment required for signalized intersection control would already be present under the Viva project. Another alternative would be to deploy a conditional TSP system like that used for the Viva system; the AVL function would also be included as recommended in initiative two under the Short-Term recommendations.

However, there are several issues to be addressed and resolved before this initiative is initiated. These issues include:

- ~ service impacts to Viva service and defined service standards with the Viva contractor, particularly in the case of mixing unconditional TSP for conventional transit services with conditional TSP for Viva transit services;
- ~ impacts to general traffic; and
- ~ service distinction between conventional transit and bus rapid transit.