

NORTH YONGE STREET CORRIDOR PUBLIC TRANSIT AND ASSOCIATED ROAD IMPROVEMENTS

Environmental Study Report



Final December 2008



E. EXECUTIVE SUMMARY

E.1 PURPOSE

York Region has had the greatest proportional increase in population and employment amongst the four suburban regions of the Greater Toronto Area over the past 10 years. Within the 2031 planning horizon, the population of the Region is forecast to increase from the current 921,000 residents (as of January 2006) to 1.5 million residents, while employment is estimated to increase from the existing 468,000 jobs (as of January 2006) to 780,000 jobs (the 2031 population and employment forecasts are sourced from Ontario Places to Grow).

The Places to Grow, Growth Plan for the Greater Golden Horseshoe was released in June 2006 and is established under the provisions of the Places to Grow Act (June 13, 2005). The Growth Plan implements the Provinces' vision for managing growth and developing stronger communities. The Growth Plan provides detailed strategies and policy directions that promote transit-supportive densities and a healthy mix of residential and employment land uses, as well as identifying and supporting a transportation network that links urban centres using efficient public transit and highway systems for moving people and goods. The Plan allows the government to designate geographic growth areas and work with local officials to develop growth plans that meet specific regional needs, while respecting the greenbelt.

The purpose of the project can be summarized as:

- Providing improved public transit infrastructure and service in the northern sector of the Regional network's primary north-south corridor capable of producing significant increases in transit ridership both within the corridor and across the network and regional boundary. This objective will be supported by interconnection with other corridors and GTA transit systems such as GO Transit and the Toronto Transit Commission (TTC);
- Developing a balanced transportation system in the corridor by the implementation of transit infrastructure and associated road improvements in conjunction with the Region's road enhancement commitments identified in the TMP. This will include integrated design and operational solutions for both transit facilities and road widening where these occur on common sections of road right-of-way, e.g. Yonge Street in the Newmarket Regional Centre; and
- Integrating improved public transit facilities in a manner that improves and enriches streetscapes with new amenities by using a holistic urban

design approach to support the Region's goals for higher density, mixed-use, transit-oriented development along the corridor in accordance with approved official plans.

E.2 STUDY AREA

The proposed geographic limits of the study area for the North Yonge Street Corridor Public Transit and Associated Road Improvements Class EA are shown in **Figure E-1**, in the context of the overall York Rapid Transit Plan. The area is generally centred along the Yonge Street Corridor and bounded by Bathurst Street to the west, and Highway 404 to the east. The southern limit of the study area is 19th Avenue/Gamble Road in the Town of Richmond Hill while the northern limit is Green Lane in the Town of East Gwillimbury.

E.3 PROJECT INITIATION

On August 8, 2005, the Region, as Proponent of the York Region Rapid Transit Plan, obtained Ministry of the Environment (MOE) approval of the Terms of Reference (ToR) for an Environmental Assessment (EA) of the proposed public transit and associated road improvements in the North Yonge Street Corridor, the northern portion of the primary north-south corridor in the Plan. In accordance with Clause 6.2 of the *Ontario Environmental Assessment Act*, the Region initiated an Individual EA to fulfil its obligations under Clause 3 of the Act.

In September 2007, The Ministry of the Environment approved a new Municipal Engineers Association (MEA) Municipal Class EA process (October 2000, as amended 2007) for municipal infrastructure including for the first time transit projects within the Class EA process together with transition provisions to allow projects already underway to be completed using the newly approved Municipal Class EA process. With this option available, York Region decided to complete the North Yonge Street Corridor EA study under this new Class EA process (Schedule C project). The public and stakeholders were notified of this decision in March 2008.

E.4 ALTERNATIVE SOLUTIONS

The alternatives to the Undertaking or the alternative transportation solutions that could be considered to respond to the Region's mobility needs and Official Plan objectives are outlined in Section 3.1. The evaluation of alternative transportation solutions is outlined in Section 3.3.3 with the preferred alternative being the **York Region Rapid Transit Corridor Initiatives**.

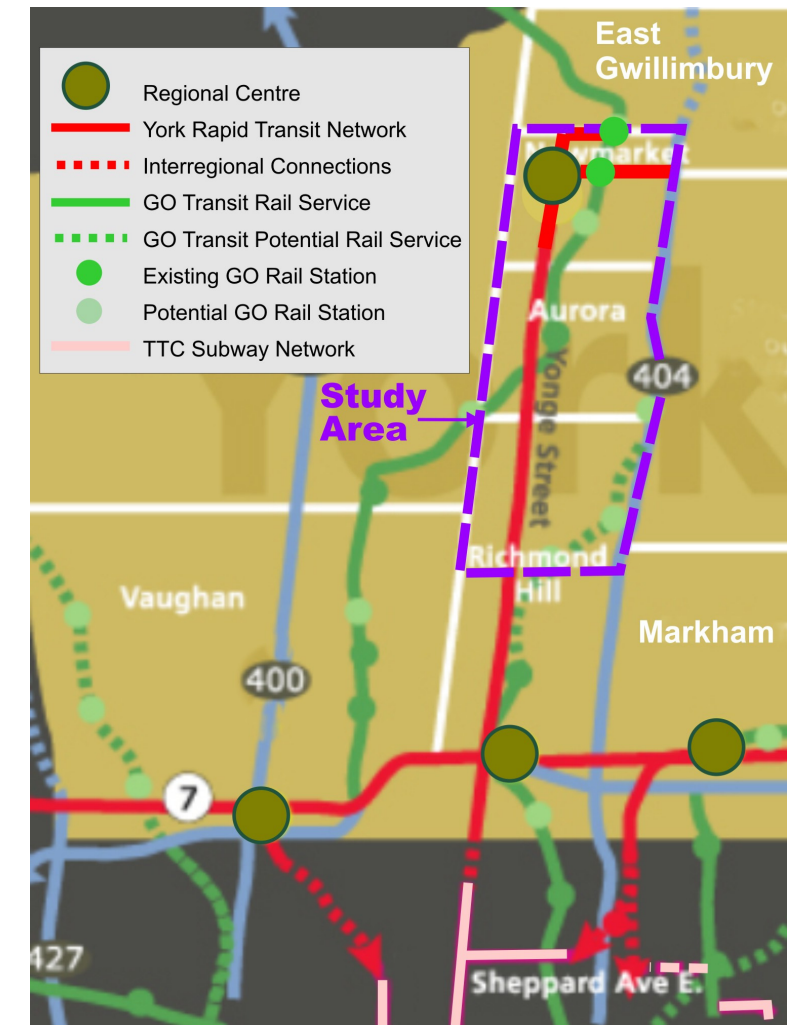


Figure E-1
York Rapid Transit Plan Corridor Relationship

Based on the analysis of transportation needs conducted for the 2002 York Region Transportation Master Plan (TMP), the widening of Yonge Street from four lanes to six lanes between Mulock Drive and Green Lane has been included as a "current commitment" in the foregoing evaluation of transportation improvement solutions within the project study area. As noted in Table 4-4, the preferred solution is the Yonge Street Road Capacity Improvements Solution. This solution is actually part of the current commitments outlined in Chapter 3.

E.5 ALTERNATIVE DESIGNS

Chapter 6 describes the analysis and initial screening of the alternative design concepts for improving public transit in the study area. The initial screening resulted in specific route alternatives being carried forward for

further evaluation (Section 6.1.1.4). The existing conditions related to the route alternatives is described in Chapter 7.

The route alternatives were developed for each segment within the study area, as outlined in Chapter 8. The project was divided into three segments corresponding to the municipalities within the study area: Richmond Hill, Aurora and Newmarket/East Gwillimbury.

E.6 PREFERRED DESIGN

Figure E-2 summarizes the overall alignment and station locations for the project. The preferred design, included in Chapter 10 for the project includes:

- A median rapidway along Yonge Street, from 19th Avenue in Richmond Hill to Green Lane in East Gwillimbury, with the exception of a constrained segment within Aurora, from Henderson Drive to Orchard Heights, where transit service will run in mixed traffic as it is today.
- A median rapidway along two routes east of Yonge Street, one along Green Lane to the East Gwillimbury GO Terminal and the other along Davis Drive to the Southlake Regional Health Centre and then in mixed traffic east of the hospital to Hwy 404.
- An interim stage along Yonge Street, from Davis Drive to Green Lane, where HOV lanes are proposed as a pre-cursor to ultimate median rapidway.
- Associated road improvements including intersection turning lanes are included as part of the undertaking to address local traffic operational needs.

E.7 NOTICE OF COMPLETION

The Notice of Completion for this Class EA is dated December 4, 2008 and identifies the public review period from December 5, 2008 to January 9, 2009.

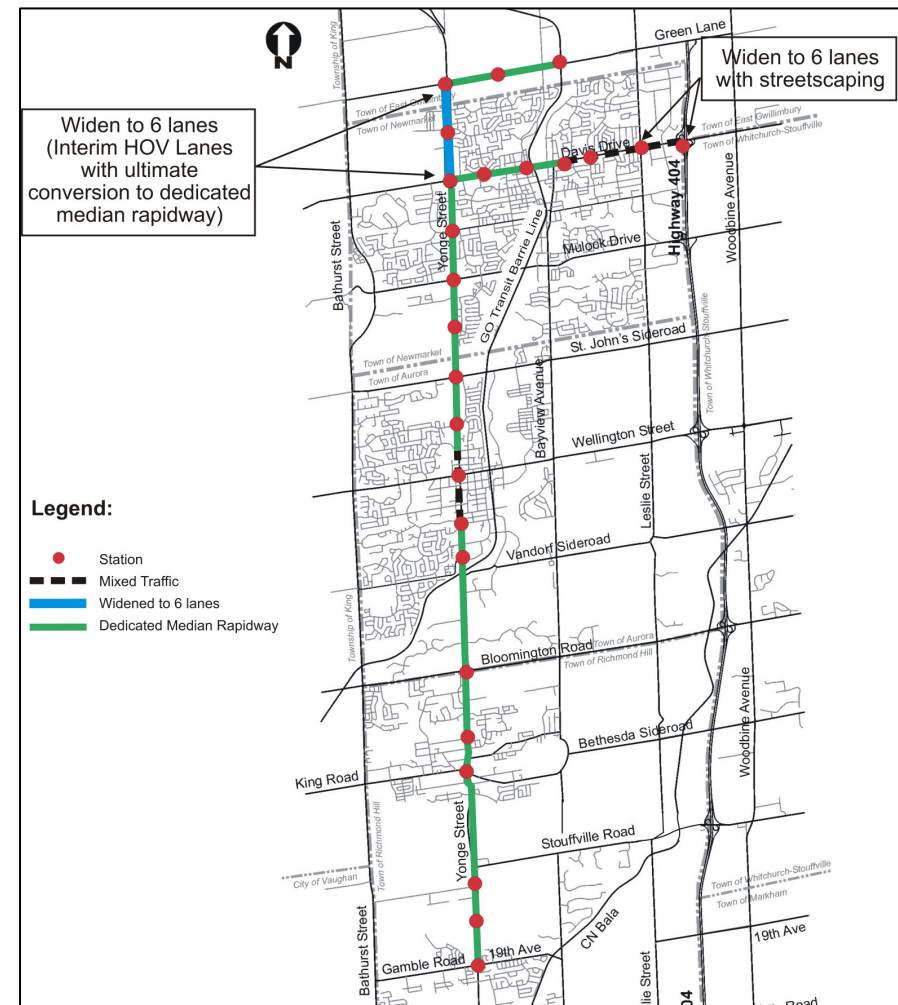


Figure E-2
Preferred Alignment and Station Locations

TABLE OF CONTENTS

E. EXECUTIVE SUMMARY	E-1				
E.1 Purpose	E-1				
E.2 Study Area	E-1				
E.3 Project Initiation	E-1				
E.4 Alternative Solutions	E-1				
E.5 Alternative Designs	E-1				
E.6 Preferred Design	E-2				
E.7 Notice of Completion	E-2				
1. INTRODUCTION AND BACKGROUND	1-1				
1.1 Background	1-1				
1.2 Purpose of the Environmental Study Report	1-1				
1.3 Relationship with Other Corridors	1-1				
1.4 Class EA Study Process	1-1				
1.5 Canadian Environmental Assessment Act (CEAA)	1-2				
1.6 Report Organization	1-2				
2. IDENTIFICATION AND DESCRIPTION OF THE PROBLEM AND OPPORTUNITY (CLASS EA PROCESS – PHASE 1)	2-1				
2.1 Definition of the Study Area	2-1				
2.2 Overview of the Existing Transportation Environment in the Study Area	2-1				
2.2.1 Major Road Network	2-1				
2.2.2 Railway Corridors	2-2				
2.2.3 Transit Network	2-2				
2.3 Planned Transportation Network Improvements	2-3				
2.3.1 Road Network	2-3				
2.3.2 Transit	2-4				
2.4 The Problem and Opportunity	2-4				
2.4.1 Statement of the Problem	2-4				
2.4.2 The Opportunity	2-5				
2.4.3 The Purpose of the Project	2-5				
3. ALTERNATIVE SOLUTIONS TO THE PROBLEM (CLASS EA PROCESS – PHASE 2)	3-1				
3.1 Description of Alternative Solutions to the Problem	3-1				
3.1.1 Do Nothing	3-1				
3.1.2 A Current Commitments Solution Including Priority Transit and Transportation Demand Management ...	3-1				
3.1.3 A Road Capacity Increase Solution Including Current Commitments and Further Road Expansion	3-1				
3.1.4 Enhanced Barrie Line Commuter Rail and Inter-regional Bus Service Solution	3-1				
3.1.5 York Region Rapid Transit Corridor Initiatives Solution Including Current Commitments	3-1				
3.2 Description of the Environments for Alternative Solutions	3-1				
3.2.1 The Built Environment	3-1				
3.2.1.1 Places to Grow	3-3				
3.2.1.2 The Greenbelt Plan	3-3				
3.2.1.3 Oak Ridges Moraine	3-3				
3.2.2 Land Use Planning	3-4				
3.2.2.1 Regional Official Plan	3-4				
3.2.2.2 Municipal Official Plans	3-5				
3.2.3 The Natural Environment	3-10				
3.2.3.1 Physiography and Soils	3-10				
3.2.3.2 Watershed Areas	3-10				
3.2.3.3 Regional Geology	3-10				
3.2.3.4 Geology/Hydrogeology	3-10				
3.2.3.5 Designated Natural Areas	3-10				
3.3 Analysis of Alternative Solutions to the Problem (Alternative Transportation Solutions)	3-12				
3.3.1 Criteria for Evaluation of Alternative Solutions	3-12				
3.3.1.1 Effectiveness of the Transportation Solution in Meeting Travel Demand	3-12				
3.3.1.2 Effects on the Social Environment (reflecting the “Healthy Communities” theme)	3-12				
3.3.1.3 Effects on the Natural Environment (reflecting the “Sustainable Natural Environment” theme)	3-12				
3.3.1.4 Effects on Smart Growth and the Economic Environment (reflecting the “Economic Vitality” theme)	3-12				
3.3.2 Analysis of Effectiveness as a Transportation Solution	3-12				
3.3.2.1 The Demand Forecasting Model	3-12				
3.3.2.2 Key Assumptions for Demand Modelling	3-13				
3.3.2.3 Responsiveness of the Alternatives to the Forecast Capacity Required to Meet Demand	3-14				
3.3.2.4 Effect of Alternative Solutions on Transit Mode Share	3-15				
3.3.3 Evaluation of Alternative Transportation Solutions Rationale for Selection of Rapid Transit	3-16				
4. ALTERNATIVE SOLUTIONS CONTINUED: YONGE STREET ROAD IMPROVEMENTS BETWEEN MULOCK DRIVE AND GREEN LANE (CLASS EA PROCESS – PHASE 2)	4-1				
4.1 Background	4-1				
4.2 Need and Justification	4-1				
4.2.1 Existing Traffic Operations	4-1				
4.2.2 Future Capacity and Demand	4-1				
4.3 Alternatives to Yonge Street Road Capacity Improvement	4-2				
4.4 Evaluation of Alternatives to the Problem	4-2				
4.4.1 No improvement in Yonge Street Road Capacity	4-2				
4.4.2 Transportation Demand Management (TDM)	4-2				
4.4.3 Improvements to Public Transit Service Only	4-2				
4.4.4 Improvements to Other Roadways	4-3				
4.4.5 Improvements to Yonge Street Capacity	4-4				
4.5 Evaluation Summary of Alternatives to the Problem	4-4				
5. FORECAST OF TRAVEL DEMAND WITH PUBLIC TRANSIT IMPROVEMENTS (THE PREFERRED TRANSPORTATION SOLUTION)	5-1				
		5.1 Setting for the Proposed North Yonge Street Public Transit Improvements	5-1		
		5.1.1 Existing Transit Travel Patterns	5-1		
		5.2 Transit Ridership Projections	5-1		
		5.2.1 Modeling Scenarios and Assumptions	5-1		
		5.2.1.1 Population and Employment	5-1		
		5.2.1.2 Base Assumptions for Demand Modelling	5-2		
		5.2.1.3 Viva Networks	5-2		
		5.3 2031 Ridership Forecasts	5-4		
		5.3.1 Rapid Transit Passenger Volumes	5-4		
		5.3.1.1 Travel Patterns and Modal Split	5-4		
		5.3.1.2 Boarding and Alighting Patterns	5-4		
		6. ALTERNATIVE DESIGN CONCEPTS FOR THE PREFERRED SOLUTION: RAPID TRANSIT ROUTES AND TECHNOLOGIES (CLASS EA PROCESS – PHASE 3)	6-1		
		6.1 Rapid Transit Routes	6-1		
		6.1.1 Preliminary Screening of Route Options	6-1		
		6.1.1.1 General Objectives for Routes	6-1		
		6.1.1.2 Description of Route Alternatives	6-1		
		6.1.1.3 Assessment and Evaluation of Alternative Routes	6-1		
		6.1.1.4 Results of screening of Alternative Routes	6-1		
		6.2 Rapid Transit Technologies	6-10		
		6.2.1 Transit Technologies Considered	6-10		
		6.2.2 Screening of Alternative Transit Technologies	6-10		
		6.2.2.1 Bus Rapid Transit (BRT)	6-13		
		6.2.2.2 Light Rail Transit (LRT)	6-13		
		6.2.3 Evaluation of Alternative Technologies	6-14		
		7. DESCRIPTION OF THE ENVIRONMENT	7-1		
		7.1 Transportation Environment	7-1		
		7.1.1 Local/Regional Transit Network	7-1		
		7.1.1.1 York Region Transit	7-1		
		7.1.1.2 Viva	7-1		
		7.1.1.3 GO Transit	7-2		
		7.1.1.4 Park and Ride	7-2		
		7.1.2 Existing Transit Volumes	7-2		
		7.1.3 Existing Transit Performance	7-2		
		7.1.4 Pedestrian and Cycling Accesses within the Corridor	7-2		
		7.1.5 Existing Roadway Network	7-3		
		7.1.5.1 Peak Traffic Periods	7-3		
		7.1.5.2 Existing Right-of-Ways	7-3		
		7.2 Natural Environment	7-3		
		7.2.1 Horizontal Groundwater Movement	7-3		
		7.2.2 Groundwater Recharge/Discharge Areas	7-3		
		7.2.3 Well Distribution	7-3		
		7.2.4 Aquatic Habitats and Communities	7-4		
		7.2.4.1 East Holland River Watershed	7-4		
		7.2.4.2 East Humber River Watershed	7-4		
		7.2.4.3 Rouge River Watershed	7-4		

7.2.4.4	Rare, Threatened or Endangered Aquatic Species	7-4	8.1.7	Fare Collection.....	8-2	9.1.4.3	Davis Drive between Yonge Street and Highway 404.....	9-10
7.2.4.5	Vegetation and Vegetation Communities.....	7-4	8.1.8	Streetscaping.....	8-3	9.2	Davis Drive Intersection Consolidation Design Alternatives	9-14
7.2.4.6	Rare, Threatened or Endangered Plant Species	7-4	8.1.9	Towards Great Regional Streets	8-3	9.2.1	George Street and Wilstead Drive Intersections.....	9-14
7.2.5	Wildlife and Wildlife Habitat	7-4	8.1.10	Other Parameters to be Considered.....	8-3	9.2.2	Parkside Drive and Longford Drive Intersections	9-15
7.2.5.1	Rare, Threatened or Endangered Wildlife Species.....	7-5	8.2	Route Alternatives Evaluation.....	8-4	9.3	Local Area Alignment Design Optimization: Main Street to Prospect Street.....	9-20
7.2.6	Contaminated Sites	7-5	8.2.1	Evaluation objectives, goals and indicators.....	8-4	9.4	Segments with Rapid Transit in Mixed traffic	9-20
7.3	Social Environment	7-5	8.2.2	Development of Segment Route Alternatives.....	8-5	9.4.1	Yonge Street between Davis Drive and Green Lane	9-20
7.3.1	Land Ownership Patterns.....	7-5	8.2.3	Richmond Hill Segment – Route Alternatives.....	8-5	9.4.2	Green Lane between Yonge Street and the East Gwillimbury GO Station.....	9-20
7.3.2	Land Use Along the Corridor.....	7-6	8.2.4	Aurora Segment - Route Alternatives.....	8-5	9.4.3	Yonge Street between Henderson Drive and Orchard Heights Boulevard.....	9-20
7.3.2.1	Residential Neighbourhoods.....	7-6	8.2.4.1	Route Alternative A2: Yonge Street	8-5	10.	THE PREFERRED DESIGN FOR THE PROJECT	10-1
7.3.2.2	Commercial Areas	7-6	8.2.4.2	Route Alternative A3: Yonge Street/Industrial Parkway/St. John's Sideroad.....	8-6	10.1	Description of the Preferred Design	10-1
7.3.2.3	Business Areas	7-6	8.2.4.3	Route Alternative A4: Route Adjacent to GO Bradford Right-of-way	8-6	10.1.1	Rapidway Elements	10-2
7.3.3	Future Development Plans	7-6	8.2.4.4	Evaluation of Alternatives Findings and Recommendation	8-6	10.1.2	Horizontal Alignment.....	10-4
7.3.4	Recreation and Tourism Areas.....	7-7	8.2.5	Newmarket/East Gwillimbury Segment – Route Alternatives	8-6	10.1.3	Vertical Alignment and Pavement Widening.....	10-5
7.3.5	Noise and Vibration	7-7	8.2.5.1	Route Alternative NE2: Yonge Street and Green Lane to East Gwillimbury GO Station	8-6	10.1.4	Intersection Design	10-5
7.3.5.1	Regulatory Requirements	7-7	8.2.5.2	Route Alternative NE3: Adjacent to GO Bradford Right-of-way to East Gwillimbury GO Station.....	8-6	10.1.5	Structures.....	10-6
7.3.5.2	Sound Level Monitoring at Receptor Locations.....	7-7	8.2.5.3	Route Alternative NE5: Yonge Street/Eagle Street West to Newmarket GO Bus Station	8-6	10.1.6	Watercourse Crossings.....	10-6
7.3.5.3	Traffic Noise Prediction Results for Existing Conditions	7-7	8.2.5.4	Route Alternative NE6: Yonge Street/Davis Drive/Main Street/Green Lane to East Gwillimbury GO Station	8-7	10.1.7	Stations	10-7
7.3.5.4	Conclusions of Noise Impact Analysis.....	7-8	8.2.5.5	Route Alternative NE7: Yonge Street/Davis Drive to Leslie Street.....	8-7	10.1.8	Park and Ride Facilities	10-8
7.3.5.5	Existing Vibration Levels Along the Corridor.....	7-8	8.2.5.6	Route Alternative NE8: Yonge Street/Davis Drive/Bayview Parkway/Green Lane to East Gwillimbury GO Station.....	8-7	10.2	Service Plan for Surface Rapid Transit	10-8
7.3.6	Air Quality and Criteria	7-8	8.2.5.7	Evaluation of Alternatives Findings and Recommendation	8-7	10.2.1	Near-Term Service Design	10-8
7.3.6.1	Existing Environmental Conditions	7-8	9.	ALIGNMENT DESIGN ALTERNATIVES	9-1	10.3	Project Activities	10-8
7.3.6.2	Existing Air Quality.....	7-9	9.1	Rapid Transit Physical Infrastructure Locations.....	9-1	10.3.1	Pre-construction Phase.....	10-8
7.3.6.3	Background Concentrations	7-10	9.1.1	Alternative Locations Within a Road Right-of-way	9-1	10.3.2	Construction Activities Phase	10-9
7.3.6.4	Predicted Atmospheric/Vehicle Emissions.....	7-10	9.1.1.1	Preliminary Evaluation	9-1	10.3.3	Operation Phase	10-9
7.3.6.5	Air Dispersion Modelling Approach.....	7-11	9.1.1.2	Conclusion	9-1	10.4	Project Staging.....	10-9
7.3.6.6	Conclusions of Air Quality Analysis	7-11	9.1.2	Richmond Hill Segment Design Alternatives (19 th Avenue to Bloomington Road).....	9-2	10.5	Design Attributes and Built-In Mitigation	10-9
7.4	Cultural Environment	7-11	9.1.3	Aurora Segment Design Alternatives (Bloomington Road to Savage Road)	9-2	11.	ASSESSMENT OF THE PREFERRED DESIGN	11-1
7.4.1	Environmental Assessment and Cultural Heritage Resources.....	7-11	9.1.3.1	Bloomington Road to Wellington Street.....	9-2	11.1	Assessment Methodology	11-1
7.4.1.1	19th Century Development.....	7-11	9.1.3.2	Wellington Street to Savage Road.....	9-3	11.2	Assessment Results.....	11-2
7.4.1.2	Identification of Built Heritage Features and Cultural Landscapes	7-12	9.1.4	Newmarket/East Gwillimbury Segment Design Alternatives	9-4	11.3	Project Related Effects and Mitigation	11-2
7.4.1.3	Description of the Existing Environment.....	7-12	9.1.4.1	Savage Road South to Mulock Drive	9-4	11.4	Analysis of Environmental Effects and Mitigation	11-3
7.4.1.4	Description of the Identified Built Heritage Resources and Cultural Heritage Landscapes.....	7-12	9.1.4.2	Mulock Drive to Green Lane	9-4	11.4.1	OBJECTIVE A: To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service	11-3
7.4.2	Archaeological Resources.....	7-13	8.	DEVELOPMENT AND SELECTION OF PREFERRED DESIGN.....	8-1	11.4.2	OBJECTIVE B: To protect and enhance the social environment in the corridor	11-5
7.5	Services and Utilities	7-14	8.1	Planning and Design Parameters	8-1	11.4.3	OBJECTIVE C: To protect and enhance the natural environment in the corridor	11-12
8.	DEVELOPMENT AND SELECTION OF PREFERRED DESIGN.....	8-1	8.1.1	Rapid Transit Design Objectives	8-1	11.4.4	OBJECTIVE D: To promote smart growth and economic development in the corridor	11-17
8.1	Planning and Design Parameters	8-1	8.1.2	Design Criteria.....	8-1	12.	PUBLIC AND AGENCY INVOLVEMENT.....	12-1
8.1.1	Rapid Transit Design Objectives	8-1	8.1.3	Bus Rapid Transit (BRT)	8-1	12.1	Technical Advisory Committee and Technical Agencies.....	12-1
8.1.2	Design Criteria.....	8-1	8.1.4	Light Rail Transit (LRT)	8-2	12.2	Public Involvement Program	12-1
8.1.3	Bus Rapid Transit (BRT)	8-1	8.1.5	Station Design Features	8-2	12.2.1	Public Consultation Centres (PCC)	12-2
8.1.4	Light Rail Transit (LRT)	8-2	8.1.6	Roadway.....	8-2	12.2.2	Facts Sheets	12-3
8.1.5	Station Design Features	8-2				12.2.3	Viva Website	12-3
8.1.6	Roadway.....	8-2						

12.3	First Nations Consultation.....	12-3
12.4	Other Stakeholder Consultations	12-4
12.5	Municipal Approvals	12-4
12.6	Record of Consultation.....	12-4
13.	IMPLEMENTATION PROCESS.....	13-1
13.1	Context	13-1
13.2	Project Implementation Plan	13-1
13.2.1	The Design Phase	13-1
13.2.2	The Construction Phase	13-1
13.3	Environmental Commitments.....	13-2
13.4	Monitoring	13-3
13.4.1	Construction Monitoring.....	13-3
13.4.2	Operations Monitoring	13-3
13.5	Modifying the Preferred Design	13-3

Appendices

Appendix A	Terms of Reference
Appendix B	Transportation Assessment Report
Appendix C	Natural Sciences Report
Appendix D	Geotechnical Study Report
Appendix E	Environmental Assessment (Contaminated Sites) Report
Appendix F	Storm Water Management Preliminary Assessment Reports
Appendix G	Cultural Heritage Resource Report
Appendix H	Stage 1 Archaeological Assessment Report
Appendix I	Noise and Vibration Impact Assessment Report
Appendix J	Air Quality Impact Assessment Report
Appendix K	Detailed Route Alternative Evaluation Tables
Appendix L1	Public Consultation Centre #1 Report
Appendix L2	Public Consultation Centre #2 Report
Appendix L3	Public Consultation Centre #3 Report
Appendix L4	Public Consultation Centre #4 Report
Appendix M	Record of Consultation
Appendix N	Davis Drive Micro-Simulation Summary
Appendix O	Excerpt from Oak Ridges Moraine Conservation Plan
Appendix P	Comments from Draft Environmental Study Report

List of Tables

2-1	2005 Average Annual Daily Traffic	2-2	7-12	MOBILE6C Tailpipe Emission Factors for Future Conditions (2021)	7-11
2-2	Existing YRT Routes within Study Area	2-2	7-13	Identified Cultural Heritage Landscapes and Built Heritage Resources in the Corridor	7-12
3-1	Summary of Alternative Transportation Solutions	3-1	8-1	Summary of BRT Running Way Geometric Design Criteria	8-2
3-2	Designated Natural Areas	3-12	8-2	Summary of LRT Running Way Geometric Design Criteria	8-2
3-3	Evaluation of Alternative Transportation Solutions (Entire Corridor)	3-17	8-3	Summary of Roadway Geometric Design Criteria	8-3
4-1	Existing Intersection Level of Service for Yonge Street Between Mulock Drive and Green Lane	4-1	8-4	Evaluation Objectives, Goals and Indicators	8-4
4-2	Projected Auto Volumes with Public Transit Improvements Only	4-3	8-5	Synopsis of Primary Route Alternative Evaluation Findings for Aurora Segment	8-10
4-3	Impacts of Road Improvements on Parallel Corridors (2021)	4-3	8-6	Synopsis of primary Route Alternative Evaluation Findings for Newmarket/East Gwillimbury Segment	8-12
4-4	Evaluation of Alternatives Transportation Solutions (Yonge Street between Mulock Drive and Green Lane)	4-5	9-1	Evaluation of Options to Locate a Rapidway in a Roadway	9-1
5-1	Population and Employment – York Region and GTA/Hamilton, 2006-2031	5-2	9-2	Evaluation of Rapidway Alignment Design Options - Aurora/Newmarket: Yonge Street from Valhalla Court to Savage Road South	9-3
5-2	Speed and Headway Assumptions on Yonge Street	5-3	9-3	Evaluation of Route Capacity and Improved Public Transit Design Alternatives on Yonge Street Between Mulock Drive and Davis Drive	9-6
5-3	Park and Ride Lot Capacities	5-4	9-4	Evaluation of Route Capacity and Improved Public Transit Design Alternatives on Yonge Street Between Davis Drive and Green Lane	9-8
5-4	2031 Yonge Street (Viva Blue) Ridership Summary	5-4	9-5	Existing (2005) PM Peak Hour Arterial Performance	9-10
5-5	2031 AM Peak Hour Ridership by Segment for Yonge Street Corridor	5-4	9-6	Evaluation of Improved Public Transit Design Alternatives on Davis Drive	9-12
5-6	2001 and 2031 AM Peak (3-Hour) Period Total Trips and Transit Modal Split	5-5	9-7	George Street/Wilstead Drive Intersection Evaluation	9-16
6-1	Alternative Rapid Transit Systems – Richmond Hill Route Options Preliminary Screening	6-2	9-8	Parkside Drive/Longford Drive/Lindsay Avenue Intersection Evaluation	9-18
6-2	Alternative Rapid transit Systems – Aurora Route Options Preliminary Screening	6-4	9-9	Evaluation of Rapidway Alignment Alternatives on Davis Drive: Main Street to Prospect Street	9-24
6-3	Alternative Rapid Transit Systems – Newmarket/East Gwillimbury Route Options Preliminary Screening	6-7	11-1	Effects and Mitigation for Mobility	11-3
6-4	Preliminary Screening of Transit Technologies	6-11	11-2	Effects and Mitigation for Social Environment	11-5
7-1	Cycling Routes in the Corridor	7-2	11-3	Effects and Mitigation for Natural Environment	11-12
7-2	Total Number of Properties Representing Potential Environmental Concern	7-5	11-4	Effects and Mitigation for Smart Growth and Economic Development	11-17
7-3	Summary of Receptor Locations	7-7	13-1	Summary of Environmental Concerns and Commitments	13-2
7-4	Predicted Existing Daytime and Nighttime Traffic Sound Level	7-8	13-2	Construction Monitoring	13-3
7-5	Recent Ambient Air Quality Monitoring for PM2.5	7-9	13-3	Monitoring Activities During Rapid Transit Operations	13-3
7-6	Recent Ambient Air Quality Monitoring for Nitrogen Oxides	7-9			
7-7	Recent Ambient Air Quality Monitoring for Carbon Monoxide	7-10			
7-8	24 hour Background Particulate Concentrations ($\mu\text{g}/\text{m}^3$)	7-10			
7-9	Background NOx and CO Concentrations ($\mu\text{g}/\text{m}^3$)	7-10			
7-10	Conservative Background VOC Concentrations ($\mu\text{g}/\text{m}^3$)	7-10			
7-11	MOBILE6C Tailpipe Emission Factors for Existing Conditions (2005)	7-11			

List of Figures

E-1	York Rapid Transit Plan Corridor Relationship	E-1	6-3	Newmarket/East Gwillimbury Route Options	6-9
E-2	Preferred Alignment and Station Locations	E-2	7-1	Transit Routes in Study Area	7-1
1-1	Rapid Transit Network	1-1	7-2	Existing (2008) Viva Blue Southbound AM Peak Hour Ridership Patterns	7-2
1-2	Corridor Relationship	1-2	7-3	Average Speed for Existing Viva Blue Service	7-2
1-3	Municipal Class EA Planning and Design Process	1-3	7-4	Wind Rose and Wind Speed Charts (2001-2005)	7-9
2-1	Study Area	2-1	7-5	MOE Monitoring Stations	7-10
2-2	YRT and Viva Routes within Study Area	2-2	8-1	Typical Two-Lane Exclusive Rapidway	8-3
2-3	Viva Network	2-3	8-2	Richmond Hill Segment – Route Alternatives	8-8
2-4	2031 York Region Road Improvements	2-4	8-3	Aurora Segment – Route Alternatives	8-9
2-5	2031 York Region Transit Network Improvements	2-4	8-4	Newmarket/East Gwillimbury Segment - Route Alternatives	8-11
2-6	York Region 2008 – 10 Year Roads Construction Program	2-4	8-5	Southlake Regional Health Centre – Potential Turn Around Locations	8-14
3-1	Existing Social Environment in Study Area	3-2	9-1	Options to Locate a Rapidway in a Roadway	9-1
3-2	Places to Grow – Schedule 5, Moving People – Transit	3-3	9-2	Future (2021) Traffic Levels on Yonge Street without Rapid Transit	9-2
3-3	Map 45 from the Greenbelt Plan	3-4	9-3	Yonge Street Existing (2005) Traffic Levels	9-4
3-4	Map 31 from the Greenbelt Plan	3-4	9-4	Existing (2005) Traffic Levels	9-10
3-5	Map 3 from the Oak Ridges Moraine Conservation Plan	3-4	9-5	Future (2021) Traffic Levels on Davis Drive without Rapid Transit	9-10
3-6	York Region – Regional Structure	3-5	9-6	Right-of-way and Holland River Bridge widened to North	9-21
3-7	Town of Richmond Hill Official Plan Schedule A Land Use Plan	3-6	9-7	Right-of-way and Holland River Bridge widened to South	9-22
3-8	Town of Aurora Official Plan – Schedule A Land Use Plan	3-7	9-8	Right-of-way widened both sides with a New Holland River Bridge	9-23
3-9	Town of Newmarket Official Plan – Schedule A Land Use Plan	3-8	10-1	Preferred Alignment and Station Locations	10-1
3-10	Draft Town of East Gwillimbury Community Structure Plan	3-9	10-2	40-45 m Right-of-Way	10-2
3-11	Existing Natural Environment in Study Area	3-11	10-3	36 m Right-of-Way	10-2
3-12	Screenlines for Demand vs Capacity Analysis	3-14	10-4	42.6 m Right-of-Way	10-3
3-13	Analysis Results for Screenline 1: South of Davis Drive	3-14	10-5	Streetscaping Plan	10-3
3-14	Analysis Results for Screenline 2: South of Wellington Street	3-15	10-6	Typical Emergency Service Median Crossing Treatment	10-5
3-15	Analysis Results for Screenline 3: South of Stouffville Road	3-15	10-7	Keith Bridge Cross-Section	10-6
3-16	Effect of Alternative Solutions on Transit Mode Share	3-16	10-8	Cross-Section under GO Barrie Bridge in Aurora	10-6
4-1	Yonge Street Existing (2005) Traffic Levels	4-1	10-9	Davis Drive Cross-Section at Southlake Regional Health Centre Pedestrian Bridge	10-7
4-2	Future (2021) Volume to Capacity Ratios for Yonge Street and Existing Transit Mode Split	4-2			
4-3	Select Link Analysis for Trips Using Yonge Street (Mulock Dr. to Green Lane)	4-3			
5-1	Existing Viva Blue Southbound AM Peak Period Ridership Patterns as of January 2007	5-1			
5-2	Viva Network	5-3			
5-3	AM Peak Hour Link Volume – 2031 BRT/Subway	5-4			
5-4	2031 BRT AM Peak (3-Hour) Period Boarding/ Alighting on Yonge Street Corridor	5-5			
6-1	Richmond Hill Route Options	6-3			
6-2	Aurora Route Options	6-6			

1. INTRODUCTION AND BACKGROUND

1.1 BACKGROUND

As a major step towards achieving the Regional Municipality of York (Region) Official Plan's three goals of **sustainable natural environment, economic vitality and healthy communities**, the Region developed its *Transportation Master Plan* (TMP), June 2002. The TMP established a comprehensive blueprint for road and transit developments in the Region through 2031. The TMP reaffirmed the need to achieve a balanced transportation system by recommending implementation of rapid transit in four corridors as shown in **Figure 1-1**. The principal objective of this network, known as the York Region Rapid Transit Plan (YRTP) is to provide a high quality public transit alternative for travel between the four designated regional centres as well as rapid transit links from the Region's network to the City of Toronto's subway network, and to transit services in neighbouring Peel and Durham Regions.



Figure 1-1
Rapid Transit Network

On August 8, 2005, the Region, as Proponent of the York Region Rapid Transit Plan, obtained Ministry of the Environment (MOE) approval of the

Terms of Reference (ToR) for an Environmental Assessment (EA) of the proposed public transit and associated road improvements in the North Yonge Street Corridor, the northern portion of the primary north-south corridor in the Plan. In accordance with Clause 6.2 of the *Ontario Environmental Assessment Act*, the Region initiated an Individual EA to fulfil its obligations under Clause 3 of the Act.

In September 2007, The Ministry of the Environment approved a new Municipal Engineers Association (MEA) Municipal Class EA process (October 2000, as amended 2007) for municipal infrastructure including for the first time transit projects within the Class EA process together with transition provisions to allow projects already underway to be completed using the newly approved Municipal Class EA process. With this option available, York Region decided to complete the North Yonge Street Corridor EA study under this new Class EA process (Schedule C project). The public and stakeholders were notified of this decision in March 2008.

Also, in May 2006, the Region began a Class EA to identify operational and safety improvements for Davis Drive from Yonge Street to Highway 404. Since the North Yonge Street Corridor Public Transit and Associated Road Improvements EA includes Davis Drive in its study area, the Region has integrated the Davis Drive Operational and Safety Improvements Class EA into the overall study. The public and stakeholders were also notified of the study integration in March 2008.

1.2 PURPOSE OF THE ENVIRONMENTAL STUDY REPORT

The purpose of this report is to document the scope and findings of the EA study which assessed the effects of both the construction of the North Yonge Street Public Transit and Associated Road Improvements and the operation of rapid transit service in the corridor. The report and its appendices constitute the documentation to be filed with the Municipal Clerk and placed on the public record for at least 30 calendar days for review by the public and review agencies as required by the Municipal Class EA Process Phase 4. In addition, the requirements for approval under the *Canadian Environmental Assessment Act* (CEAA) are being pursued through a parallel process.

1.3 RELATIONSHIP WITH OTHER CORRIDORS

As a primary corridor on York Region's proposed rapid transit network and the major inter-regional connector between the Towns of East Gwillimbury, Newmarket, Aurora and Richmond Hill and the City of Toronto, the Yonge

Street Corridor fulfils several roles relating to the other corridors in the Region's network as well as those of other transit operators interfacing with it. These roles can be summarized as follows:

- Providing the high quality transit link between the Newmarket Regional Centre and the three southern Regional Centres located along the Highway 7 Corridor.
- Providing the central north-south public transit feed to the planned Richmond Hill Centre intermodal terminal station at the junction of the Yonge Street and Highway 7 Corridors in the Bayview Glen area of Richmond Hill.
- Providing improved transit service to the heavily congested southern leg of the corridor and across the Regional boundary to the Yonge Subway terminus at Finch Station.
- Providing rapid transit access from the northern sector of the Corridor to the proposed Highway 407 inter-regional bus rapid transit corridor at the Richmond Hill Centre terminal.
- Permitting convenient connections between rapid transit, local transit services, and the inter-regional GO Transit network.

Figure 1-2 illustrates the relationship of the North Yonge Street Corridor to the remainder of the South Yonge Street Corridor and to other inter-connected corridors mentioned above.

1.4 CLASS EA STUDY PROCESS

As noted previously, the Region decided to complete the EA as a Municipal Class EA as permitted under the recently approved Implementation and Transition Provisions in Part D "Municipal Transit Projects" of the 2007 amendment of the MEA's Class EA document. Consequently, the documentation of the steps undertaken under the IEA process has been assembled in this Environmental Study Report in the framework of the five phase Class EA process illustrated in **Figure 1-3** and described below.

The main elements of the Class EA planning process are incorporated in the following five phases summarized as follows:

- Phase 1** Identify the **problem (deficiency) or opportunity**.
- Phase 2** Identify **alternative solutions** to address the problem or opportunity by taking into consideration the existing environment, **and establish the preferred solution taking into account public and review agency input**. At this point, determine the appropriate Schedule for the undertaking and document decisions in a Project File for

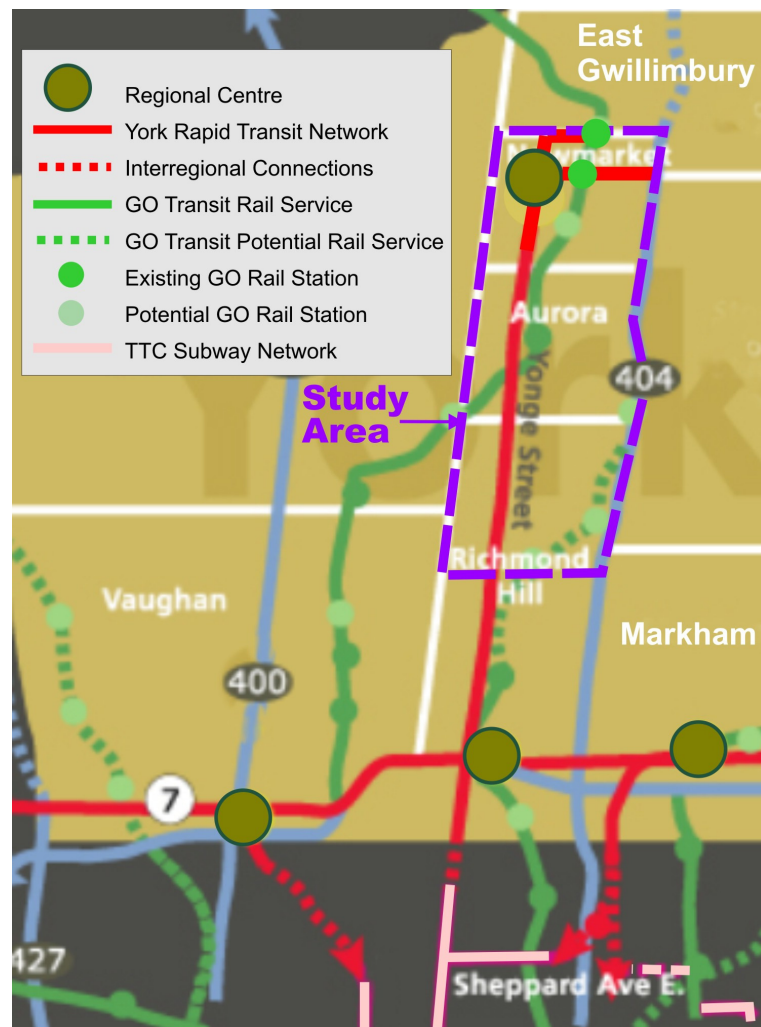


Figure 1-2
Corridor Relationship

Schedule B projects, or proceed through the following Phases for Schedule C projects.

Phase 3 Examine **alternative methods** of implementing the **preferred solution**, based upon the existing environment, public and review agency input, anticipated environmental effects and methods of minimizing negative effects and maximizing positive effects.

Phase 4 Document, in an **Environmental Study Report** a summary of the **rationale, and the planning, design and consultation process** of the project as established through the above Phases, and make such documentation available for comment by review agencies and the public.

Phase 5 Complete contract drawings and documents, and proceed to **construction and operation; monitor construction** for adherence to environmental provisions and commitments. Where special conditions dictate, also **monitor the operation** of the completed facilities.

The first two phases have also utilized findings of the TMP and other transportation studies completed prior to the commencement of the EA and these have been incorporated in the findings described in Chapters 2 and 3 of this Environmental Study Report (ESR).

The third and fourth phases of the assessment encompassed the following key tasks:

- Detailed and focused investigation of existing conditions;
- Development of alternative methods of carrying out the undertaking (designs);
- Assessment of environmental effects of alternative methods;
- A comparative evaluation of the alternative methods;
- Selection of the Preferred Method;
- Detailed description of the project including phasing and built-in mitigation;
- Detailed assessment of the environmental effects of the Preferred Method;
- Identification of lands needed for the implementation of the Preferred Method;
- Recommendations for actions to prevent, change, mitigate, or remedy adverse effects, including monitoring provisions;
- Conclusions of the effects of the Preferred Method on the environment; and
- Documentation of the study in an ESR.

The output of these tasks included:

- Opportunities to minimize identified potential adverse effects through the implementation of effective mitigation measures;
- Opportunities to restore, enhance, or improve overall environment quality of the along the corridor including the preparation of a streetscape plan;
- Definition of the Preferred Functional Design for infrastructure of public transit and associated road improvements and the potential service plan for operations;
- Right-of-way (ROW) protection requirements for the preferred design to allow for orderly development or redevelopment of lands in proximity of the transit facilities; and
- A staged implementation process for construction of the undertaking based on development pressures, ridership requirements and funding availability.

1.5 CANADIAN ENVIRONMENTAL ASSESSMENT ACT (CEAA)

Federal funding will almost certainly be required because of the size and importance of this project. Funding by a federal agency is considered a *trigger* under the CEAA.

Funding could flow from Industry Canada through the Strategic Infrastructure Fund and as such Transport Canada would likely be designated the *Responsible Authority*. Other approvals or triggers under CEAA for this project include approval for a TransCanada Pipeline crossing under the jurisdiction of the National Energy Board and DFO (Department of Fisheries of Oceans) approval of mitigation of any HADDs (Harmful, Alteration, Disruption, or Destruction) caused at river or creek crossings.

Several Federal agencies are on the project contact list, including Transport Canada, Health Canada, Environment Canada, Canadian Environmental Assessment Agency, Department of Fisheries and Oceans, Indian and Northern Affairs Canada (INAC). These agencies receive various project related material such as Public Consultation Centre Notices and specific, Submission Notices. Transport Canada has confirmed that the waters of the East Holland River at the Davis Drive crossing (Keith Bridge) are navigable and therefore subject to the requirements of the Navigable Waters Act. INAC has provided the project team with information related to possible First Nations groups that may have an interest in the project. Within INAC, three departments are included on the contact list, which are Specific Claims, Comprehensive Claims, and Litigation Management and Resolution Branches.

1.6 REPORT ORGANIZATION

This report is divided into thirteen Chapters. The background to the study and the purpose of the report are provided in **Chapter 1** including the planning and approval process. **Chapter 2** provides an overview of the study area and the problem or opportunity to be addressed by this study. **Chapter 3** identifies the Alternative Transportation Strategies to the respond to the need to be addressed by the project and describes the findings of a comparative evaluation of these solutions. The Alternative Transportation Strategies are continued in **Chapter 4** which specifically discusses the road improvements between Mulock Drive and Green Lane on Yonge Street. **Chapter 5** sets out the findings of the travel demand analysis carried out for the preferred solution.

In **Chapter 6**, the alternative methods of carrying out the preferred Transportation Solution are presented and evaluated. A description of the

study area's existing conditions that could be affected by the project is presented in **Chapter 7**. **Chapter 8** describes fundamental planning and design parameters that were used in developing alignments and alternatives. A description of the route alternatives and the factors influencing their development is provided in **Chapter 8** which also includes the evaluation methodology, criteria used for the evaluation and the initial screening of local alignment alternatives. In addition, **Chapter 9** evaluates primary route alternatives through each segment of the corridor. A detailed description of the preferred design solution including project development activities that might affect the environment is presented in **Chapter 10**.

Results of the assessment of the environmental effects, recommended mitigation measures and proposed monitoring are summarized in **Chapter 11**. Public and agency consultation formed an integral part of all phases of this study and is summarized in **Chapter 12**. **Chapter 13** outlines the project Implementation Plan.

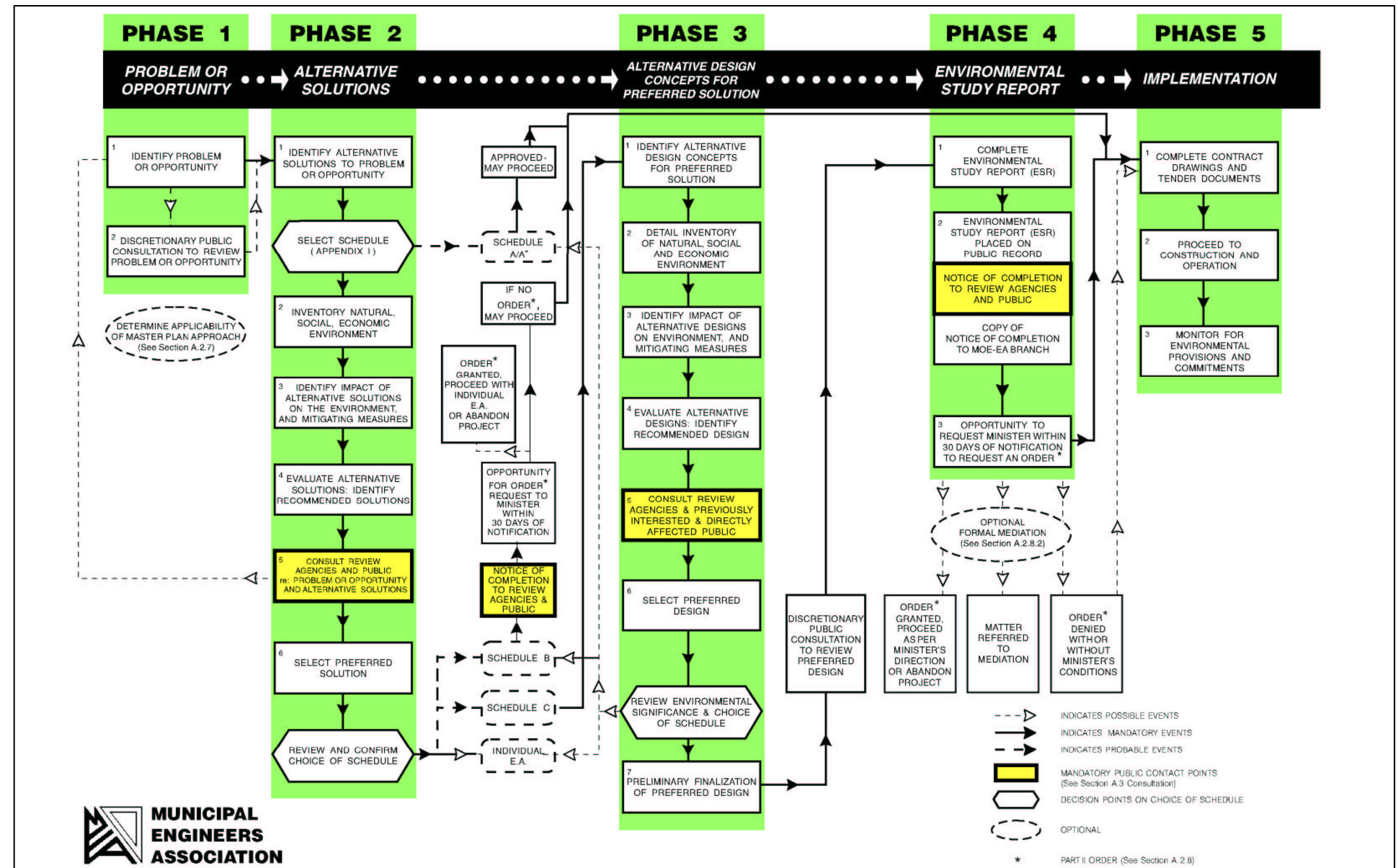


Figure 1-3
Municipal Class EA Planning and Design Process

2. IDENTIFICATION AND DESCRIPTION OF THE PROBLEM AND OPPORTUNITY (CLASS EA PROCESS – PHASE 1)

2.1 DEFINITION OF THE STUDY AREA

The proposed geographic limits of the study area for the North Yonge Street Corridor Public Transit and Associated Road Improvements Class EA are shown in **Figure 2-1**. The area is generally centred along the Yonge Street Corridor and bounded by Bathurst Street to the west, and Highway 404 to the east. The southern limit of the study area is 19th Avenue/Gamble Road in the Town of Richmond Hill while the northern limit is Green Lane in the Town of East Gwillimbury.

The geographic limits of the study area were selected using the following considerations:

- The constraints and opportunities within the selected corridor as identified through the inventory of the existing and planned environment completed as part of a Need and Justification analysis carried out in advance of the Terms of Reference (ToR) preparation;
- The rapid transit network proposed in York Region's Official Plan and Transportation Master Plan (TMP) including the already approved Yonge Street Transitway from Steeles Avenue to 19th Avenue; and
- The forecast level of transit ridership along the length of the corridor within the planning period to 2031.

A number of background reports were also used in the preparation of this study. These supporting documents include the following:

- Places to Grow Growth Plan for the Greater Golden Horseshoe, 2005, Ministry of Public Infrastructure Renewal;
- The Greenbelt Plan, February 2005, Ministry of Municipal Affairs and Housing;
- Oak Ridges Moraine Conservation Plan, April 2002, Ministry of Municipal Affairs and Housing
- 2031 Road & Transit Network, Staging & Costs, February 2002, Regional Municipality of York;
- York Region Transit Five-Year Service Plan 2006-2010, Final Report, May 2006;
- Transportation Master Plan, Final Report, June 2002, Regional Municipality of York;
- York Region Official Plan-Office Consolidation, September 1, 2006, Regional Municipality of York;

- Inter-Regional Bus Rapid Transit, Volumes 1-3, December 2002, GO Transit;
- Town of Richmond Hill Official Plan-Office Consolidation, December 31, 1998, Town of Richmond Hill;
- Town of Aurora Official Plan-Office Consolidation, January 2005, Town of Aurora;
- Town of Newmarket Official Plan 2006-2026, October 10, 2006, Town of Newmarket;
- Town of East Gwillimbury Official Plan Amendment 95, July 1997, Town of East Gwillimbury;
- Secondary Plans from the Towns of Richmond Hill, Aurora and Newmarket; and
- Yonge Street Corridor Public Transit Improvements Environmental Assessment from Steeles Avenue to 19th Avenue (MOE approved in April 2006).

2.2 OVERVIEW OF THE EXISTING TRANSPORTATION ENVIRONMENT IN THE STUDY AREA

2.2.1 Major Road Network

Yonge Street is an arterial roadway extending from Lake Ontario in downtown Toronto to north of the Regional Municipality of York and beyond. Within the study area, Yonge Street from 19th Avenue to Green Lane is under the jurisdiction of the Regional Municipality of York, except for the section through Aurora from the midpoint of the GO rail bridge north of Industrial Parkway South to approximately 200 metres north of Orchard Heights Drive which is under local jurisdiction.

Throughout the majority of the study area, Yonge Street consists of four general purpose lanes with a centre left turn lane. In the area between Golf Links Drive and Aurora Heights Drive in the Town of Aurora, Yonge Street is narrower and does not have a centre left turn lane. There is some on-street parking permitted through downtown Aurora with the details as follows: prohibited on the west side of Yonge Street from a point 30 metres south of Wellington Street to a point 128 metres south of Wellington Street between 8:30 am to 6:00 pm Monday to Saturday; and prohibited on the east side of Yonge Street from 30 metres south of Wellington Street to the Edward Street intersection between 9:00 am and 4:30 pm Monday to Saturday.

Within the study area, the average annual daily traffic (AADT) along Yonge Street varies from 19,200 to 33,600 vehicles as illustrated by the 2005 AADT's for representative locations shown in **Table 2-1**.

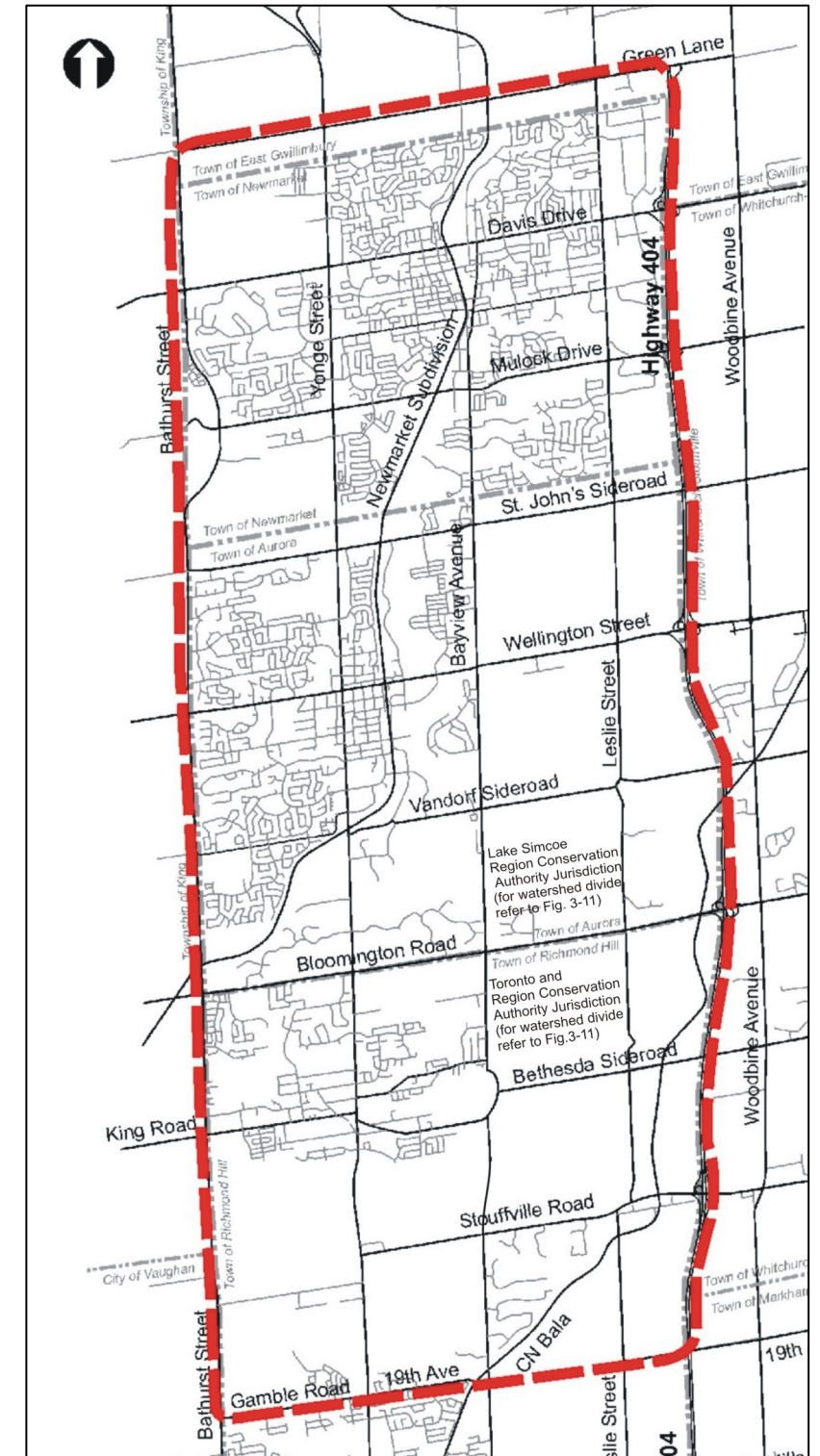


Figure 2-1
Study Area

Table 2-1
2005 Average Annual Daily Traffic

Location	AADT (Vehicles per day)
North of Stouffville Road	19,200
North of Bloomington Road	23,300
North of St. John's Sideroad	27,300
South of Davis Drive	33,600

Source: Automatic traffic recorder (ATR) counts provided by York Region

Truck movements make up approximately 5% of the vehicle composition during the peak hours.

Within the study area there are several major arterial roadways running both north-south and east-west. The arterial roadways oriented north-south include Bathurst Street west of Yonge Street, and Bayview Avenue and Leslie Street located east of Yonge Street. All of these roadways traverse the entire study area from Richmond Hill through Aurora and Newmarket to East Gwillimbury. Only Bayview Avenue does not make it through to East Gwillimbury, but terminates at Mulock Drive in Newmarket (Prospect Street continues from the terminus of Bayview Avenue at Mulock Drive to Davis Drive). The major east-west roadways are 19th Avenue/Gamble Road and Stouffville Road in Richmond Hill; Bloomington Road, Wellington Street and St. John's Sideroad in Aurora; Mulock Drive and Davis Drive in Newmarket; and Green Lane in East Gwillimbury. All of the noted east-west arterials have interchanges with Highway 404 except for 19th Avenue and St. John's Sideroad.

2.2.2 Railway Corridors

There are two railway lines within the study area. These are CN Rail's Bala subdivision to the east and the GO Transit Barrie line. Both of these lines are an integral part of CN's and GO's mainline network and are significant features within the EA study area. GO Transit also has stations on the CN Bala subdivision south of the study area at Langstaff Road and Major Mackenzie Drive. The GO Barrie line supports the present GO Rail commuter service with stations located at Wellington Street in Aurora, Davis Drive in Newmarket and Green Lane in East Gwillimbury. The GO Barrie line provides service southbound in the a.m. peak period to the City of Toronto, and northbound from there in the p.m. peak period with four trains in each direction.

2.2.3 Transit Network

All existing York Region Transit, Viva and GO Bus services operate their routes in mixed traffic throughout the study area. Currently, there are no Toronto Transit Commission routes operating within the study area.

York Region Transit

York Region Transit (YRT) provides a network of local bus service through a large portion of the study area. This service is summarized in **Table 2-2** and illustrated in **Figure 2-2**.

Table 2-2
Existing YRT Routes within Study Area

Route #	Description	Major Road(s)
22	King City	Bloomington Rd, King Rd, Yonge St
31	Aurora North	Wellington St, Orchard Heights Blvd
32	Aurora South	Henderson Dr, Wellington St, Yonge St, Bathurst St
33	Wellington	Wellington St, Leslie St
34	Industrial Parkway	Industrial Pkwy, Yonge St, St. John's Sdrd
44	Bristol-London	London Rd, Bristol Rd, Yonge St
52	Holland Landing Local	Yonge St
54	Bayview North	Bayview Ave, Main St
55/55B	Davis Drive	Davis Dr
56	Gorham-Eagle	Eagle St, Gorham St, Harry Walker Pkwy
57/57A	Mulock Dr	Mulock Dr
58	Leslie North	Leslie St
84	Oak Ridges	Yonge St, Bloomington Rd
86	Weldrick-Newkirk	Weldrick Rd, Newkirk Rd, Yonge St
88	Bathurst	Bathurst St
90	Leslie South	Bathurst St
98	Yonge North	Yonge Street
520/521	Newmarket Community Bus	Davis Dr, Gorham St, Eagle St

YRT's Viva Service

In September 2005, York Region launched Viva, a rapid bus service generally operating in mixed traffic conditions. The four corridors in which Viva operates (as illustrated previously in Figure 1-1) are Yonge Street, Highway 7, Vaughan North-South Link, and Markham North-South Link.

The Viva Blue route travels along Yonge Street from Finch Station in the City of Toronto northward to the Newmarket Bus Terminal, located at Eagle Street and Davis Drive. Along Yonge Street, there are ten Viva stops within the study area as shown in **Figure 2-3**. The headway of the Viva Blue route within the study area is 10 minutes during the weekday a.m. and p.m. peak periods and 12 to 15 minutes in the off-peak periods and weekends.



Source: York Region Transit

Figure 2-2
YRT and Viva Routes within Study Area

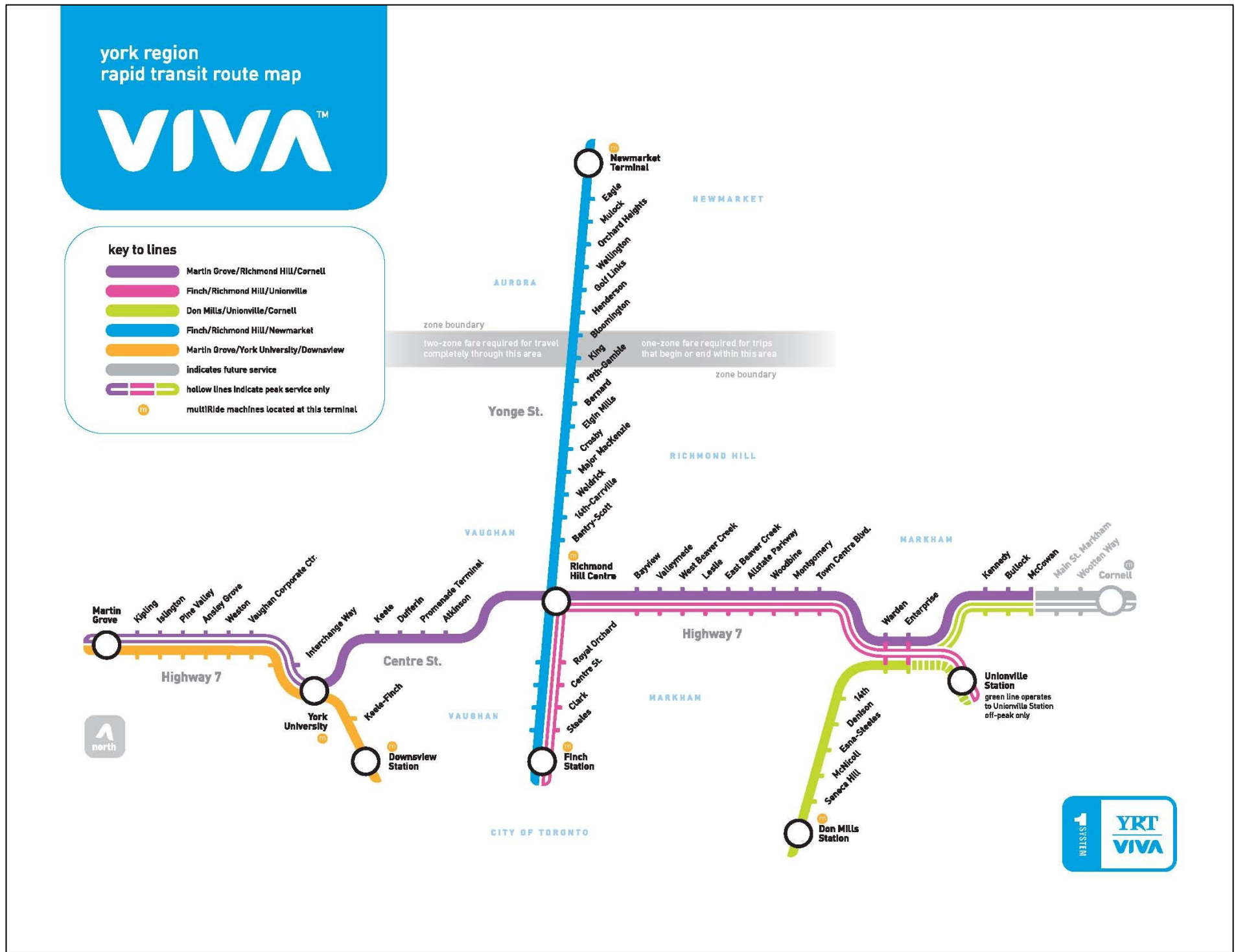


Figure 2-3
Viva Network

GO Transit

GO Transit provides both rail and bus service within York Region with several routes crossing the study area. North-south peak period commuter rail service in the area is provided by the Barrie GO Line on GO Transit's Newmarket subdivision. GO Transit has bus and rail stops and stations/terminals at the following locations within the study area.

- Richmond Hill Bus Stop located at Yonge Street and King Road,
- Aurora GO Rail Station located on Wellington Street just east of Yonge Street,
- Aurora GO Bus Station at Yonge Street and Murray Drive,
- Newmarket GO Bus Terminal located at Eagle Street and Davis Drive,
- Newmarket Rail Station located on Davis Drive, just east of Main Street, and
- East Gwillimbury GO Rail and Bus Station on Green Lane.

GO Transit operates the Newmarket 'B', Newmarket-York University, Barrie-Bradford, and Highway 400 bus routes within the study area. The frequency of the Newmarket 'B' bus service has been reduced significantly with the introduction of the Viva service in the fall of 2005. An express bus service on Highway 404 introduced by GO Transit has recently been discontinued.

2.3 PLANNED TRANSPORTATION NETWORK IMPROVEMENTS

The 2031 planned road and transit improvements identified in the TMP are the foundation for all transportation infrastructure planning in York Region, including the 10-year capital plan. These improvements are illustrated in **Figures 2-4** and **2-5** for the 2031 improvements to the road and transit networks respectively.

2.3.1 Road Network

The Region's 2008 - 10 Year Roads Construction Program identifies several road expansion projects which are shown in **Figure 2-6**. As noted in the Capital Plan, the construction of roads in urban areas also includes the implementation of streetscaping and tree planting. The planned road expansion projects within the study area are described in detail below:

- Operational improvements including widening of Bathurst Street to four lanes from Wellington Street to Mulock Drive (under construction);

- Operational improvements including widening of Bathurst Street to four lanes from Mulock Drive to Highway 9 in 2009;
- Operational improvements including widening of Yonge Street to six lanes from Mulock Drive to Green Lane in 2011 to be determined as part of this EA;
- Operational improvements on Davis Drive between Prospect Street to west of Main Street in 2010 to be determined as part of this EA;
- Widening of Bloomington Road to four lanes with a continuous left turn lane from Yonge Street to Bathurst Street in 2010;
- Widening of Bloomington Road to four lanes from Bayview Avenue

- to Highway 404 in 2011;
- Widening of Bloomington Road to four lanes with a continuous left turn lane from Yonge Street to Bayview Avenue in 2012;
- Operational improvements including widening of Bayview Avenue to four lanes from 19th Avenue to Stouffville Road in 2015;
- Operational improvements including widening of Leslie Street to four lanes from St. John's Sideroad to Mulock Drive in 2015;
- Operational improvements including widening of Leslie Street to four lanes from Wellington Street to St. John's Sideroad in 2015;
- Operational improvements including widening of Bayview Avenue

- to four lanes from Bloomington Road to Wellington Street in 2016; and
- Operational improvements including widening of Bayview Avenue to four lanes from Stouffville Road to Bloomington Road in 2017.

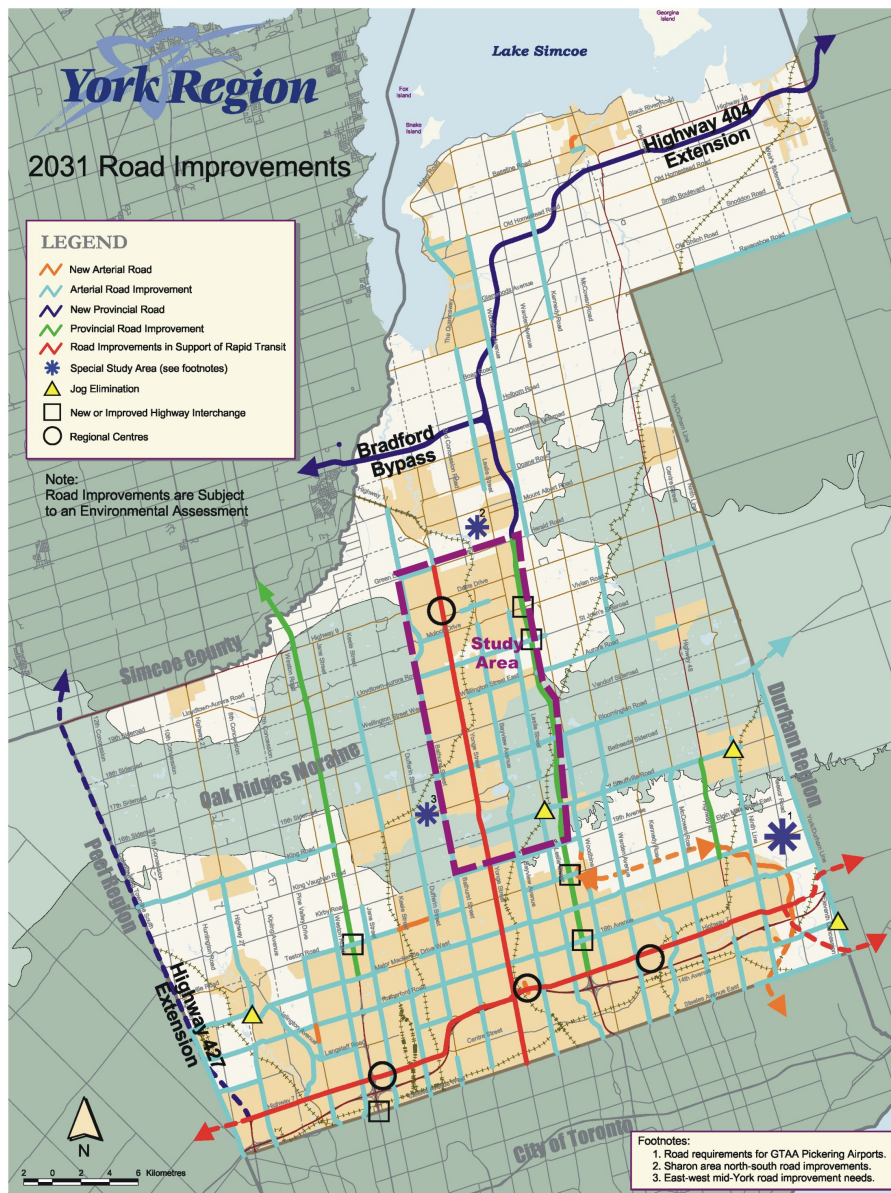


Figure 2-4
2031 York Region Road Improvements

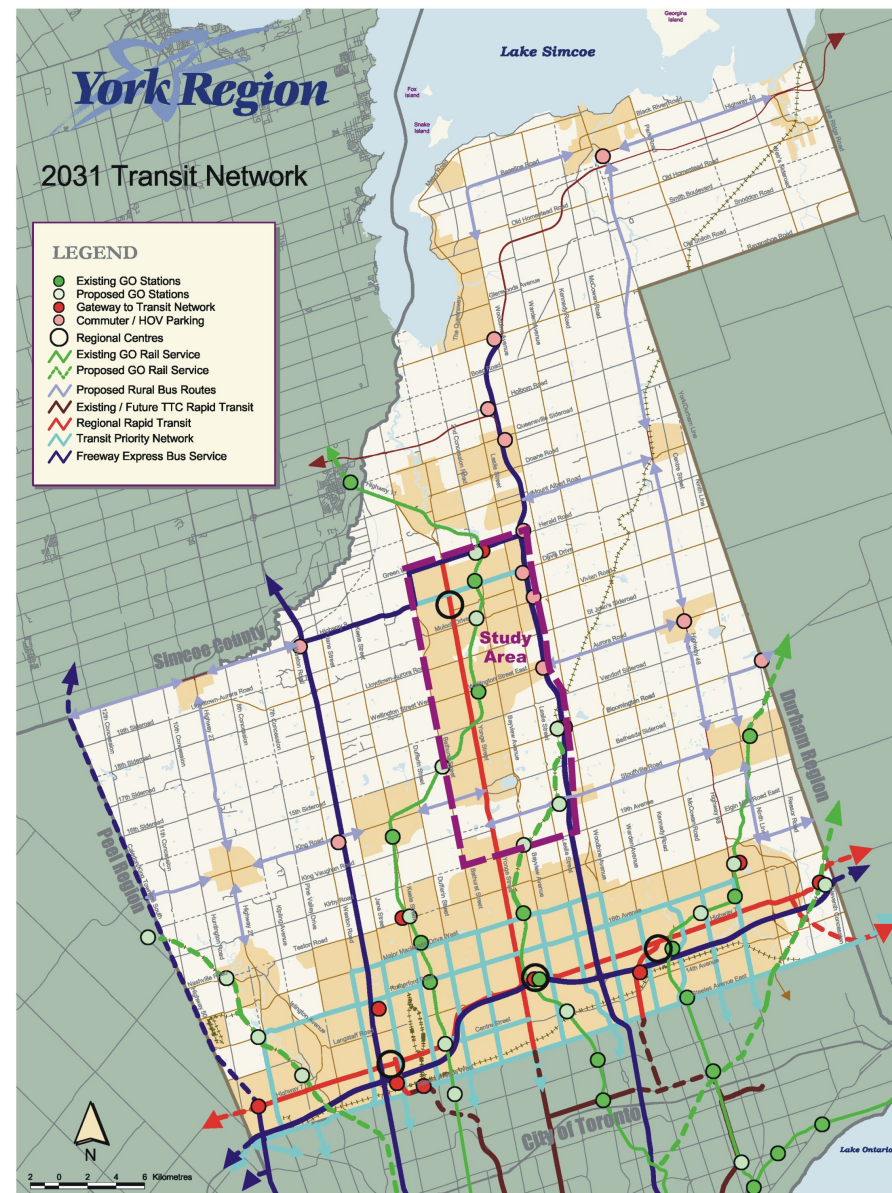


Figure 2-5
2031 York Region Transit Network Improvements

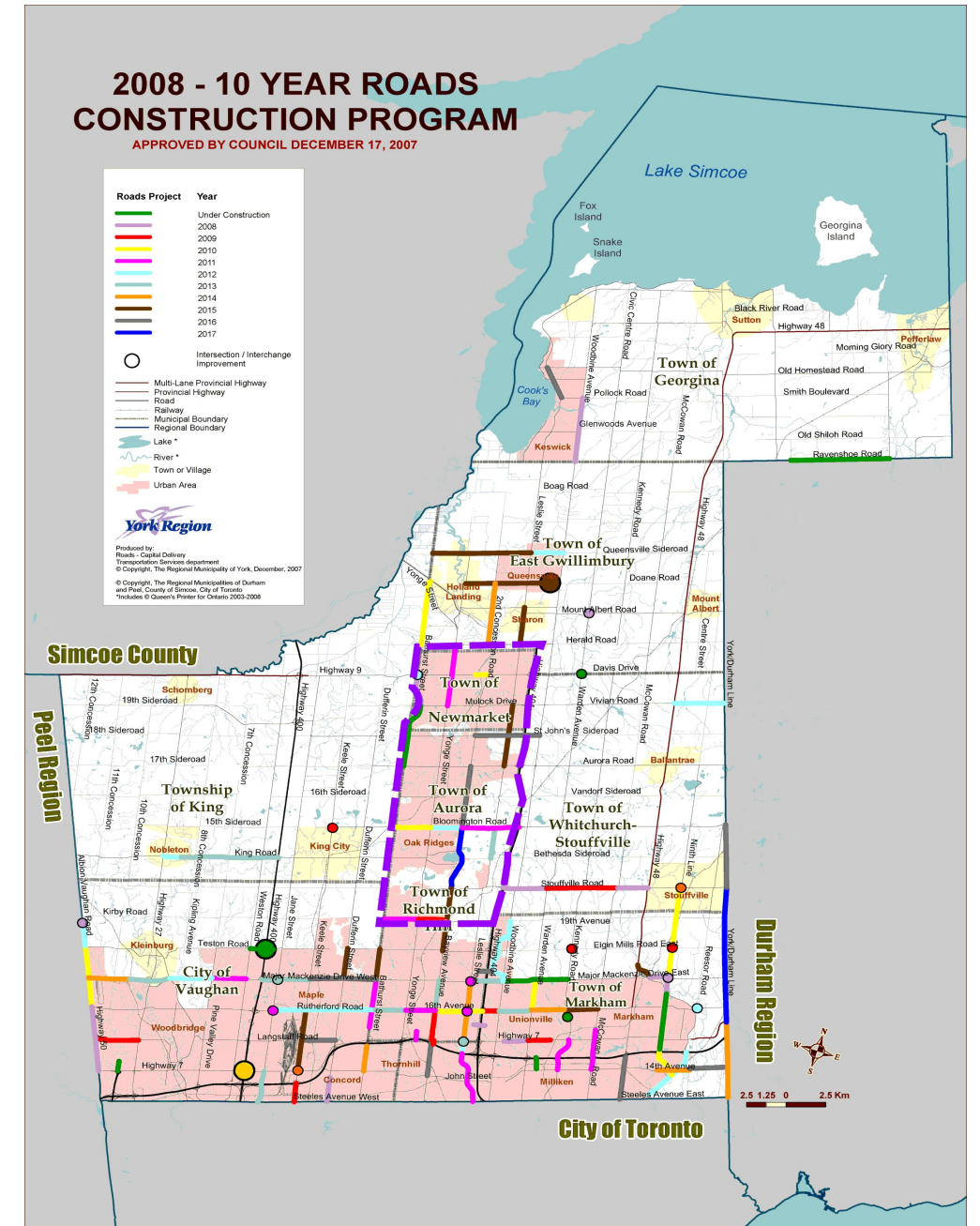


Figure 2-6
York Region 2008 - 10 Year Roads Construction Program

2.3.2 Transit

In May 2006, YRT published the Five-Year Service Plan 2006-2010 which includes the improvements and planning initiatives discussed in this section.

For 2006, as per the plan, a number of YRT routes within the study area will include Sunday service as a new period of operation. Route 98, Yonge North will be extended to the East Gwillimbury GO Station. The Aurora North Route 31 will have weekday service extended into the late evening.

In the medium term, three to five years, the Aurora North route will be reconfigured with improved connections to Viva service.

Beyond 2007, the report recommends that YRT examine revisions to the existing network including extending service from the current northern terminus in Newmarket. It is important that Viva riders experience the highest level of feeder service with respect to frequency, reliability, convenience, comfort and directness.

YRT is participating in planning, currently underway, to develop a GTA smart farecard to enable travel on the various transit services (GO Transit, YRT, TTC, etc...) using one farecard. This farecard system will not include YRT until 2009, and therefore the existing fare payment technology will be used until such time. In addition, YRT is preparing an analysis of terminal facilities in Newmarket and the study team has been involved in this activity.

2.4 THE PROBLEM AND OPPORTUNITY

2.4.1 Statement of the Problem

York Region has had the greatest proportional increase in population and employment amongst the four suburban regions of the Greater Toronto Area over the past 10 years. Within the 2031 planning horizon, the population of the Region is forecast to increase from the current 921,000 residents (as of January 2006) to 1.5 million residents, while employment is estimated to increase from the existing 468,000 jobs (as of January 2006) to 780,000 jobs (the 2031 population and employment forecasts are sourced from Ontario Places to Grow).

The Places to Grow, Growth Plan for the Greater Golden Horseshoe was released in June 2006 and is established under the provisions of the Places to Grow Act (June 13, 2005). The Growth Plan implements the Provinces' vision for managing growth and developing stronger communities. The Growth Plan provides detailed strategies and policy directions that promote

transit-supportive densities and a healthy mix of residential and employment land uses, as well as identifying and supporting a transportation network that links urban centres using efficient public transit and highway systems for moving people and goods. The Plan allows the government to designate geographic growth areas and work with local officials to develop growth plans that meet specific regional needs, while respecting the greenbelt.

Much of this growth is targeted to live and/or work in the southern areas of the Region that form and straddle the Yonge Street Corridor. This growth will generate a proportionate increase in travel demand. While it is expected there will be a greater segment of the population living and working within the Region itself, north-south travel demand between the Region and the City of Toronto will also remain a dominant feature amounting to 35% of total travel demand. A large part of this travel will occur in the Study Corridor resulting in significant capacity deficiencies, even in the planned expanded road network.

Significant growth is anticipated in the Newmarket Centre, which has been identified as an Urban Growth Centre in Place to Grow. By 2021, Yonge Street and Davis Drive within the study area will utilize or exceed the realistic theoretical capacity range of the existing roadways. The growth in traffic will undoubtedly exacerbate current traffic operational issues and translate into additional delay for road users. This indicates that solutions other than just road capacity enhancements are required.

2.4.2 The Opportunity

York Region's Official Plan (Office Consolidation, as of September 1, 2006) places a strong emphasis on significantly increasing public transit use to accommodate future transportation needs and to support the Plan's vision of sustaining the natural environment, optimizing economic vitality and ensuring healthy communities. In support of a Centres and Corridors Policy, the Official Plan (OP) identifies four regional centres and two main regional corridors. These four existing and/or developing centres, intended to be focal points for business, government and culture with complementary medium and high density mixed-use development, are:

- The Richmond Hill Centre encompassing the Langstaff Community area surrounding the Yonge Street/Highway 7 intersection in southern Richmond Hill;
- The Newmarket Centre, at the north end of the primary north-south corridor on Yonge Street and home to the Regional Council offices;
- Markham Centre to the east in the vicinity of Highway 7 and Warden Avenue; and

- The Vaughan Corporate Centre to the west in the vicinity of Highway 7 and Highway 400.

In large part, the Region's transportation system centres on the two primary corridors identified in the OP. These are the north-south leg on Yonge Street and the major east-west leg, Highway 7. As a major step towards achieving the OP's three goals of **sustainable natural environment, economic vitality and healthy communities**, the Region developed its *Transportation Master Plan* (TMP June 2002). The TMP established a comprehensive blueprint for road and transit developments in the Region through 2031 and articulated the goals in a set of twelve, desirable 'end states' for the transportation system. These were:

- Reduced vehicular trips and shorter work trips;
- Employer based Travel Demand Management initiatives;
- Reduced dependence on automobiles;
- Universal access to public transit;
- Integrated transit services and fares among GTA transit operators serving York Region;
- Transit accessible human services;
- Efficient and safe movement of goods;
- Efficient use of infrastructure;
- Infrastructure in a 'state of good repair';
- Strong protection for the environment;
- Adequate and dedicated long-term funding sources; and
- Effective public consultation.

The Region's TMP reaffirmed the need to achieve a balanced transportation system by recommending implementation of rapid transit in four corridors. The TMP supports the Government of Ontario's Smart Growth vision for fostering and managing growth. Improved public transit has been designated to have an essential role to meet future travel needs, increase accessibility for residents, reduce dependence on automobiles, support the planned urban structure of the Region, and accommodate planned growth.

As outlined in the TMP, a rapid transit network in the proposed four corridors, as shown in Figure 1-1, is a key recommendation. The principal objective of this network, known as the York Region Rapid Transit Plan (YRTP) is to provide a high quality public transit alternative for travel between the four regional centres as well as rapid transit links from the Region's network to the City of Toronto's subway network.

2.4.3 The Purpose of the Project

The purpose of this project, the North Yonge Street Corridor Public Transit and Associated Road Improvements encompasses two fundamental

objectives:

- Firstly, to improve accessibility to current and planned development by providing a high quality public transit alternative to reduce automobile dependence; and
- Secondly, to support “Places to Grow” and contribute to the achievement of the Regional Official Plan objectives of sustainable natural environment, economic vitality and healthy communities. The undertaking must help make the Region’s urban centres be more liveable, pedestrian-oriented and economically viable by providing a valuable tool for structuring and achieving land use and social objectives.

Following adoption of the 2002 TMP by Regional Council, the Region initiated the planning and project development phase of the Rapid Transit Plan. The scope of this first phase included network-wide transportation planning in parallel with, and in support of, Environmental Assessments of public transit improvements in each of the four corridors.

A key activity has been travel demand analyses, using the results of the survey of regional and inter-regional travel patterns, the *2001 GTA-wide Transportation Tomorrow Survey* and the current demographic projections of York Region and the City of Toronto. This demand forecasting across the network has confirmed the findings of the Yonge Street Transitway Need and Justification Study (conducted for York Region, July 2002), specifically by showing that the shortfall in the Yonge Street Corridor road capacity at the 2021 and 2031 planning horizons can be reduced by attracting a significant share of corridor trips to public transit. Achievement of these travel demand forecasting results, combined with the smart growth and sustainable environment objectives of the Region’s TMP, reflect the purpose of the project, the North Yonge Street Corridor Public Transit and Associated Road Improvements.

The purpose can be summarized as:

- Providing improved public transit infrastructure and service in the northern sector of the Regional network’s primary north-south corridor capable of producing significant increases in transit ridership both within the corridor and across the network and regional boundary. This objective will be supported by interconnection with other corridors and GTA transit systems such as GO Transit and the Toronto Transit Commission (TTC);
- Developing a balanced transportation system in the corridor by the implementation of transit infrastructure and associated road improvements in conjunction with the Region’s road enhancement

commitments identified in the TMP. This will include integrated design and operational solutions for both transit facilities and road widening where these occur on common sections of road right-of-way, e.g. Yonge Street in the Newmarket Regional Centre; and

- Integrating improved public transit facilities in a manner that improves and enriches streetscapes with new amenities by using a holistic urban design approach to support the Region’s goals for higher density, mixed-use, transit-oriented development along the corridor in accordance with approved official plans.

The **Project**, which is subject to the full Class EA planning process, will comprise all infrastructure, systems, vehicle types and subsequent operational requirements necessary to achieve a significant improvement in public transit service and its attractiveness in the northern portion of the Yonge Street Corridor from 19th Avenue to Green Lane during the planning period. It will also include any associated road improvements on Yonge Street and elsewhere that should be implemented concurrently to provide the desirable balanced transportation solution.

3. ALTERNATIVE SOLUTIONS TO THE PROBLEM (CLASS EA PROCESS – PHASE 2)

In accordance with the information requirements set out in Section 6.1 (2) of the Environmental Assessment Act, the approved Terms of Reference for the original Individual EA study required the Proponent to identify, analyze and evaluate all reasonable alternatives to the proposed undertaking, public transit improvements in the North Yonge Street Corridor. Similarly, Phase 2 of the Class EA process now being followed requires all reasonable and feasible solutions to the problem to be identified, described and evaluated. For this project, the alternatives comprise functionally different transportation solutions to the problem summarized in the study context in **Chapter 2** and addressed in York Region’s Transportation Master Plan (TMP). This chapter presents the findings of this step in the Class EA process.

3.1 DESCRIPTION OF ALTERNATIVE SOLUTIONS TO THE PROBLEM

The alternatives to the Undertaking or the alternative transportation solutions that could be considered to respond to the Region’s mobility needs and Official Plan objectives are outlined below. Components assumed in each alternative are shown in **Table 3-1**. In addition to the existing conditions, five alternative solutions have been examined. These have been built incrementally around different components of the York Region TMP and represent a broad range of approaches with different transportation modes.

3.1.1 Do Nothing

The purpose of this alternative is to confirm the need and justification for an undertaking by assessing the effect of utilizing only the existing road and public transit infrastructure and services in place, without improvements throughout the planning period to 2031. For public transit, this assumption applies to all bus and rail transit service providers including GO Transit, YRT and TTC.

3.1.2 A Current Commitments Solution Including Priority Transit and Transportation Demand Management

This base case solution comprises all road infrastructure improvements currently committed in York Region’s 10-year capital plan and the TMP to 2031, the committed service and infrastructure improvements of the local

and inter-regional transit authorities, YRT, TTC and GO Transit excluding the regional rapid transit network.

Table 3-1
Summary of Alternative Transportation Solutions

Alternative Transportation Solutions	Components In Each Solution			
	Road Network	Inter-regional Transit Network (GO Transit)	Local Transit System Network	Public Transit Improvements (e.g. Rapid Transit Network)
Do Nothing	<ul style="list-style-type: none"> Existing road network 	<ul style="list-style-type: none"> Existing GO Rail network 	<ul style="list-style-type: none"> Existing Transit Network 	<ul style="list-style-type: none"> No improvements in York Region
Current Commitments Including Priority Transit and Transportation Demand Management	<ul style="list-style-type: none"> Planned improvements based on York Region 10 year capital plan and the TMP network. Expanded provincial highway system 	<ul style="list-style-type: none"> Capacity and Service improvements consistent with GO Transit 10 year Capital Plan 	<ul style="list-style-type: none"> Committed YRT local and rapid (including Viva) transit service improvements 	<ul style="list-style-type: none"> No further improvements in York Region
Road Capacity Increase Including Current Commitments & Further Road Expansion	<ul style="list-style-type: none"> Expansion of road network and widenings to meet travel demand 	<ul style="list-style-type: none"> Existing GO Rail network 	<ul style="list-style-type: none"> Committed YRT local and rapid (including Viva) transit service improvements 	<ul style="list-style-type: none"> No further improvements in York Region
Enhanced Bradford Line Commuter Rail and Inter-regional Bus Service	<ul style="list-style-type: none"> Planned improvements based on York Region 10 year capital plan and the TMP network. Expanded provincial highway system 	<ul style="list-style-type: none"> All day and reverse peak service on all existing GO Rail lines Freeway HOV on Highways 407, 400 and 404 	<ul style="list-style-type: none"> Committed YRT local and rapid (including Viva) transit service improvements Connections to new GO services 	<ul style="list-style-type: none"> No further improvements in York Region
York Region Rapid Transit Corridor Initiatives Including Current Commitments (in the North Yonge Street Corridor as represented by the Region’s Transportation Master Plan)	<ul style="list-style-type: none"> Planned improvements based on York Region 10 year capital plan and the TMP network. Expanded provincial highway system 	<ul style="list-style-type: none"> Capacity and Service improvements consistent with GO Transit 10 year Capital Plan 	<ul style="list-style-type: none"> Committed YRT local and rapid (including Viva) transit service improvements Connections to new Rapid Transit 	<ul style="list-style-type: none"> Enhanced rapid transit in all proposed corridors identified in TMP Implementation of transit priority network in TMP Extension of Yonge Subway to Highway 7 Extension of Spadina Subway to Vaughan Corporate Centre

Also included in this alternative are Transportation Demand Management (TDM) strategies which the Region and local municipalities are currently pursuing. Examples include transit priority for new services, *Smart Commute Central York*, *Smart Commute North Toronto*, *Vaughan* and *Smart Commute 404-7*. In this solution, the above commitments are assumed to be the full extent of transportation improvements through the planning period.

3.1.3 A Road Capacity Increase Solution Including Current Commitments and Further Road Expansion

The focus of this solution is an increase in road capacity only beyond the “Current Commitments” Solution’s road and public transit improvements. Road capacity is assumed to be increased to whatever level is required to meet the demand at the 2031 planning horizon. The capacity increases assumed included Yonge Street and Bathurst Street.

3.1.4 Enhanced Barrie Line Commuter Rail and Inter-regional Bus Service Solution

In this solution, the transportation system would comprise all current road commitments and local and rapid transit (including Viva in general traffic lanes) service commitments plus an enhanced inter-regional transit system consisting of both commuter rail and 400 series highway bus services such as those operated by GO Transit.

3.1.5 York Region Rapid Transit Corridor Initiatives Solution Including Current Commitments

This solution focuses on a significant improvement in public transit services in York Region in addition to all components of the “current commitments” solution. This solution comprises the implementation of York Region’s Rapid Transit Plan recommended in the *2002 Transportation Master Plan* with associated local service connections.

3.2 DESCRIPTION OF THE ENVIRONMENTS FOR ALTERNATIVE SOLUTIONS

A general description of the environment within the project study area is discussed in this section.

3.2.1 The Built Environment

The North Yonge Street Corridor has historically provided a focus for mixed-use development comprised of a combination of low-medium density residential, institutional, retail and highway commercial land uses. There is a mix of recently planned mixed-use areas and historic cores (Aurora and Newmarket) that incorporate a variety of uses and development densities. Recently designated or emerging mixed-use areas identified in the EA study area include the designated regional centre in Newmarket (Yonge Street between Mulock Drive and Green Lane, and Davis Drive from Eagle Street to Alexander Road), Yonge Street through Aurora, Davis Drive in Newmarket and Green lane in East Gwillimbury. The existing land use within the study area is shown in **Figure 3-1**.

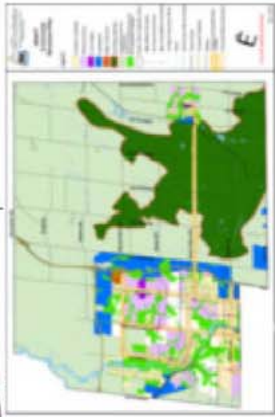
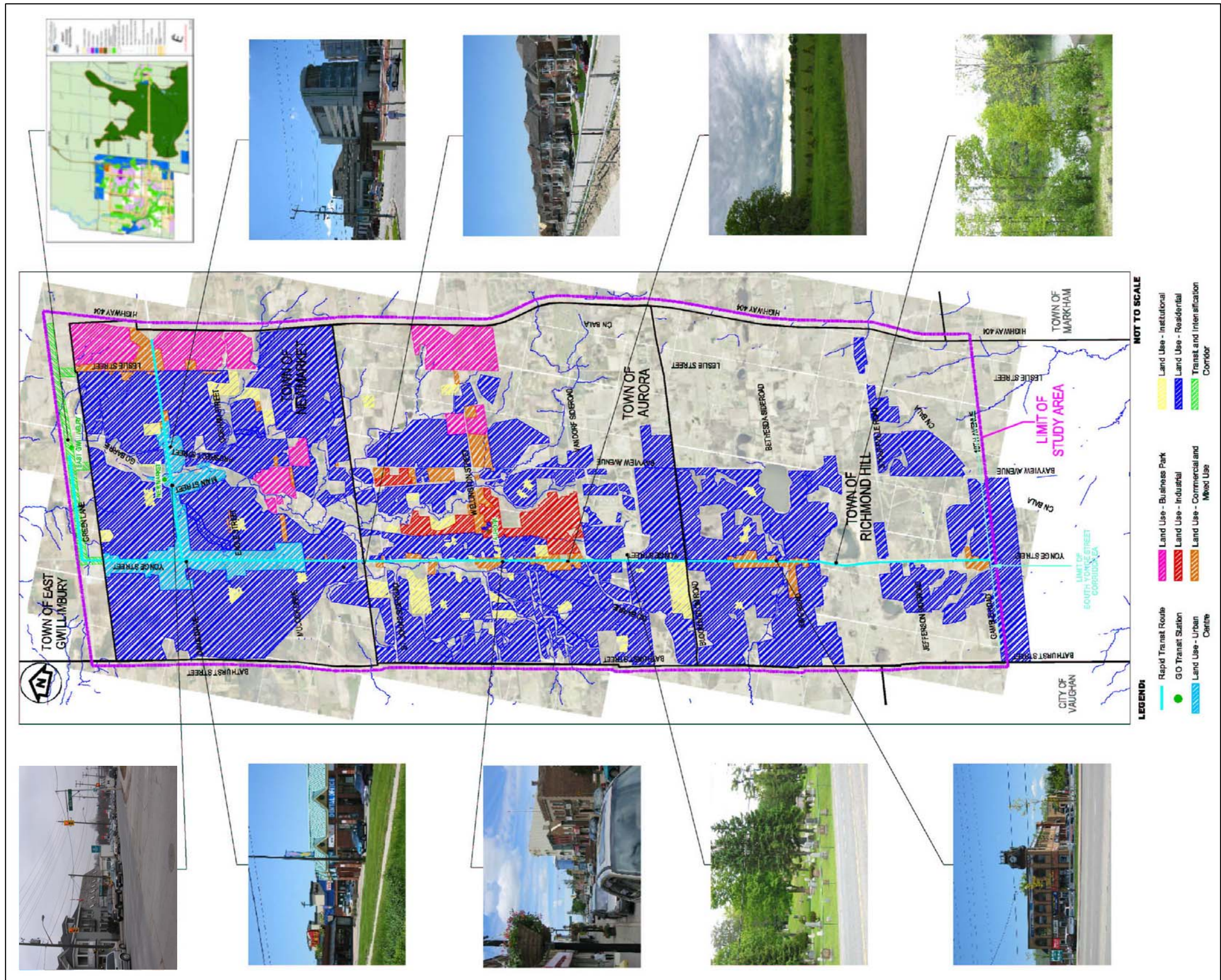


Figure 3-1
Existing Social Environment in Study Area

In general, the North Yonge Street Corridor mixed-use development is bounded by stable low-density residential development. The North Urban Development Area in the Oak Ridges/Lake Wilcox area of Richmond Hill is an emerging mixed-use area with significant development planned until 2011.

Historic core areas along Yonge Street within the study area include the former village centres of Aurora, and Oak Ridges, as well as along Main Street and Davis Drive in Newmarket. These areas are important to the local community and have historic streetscapes and the local plans promote their retention and enhancement. The existing and planned development of the study area is described in more detail in **Chapter 7** of the report.

3.2.1.1 Places to Grow

The Places to Grow, Growth Plan for the Greater Golden Horseshoe was released in June 2006 and is established under the provisions of the Places to Grow Act (June 13, 2005). The Growth Plan implements the Provinces' vision for managing growth and developing stronger communities.

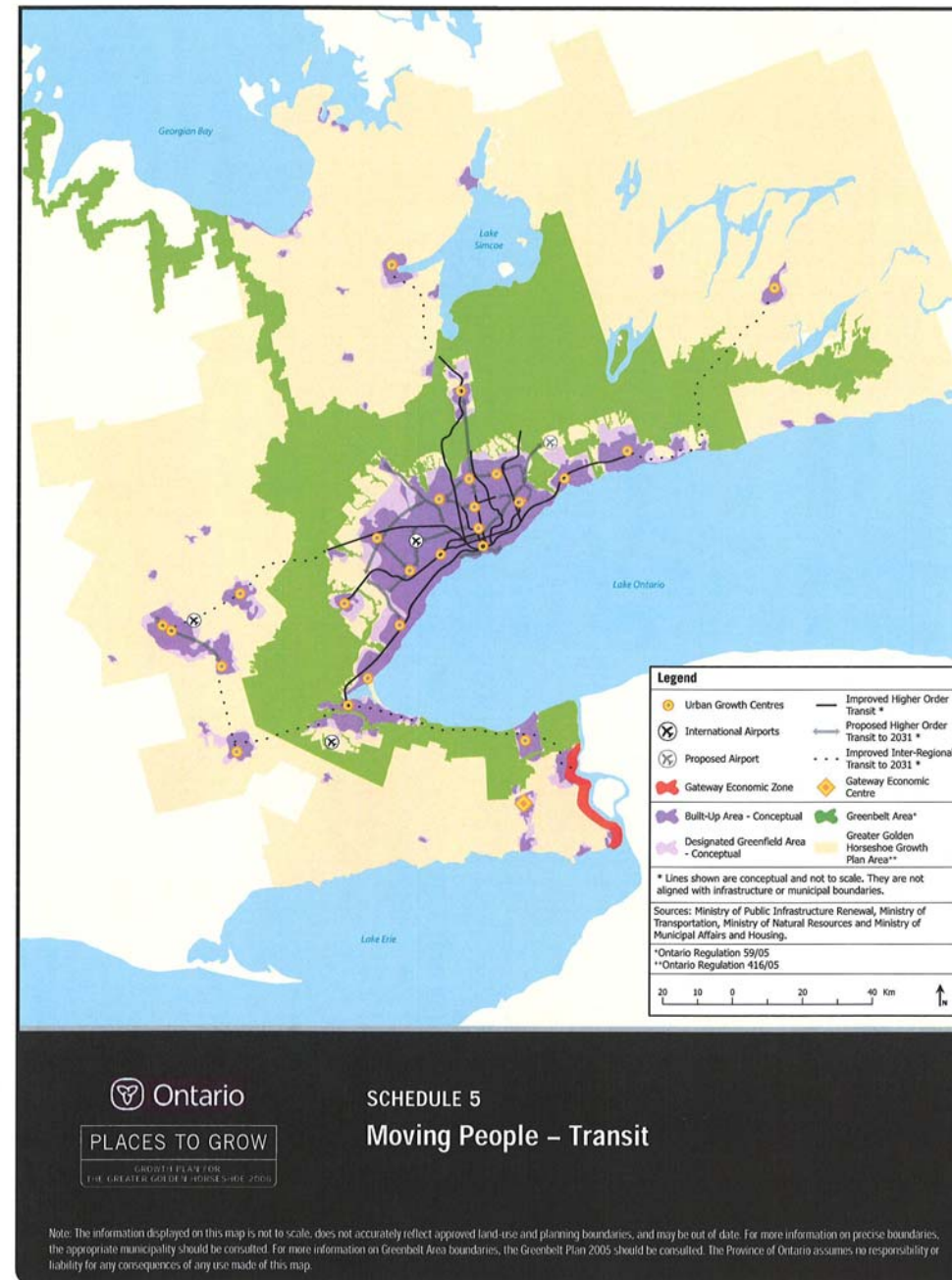
The Growth Plan provides detailed strategies and policy directions that promote transit-supportive densities and a healthy mix of residential and employment land uses. The plan also identifies and supports a transportation network that links urban centres using efficient public transit and highway systems for moving people and goods. **Figure 3-2** is Schedule 5 from the Place to Grow document showing the transit corridors in relation to the urban growth centres.

By identifying where development can occur, the growth plan will complement the recently approved Greenbelt Plan (refer to **Section 3.2.1.2** of the ESR) that protects valuable agricultural lands and natural systems around the greater Golden Horseshoe area. The Growth Plan should be used in conjunction with the Oak Ridges Moraine Conservation Plan and the Greenbelt Plan.

The Places to Grow Plan allows the Government to designate geographic growth areas and work with local officials to develop growth plans that meet specific regional needs, while respecting the greenbelt. The Growth Plan notes that "Transit is the first priority for investment to meet the Growth Plan's objectives of increasing transit ridership, managing congestion, reducing commuting time, improving levels of transit service, and providing alternative transportation choices to the automobile".

3.2.1.2 The Greenbelt Plan

The Greenbelt Plan was approved in early 2005 and set out by the Ministry of Municipal Affairs and Housing. This Plan protects valuable agricultural



Source: Places to Grow. Growth Plan for the Greater Golden Horseshoe. 2006

Figure 3-2
Places to Grow – Schedule 5, Moving People - Transit

lands and natural systems throughout the Greater Golden Horseshoe. Where the Greenbelt and the Oak Ridges Moraine (ORM) overlap, the legislation from the ORM takes precedence. Within this study area the Greenbelt is located along Yonge Street from Elgin Mills Road in the south to Vandorf Road in the north, which encompasses part of the study area from Gamble Road to Vandorf Road. This Plan builds upon the items that

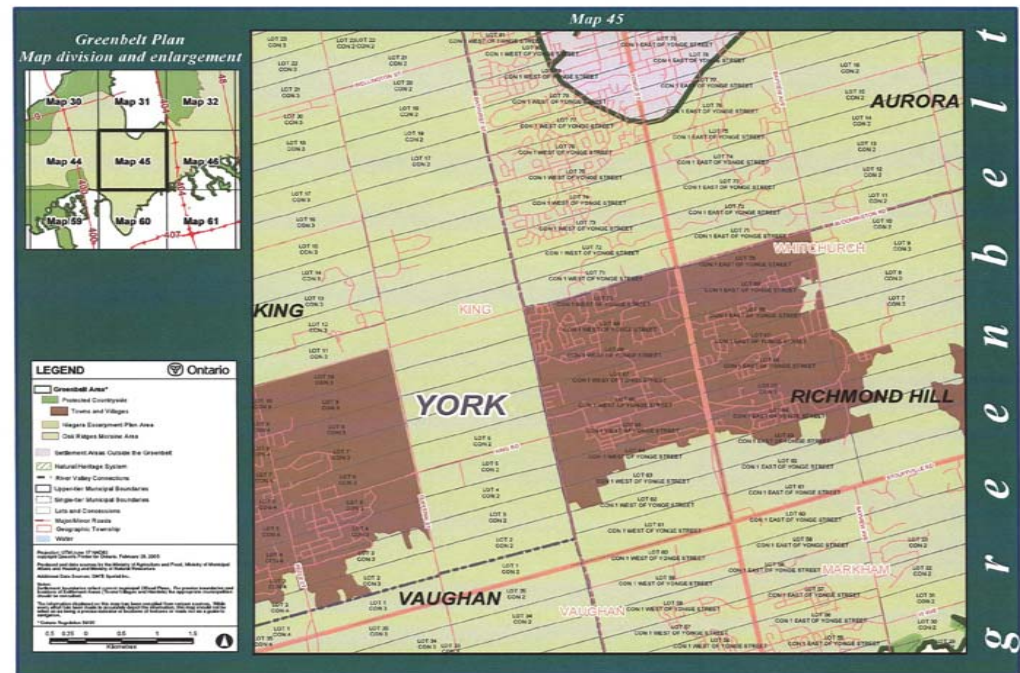
form the Oak Ridges Moraine Conservation Plan (ORMCP).

The relevant Maps from the Greenbelt Plan are shown in **Figures 3-3 and 3-4**. Within the jurisdiction of TRCA from Gamble Road to Bloomington Road, the lands are designated in the Greenbelt Plan as "Oak Ridges Moraine Area" from Gamble Road to just north of Stouffville Road; and as "Towns and Villages" from just north of Stouffville Road to Bloomington Road. Within the jurisdiction of LSRCA from Bloomington Road northward, the lands are designated in the Greenbelt Plan as "Oak Ridges Moraine" in the west part of the study area around Bathurst Street through Aurora and Newmarket and as "Settlement Areas Outside of the Greenbelt Area" for the majority of the study area.

3.2.1.3 Oak Ridges Moraine

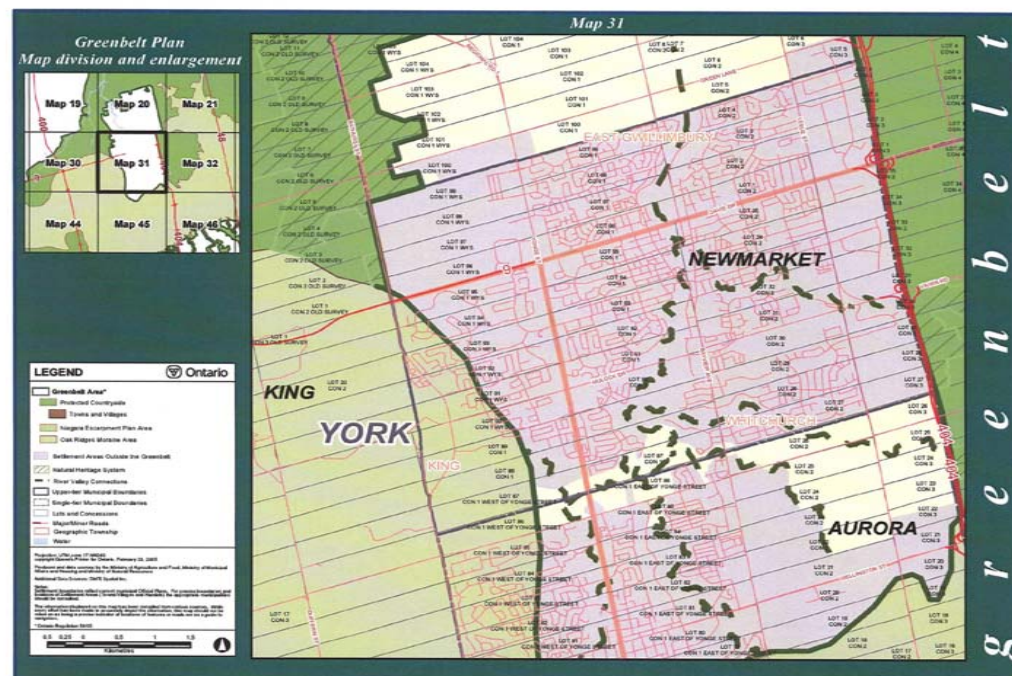
As one of Ontario's most significant landforms, the Oak Ridges Moraine stretches 160 kilometres from the Trent River in the east to the Niagara Escarpment in the west covering 190,000 hectares of land and water. In this study area, the Oak Ridges Moraine is located along the North Yonge Street Corridor from 19th Avenue in Richmond Hill to just north of Vandorf Sideroad in Aurora. The land use designation map from the Oak Ridges Moraine Conservation Plan is shown in **Figure 3-5**. The Oak Ridges Moraine Conservation Act (Act) came into affect in 2001, prepared by the Ministry of Municipal Affairs and Housing. The Act protects the ecological and hydrological integrity of the Oak Ridges Moraine and ensures that the area remains a continual natural landform. The Oak Ridges Moraine Conservation Plan provides direction to municipalities for Transportation, Infrastructure and Utilities projects that are within areas designated as "Natural Core" or "Natural Linkage" areas, and cross Key Natural Heritage Features.

Within the jurisdiction of TRCA on Yonge Street from Gamble Road to Bloomington Road the lands are designated in the Oak Ridges Moraine Conservation Plan as "Natural Core Area" on the east side of Yonge Street surrounding Bond Lake and "Natural Linkage Area" on the west side of Yonge Street, west of Bond Lake. Further south on Yonge Street, on the east side, south of Stouffville Road the area is designated as "Natural Linkage Area" with a small section on the west side of Yonge Street as well. A very small section of "Countryside area" is located on the east side of YOnge Street, south of Stouffville Road. The balance of the lands in TRCA's jurisdiction is designated as "Settlement Area". The majority of land that is located on the Oak Ridges Moraine within the jurisdiction of LSRCA (north of Bloomington Road) is classified as a settlement area. From Bayview Avenue east to Highway 404 there is a mix of "Countryside Area" and "Natural Linkage Area".



Source: The Greenbelt Plan. Ministry of Municipal Affairs

Figure 3-3
Map 45 from the Greenbelt Plan



Source: The Greenbelt Plan. Ministry of Municipal Affairs

Figure 3-4
Map 31 from the Greenbelt Plan

As per TRCA's letter dated November 27, 2008, Section 41 Transportation, Infrastructure and Utilities from the Oak Ridges Moraine Plan is included in **Appendix O**. The letter also noted the following regarding the Oak Ridges Moraine:

- There are significant natural areas that exist along the route within the Oak Ridges Moraine planning area.
- Of particular significance is the approximately 1 kilometre stretch of Yonge Street between approximately Stations 17+600 and 18+600.
- In this area, the roadway bisects the Oak Ridges Moraine through its narrowest point east-west.
- This area is identified as both “Natural Core” and “Natural Linkage” areas, with Yonge Street as the boundary between these two designations.
- Significant effort, by the public, TRCA and all levels of government, has gone into ensuring the preservation of this corridor, and future plans for the restoration of these lands, particularly the linkage areas on the west side, are extensive.

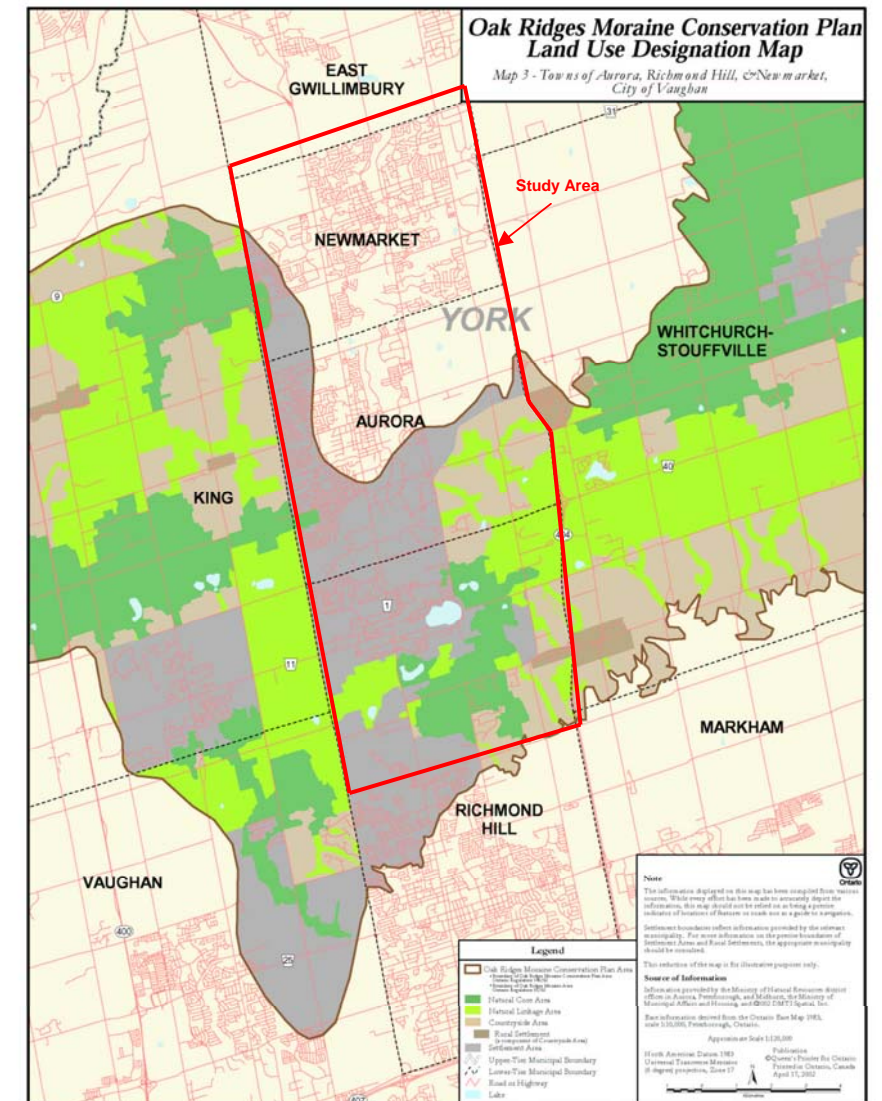
3.2.2 Land Use Planning

3.2.2.1 Regional Official Plan

The Regional Municipality of York's Official Plan establishes an urban structure for the Region, which is comprised of Regional Centres, which are connected by Regional Corridors, served by rapid transit. In January 2005, York Region approved Amendment 43 – Centres and Corridors to the Official Plan, which “will better articulate and more fully implement the Region's planned urban structure of Regional Centres linked by Regional Corridors, served by rapid transit, and the role of Local Centres and Local Corridors in this structure.” Refer to **Figure 3-6** for the regional structure as outlined in Map 5 of the York Region Official Plan.

Within the study area, the Town of Newmarket is identified as a Regional Centre which will serve as a hub of business, cultural, government and social activity. This Regional Centre will contain the highest concentration and intensity of uses in the Region. It will also be designed to be serviced by rapid transit.

Regional Corridors are considered “main arteries” of the Region's urban structure since they form the connections between the Regional Centres. York Region's current Official Plan designates Yonge Street as a Regional Corridor and it also



Source: Oak Ridges Moraine Conservation Plan. Ministry of Municipal Affairs and Housing

Figure 3-5
Map 3 from the Oak Ridges Moraine Conservation Plan

envisions that rapid transit service will be provided on Yonge Street to serve this Regional Corridor. Yonge Street, as a Regional Corridor will have rapid transit services initiated as early as possible which will allow for development and redevelopment.

The development of high-density uses along the corridor will support the introduction of a rapid transit system along the North Yonge Street Corridor. Without the development of intensified areas, the extent of potential benefits from the rapid transit system would not be realized.

With the principles put in place by the Region, it will ensure that the right form of development takes place that would complement a rapid transit system and the Region should work proactively and not allow for the

possibility of lower density development along the corridor.

3.2.2.2 Municipal Official Plans

Town of Richmond Hill

The Town of Richmond Hill states in their Official Plan (consolidated December 31, 1998) that “Local transit routings shall be integrated with, and supportive of inter-regional and inter-municipal public transit systems” and that “Adequate facilities to maximize the level of transit service such as bays, bus shelters, exclusive bus lands where warranted and additional right-of-ways and/or pavement widths which will accommodate bus or other forms of transit will be provided.” The land use schedule as included in the Town’s Official Plan is shown in **Figure 3-7**.

There are four secondary plans to the Town’s Official Plan that pertain to the study area within Richmond Hill. These secondary plans provide more detailed information on specific areas that is not part of the Official Plan.

Town of Aurora

The Town’s Official Plan states that they will “support a basic, dependable, accessible and integrated transit system, as an essential, environmentally significant public service through appropriate land use, urban and subdivision and transit management policies”. The Town encourages the creation of a Regional and/or Greater Toronto Area wide transit network. The Town also “encourages land use and density allocations, and subdivision layout to support efficient and appropriate transit service”.

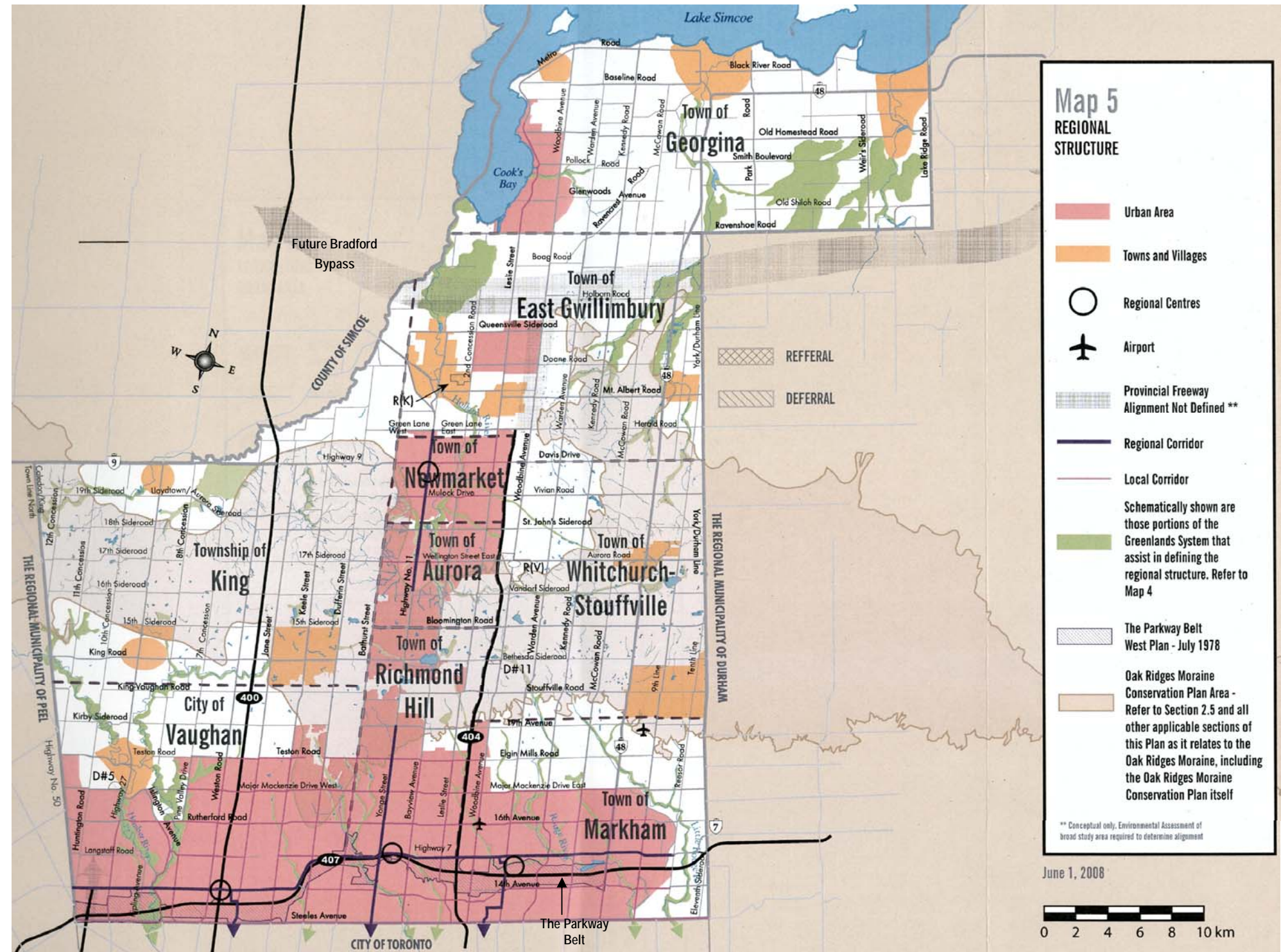
The Town of Aurora Official Plan identifies future residential areas east of Bayview Avenue and additional employment lands next to Highway 404. A new urban centre is identified at the Bayview Avenue and Wellington Street intersection. Refer to **Figure 3-8** for the Town’s land use plan, which is Schedule A in their Official Plan. Aurora’s Official Plan does not anticipate major changes to Yonge Street, which is characterized by a historic commercial core at Wellington Street and two other community commercial nodes located north and south of the core.

There is only one secondary plan that involves lands within the study area located in the southern part of the Town.

Town of Newmarket

The Town of Newmarket’s Official Plan, approved by Regional Council in April 2008, supports the development of a Regional rapid transit system on Yonge Street and Davis Drive and any land use changes that would be necessary surrounding potential station locations.

As outlined in the Provincial Growth Plan (refer to Section 6.3.3) Newmarket is considered an urban growth centre where future growth and



Source: York Region Official Plan, November 2005

Figure 3-6
York Region – Regional Structure

intensification will be directed. Within the Town, the Official Plan outlines three urban centres, as shown in **Figure 3-9** which are:

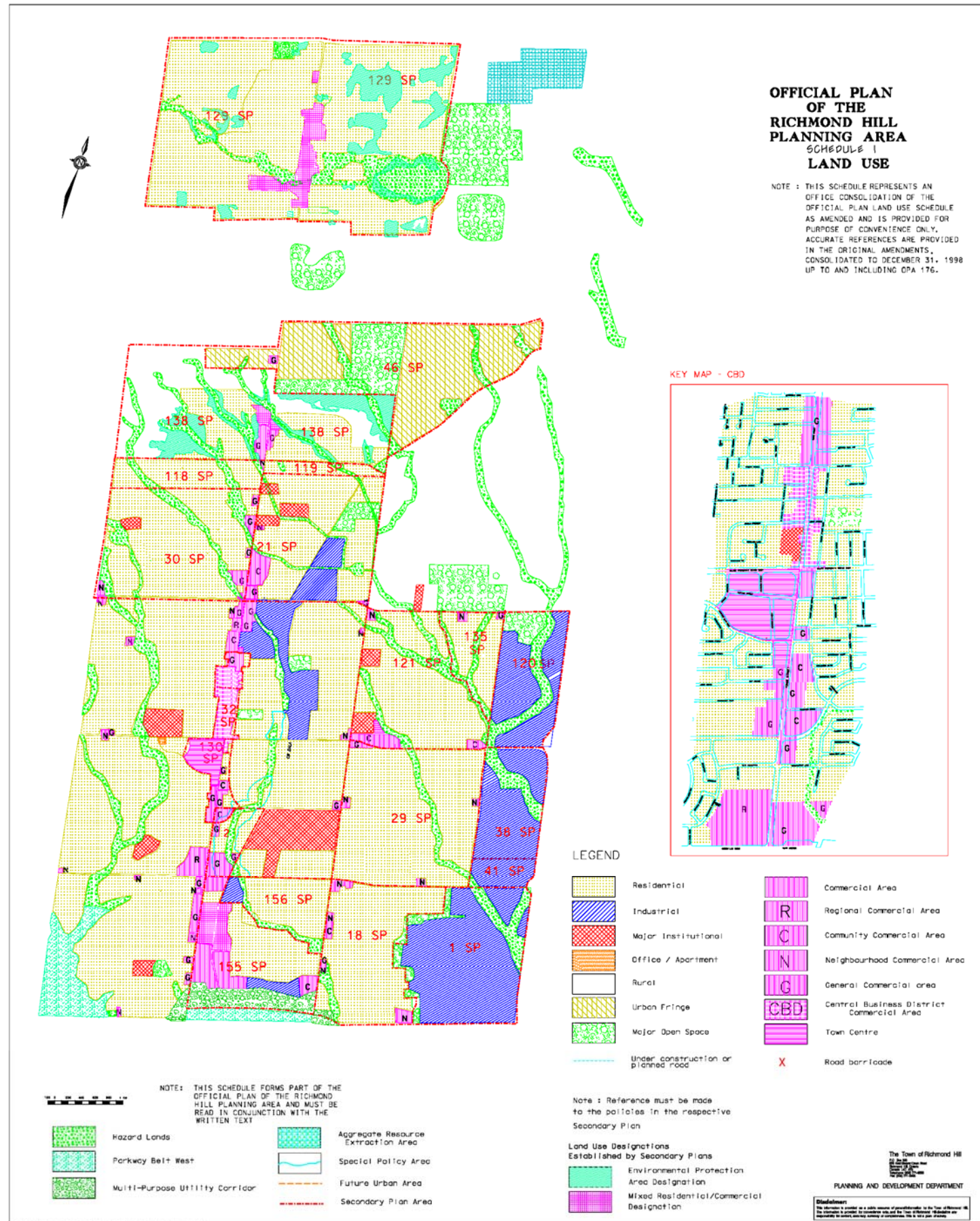
- Yonge Street Regional Centre (Mulock Drive to Davis Drive)
- Regional Healthcare Centre
- Historic Downtown Core

The plan envisions that the Yonge Street/Davis Drive intersection will serve as the major strategic gateway to the municipality. The Regional Healthcare Centre is comprised of the Southlake Regional Health Centre and the surrounding area which make up the highest concentration of employment in the Town. The Historic Downtown Core on Main Street is considered the traditional Central Business District of the Town and is considered the cultural and community focus of the Town.

Town of East Gwillimbury

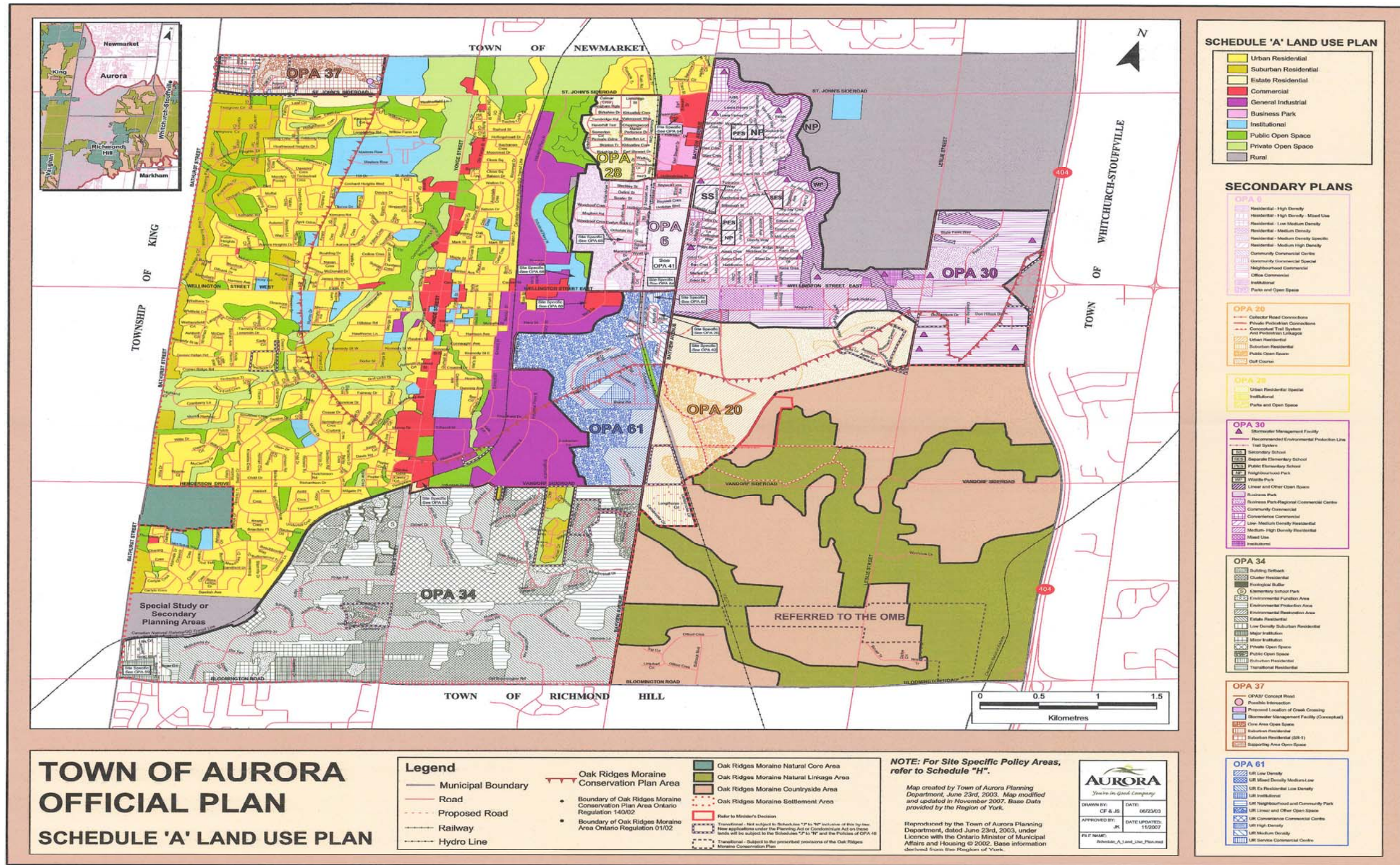
The study area involves a very small area of the Town of East Gwillimbury which is located along Green Lane, classified as an urban buffer zone. At the time of this ESR the Town was undertaking a review of their Official Plan including secondary plans for the study area along Green Lane, which envisions significant growth and development density in this corridor. The Draft Community Structure Plan for the Town is illustrated in **Figure 3-10**.

3



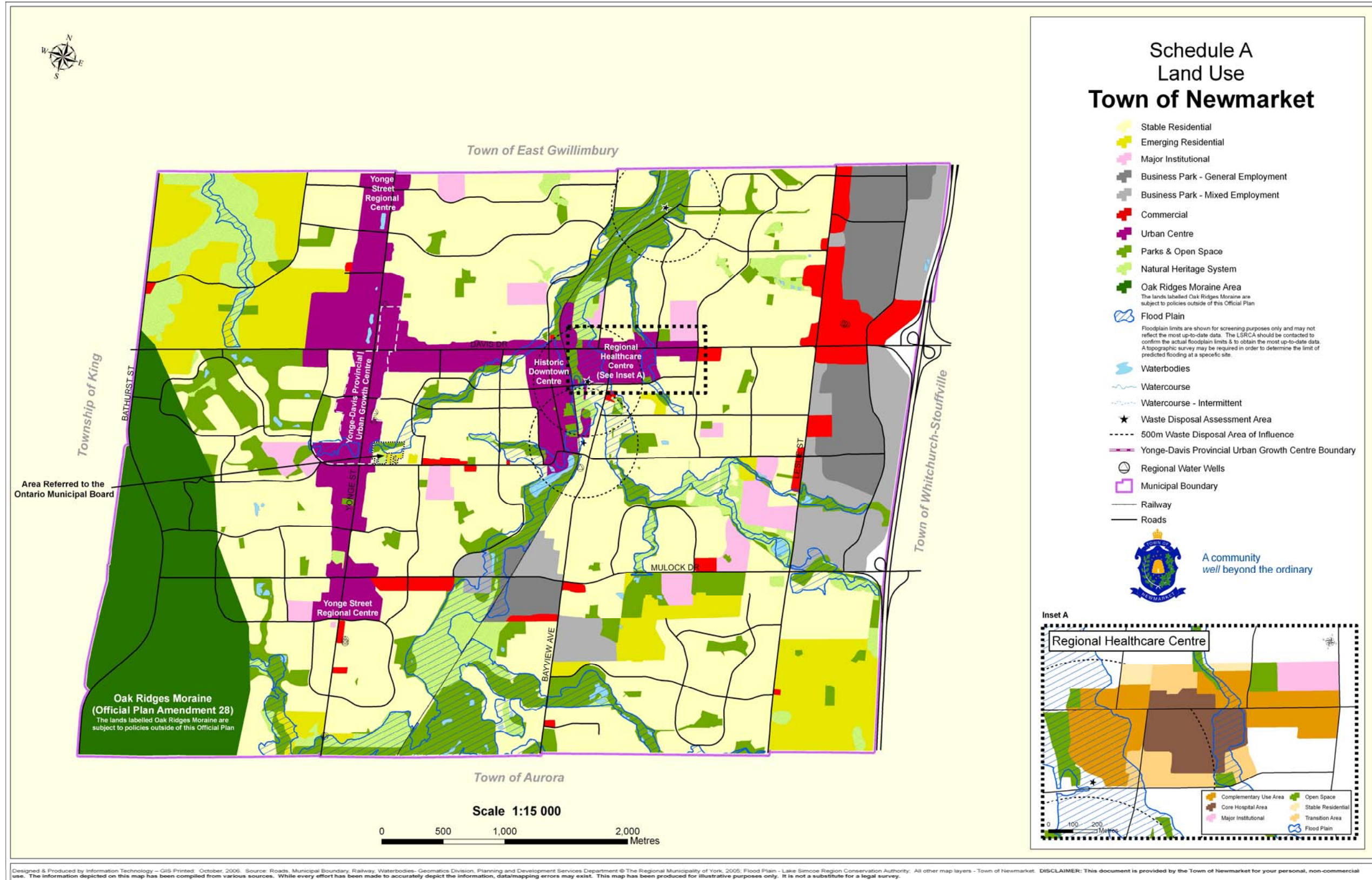
Source: Town of Richmond Hill

Figure 3-7
Town of Richmond Hill Official Plan – Schedule A Land Use Plan



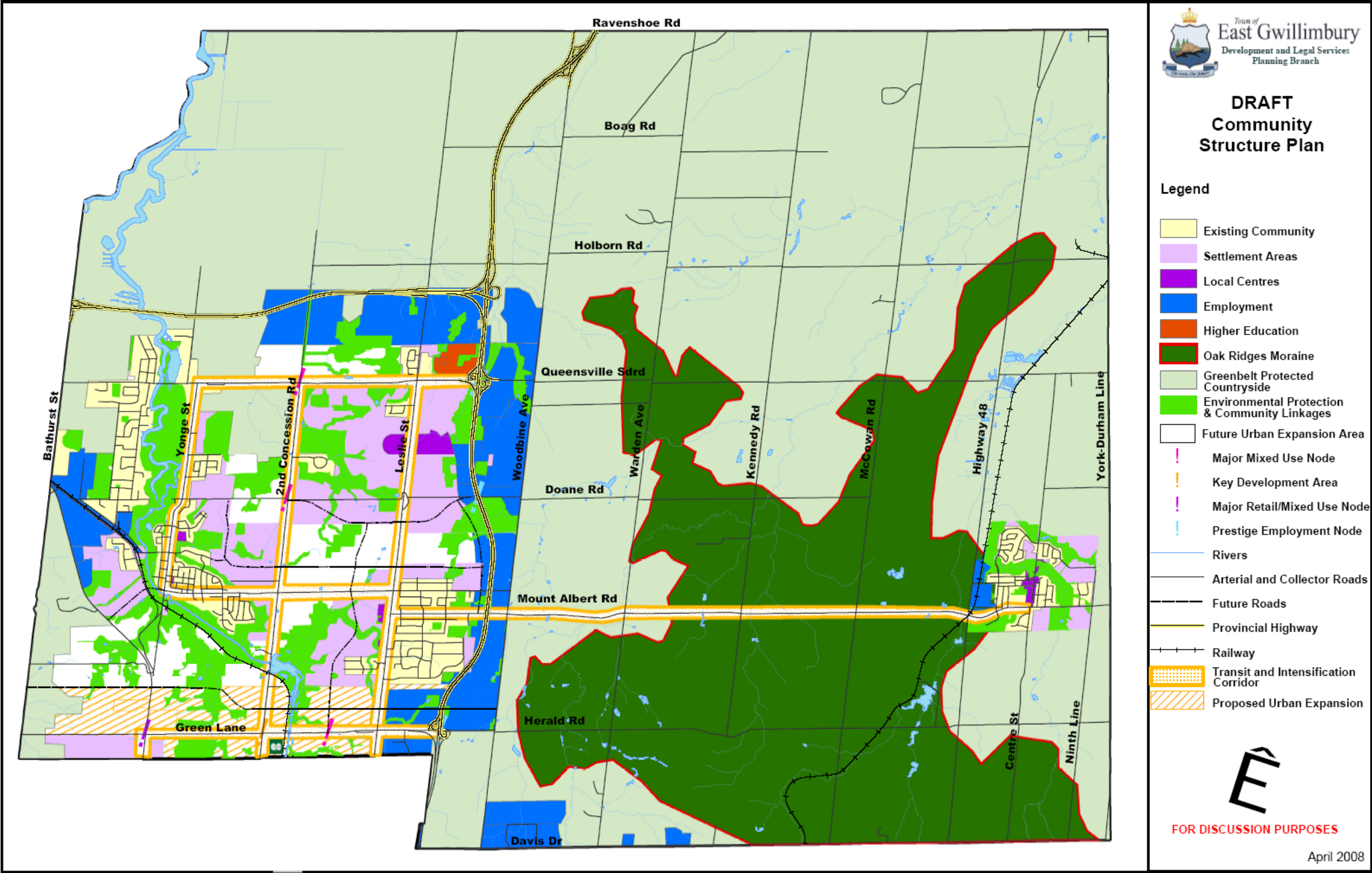
Source: Town of Aurora Official Plan

Figure 3-8
 Town of Aurora Official Plan - Schedule A Land Use Plan



Source: Town of Newmarket Official Plan, 2006

Figure 3-9
Town of Newmarket Official Plan - Schedule A Land Use Plan



Source: Town of East Gwillimbury

Figure 3-10
Draft Town of East Gwillimbury Community Structure Plan

3.2.3 The Natural Environment

Figure 3-11 illustrates the existing natural conditions within the study area and the main elements of the natural environment are outlined below.

3.2.3.1 Physiography and Soils

The study area is located within the Schomberg Clay Plains and the Oak Ridges Moraine physiographic regions. The Schomberg Clay Plains region extends centrally from approximately Wellington Street to Green Lane, while the Oak Ridges Moraine region encompasses the entire southern portion of the study area from Wellington Street south to 19th Avenue/Gamble Road.

The soils within the Schomberg Clay Plains are classed as Schomberg clay loam and Schomberg clay silts, which are both slightly alkaline, demonstrate good drainage and are generally associated with a smooth, moderately sloping to irregular steeply sloping type of topography. The east branch of the Holland River is mainly confined to this area. Along the northeastern limits of the study area, the Schomberg clay loams are replaced by Nomdheas sandy loams and Perry fine sandy loams. These soils provide good drainage on a smooth, gently to moderately sloping type of topography.

Within the southern half of the study area between Wellington Street and 19th Avenue, the soil types associated with the Oak Ridges Moraine are noticeably different. Pockets of Schomberg clay loams are present; however, the majority of the area is underlain by Pontypool sandy loam and Woburn loam. Both of these soils provide good drainage and are characteristic of a smooth to irregular steeply sloping type of topography. A diversity of soil types is represented in the Oak Ridges/Lake Wilcox area. Immediately west of Lake Wilcox to the Yonge Street corridor the soils within the East Humber River watershed are comprised of soils that are imperfectly drained and slightly acidic. A band of Brighton sandy loam over gravel extends northeast from Wilcox Lake to Bloomington Road between Bayview Avenue and Leslie Street. This soil type is characterized as having good drainage through a very gently sloping topography. Toward and along the eastern boundary of the study area between Stouffville Road and Bloomington Road, the gently sloping topography is maintained; however the gravely soils are replaced by Peel clay. This soil type is imperfectly drained and is generally found in a smooth to gently sloping landform. This relationship is evident by the presence of the Wilcox Lake Bog and the Wilcox-St. George Wetland Complex. The Forester Marsh area located west of Bayview Avenue, south of Bloomington Road provides another distinct type of soil classification within the study area. The soil series is classified as muck and is described as having well decomposed organic deposits over mineral material and as having very poor drainage.

3.2.3.2 Watershed Areas

Within the study area there are two watersheds (Rouge and Humber) within the TRCA's jurisdiction and one (Holland) within LSCRA's jurisdiction. The watershed divide between the two conservation authorities is approximately located at Bloomington Road. The three main watersheds are described as the following:

- The Rouge River Watershed crosses the central portion of the Town of Richmond Hill with an upper watershed area located on the Oak Ridges Moraine. This is a significant drainage system with coldwater flows and discharge contributing to the Rouge River which is the focal area for the extensive Rouge Valley Park that has been established downstream of the study corridor. Development in this watershed should consider the goals of the TRCA for Rouge River watershed protection. The vulnerable redside dace has been identified as an appropriate management target for some of the watershed tributaries.
- The Humber River Watershed has sections within the northern area of the Town of Richmond Hill on the Oak Ridges Moraine. Development in this watershed must consider the goals of the Humber River Watershed Plan. The vulnerable redside dace occurs in many of the tributaries draining to Lake Ontario.
- The Holland River Watershed (East Branch of the Holland River and tributaries) encompasses the remaining part of the study area north of Bloomington Road. The southern portion of the watershed is located on the Oak Ridges Moraine. This watershed has been identified as a significant watercourse system by the Lake Simcoe Region Conservation Authority (LSRCA). Development proposed in the watershed must consider the guidelines in the Lake Simcoe Management Strategy. Lake Simcoe provides habitat for the threatened Lake Simcoe whitefish, and the vulnerable redside dace occurs in some of the Holland River tributaries.

3.2.3.3 Regional Geology

The Quaternary-age deposits of York Region consist predominantly of glacial till, glaciolacustrine sand, silt, and clay deposits, and shallow post-glacial lacustrine sediments. These deposits were laid down by glacial ice sheets and associated rivers and lakes. Recent deposits of alluvium are found in the river and stream valleys and associated flood plains. Typically bedrock is expected below a significant thickness of the sedimentary overburden (depths greater than 100 metres). The Quaternary soil deposits overlying the bedrock in the study area are believed to have been deposited over the course of two glaciations and one interglacial (i.e. warmer) stage. The oldest soil deposits identified in the Greater Toronto Area are the

Illinoian Tills which immediately overlie bedrock, where they are present. These tills are overlain by interglacial period lacustrine sands, silts and clays that are in turn, overlain by the most recent glacial deposits.

3.2.3.4 Geology/Hydrogeology

Surficial geologic mapping was reviewed for the study area that comprises the proposed alignment alternatives and adjacent land and is presented in the Natural Sciences Report in **Appendix C**.

The two physiographic regions in the study area, are comprised of the primary units of surficial geology along the proposed routes. The surficial sediments within the study area overlie the relatively flat lying Palaeozoic rocks of the St. Lawrence lowlands. The Schomberg Clay Plains are classified as glacial lake deposits of silt and clay that are massive to laminated. The Oak Ridges Moraine is a region comprised of moraine deposits of fine sand to gravel and glacial till deposits of clayey silt to silt. The glacial deposits occur in till or lake plains often interbedded fine sand, silt and clay.

The surficial geology in the study area from Gamble Road to King Road is primarily glaciolacustrine-derived silty to clayey till, with a band of ice-contact stratified deposits. Moving north from King Road there is a band of glaciofluvial deposits and then another band of ice-contact stratified deposits. North of Henderson Drive/Vandorf Sideroad, the surficial geology changes to massive-well laminated with seams of older alluvial deposits.

In addition to surficial geologic distribution, the study area has a vertical stratigraphic profile of soil deposits, with some complexities. The Geotechnical Study is included in **Appendix D** with the details on local subsurface stratigraphy outlined in Section 3.2 of that report. Soil strata are distributed as approximately horizontal units. Each unit exhibits variability in the thickness and elevation of contacts, with some units exhibiting greater variability. There is a variety of stratigraphic units from Paleozoic bedrock to recent alluvial deposits.

3.2.3.5 Designated Natural Areas

As described in **Appendix C**, designated natural areas include those identified for protection by the Ministry of Natural Resources (MNR), TRCA, LSRCA and the Oak Ridges Moraine Conservation Act (ORMCA). As shown in **Figure 3-2** a large portion of the study area falls within the Oak Ridges Moraine, which is considered one of Ontario's most significant landforms. The Oak Ridges Moraine has a unique composition of environmental, geological and hydrological features that make its ecosystem vital to southern-central Ontario. All but two of the designated areas occurring in the study area are associated with the Oak Ridges

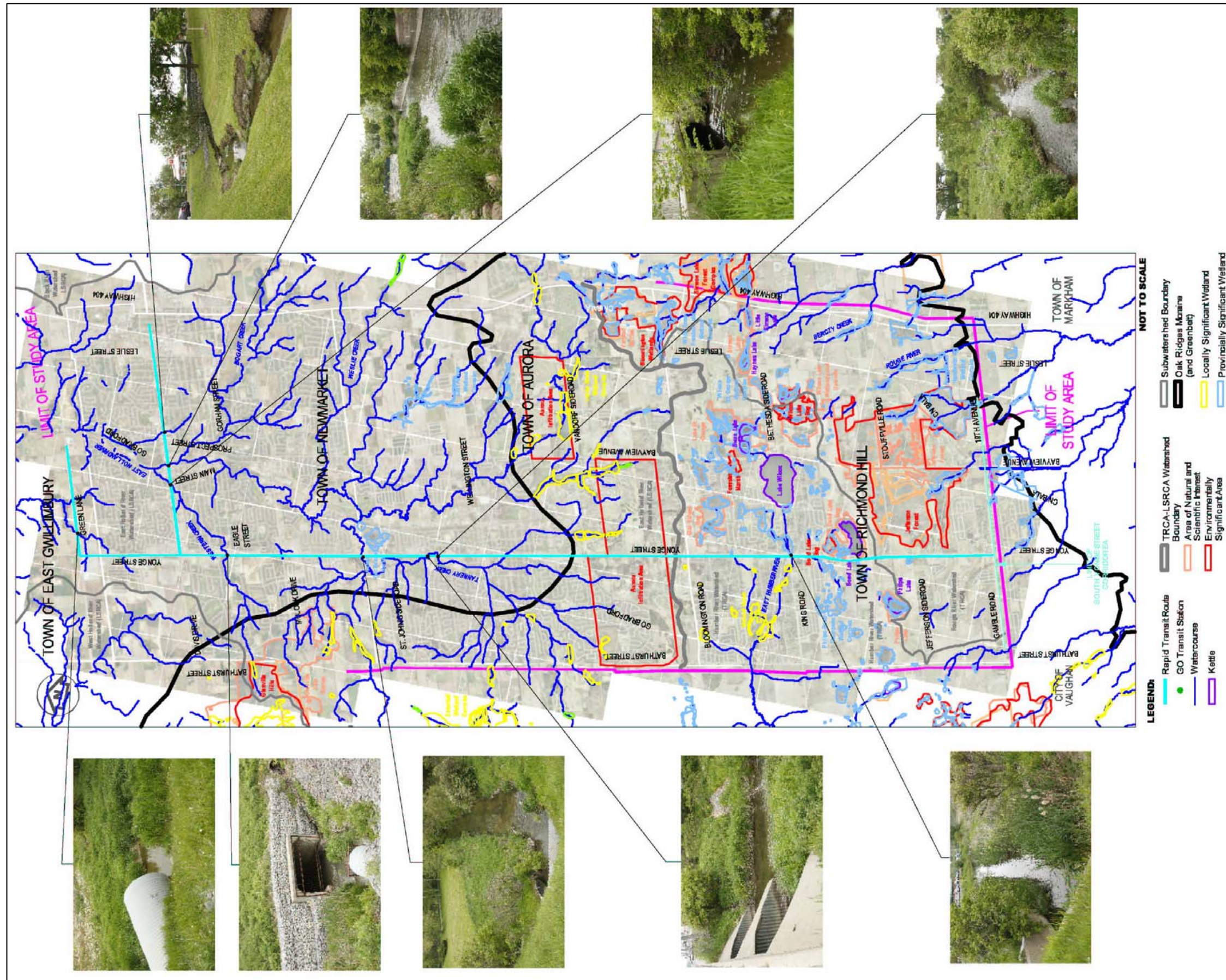


Figure 3-11
Existing Natural Environment in Study Area

Moraine physiographic region and in most situations, have more than one designation. The name of each complex, its general location and classification are presented in **Table 3-2**, and Figures 3a, 3b and 3c of **Appendix C**. The Aurora McKenzie Marsh and the East Aurora Wetland Complex are not located on the Oak Ridges Moraine. Both of these features are classed as provincially significant wetlands (PSW).

Table 3-2
Designated Natural Areas

Designated Area	General Location	Classification
Bloomington Wetlands	Bloomington Rd, east of Leslie St	ESA, PSW
Bond Lake Bog and Bond Lake	East side of Yonge St, north of Stouffville Rd	ANSI, ESA, PSW
Forester Marsh	East side of Yonge St, south of Bloomington Rd	ESA, PSW
Glenville Hills Kames	Bathurst St/Mulock Dr	ANSI
Jefferson Forest	Bayview Ave/Stouffville Rd – south to Jefferson Forest Dr.	ANSI, ESA, PSW
Leslie Street Wetland	Vandorf Sdrd, west of Leslie St	N-PSW
Mallard marsh	East Humber River, west of Yonge St	N-PSW
Oak Ridges Bog	East side of Yonge St, south of Bloomington Rd	ANSI, PSW
Philips-Bond-Thompson Wetland Complex	West of Yonge St, north of Jefferson Rd	ANSI, PSW
Rouge River Headwater Wetland Complex	East of Bayview Ave, north of 19 th Ave	ANSI, ESA, PSW
Simon Lake/Hayes Lake	West of Leslie St, north of Bethesda Sdrd	ANSI, PSW
Vandorf Kettles	East of Leslie St, south of Vandorf Sdrd	ANSI, ESA, PSW
Wilcox Lake Bog	East of Bayview Ave, south of Bethesda Sdrd	ESA, PSW
Wilcox-St.George Wetland Complex	East of Bayview Ave, north of Bethesda Sdrd	ANSI, PSW
Wilcox Lake Wetlands and Uplands	East of Bayview Ave, south of Bethesda Sdrd	ANSI

Notes: ANSI – Area of Natural and Scientific Interest; ESA – Environmentally Significant Area; PSW – Provincially Significant Wetland; N-PSW – Non – Provincially Significant Wetland

Forest blocks of varying size, age and quality occur north of Davis Drive and Green Lane in the Holland River watershed. A large good quality forest block has been retained in the Northwest Newmarket Secondary Plan Area.

3.3 ANALYSIS OF ALTERNATIVE SOLUTIONS TO THE PROBLEM (ALTERNATIVE TRANSPORTATION SOLUTIONS)

Evaluation of the alternative solutions indicated in **Table 3-1** must consider the advantages and disadvantages of each in terms of a broad range of criteria reflecting both the problem faced by the Region and the opportunities presented. These criteria, based on the primary objectives introduced in **Chapter 1**, and the Purpose of the Project are described below.

3.3.1 Criteria for Evaluation of Alternative Solutions

The framework adopted for evaluation of the alternative solutions was that of the Regional Official Plan objectives or themes stated in **Chapter 1** in describing the Purpose of the Project. These principle themes incorporate the criteria proposed in the approved *Terms of Reference* (Section 5.7.2) within the following categories of criteria for the evaluation:

3.3.1.1 Effectiveness of the Transportation Solution in Meeting Travel Demand

The purpose of this category is to compare the effectiveness of the alternatives in terms of their capacity to address forecast travel demand and increase transit mode share at the 2031 horizon year. A qualitative assessment of the long-term growth capacity is also considered in this category.

3.3.1.2 Effects on the Social Environment (reflecting the “Healthy Communities” theme)

Criteria in this category address the impact on the socio-economic environment and include the need for acquisition of residential or commercial property for new or widened road rights-of-way, level of traffic congestion, the potential for traffic infiltration through neighbourhoods, the effect of increased noise and vibration during construction and operation and the likelihood of adverse effects on archaeological resources and heritage or cultural features.

3.3.1.3 Effects on the Natural Environment (reflecting the “Sustainable Natural Environment” theme)

The focus of this category of criteria is to assess the potential effect of the alternative on elements of the natural environment such as fisheries and aquatic habitat, wildlife habitat, natural vegetation and wetlands, ground and surface water resources, regional and local air quality and ecosystems.

3.3.1.4 Effects on Smart Growth and the Economic Environment (reflecting the “Economic Vitality” theme)

This category addresses the economic aspects of the socio-economic environment and the impact on urban form by encompassing criteria that assess either opportunities to promote existing and increased economic activity or the potential adverse effects on current business activity in the corridor. The criteria measuring benefits include support of the Region’s overall vision, approved urban structure and development distribution, improved access to business and community centres, increased pedestrian activity around facilities, the quality of commuting options for employees

and the effect on congestion levels in the corridor.

Potential adverse effects of the solutions are assessed by criteria such as disruption or modification of access to businesses, displacement of businesses due to right-of-way widening and convenience of goods movement. Direct costs in the form of public sector capital funding needed and the travel time delay costs are also addressed in this category. **Table 3-3** illustrates the application of the above criteria for evaluation of alternatives listed in Section 3.1.

3.3.2 Analysis of Effectiveness as a Transportation Solution

Initially, it is necessary to analyze and quantify the performance of the existing transportation system and each improvement solution in meeting:

- the forecast travel demand during the planning period, and
- the Region’s objectives of improved mobility and the development of a high quality alternative to reduce auto dependency.

The forecasting methodology and tools used to quantify the future demand and the responsiveness of each alternative are described below.

3.3.2.1 The Demand Forecasting Model

A comprehensive, state-of-the-art transportation demand forecasting model has been developed to provide an effective planning tool for York Region’s Public Transit Improvements program. The model, developed from an extensive survey of travel behaviour, the *2001 Transportation Tomorrow Survey* (TTS), has been successfully validated as a forecasting tool. The model for this study was developed prior to the more recent 2006 TTS survey and therefore was not validated against this study. With sensitivity to transportation and transit system connectivity, levels of service and prices, demographic characteristics and land use, the models can be used to analyze alternative policies (e.g., fares, service levels), investments (rapid transit, intermodal connections) and design details. The model estimates a.m. peak period travel for five modes:

- Auto driver and passenger;
- Public transit (Viva, YRT, TTC, GO Bus) with walk access;
- Public transit with park/kiss-and-ride access;
- GO Rail with public transit or walk access; and
- GO Rail with park/kiss-and-ride access.

Travel is estimated for work, post-secondary school, secondary school and other trip purposes. The Program’s model encompasses the Greater Toronto Area (GTA and Hamilton) and is based on the 2001 GTA zone system comprising 1,717 traffic zones. Additional traffic zone detail was

included in the Viva corridors to reflect walk access and station location assumptions. Level-of-service sensitive and behaviour based trip distribution (gravity model) and modal split (logit model) techniques are employed within the four-stage modelling process, described as follows:

- **Trip Generation:** estimates the number of trips that will be made within the study time period. A conventional approach using trip rates and regression equations is used for work, school and other trips. For work and school purpose trips, sub-categories are defined with trip rates developed that reflect the different travel behaviour of social groups by occupation type (professional, manufacturing, general office/sales) and schooling level (secondary and post secondary), respectively;
- **Trip Distribution:** links the trip productions and attractions by trip purpose and type to determine travel flows. A gravity model is calibrated to estimate work trip flows, again accounting for socio-economic differences within the population by calibrating separate models for each occupation type. The process is sensitive to level-of-service, with the resulting travel orientations reflecting the assumed improvements in public transit facilities and other major transportation system changes. A standard Fratar proportional balancing process is used for school and other trip purposes;
- **Mode Split:** determines the trip travel mode. A multinomial logit model is used to determine the breakdown by mode (auto, transit, commuter rail) for work (by occupation group) and post-secondary school trips. It also distinguishes the transit access mode (park-and-ride or all-way). Existing modal split rates are assumed for non-work trips, based on defined origin-destination super-zones; and
- **Trip Assignment:** determines the trip route through the given transportation system. The standard assignment algorithms within EMME/2 are used, involving a multiple path transit assignment and user equilibrium auto assignment.

In recognition of the interaction between the four components of travel behaviour, equilibration is achieved by iterating through the three stages of trip distribution, modal split and trip assignment until a reasonable level is achieved. In addition, a link between the trip distribution and modal split components is maintained to incorporate the interdependence between them.

For preliminary planning purposes, the model forecasts can be translated from the a.m. peak 3-hour period to an a.m. peak hour or daily forecasts using relevant conversion factors. A factor of 0.6 was developed for the a.m. peak hour based upon comparisons of actual auto and transit traffic data, with 0.55 used for the higher volume Yonge Street Corridor. The daily

trips were converted using a factor of 3.5, calculated from 2001 TTS data relationships between the time periods.

The model outlined above was used to forecast the travel patterns and mode choice within the Region and across Regional boundaries in the 2031 horizon year for each of the alternative transportation strategies, including the “Do Nothing” option. Population and employment data, based on the Regional and, where relevant, City of Toronto Official Plans and described in **Chapter 5**, was utilized as the primary input for the modelling. **Chapter 5** also provides details of the basic transportation network modelled using the assumptions outlined below for each transport mode.

3.3.2.2 Key Assumptions for Demand Modelling

Road Network

The base case road network includes all arterial improvements identified in the 10-year York Region capital program as well as the TMP network to 2031. Committed road expansion projects, shown in **Figure 2.2** in **Chapter 2**, include the widening of Yonge Street between Green Lane and Mulock Drive and the widening of Bathurst Street from Davis Drive to King Road. Expansion of the provincial highway system within York Region included the proposed extensions of Highway 427 and Highway 404 and the widening of Highway 400. In the alternative scenario involving road expansion, an iterative approach was used to expand roads to meet projected auto demand.

GO Transit Network

Improvements considered under the enhanced Richmond Hill Commuter Rail and Inter-Regional Bus Service alternative are generally consistent with the GO Transit 10-year Capital Plan and 2021 Plan and included full all-day and reverse peak service on the Richmond Hill, Barrie and Stouffville GO Rail Services. Peak headways of 15 minutes were assumed for the Richmond Hill and Barrie services.

In addition to the changes to the GO Rail services, this alternative includes an extensive network of Freeway Express Bus or BRT inter-regional transit services including:

- A Highway 400 service from Newmarket (with connections to Barrie) to the Spadina Subway (Downsview);
- A Highway 407 service across York Region; and
- A Highway 404 service from Newmarket to the Bloor Subway (Castle Frank Station).

In all cases, these services included connections to major transit routes in

South York Region and Toronto.

Local Transit Network

For all future strategies except the Do Nothing Alternative, most of the recommendations from the York Region Transit 5-Year Service Plan have been included. This includes route extensions, route restructuring and expansion of service to new communities. For the York Region Rapid Transit Corridor Initiatives Alternative, YRT services overlapping with rapid transit services have been removed to avoid duplication.

In the existing transit network within the demand model, transit speeds were estimated from timetables and vary by route segment. Assumed speeds for regular bus services generally range from 20–25 km/hr. With future traffic growth, transit speeds on major routes such as Highway 7 and Yonge Street, where minimal road expansion is planned, will likely degrade due to congestion. In order to reflect this condition in the model, speeds for all regular bus routes were reduced by 20% on average. For example, a route that was coded with a 20 km/hr speed in the existing network was reduced to 16 km/hr in the future network. This reduction was not applied for the Road Expansion Alternative or the York Region Rapid Transit Corridor Initiatives Alternative, as these options include significant improvements to reduce congestion (e.g. road expansion) or improved bus times in key corridors (e.g. bus-rapid transit and transit priority).

Improved Public Transit

For the York Region Rapid Transit Corridor Initiatives Alternative, several major transit improvements were incorporated. These included:

- Bus Rapid Transit (Viva in dedicated lanes) operating in all YRTP corridors at average speeds of up to 30 km/hr;
- Implementation of transit priority on most major arterials in South York Region, consistent with Figure 2.5 sourced from the *York Region Transportation Master Plan*. The effect of transit priority was assumed to provide an improvement of 5 km/hr over the base case bus speeds on the transit priority routes; and
- Extension of subways including Yonge Subway to Highway 7, Spadina Subway to York Region (Vaughan Corporate Centre) and Sheppard Subway to the Scarborough Town Centre.

The above assumptions formed the basis for forecasting the 2031 travel demand and mode choice, and assessing the ability of the five alternative transportation strategies to carry the forecast travel demand.

3.3.2.3 Responsiveness of the Alternatives to the Forecast Capacity Required to Meet Demand

An established technique for assessing the performance of any transportation system is to compare the relationship between overall travel demand and system capacity at selected locations or screenlines in the system. In any scenario being assessed, this method also recognizes the capacity of other non-auto modes contributing to the total capacity across any one screenline. Screenlines across the transportation network are selected to provide an improved basis for analysis for the following reasons:

- i) because of parallel facilities, there are a number of alternative routes available and the choice of route can vary from the most direct route in order to reduce travel time and avoid local congestion.
- ii) comparison of historical and future trends must be based on roadway groupings as present roadways are expanded or new parallel roadways are added.
- iii) the traffic characteristics, i.e. local vs. through traffic and modal split vary due to the type and location of the roadway facility and transit service.

For analysis purposes, three east-west screenlines across the North Yonge Street Corridor were selected as illustrated in **Figure 3-12**. The first screenline is located just south of Davis Drive, the second is located just south of Wellington Street, and the third is located just south of Stouffville Road. The three screenlines are located parallel to the above mentioned locations to encompass north-south travel between, and including, Bathurst Street and Bayview Avenue.

The effectiveness of each transportation alternative in meeting both the long term travel demand within the Region and across Regional boundaries was analyzed by modelling 2031 travel demands. The analysis was done using a network-wide approach adopting similar system components for all corridors of the *Region's Transportation Master Plan* network.

Travel demands in the north part of this corridor (i.e. South of Davis Screenline) are between 15% and 50% higher in the p.m. peak period than in the a.m. peak. As a result, the screenline volumes for the a.m. peak period do not provide the complete picture of the needs in this part of the corridor. In order to ensure that the deficiencies are accurately reflected for this screenline, a hybrid approach was adopted for the screenline analysis whereby peak hour volumes represent the worst case scenario of the p.m. peak hour or a.m. peak hour. For the South of Davis Screenline, the peak hour conditions are representative of the p.m. peak hour (northbound direction) whereas the other screenlines are representative of the a.m. peak

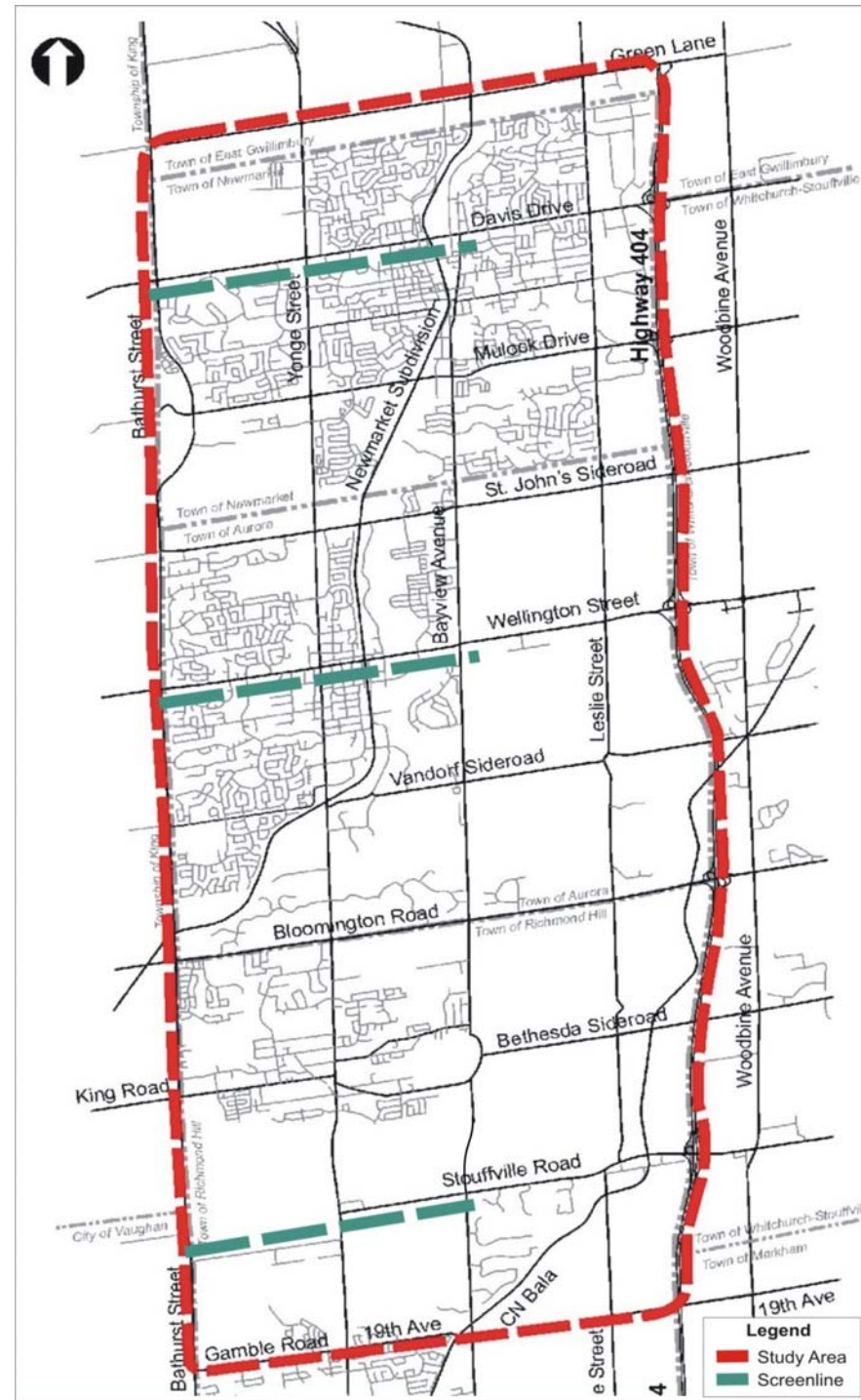


Figure 3-12
Screenlines for Demand vs Capacity Analysis

hour (southbound direction).

Figures 3-13 to 3-15 illustrate the projected relationship between demand and system capacity at the three screenlines for the peak hour-peak

direction travel in each of the alternative strategies in 2031. The screenline data provides both the total person-trips to be carried across the screenline and the projected contribution of each system mode towards meeting the demand. Transit mode shares are based on the combined sum of bus, GO Rail and rapid transit.

Screenline 1 – South of Davis Drive in the Town of Newmarket

The screenline analysis for the South of Davis Drive screenline is shown in **Figure 3-13**.

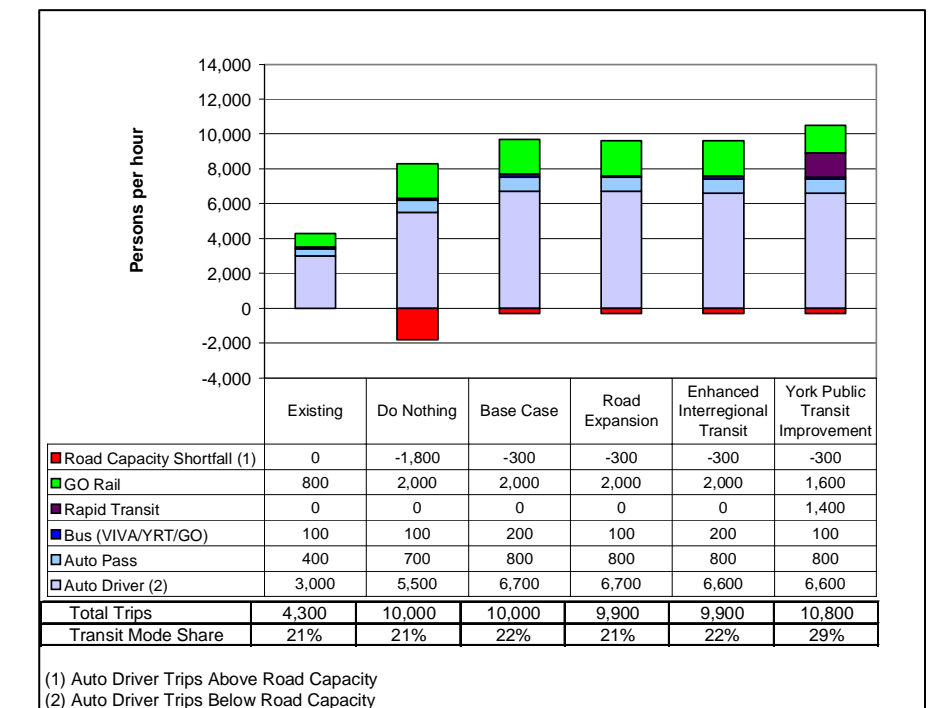


Figure 3-13
Analysis Results for Screenline 1 – South of Davis Drive

The key findings for *Screenline 1 - South of Davis Drive in the Town of Newmarket* are:

- Even with the road widening planned in the TMP, (Current Commitments including Yonge Street widening from Mulock to Green Lane), the available road lanes would be marginally (5%) over capacity by 2031 under all improvement strategies. Even the road capacity improvements alternative may not address all capacity shortfalls since it is assumed that Yonge Street and Bathurst Street can only be widened to six lanes, and it is not feasible to widen Prospect Street which traverses through downtown Newmarket.
- Approximately 1000 additional transit riders are attracted by the Public

Transit Improvements solution when compared with the 2,200 attracted by the Current Commitments and Enhanced Inter-regional Transit strategies.

- Introduction of the Public Transit Improvements recommended in the TMP would provide reserve capacity for at least 2000 additional transit trips across the screenline assuming up to 2 minute headways and 70 passengers per vehicle.
- Notwithstanding the planned introduction of Regional Public Transit Improvements, GO Rail ridership is projected to increase by a factor of two over existing levels.

Screenline 2 – South of Wellington Street in the Town of Aurora

The screenline analysis for the South of Wellington Street screenline is shown in **Figure 3-14**.

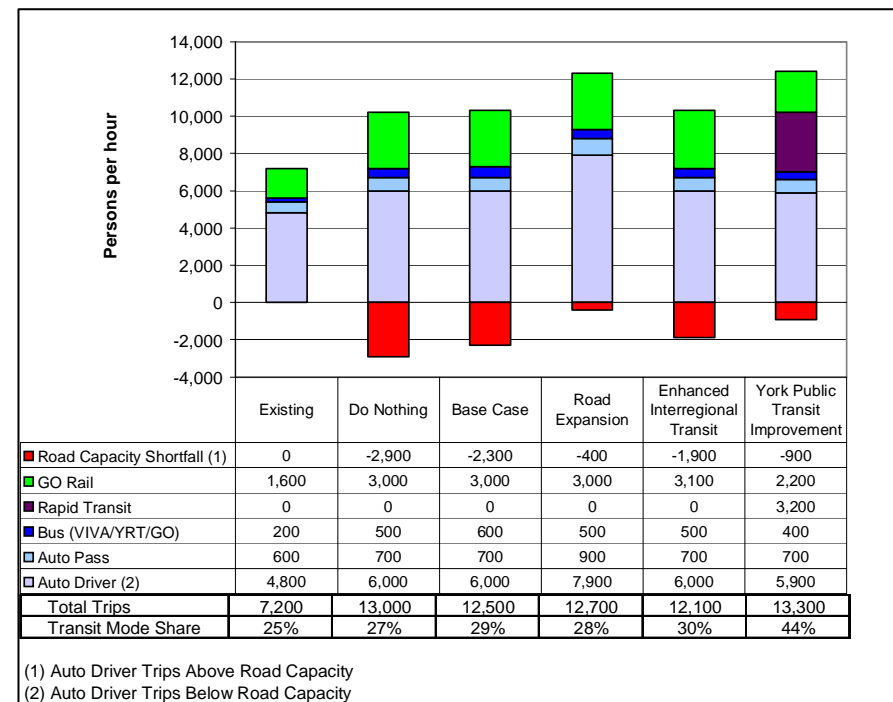


Figure 3-14
Analysis Results for Screenline 2 – South of Wellington Street

The key findings for *Screenline 2 - South of Wellington Street in the Town of Aurora* are:

- In 2031 the “Current Commitments” solution will have to provide for over 6,000 auto trips and 3,600 transit trips. Even after implementation of the TMP road system improvements, the road capacity will be 2300

trips short of the demand for auto-use.

- With the implementation of the Region’s Public Transit Improvements solution the transit mode split is increased significantly hence reducing the road capacity deficiency by 60%, leaving a system shortfall of only 900, and providing reserve capacity to attract more of the projected trips to transit.
- The Public Transit Improvements solution increases transit trips by approximately 60% from the 3,600, projected for the Current Commitments solution, to a total of 5,800 shared between GO and regional transit services.
- A Road Expansion Only solution to provide the required system capacity would require a further two lanes in each direction to be added to the current TMP commitments across the screenline (1900 vehicles).
- The Public Transit Improvements solution, when combined with GO Rail system capacity, provides ultimate transit capacity for over 5,000 additional transit trips beyond 2031.

Screenline 3– South of Stouffville Road in the Town of Richmond Hill

The screenline analysis for the South of Stouffville Road screenline is shown in **Figure 3-15**.

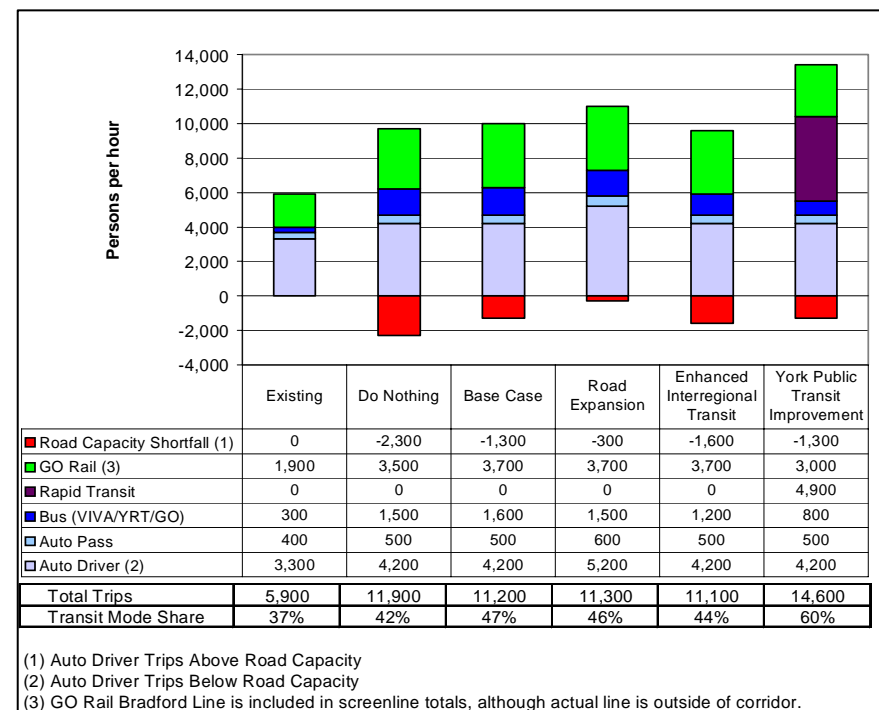


Figure 3-15
Analysis Results for Screenline 3 – South of Stouffville Road

The key findings for *Screenline 3 - South of Stouffville Road in the Town of Richmond Hill* are:

- With implementation of the Region’s committed improvements under the TMP, there will still be a shortfall of approximately 1,300 trips (10% of the total screenline capacity).
- There remains a shortfall in road capacity under all alternatives, but the Public Transit Improvements solution accommodates approximately 30% more trips than the Committed Improvements alternative, 4,900 of which are on Rapid Transit, and also provides reserve capacity to further attract trips to transit.
- There is an increase of 3,400 total transit riders to 8,700 in the Region’s Transit Initiatives solution from 5,300 in the Current Commitments solution.
- Even with the planned York Rapid Transit Improvements, GO Rail ridership is expected to increase by 60% over existing.

3.3.2.4 Effect of Alternative Solutions on Transit Mode Share

Improving public transit is fundamental to the York Region Growth Solution from a social, environmental and economic perspective. In order to evaluate the ability of each alternative to improve the attractiveness and use of public transit in York Region and reduce auto dependency, this section presents a summary and discussion of the impacts of each alternative on transit mode shares.

As shown in **Figure 3-16**, transit mode shares are expected to remain relatively constant under the Do Nothing and Current Commitments alternatives. The exception is in corridors where severe congestion contributes to significant shifts from auto to transit (a result that is mostly related to the underlying model assignment procedures that do not reflect capacity constraints on the transit system).

An alternative involving enhanced Barrie commuter rail and inter-regional bus service will have limited impacts on mode shares, although it is important to note that some components of this enhanced transit system are not included in some of the screenline totals (e.g. freeway express bus services on Highway 400 and the Barrie GO Rail Service).

Not surprisingly, the only option that could contribute to significant improvements in transit mode shares is an option involving public transit improvements, and in particular rapid transit. With the combination of transit improvements considered, mode shares could be expected to increase significantly across several of the screenlines.

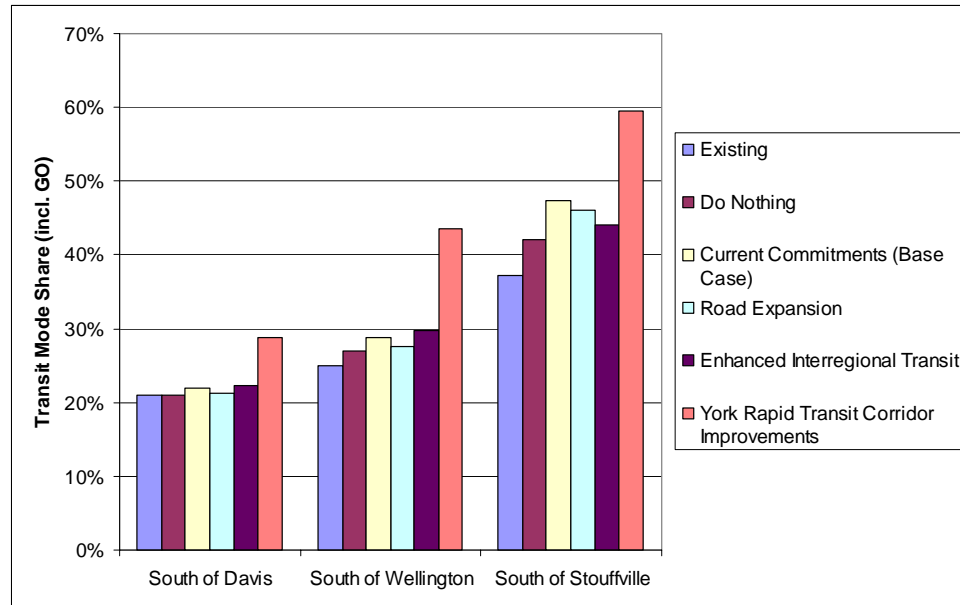


Figure 3-16
Effect of Alternative Solutions on Transit Mode Share

3.3.3 Evaluation of Alternative Transportation Solutions Rationale for Selection of Rapid Transit

The selection of the preferred transportation solution stems from the multi-criteria comparative evaluation presented in tabular form in **Table 3-3**. Each transportation alternative was assessed in terms of the criteria described previously and its ability to meet the overall planning objective for each category.

A “quality of response” rating for each criterion was assigned to each alternative to provide a graphical indication of their relative merits on the basis of this qualitative and quantitative evaluation. The findings lead to the following conclusions:

- Clearly, “Doing Nothing” cannot be considered a valid alternative. Although it would be the least capital cost alternative, it is not responsive to any of the key objectives in addressing the purpose of the undertaking.
- Although the “Current Commitments” solution includes all TMP planned road improvements, it is unable to address travel demand in the North Yonge Street Corridor. In the south part of the study area, existing road facilities are effectively widened to the available ROW width and there are few opportunities for road capacity improvements. Without a significant improvement in public transit, continued operation of existing

conventional transit service will not provide an effective alternative to the traffic congestion predicted for the arterial roads in the corridor.

- A solution focussed on unconstrained road expansion beyond the TMP network until the shortfall is eliminated would partially address corridor demands where there is room to expand within the available ROW; however where roads have already been expanded to their full width, any further widening would result in major social impacts in the form of property acquisition. Perhaps more significant are the secondary impacts of a decrease in air quality resulting from more vehicle trips, a higher accident potential and community barrier effects. Also, a solution focused on road expansion would not provide the flexibility to handle corridor demands beyond the planning horizon as it effectively uses up all available ROW space. This alternative is also not responsive to the Region’s OP objectives and the goal of reducing auto dependency.
- Enhancing Barrie commuter rail and inter-regional bus services in the corridor will not service travel demand in this corridor because more frequent rail service attracts primarily downtown-Toronto destined trips and inter-regional bus service on Highway 404 and Highway 400 bypasses the core development nodes along the corridor. In addition, the location of the inter-regional transit routes does not support the urban form envisioned in the Region’s *Official Plan* and thus will not encourage transit-oriented development within the Region.
- As noted previously, the York Region Rapid Transit Corridor Initiatives solution is the only alternative that addresses long-term travel demand in the corridor. This solution includes committed road widening projects as well as the introduction of the York Rapid Transit Network. By providing an effective alternative to auto use, this solution supports both York Region and local municipal Official Plan objectives. At the same time, the improvements can incorporate significant flexibility to expand the system capacity over time for the long-term travel needs in the Region. For example, the capacity of a surface rapid transit system is at least 10,000 persons per hour, the equivalent of more than 10 traffic lanes in each direction.

As well as responding best to the transportation demands, this alternative can be implemented with mitigable adverse effects on the natural environment and will make a positive contribution to the reduction of harmful vehicle emissions. In addition, adverse effects on the social environment can be mitigated and the solution offers the opportunity to support the desired urban form, enhance streetscapes and encourage development of more liveable communities.

Preferred Alternative Solution

As a result, the “York Region Rapid Transit Corridor Initiatives” Solution was selected as the preferred alternative to the undertaking.

Table 3-3
Evaluation of Alternative Transportation Solutions (Entire Corridor)

Evaluation Objectives	ALTERNATIVE TRANSPORTATION SOLUTIONS				
	Do Nothing	Current Commitments including Priority Transit & Transportation Demand Management	Road Capacity Increase including Current Commitments & Further Road Expansion	Enhanced Bradford Line Commuter Rail and Inter-Regional Bus Services	Rapid Transit Corridor Initiatives including Current Commitments
Transportation Environment					
Ability of transportation system to maintain and improve mobility.	2031 Travel Demand Forecasts show there would be a major shortfall in the road capacity of the corridor of approximately 3-4 lanes in each direction. The operational performance of the system would be severely degraded.	The travel demand forecast shows a shortfall in road capacity in the corridor of approximately 2-3 lanes in each direction. An auto-based system without the TMP rapid transit initiative is not an effective solution to meet future inter and intra regional travel needs.	This auto-use focused alternative would require 2 arterial lanes in addition to the current commitments to provide for 2031 capacity. Relies primarily on auto use for connectivity to inter-regional transit services.	2031 Travel Demand Forecasts show that this transit improvement alone will not meet overall mobility needs in the corridor. Enhanced bi-directional inter-regional rail and 400-series service offers long-term reserve capacity for some origin-destination pairs.	Rapid transit in dedicated lanes largely eliminates road capacity shortfall and provides reserve transit capacity for long-term growth. Provides improved access and connectivity to inter-regional transit services operating in the Region. Offers long-term growth capacity for several origin-destination pairs.
Effect on transit mode share	Traffic congestion would make the existing transit system less reliable and longer trip times would make it less viable as an alternative to auto-use.	The operational performance of the local transit system would be severely degraded.	This solution discourages the use of committed local and inter-regional transit services resulting in minimal increase in transit mode share.	The forecasted shortfall in road capacity of 2-3 lanes in each direction indicates that this solution cannot increase transit mode split for shorter intraregional trips. Requires enhanced local transit service and large park and ride facilities to attract ridership and reach employment centres.	Solution has a significant positive effect on transit mode share as shown in Figure 3-5.
RESPONSIVENESS	○	◐	◑	◒	◓
Natural Environment					
Fisheries and Aquatic Resources	Potential impact to habitat as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential impact to habitat as a result of increased traffic demand on the wider road network and resulting incremental contaminant runoff.	Potential for effects on aquatic habitat (HADD) associated with required significantly widened or new structures, culverts etc...	Potential for effects on aquatic habitat (HADD) associated with required widened or new structures, culverts etc...	Potential for effects on aquatic habitat (HADD) associated with required widened or new structures, culverts etc...
Surface/Ground Water Quality and Quantity	Potential impact to surface and ground water quality as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential water quality effects associated with required widened or new structures, culverts etc. (during construction and increased run-off during operations).	Potential water quality effects associated with required widened or new structures, culverts etc. (during construction and increased run-off during operations).	Potential water quality effects associated with required widened or new structures, culverts etc. (during construction and increased run-off during operations).	Potential water quality effects associated with required widened or new structures, culverts etc. (during construction and increased run-off during operations).
Wetlands	None	Potential for removal of wetlands and incremental effects to the local ecosystem due to any intrusion that is unavoidable.	Potential for removal of wetlands and incremental effects to the local ecosystem as a result of changes to existing habitat.	Potential for removal of wetlands and incremental effects to the local ecosystem is less since the expansion of transit infrastructure will occur largely within existing rail and roadway rights-of-way.	Potential for removal of wetlands and incremental effects to the local ecosystem is less since the expansion of transit infrastructure will occur largely within existing rail and roadway rights-of-way.
Vegetation and flora	None	Potential for removal of vegetation/flora or environmentally designated land such as ESA's, ANSI's etc. due to any intrusion that is unavoidable.	Potential for removal of vegetation/flora or environmentally designated land such as ESA's, ANSI's etc. as a result of the road widening.	Potential for removal of vegetation/flora or environmentally designated land such as ESA's, ANSI's etc. is less since the expansion of transit infrastructure will occur within existing rail and roadway rights-of-way.	Potential for removal of vegetation/flora or environmentally designated land such as ESA's, ANSI's etc. as a result of widening beyond existing road right-of-way to accommodate the transitway.
Wildlife Resources and Linkages	None	Potential for removal of wildlife habitat, and in turn wildlife itself due to any intrusion that is unavoidable.	Potential for removal of wildlife habitat, and in turn wildlife itself due to any required road widening.	Potential for removal of wildlife habitat, and in turn wildlife itself is less since the expansion of transit infrastructure will occur within existing rail and roadway rights-of-way.	Potential for removal of wildlife habitat, and in turn wildlife itself due to any required widening to accommodate the transitway in areas where intrusion onto habitat is unavoidable.
RESPONSIVENESS	◐	◑	◒	◓	◔

Table 3-3 (Continued)
Evaluation of Alternative Transportation Solutions (Entire Corridor)

Evaluation Objectives	ALTERNATIVE TRANSPORTATION SOLUTIONS				
	Do Nothing	Current Commitments including Priority Transit & Transportation Demand Management	Road Capacity Increase including Current Commitments & Further Road Expansion	Enhanced Bradford Line Commuter Rail and Inter-Regional Bus Services	Rapid Transit Corridor Initiatives including Current Commitments
Social Environment					
Effects on Property	No property acquisition.	Requires some land acquisition to accommodate the current commitments.	Requires significant property acquisition due to lack of road right-of-way for necessary road widening.	Property acquisitions for enhanced services will be limited because the transit improvements will be largely within existing rail or provincial highway rights-of-way.	Reduces land acquisition costs for transportation facilities by promoting greater use of high capacity vehicles. However, dedicated transitways in existing road rights-of-way often require modified access patterns to adjacent properties.
Effect on Community Environment	Worsening road congestion will increase neighbourhood traffic infiltration. Indirect costs due to urban sprawl requiring additional facilities	Neighbourhood traffic infiltration would still be evident however to a lesser degree. Over time congestion will increase infiltration. Some streetscaping possible with TMP road improvements.	Would initially reduce neighbourhood traffic infiltration but create more of a barrier between communities. High capacity arterials limit streetscaping opportunities.	Neighbourhood traffic infiltration would still be evident however to a lesser degree. Little opportunity for streetscape enhancement beyond TMP road improvement opportunities.	Neighbourhood traffic infiltration would be reduced by replacing most of the road capacity shortfall by an increased use of transit. Insertion of a new transit infrastructure can act as a catalyst for streetscape improvement and urban renewal. The transitway may be perceived as a barrier between communities, however improved public transit will enhance access to community facilities.
Noise and vibration effects	Traffic congestion on arterial and local roads will increase ambient levels.	TMP commitments will improve traffic flow but over time ambient levels will worsen on arterial and local roads.	Potential for increase due to closer proximity to adjacent properties as a result of major road expansion.	Higher service frequency on rail rights-of-way increases potential for noise intrusion. Continuing traffic growth will worsen levels on arterial and local roads.	Increased transit mode share will reduce traffic-generated levels. Potential for increase due to closer proximity to adjacent properties as a result of the road expansion.
Air Quality	Increased congestion within the corridor will have an impact on overall air quality and energy consumption.	Initial reduction in congestion levels will improve air quality, however, in long term continued reliance on auto use for growing travel demand will increase overall vehicle trips and congestion resulting in increased vehicle emission and energy consumption.	Marginally better than the Do Nothing Solution since added road capacity will reduce overall traffic congestion. However this continued reliance on auto use for growing travel demand will increase overall vehicle trips and congestion resulting in increased vehicle emission and energy consumption.	Inter-Regional freeway bus service have limited impact on immediate corridor demands and therefore limited impact on air quality within the corridor. There would however be reductions in Regional air quality due to mode shifts outside of the study area.	The projected higher transit mode share has the greatest overall benefit due to reduction in auto emissions and effect of Green House Gas (GHG).
Effect on Cultural Environment • Archaeological Resources • Built Heritage Resources/Cultural Landscapes	None	Any change in the existing road network as part of the current commitments would be designed to minimize any disruption to known archaeological sites or built heritage resources.	Further road expansion increases the potential for disruption to known archaeological sites or built heritage resources.	Potential for disruption to known archaeological sites or built heritage resources is limited because improvements would take place in existing rail or provincial highway rights-of-way.	Potential for disruption to known archaeological sites or built heritage resources is limited because improved public transit infrastructure will be mostly within existing road rights-of-way.
RESPONSIVENESS	●	●	●	●	●
Smart Growth & Economic Environment					
Effect on Regional and Municipal Planning Policies	Will prevent the achievement of OP land use and development objectives and policies.	An incomplete TMP without a viable transit alternative does not promote Regional/Municipal OP urban form and development objectives.	A focus on meeting travel demand by increasing road capacity only does not promote Regional/Municipal OP urban form and mode choice objectives and constrains development levels.	Although OP mode choice objectives are supported, use of existing rail or provincial highway rights-of-way offers limited opportunities to promote Regional/Municipal OP urban form and development pattern objectives.	The rapid transit network supports York Region's OP, Centres and Corridors Solution, and mode choice objectives, as well as promoting Municipal planning and development objectives and Provincial Places to Grow.
Effect on Travel time	The resulting loss of mobility will degrade employees' work commute in and to the Region and increase cost of goods movement for business.	Worsening congestion over time will gradually increase time-related cost of travel and goods movement in the Region, and degrade employees' work commute in and to the Region.	Increase in time-related costs would be less significant assuming road capacity increases could be achieved. Goods movement will continue in high volume traffic conditions.	Longer term congestion related travel time increases and costs for goods and people movement will still increase for intra-Regional travel.	Reduction in travel time available with improved transit system segregated from congested roads.

Table 3-3 (Continued)
Evaluation of Alternative Transportation Solutions (Entire Corridor)

Evaluation Objectives	ALTERNATIVE TRANSPORTATION SOLUTIONS				
	Do Nothing	Current Commitments including Priority Transit & Transportation Demand Management	Road Capacity Increase including Current Commitments & Further Road Expansion	Enhanced Bradford Line Commuter Rail and Inter-Regional Bus Services	Rapid Transit Corridor Initiatives including Current Commitments
Costs	Doing nothing minimizes public sector capital costs and business displacement but will increase indirect business costs due to inefficiency of goods and people movement. Indirect cost due to urban sprawl requiring additional facilities. Time-related cost of travel will be significantly increased.	The Region's TMP current commitments will require fairly significant on-going public sector capital spending.	This focus on road improvement only implies a higher unit travel cost by the general public who will have no alternative to auto use on the enhanced road system.	Requires significant investment in capital works and inter-Regional transit operation and maintenance.	Requires substantial investment in capital works and Regional transit operation and maintenance. Provides a lower unit travel cost option to the general public.
Business Activities	Will discourage business development due to significant loss of mobility.	Will result in less business investment due to continued congestion in the corridor without an effective non-auto alternative.	Downgrades the viability of the transit option by forcing people and goods to share the enhanced road system.	Improves goods movement by providing some reduction in auto volumes.	Improves goods movement by providing some reduction in auto volumes. Modification in access to adjacent businesses may result in business loss.
RESPONSIVENESS	○	●	●	●	●
					PREFERRED SOLUTION

LEGEND: Least Responsive ○ ● ● ● ● Most Responsive

Note: ANSI – Area of Natural and Scientific Interest; ESA – Environmentally Significant Area; HADD –Harmful, Alteration, Disruption or Destruction ; OP – Official Plan; TMP – Transportation Master Plan

4. ALTERNATIVE SOLUTIONS CONTINUED: YONGE STREET ROAD IMPROVEMENTS BETWEEN MULOCK DRIVE AND GREEN LANE (CLASS EA PROCESS – PHASE 2)

4.1 BACKGROUND

Based on the analysis of transportation needs conducted for the 2002 York Region Transportation Master Plan (TMP), the widening of Yonge Street from four lanes to six lanes between Mulock Drive and Green Lane has been included as a “current commitment” in the foregoing evaluation of transportation improvement solutions within the project study area (refer to Chapter 3 of the ESR). This road capacity improvement, identified as a 2011 construction project in the Region’s 2008, 10 Year Roads Construction Program (refer to **Figure 2-6** in **Chapter 2**), is an important contributor to the ability of the preferred solution, Regional Public Transit Improvements, to meet the overall system capacity needs assessed in the screenline analysis. In addition, due to existing transportation capacity issues, the Town of Newmarket has requested the Region to make this improvement a key priority.

As a “current commitment”, the widening of Yonge Street was also included in the Road Expansion, Enhanced Inter-regional Transit and York Region Public Transit Improvements alternatives. Given that the local road widening is a committed improvement to the transportation system included in all alternatives except the Do Nothing alternative, the effectiveness of this improvement and any alternatives in contributing to the preferred undertaking requires a separate specific evaluation. Accordingly, the purpose of this section is to confirm that the Yonge Street road widening is the preferred current commitment as a key component of the Regional Rapid Transit strategy.

The horizon year used for the analysis of the road improvements was 2021, which differs from 2031 used in **Section 4.2**. The use of 2021 is reasonable for traffic conditions in the existing commercial areas along Yonge Street to reach saturation. The 2031 horizon year for transit infrastructure planning is intended to capture the redevelopment in the corridor to meet Regional OP and Provincial Places to Grow policies, and inherently will take longer to evolve than the initial greenfield development for low density commercial uses.

4.2 NEED AND JUSTIFICATION

4.2.1 Existing Traffic Operations

Within the study area, Yonge Street from Mulock Drive to Green Lane is a four lane arterial roadway with a posted speed limit of 60 km/hr. Existing signalized intersections along this section of Yonge Street are frequent due to the number of adjacent commercial developments.

A detailed traffic analysis was conducted for the North Yonge Street Corridor between Green Lane and Mulock Drive and documented in **Appendix B** of this ESR. Consistent with observed conditions, Yonge Street is shown to be operating at a poor level of service (LOS) during the weekday p.m. peak periods as well as the weekend peak periods. In fact, traffic volumes are higher on weekends than weekdays at many locations. This is primarily a result of the high level of commercial development in the corridor north and south of Davis Drive.

As shown in **Figure 4-1**, existing traffic volumes already exceed the practical capacity of Yonge Street based on its four lane cross-section.

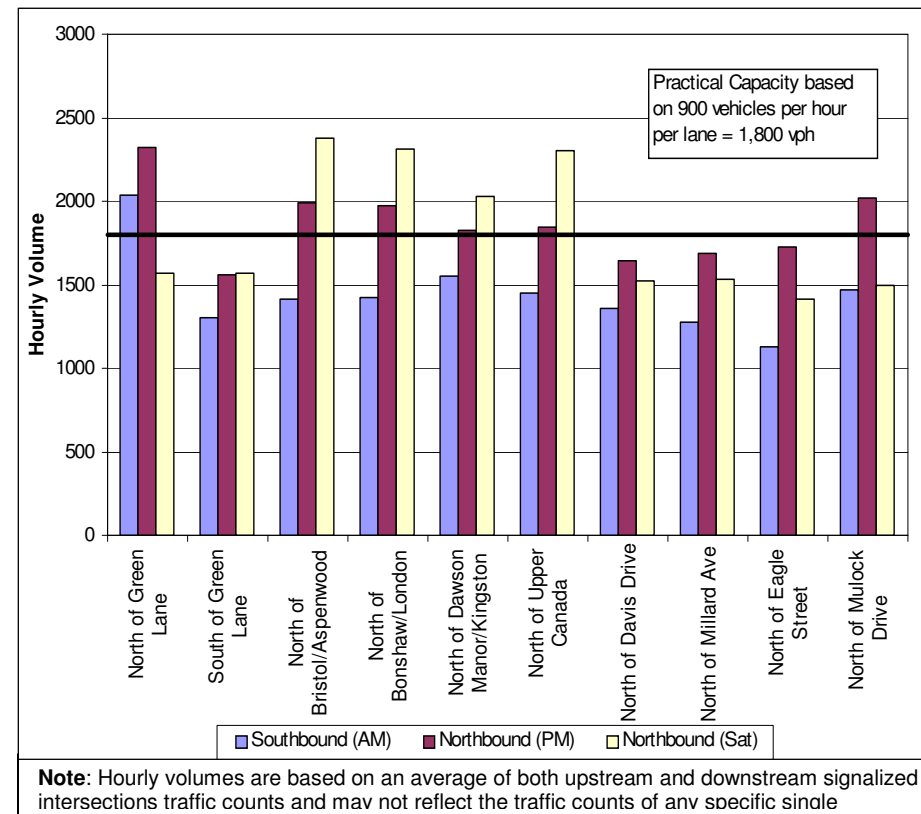


Figure 4-1
Yonge Street Existing (2005) Traffic Levels

This results in a poor level of service for most intersections on Yonge Street in the p.m. peak hour and on weekends. In the p.m. peak hour, 5 out of 14 intersections between Green Lane and Mulock Drive are operating at LOS E or F, with F representing failure. On Saturday, seven out of the 14 signalized intersections are operating at LOS E or F, as summarized in **Table 4-1**. On Saturday, the majority of problems occur at or north of Davis Drive.

Table 4-1
Existing Intersection Level of Service for Yonge Street Between Mulock Drive and Green Lane

Intersection Reference Yonge Street @	AM Peak		PM Peak		Saturday	
	Delay	LOS	Delay	LOS	Delay	LOS
Green Lane	32	C	104	F	61	E
Green Lane Centre	3	A	11	B	35	C
Aspenwood Drive/Bristol Road	16	B	70	E	204	F
Bonshaw Avenue/London Road	15	B	16	B	81	F
Dawson Manor Blvd/Kingston Road	8	A	21	C	74	E
Upper Canada Mall	3	A	89	F	134	F
Davis Drive	41	D	101	F	96	F
KFC/Chapters Access	10	A	7	A	21	C
Millard Avenue	18	B	27	C	58	E
Gladman Avenue/York Admin Access	3	A	9	A	6	A
Eagle Street	27	C	46	D	35	C
William Roe Blvd/Clearmeadow Blvd	10	A	11	B	10	A
Mulock Drive	36	D	142	F	30	C

Note: “Delay” is the average overall delay for the intersection in seconds per vehicle

4.2.2 Future Capacity and Demand

Based on the York Region Transportation Demand Model, volumes on Yonge Street between Green Lane and Mulock Drive are projected to increase by at least 2%-3% per annum until 2021, assuming current travel behaviour and the current transit infrastructure. Growth in Saturday traffic will likely be lower due to the fact that a large amount of commercial development has already taken place in the corridor and will reach a saturation point. Other big-box outlets will also open up elsewhere, thereby mitigating further growth. The effect of these traffic volume increases, assuming the more conservative figure of 2% for weekday traffic and 1% for Saturday traffic up to 2021, is shown in **Figure 4-2**. Considering that Yonge Street is already operating beyond its practical capacity in the p.m. peak

hour and weekend periods, the effect of further traffic growth would be substantial. Without any road widening, auto volumes would exceed existing road capacity by as much as 75% for the 2021 weekday p.m. peak hour. This could be expected to worsen for 2031 conditions; however, this horizon is not shown given that the practical capacity has been more than exceeded in 2021. Even under a road widening scenario, p.m. peak hour and weekend volumes would exceed the capacity of a six lane roadway at some locations suggesting that a comprehensive set of transportation improvements is required.

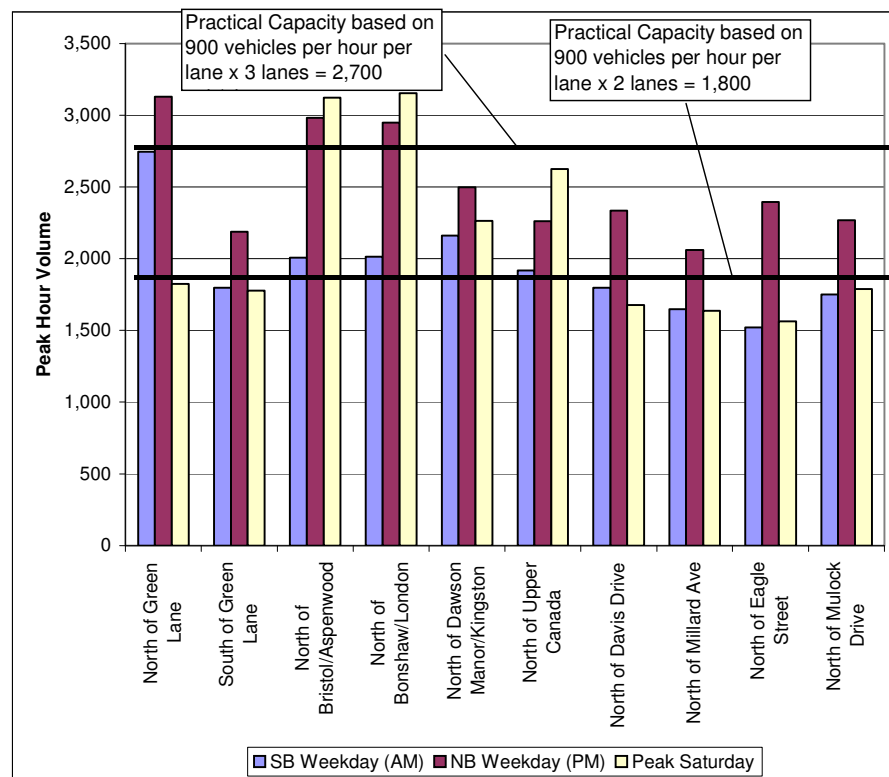


Figure 4-2
Future (2021) Volume to Capacity Ratios for Yonge Street and Existing Transit Mode Split

4.3 ALTERNATIVES TO YONGE STREET ROAD CAPACITY IMPROVEMENT

The demand/supply analysis described above shows that there will be a significant shortfall in road capacity in the future on Yonge Street, exacerbating existing congestion problems. Accordingly, a number of planning alternatives to address this problem were considered and analysed:

- No improvement in Yonge Street road capacity
- Travel Demand Management (TDM)
- Improve public transit service only
- Improve parallel roadways
- Improve Yonge Street capacity (a component of the preferred alternative developed in Section 3.2, Rapid Transit Initiatives including Other Current Commitments)

As can be observed, the planning alternatives listed above range from the status quo (no improvements) to an increase in the capacity of either the public transit or road system. Each alternative is discussed and evaluated in the next section.

4.4 EVALUATION OF ALTERNATIVES TO THE PROBLEM

4.4.1 No improvement in Yonge Street Road Capacity

In relation to the road improvement undertaking, a “do-nothing” option implies continuation of the status quo in terms of transportation capacity for the portion of Yonge Street, between Mulock Drive and Green Lane.

Considerable urban growth (residential, commercial and industrial) during the last decade or so in the Newmarket area, has necessitated plans for road network expansion, improvements to the existing arterial roadways in the area and consideration of implementation of rapid transit systems due to the increasing traffic congestion and decline in road safety.

Within the area, there are a large number of commercial developments along Yonge Street that attract numerous trips throughout the day and on weekends, and Yonge Street is the only means of accessing these developments. In fact, there are very few continuous north-south routes through Newmarket placing high pressure on the four main routes; those being Bathurst Street (somewhat outside the built up area), Yonge Street, Bayview Avenue (which is restricted through the old part of Newmarket) and Leslie Street. Continued development will place additional pressures on these routes.

While a “do-nothing” scenario avoids the short-term negative impacts usually associated with road/infrastructure improvements and the corresponding expenditure of public funds, it represents a “no-response” option. Clearly, the justification for any public undertaking must be that the preferred alternative provides the greatest net benefit to the overall environment.

Conclusion: Taking into account the significant negative consequences of a “do-nothing” scenario, this course of action cannot be considered a reasonable or acceptable option. In support of the approved Official Plan Regional Centre urban structure recommendations, some proactive measures must be considered to address existing traffic operational issues and growing travel demand in this corridor.

4.4.2 Transportation Demand Management (TDM)

An alternative to expanding transportation capacity is to reduce single occupant vehicle demand. This could be done through efforts to increase car and van pooling, telecommuting or other measures. One of the challenges with this solution in the North Yonge Street Corridor is that much of the traffic is related to the commercial developments along Yonge Street, as opposed to commuter traffic which is more responsive to TDM measures. This is re-enforced by the fact that traffic is highest on weekends. If an aggressive program of TDM measures were pursued, the traffic levels could be reduced by up to 5%, which is less than the amount required to address road capacity shortfalls. As discussed previously, future auto demand will exceed supply at some locations by 75%.

Under this alternative, the through traffic volumes may be slightly lower, but no significant reduction of the overall traffic congestion would be realized. Traffic increases due to existing and future adjacent developments will have an offsetting effect, increasing traffic delays over longer periods of time, as well as the potential for accidents, particularly the types associated with congestion. Vehicle occupancy increases (as a transportation solution) would also be complicated to initiate and enforce.

Conclusion: This alternative would only have a marginal positive effect on the available capacity and safety deficiencies. However, it is part of the overall commitments identified in the TMP and is currently being pursued separately through the Region’s Smart Commute Program.

4.4.3 Improvements to Public Transit Service Only

In the screenline analysis presented earlier in **Section 3.3.2.3**, all of the alternatives except the Do Nothing alternative included the widening of Yonge Street to six lanes between Mulock Drive and Green Lane, consistent with the 10-year roads capital plan and TMP. As a result, none of the alternatives considered public transit improvements as a stand-alone alternative.

One alternative to widening Yonge Street in Newmarket would be to implement public transit improvements only. **Table 4-2** shows the road capacity shortfall assuming no road widening and transit improvements

only. North of Davis Drive, it is estimated that even with public transit improvements and no road widening there will still be approximately 1,400 vehicles than cannot be accommodated by the road network. This is largely a result of the fact that transit only is attractive for a small portion of the trips in this section. The projected transit volume (YRT plus VIVA) is estimated to be 280 passengers per hour north of Davis Drive. This implies that it would be necessary to increase transit mode split by another five times to meet the projected travel demand needs. For the Saturday peak period, this conclusion on the effectiveness of transit improvements only on the section of Yonge Street north of Davis Drive would likely be magnified, as people are less likely to use transit for discretionary trips.

Table 4-2
Projected Auto Volumes with Public Transit Improvements Only

Section	Existing Weekday PMPKHR Auto Volume (max)	Projected Future PMPKHR Auto Volume (max) ⁽¹⁾	Existing Road Capacity ⁽²⁾	Capacity Shortfall
Davis Drive - Green Lane	2,200	3,190	1800	1,390
Mulock Drive - Davis Drive	1,800	2,310	1800	510

⁽¹⁾ Assumes 1.5% growth per annum to 2021 north of Davis and 1% per annum south of Davis, as projected by the EMME/2 model

⁽²⁾ Based on 4-lane capacity of Yonge Street

Conversely, south of Davis Drive public transit improvements have a greater impact on transit ridership attracting some 1,200 peak hour riders in 2021 on VIVA alone. A further 50% increase in transit ridership would eliminate the projected road capacity shortfall. This increase could be achieved through fare incentives, improvements to transit feeder services, or auto-disincentives.

Conclusion: The introduction of rapid transit service along Yonge Street, integrated with other transit systems serving the area, will contribute to a reduction in traffic volumes along Yonge Street and surrounding streets. However, this alternative is not expected to fully address the road capacity shortfalls that would occur if Yonge Street capacity improvements were not implemented, particularly north of Davis Drive.

4.4.4 Improvements to Other Roadways

As well as additional lanes on Yonge Street, the Region's 10-year capital plan includes north-south capacity increases on Bathurst Street and Leslie Street and, in addition some east-west improvements. These road improvements have been accounted for in the screenline analysis presented in Section 3.3.2.3 where it was demonstrated that additional transportation capacity is required over and above these committed

improvements.

The previous analysis focused on the screenline results and did not explicitly address the section of Yonge Street between Mulock Drive and Green Lane. Accordingly, a sub-area analysis was undertaken to explore the impacts of widening or improving parallel roadways on the capacity requirements for Yonge Street. A number of potential alternatives were identified and modelled, which are listed below. These are intended to be illustrative alternatives to explore the sensitivity of Yonge Street volumes to improvements on other parallel facilities and should not be considered an exhaustive list. These improvements are above and beyond what is already planned in the TMP and are analyzed here to see if they have potential to address the travel demand forecast for the Yonge Street Corridor.

- Widening Bathurst Street to six lanes between St. John's Sideroad and Green Lane
- Improvements to Davis Drive between Yonge Street and Leslie Street
- Widening of Mulock Drive to six lanes between Bathurst Street and Leslie Street

Another option that was explored was the impacts of the Bradford By-pass and the Highway 404 extension. These were found to have limited impact on traffic volumes on Yonge Street south of Green Lane. They are also included in the committed transportation improvements.

Widening of Bayview Avenue/Prospect Street through historic Newmarket was not considered to be a feasible option due to the sensitive nature of the surrounding properties.

As shown on **Table 4-3**, widening of other facilities does not have a significant impact on Yonge Street volumes between Mulock Drive and Green Lane, and in some cases may actually increase volumes on Yonge Street. Part of the reason for the insensitivity of Yonge Street volumes to improvements on parallel roadways is that many of the trips in the corridor are local trips. This is confirmed by the select link analysis shown in **Figure 4-3** which shows the travel patterns for a.m. peak hour trips using any portion of Yonge Street between Mulock Drive and Green Lane. It should also be noted that the results shown are for the a.m. peak hour, and which is less congestion than the p.m. peak hour, however, the York Region Model is calibrated to a.m. peak conditions. Even considering the differences in congestion levels between the a.m. and p.m. peak periods, the effects of improvements to parallel roads on the demand in the Yonge Street corridor are expected to be minimal.

The environmental impacts of improvements to other roadways are likely to be significant. For example, there may be environmental impacts resulting

from further widening of Bathurst Street given that it is less urbanized than Yonge Street. Similarly, widening of Davis Drive would have significant property impacts.

Table 4-3
Impacts of Road Improvements on Parallel Corridors (2021)

Improvement Alternative	Location	
	Green Lane to Davis Dr.	Davis Dr. to Mulock Dr.
Projected Capacity Shortfall (Max)	1,200	500
Widen Bathurst Street	-30	-30
Improvements to Davis Drive	+90	+40
Widen Mulock Drive	+80	+80

Conclusion: Overall, widening/improvements to other parallel roadways in the area does not represent a feasible alternative solution to increasing traffic congestion on Yonge Street.

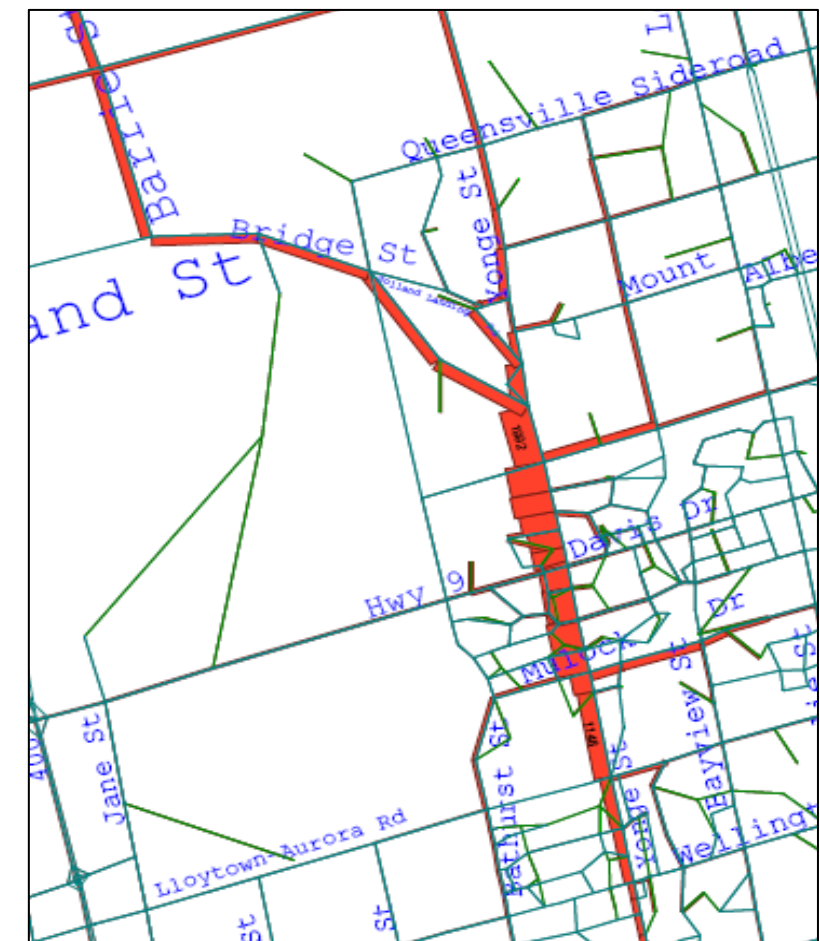


Figure 4-3
Select Link Analysis for Trips Using Yonge Street (Mulock Dr. to Green Lane)

4.4.5 Improvements to Yonge Street Capacity

This alternative involves improvements to enhance the capacity of Yonge Street which could include widening from the existing four through lanes and centre left turn lane to six through lanes and a centre left turn lane, and/or various intersection improvements to enhance the capacity and movements within the corridor. These improvements would be implemented in conjunction with transit improvements.

As shown previously in **Figure 4.3**, increased through-lane capacity by up to 50% (i.e. 4 to 6 lanes), would significantly improve traffic operations and safety on Yonge Street, however, temporary disruption and inconvenience during construction, will need to be minimized by including efficient staging plans and protective measures in the widening design.

Conclusion: Improvements to the Yonge Street capacity is the preferred transportation solution since it addresses both local and through traffic capacity, operations and safety between Mullock Drive and Green Lane.

4.5 EVALUATION SUMMARY OF ALTERNATIVES TO THE PROBLEM

Table 4-4 summarizes the evaluation of the transportation solutions considered as alternatives to the Yonge Street associated road improvements, included as part of this study. As noted in the table, the preferred solution is the **Yonge Street Road Capacity Improvements Solution**. This solution is actually part of the current commitments outlined in **Chapter 3** (and **Table 3-1**) of this ESR.

**Table 4-4
Evaluation of Alternatives Transportation Solutions (Yonge Street between Mulock Drive and Green Lane)**

Evaluation Objectives	ALTERNATIVE TRANSPORTATION SOLUTIONS				
	No Improvement in Yonge Street Road Capacity	Travel Demand Management (TDM)	Improve Public Transit Service Only	Improve Other Parallel Roadways	Yonge Street Road Capacity Improvements (part of the Current Commitments in the Preferred Alternatives to the Undertaking)
Transportation Environment					
Ability of transportation system to maintain and improve mobility.	2031 travel demand forecasts show that there would be a major shortfall in the road capacity of the corridor. The operational performance of the system would continue to degrade.	May reduce commuter-oriented trips but unlikely to impact commercial/shopping trips significantly	Transit ridership projections north of Davis Drive are well below amount required to off-set auto volume increases. This alternative has more potential south of Davis Drive	Improvements to other parallel roadways may benefit the overall traffic operation in the area but influence on Yonge St traffic congestion would be minor.	Addresses most road capacity shortfalls and provides balanced transportation network based on forecast demand.
Effect on transit mode share	Traffic congestion would make the existing road system less reliable including longer trip times.	Committed improvements already include significant transit improvements	The higher transit mode share will contribute to improved traffic operations on Yonge St.	This solution discourages the use of committed local and inter-Regional transit services resulting in a minimal increase in transit mode share.	May increase transit ridership, particularly for transit service in mixed traffic, by reducing congestion and delay overall.
RESPONSIVENESS	○	◐	◑	◒	●
Natural Environment					
Fisheries and Aquatic Resources	Potential impact to habitat as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential impact to habitat as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential impact to habitat as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential for effects on aquatic habitat (HADD) associated with required widened or new structures, culverts etc...	Potential for effects on aquatic habitat (HADD) associated with required widened or new structures, culverts etc...
Surface/Ground Water Quality and Quantity	Potential impact to surface and ground water quality as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential impact to surface and ground water quality as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential impact to surface and ground water quality as a result of increased traffic demand on the road network and resulting incremental contaminant runoff.	Potential water quality effects associated with required widened or new structures, culverts, etc... (during construction and increased run-off during operations).	Potential water quality effects associated with required widened or new structures, culverts, etc... (during construction and increased run-off during operations).
Wetlands	None	None	None	Potential for removal of wetlands and incremental effects to the local ecosystem is high if widening to existing road right-of-way is required.	Potential for incremental effects to the local ecosystem if widening to existing road right-of-way is required.
Vegetation and Flora	None	None	None	Potential for removal of vegetation/flora or environmentally designated land such as ESA's, ANSI's etc...if widening to existing road right-of-way is required.	Potential for removal of vegetation/flora if widening to existing road right-of-way is required.
Wildlife Resources and Linkages	None	None	None	Potential for removal of wildlife habitat, and in turn wildlife itself if widening to existing road right-of-way is required.	Potential for removal of wildlife habitat, and in turn wildlife itself if widening to existing road right-of-way is required.
RESPONSIVENESS	◑	◒	◑	◒	◑
Social Environment					
Effects on Property	No property acquisition.	No property acquisition.	No property acquisition.	Property required if widening of the existing road right-of-way is necessary	Property required if widening of the existing road right-of-way is necessary.
Effect on Community Environment	Worsening road congestion will increase neighbourhood traffic infiltration. Indirect costs due to urban sprawl requiring additional facilities.	Worsening road congestion will increase neighbourhood traffic infiltration. Indirect costs due to urban sprawl requiring additional facilities.	Improved public transit will enhance access to community facilities. However, if traffic congestion levels continue to increase this access will in fact not be enhanced.	High capacity arterial roadways limit streetscaping opportunities.	An increase in capacity on Yonge St will reduce neighbourhood traffic infiltration. Required widening may create more of a barrier between communities.
Noise and vibration effects	Traffic congestion on Yonge St will increase ambient levels.	Traffic congestion on Yonge Street will increase ambient levels.	Noise levels may decrease slightly initially, however over time as traffic congestion levels continue to worsen ambient levels.	Potential for increase due to closer proximity to adjacent properties as a result of major road expansion.	Potential for increase due to closer proximity to adjacent properties as a result of major road expansion.

Table 4-4 (Continued)

Evaluation of Alternatives Transportation Solutions Continued (Yonge Street between Mulock Drive and Green Lane)

Evaluation Objectives	ALTERNATIVE TRANSPORTATION SOLUTIONS				
	No Improvement in Yonge Street Road Capacity	Travel Demand Management (TDM)	Improve Public Transit Service Only	Improve Other Parallel Roadways	Yonge Street Road Capacity Improvements (part of the Current Commitments in the Preferred Alternatives to the Undertaking)
Air Quality	Increased congestion within the corridor will have an impact on overall air quality and energy consumption.	Will have a minimal improvement in air quality, however increased congestion within the corridor will have an impact on overall air quality and energy consumption.	Marginally better than the No Improvement to Yonge St Capacity Solution since adding an alternative to auto use will result in decreased vehicle emission and energy consumption.	Marginally better than the No Improvement to Yonge St Capacity Solution since added road capacity will reduce overall traffic congestion.	Marginally better than the No Improvement to Yonge St Capacity Solution since added road capacity will reduce overall traffic congestion.
Effect on Cultural Environment <ul style="list-style-type: none"> Archaeological Resources Built Heritage Resources/Cultural Landscapes 	None	None	None	Any road expansion increases the potential for disruption to known archaeological sites or built heritage resources.	Any road expansion increases the potential for disruption to known archaeological sites or built heritage resources.
RESPONSIVENESS	●	●	●	●	●
Smart Growth & Economic Environment					
Effect on Regional and Municipal Planning Policies	Will prevent the achievement of OP land use and urban form objectives and policies.	Solution will be insufficient to promote OP land use and urban form objectives and policies.	Improved public transit supports OP objectives and policies however road capacity shortfall will hinder their achievement.	Minor benefit to Yonge St. congestion since it is not supportive of OP Regional Centre policy and urban form objectives.	Road capacity improvements in combination with improved public transit responds best to OP achievement of urban form objectives and goals.
Effect on Travel time	The loss of mobility will degrade the commute/travel in and to the Region and increase the cost of goods movements for business.	Worsening congestion over time will gradually increase time-related cost of travel and goods movement in the Region, and degrade employees' work commute in and to the Region.	Longer term congestion related travel time increases and costs for goods and people movement will still increase for intra-Regional travel.	Improvements would benefit the overall traffic operation in the area but influence on Yonge St traffic congestion would be minor.	Improved traffic operations along Yonge St will reduce travel time.
Business Activities	Will discourage business development due to significant loss of mobility.	Will result in less business investment due to continued congestion in the corridor.	This alternative alone will not reduce congestion and therefore will result in decreased business investment/development.	Improves goods and people movements in the Region due to a reduction in traffic congestion	Improves goods and people movements in the corridor due to a reduction in traffic congestion.
Costs	Doing nothing minimizes public sector capital costs and business displacement but will increase indirect business costs due to inefficiency of goods and people movement. Time-related cost of travel will be significantly increased.	Requires minimal capital investment in capital works.	Requires significant investment in capital works and intra-regional transit operation and maintenance.	Costs would be substantial if extensive widening of the existing road right-of-way is required.	Costs would be substantial if extensive widening of the existing road right-of-way is required.
RESPONSIVENESS	○	●	●	●	●
					PREFERRED SOLUTION

LEGEND: Least Responsive ○ ● ● ● ● Most Responsive

Note: ANSI – Area of Natural and Scientific Interest; ESA – Environmentally Significant Area; HADD –Harmful, Alteration, Disruption or Destruction; OP – Official Plan; TMP – Transportation Master Plan

5. FORECAST OF TRAVEL DEMAND WITH PUBLIC TRANSIT IMPROVEMENTS (THE PREFERRED TRANSPORTATION SOLUTION)

5.1 SETTING FOR THE PROPOSED NORTH YONGE STREET PUBLIC TRANSIT IMPROVEMENTS

5.1.1 Existing Transit Travel Patterns

As described and illustrated in **Chapter 2**, the North Yonge Street Corridor is served by a number of transit routes and service types, such as:

- York Region Transit (YRT)
- Viva Blue
- GO Transit Bus (Newmarket “B” service)
- GO Transit Rail (Barrie GO Train Service)

With the exception of the YRT 98 North Yonge Route, most of the YRT routes act as local community routes as well as feeder services for the Viva Blue route. The Viva Blue route is a limited stop express type transit service and is primarily used by commuters travelling south in the morning and north in the evening. As of January 2007, this route carried an average of 14,500 passengers on weekdays, 9,000 on Saturdays, and 5,000 on Sundays. As shown on **Figure 5-1**, ridership on this route is higher in the south part of the Region than the north part, with the peak demand

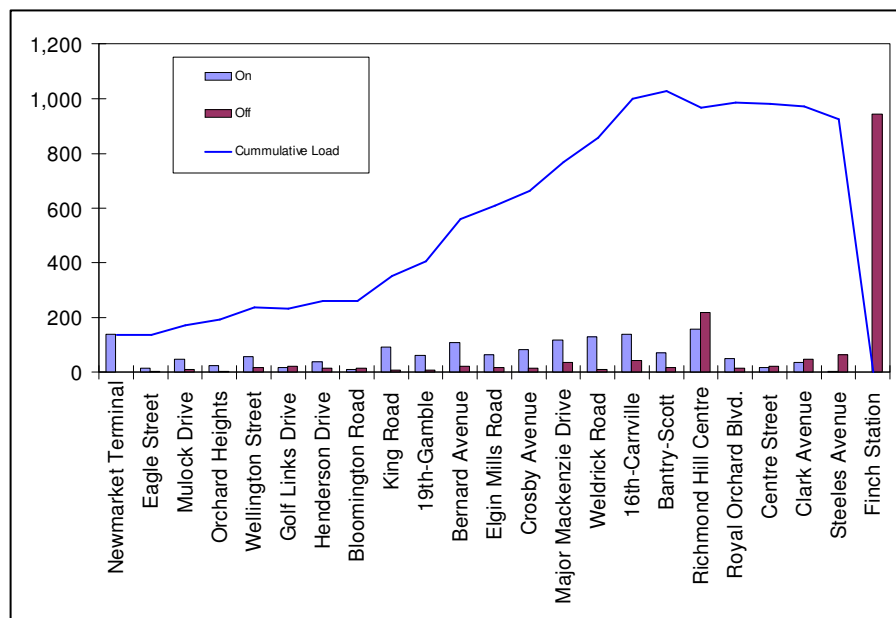


Figure 5-1
Existing Viva Blue Southbound AM Peak Period Ridership Patterns as of January 2007

occurring between Highway 7 (where there are a large number of transfers from the main east-west Viva service) to the Finch subway station. Within the study area, the peak period (7 a.m. – 9 a.m.) southbound ridership at Wellington Street is approximately 235 passengers.

GO Transit Bus and Rail services are similarly oriented towards southbound a.m. peak direction travel. In August 2006, southbound ridership for the Bradford GO line was approximately 4,000 passengers, of which 750 boarded at the Newmarket Station (Davis Drive) and 1,570 boarded at the Aurora Station (Wellington Street). Boardings for the new East Gwillimbury station (Green Lane) were 334 in September 2005, shortly after opening. The Bradford GO Line was extended to Barrie in December 2007.

5.2 TRANSIT RIDERSHIP PROJECTIONS

The transportation demand forecasting model described in **Chapter 3** and used for analysis of the response of alternative transportation solutions to long term travel demand was again used to develop forecasts of the ridership to be carried by the York Rapid Transit Corridor Initiatives preferred alternative.

Ridership forecasts were prepared for a representative rapid transit alignment in the North Yonge Street Corridor. The alignment generally corresponds to the Viva Blue alignment straight up Yonge Street, with the exception of an extension to Highway 404 along Davis Drive. Other options were examined, including providing a connection to the new East Gwillimbury GO Station; however, ridership modelling of this alignment would represent similar connections to the GO Rail at the Davis Drive Station as well as service Davis Drive, which is the main east-west corridor through the heart of the Newmarket Regional Centre. Ridership projections for other alignments are summarized in **Chapter 8** as part of the selection of the preferred alignment.

Ridership projections and related assumptions are developed for the 2031 horizon, consistent with the analysis of alternative solutions developed in Chapter 3. This timeframe is typically used as the maximum timeframe over which demographic trends and travel patterns can be predicted with reasonable reliability. As discussed later in this chapter rapid transit services were assumed to be in place in all other Viva corridors, as shown in **Figure 1-1** in **Chapter 1**.

As described in **Section 3.3**, a 2021 horizon year for traffic analysis was selected as an appropriate timeframe for traffic to reach saturation in the commercial areas along Yonge Street through Newmarket. A 2031 horizon year for transit infrastructure planning is intended to capture redevelopment

in the North Yonge Street Corridor to meet Regional Official Plan and Provincial Places to Grow policies and inherently will take longer to evolve than low density greenfield development.

These transit ridership projections combined with associated road capacity requirements form the basis for analysis and evaluation of alternative design concepts presented in **Chapters 7, 8 and 9**.

5.2.1 Modeling Scenarios and Assumptions

The following sections present the assumptions used to derive the 2031 York Region Rapid Transit Plan (YRTP) ridership forecasts for a network of rapid transit service in the YRTP corridors.

5.2.1.1 Population and Employment

Population and employment projections at the traffic zone level from the Official Plan (OP) forecasts provided by York Region have been used. No modifications were made to concentrate future development in nodes and corridors served by YRTP, which typically occurs with the introduction of new rapid transit facilities. This reflects a conservative assumption for the development of YRTP ridership forecasts.

Table 5-1 summarizes the population and employment forecasts for the study area municipalities as well as the Regions within the GTA. This data is taken from the Places to Grow Plan. Over the travel demand modelling study horizon (2006 to 2031), York Region is anticipated to have the highest absolute population growth (an increase of 577,000 from about 930,000 to 1.507 million) as compared to other regions in the GTA. York Region is also forecast to have very strong employment growth (337,000), which follows only Peel (340,000) in terms of absolute employment growth. One of the fastest growing areas in York Region is East Gwillimbury, which will add 66,000 people and 26,000 jobs over the next 25 years. Many of these will be just north of the study area. Newmarket and Aurora are both projected to grow significantly adding 20,000 people and 8,000 and 15,000 jobs respectively by 2031. Richmond Hill is also expected to experience a 44% growth in population and 66% growth in employment.

The demand forecasting modelling was carried out in advance of approval of the Places to Grow distribution targets, shown in **Table 5-1**. The modelling used population and employment data generally lower and less than 10% different from the targets from Places to Grow.

Consequently the modelling's estimate of potential transit ridership in this corridor will be marginally conservative since the Places to Grow targets place a higher emphasis on intensification and allocation of population and employment on Regional Centres.

It is worth noting that the rationale for comparing growth for the 2001-2031 period is that the travel demand model is calibrated to 2001 conditions, the latest year for which observed travel demand data was available at the time of the analysis (i.e. from the 2001 Transportation Tomorrow Survey).

Table 5-1
Population and Employment -York Region and GTA/Hamilton, 2006 – 2031

REGION/ MUNICIPALITY	POPULATION				Growth 2006-2031	
	2006	2011	2021	2031	Abs.	%
YORK REGION	930,000	1,078,000	1,315,000	1,507,000	577,000	62%
Aurora	50,000	57,000	68,000	70,000	20,000	40%
East Gwillimbury	22,000	26,000	48,000	88,000	66,000	300%
Georgina	45,000	49,000	58,000	71,000	26,000	58%
King	20,000	24,000	30,000	35,000	15,000	75%
Markham	272,000	306,000	370,000	423,000	151,000	56%
Newmarket	77,000	84,000	92,000	97,000	20,000	26%
Richmond Hill	169,000	197,000	231,000	243,000	74,000	44%
Vaughan	249,000	296,000	361,000	419,000	170,000	68%
Whitchurch-Stouffville	25,000	39,000	56,000	61,000	36,000	144%
OTHER GTA REGIONS	5,050,000	5,800,000	6,470,000	7,120,000	2,070,000	41%
Toronto	2,590,000	2,760,000	2,930,000	3,080,000	490,000	19%
Durham	530,000*	660,000	810,000	960,000	430,000	81%
Peel	1,030,000*	1,320,000	1,490,000	1,640,000	610,000	59%
Halton	390,000*	520,000	650,000	780,000	390,000	100%
Hamilton	510,000*	540,000	590,000	660,000	150,000	29%
REGION/ MUNICIPALITY	EMPLOYMENT				Growth 2006-2031	
	2006	2011	2021	2031	Abs.	%
YORK REGION	462,000	570,000	726,000	799,000	337,000	73%
Aurora	20,000	25,000	32,000	35,000	15,000	75%
East Gwillimbury	6,000	7,000	17,000	32,000	26,000	433%
Georgina	8,000	9,000	15,000	22,000	14,000	175%
King	7,000	8,000	11,000	12,000	5,000	71%
Markham	145,000	179,000	227,000	249,000	104,000	72%
Newmarket	42,000	46,000	49,000	50,000	8,000	19%
Richmond Hill	61,000	76,000	96,000	101,000	40,000	66%
Vaughan	162,000	204,000	255,000	276,000	114,000	70%
Whitchurch-Stouffville	10,000	15,000	22,000	24,000	14,000	140%
OTHER GTA REGIONS	2,560,000	3,040,000	3,340,000	3,550,000	990,000	39%
Toronto	1,440,000	1,540,000	1,600,000	1,640,000	200,000	14%
Durham	190,000*	260,000	310,000	350,000	160,000	84%
Peel	530,000*	730,000	820,000	870,000	340,000	64%
Halton	190,000*	280,000	340,000	390,000	200,000	105%
Hamilton	210,000*	230,000	270,000	300,000	90,000	43%

Sources: York Regional Official Plan; Places to Grow, Schedule 3
Note: * 2001 Data

5.2.1.2 Base Assumptions for Demand Modelling

The following key assumptions provide the basis for generating 2031 travel demand forecasts for the YRTP Network Scenario.

Road Network: Improvements to the arterial road system in York Region based on the York Region 10 – Year Roads Construction Program and the 2031 TMP network have been incorporated in the model including the proposed road widenings on Yonge Street, Bathurst Street and Bayview Avenue.

York Region Transit Network: For transit improvements at the 2031 planning horizon, the recommendations from the **York Region Transit 5-Year Service Plan: 2006-2010** are assumed to have been incorporated. This includes route extensions, transfer of YRT services to TTC service extensions, other route restructuring, and new services in newly developed and previously unserved areas. The base transit system in York Region for each horizon year is defined by York Region Transit's Five-Year Service Strategy route structure. The main components include:

- Route extensions to new areas of development;
- Re-orientation of existing routes to connect to York University/Downsview TTC Station, Don Mills TTC Station and new GO Rail stations;
- Enhancements including the filling in of a basic grid system; and
- Enhanced continuous through-services, between York Region and Toronto.

GO Transit Rail: Increased services in all GO Rail corridors, consistent with GO Rail's 10 Year Capital Plan. This includes capacity and service improvements on the Bradford, Richmond Hill and Stouffville GO Rail lines and new GO Stations located at Kennedy/Bloor-Danforth Subway, Leslie/Sheppard Subway and York University/Bradford Line.

GO Transit Bus: Highway 407 Express Bus added to network, with York Region stops at Unionville, Langstaff and York University and a Highway 404 service from Newmarket to the Bloor Subway (Castle Frank Station). A peak period headway of 10 minutes is assumed.

TTC: Rapid transit system is based on the present system, with extension of the Spadina Subway assumed to Vaughan Corporate Centre and the Yonge Line to Richmond Hill Centre by 2031.

Socio-economic Factors: The model utilizes three transit friendliness measures within the mode choice sub-model, relating to urban density, land use mix, and auto ownership. The first two were estimated using population and employment forecasts at the traffic zone level. Auto

ownership has been projected using a multi-variate auto-ownership model, relating car-ownership with such variables as average household income, household size, level of transit service, and urban density.

Auto Costs: Parking costs in real dollars are assumed to increase by 15% over existing conditions within the City of Toronto. The existing spatial coverage of parking costs will expand, consistent with strategies of the Toronto Parking Authority. Within York Region, a \$5 parking charge is assumed at major nodes (e.g. Markham Centre, Vaughan Corporate Centre and Newmarket Centre) and at employment locations in the Viva corridors of Yonge Street and Highway 7. No parking charge is assumed at GO Transit stations.

Fares: Current fare structure is assumed with the YRT three-zone system, GO Transit fare by distance and TTC flat fare. No increase in fares in real dollars is assumed for TTC, GO Transit and YRT services. It is assumed that Viva will have the same fare as YRT services, with free transfers between YRT and Viva.

Fare Integration: It is assumed that current fare policies would be in effect in 2031, with no fare integration between TTC and YRT/Viva and a double fare for many short cross-boundary transit trips across the York Region/City of Toronto boundary, consistent with current policies. This most likely under-estimates the ridership potential for the proposed services.

Service Policies: Closed door services of YRT/Viva routes in the City of Toronto is assumed. This reflects current policies, with YRT services operating in the City of Toronto not permitted to serve internal Toronto trips. Again, this is a conservative assumption.

5.2.1.3 Viva Networks

The Viva networks are assumed to operate in all four Viva corridors (Yonge Street, Highway 7, Vaughan North-South Link and Markham North-South Link). The rapid transit program, which commenced in September 2005, is designed to build long-term rapid transit ridership and serve the Region's Corridors and Centres land use plans designed to support higher transit usage. The current route structure is shown in **Figure 5-2**.

For purposes of this EA report, full implementation of Viva is modelled assuming subway to Vaughan Corporate Centre (Highway 7), extension of the Yonge subway to Richmond Hill Centre and Bus Rapid Transit (BRT) in the remaining corridors. The ultimate Viva network configuration could involve combinations of BRT, Light Rail Transit (LRT) or subway with the technology transitions taking place over time as required by demand and when funds are available. BRT ridership levels are also considered representative of the potential ridership that might be achieved with LRT

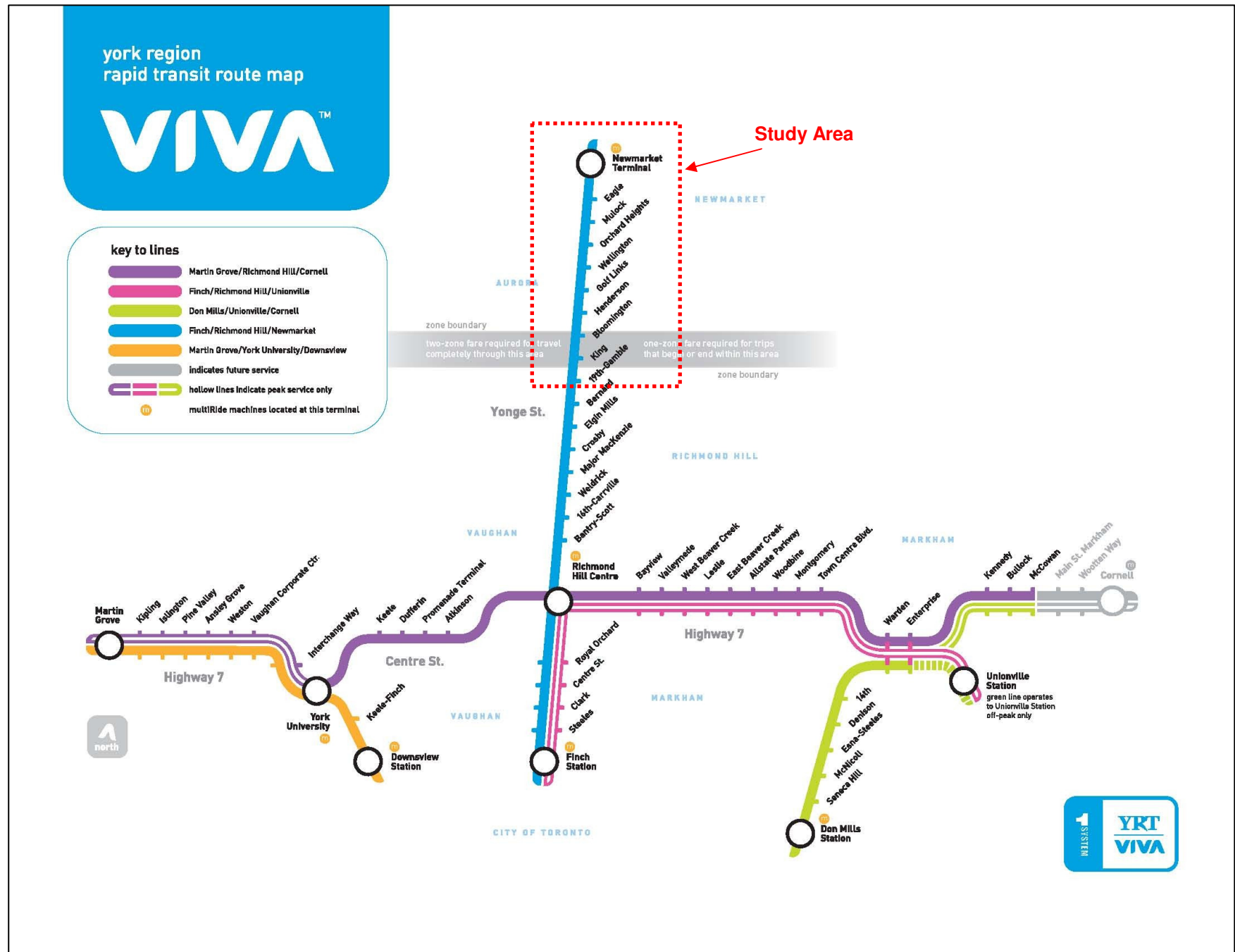


Figure 5-2
Viva Network

technology operating within the same corridors. In the scenario modelled, BRT is assumed to be operating in dedicated bus lanes with traffic signal priority treatment at signalized intersections and other transit priority treatments, as required to maximize transit operations.

Speed and Headway

Table 5-2 shows the speed and headway assumptions for the rapid transit services on Yonge Street. The speeds are indicated by corridor segment and are based on speed and delay studies of existing conditions in the

respective Viva corridors, and estimates of performance based on posted speed limits, stop spacing, level of transit priority and other factors. Higher speeds are assumed for the section corresponding to the Yonge Street subway extension from Finch to Highway 7.

Table 5-2
Speed and Headway Assumptions on Yonge Street

Segment	Segment Length (km)	Viva (BRT)	
		Speed (km/h)	Headway** (min)
Yonge Street			
Finch Station to Steeles	1.9*	35*	2.0*
Steeles to Hwy 7/ Richmond Hill Centre	4.3*	35*	2.0*
Highway 7/ Richmond Hill Centre to Major Mackenzie	4.0	25	0.5
Major Mackenzie to 19 th Avenue	4.1	25	0.5
19 th Avenue to Newmarket	21.1	35	1
Finch Station to Newmarket	35.4	29.6	

* Assumes subway to Richmond Hill
** Headway is defined as the time between vehicles arriving at a stop/station.

Stations

The station spacing is assumed to be approximately one kilometre in the denser, built-up portions of the corridors and two kilometres in the lower density areas. The following inter-modal stations are assumed in York Region, allowing transfers between GO Rail, YRT/Viva, and park-and-ride facilities:

- Richmond Hill Centre Intermodal Terminal: Interface between Viva/YRT services and the GO Richmond Hill Line and Highway 407 BRT;
- Unionville/Markham Centre Station: Interface between Viva/YRT services, GO Stouffville Line and Highway 407 BRT;
- Vaughan Corporate Centre Station: Interface between Viva/YRT services, GO Bradford Line and Highway 407 BRT; and
- Within the study area, a connection between Viva/YRT and GO rail (Bradford Line) with an assumed connection at either Davis Drive or Green Lane.

Viva services extending into the City of Toronto are assumed to link to the TTC subway system at Richmond Hill Centre (on an extended Yonge Line), Vaughan Corporate Centre (on an extended Spadina Line) and Don Mills Station (Sheppard Line).

Park-and-Ride Facilities

Table 5-3 shows the assumed location and number of parking spaces at park-and-ride lots serving Viva in 2031. Approximately 2,050 parking spaces are assumed for the 2031 model runs, with Richmond Hill Centre Intermodal Terminal at Yonge Street and Highway 7 as the main location. The Finch park-and-ride lot at the northern terminus of the Yonge Subway line is assumed at its current capacity.

It is also possible that park-and-ride facilities for Viva services would be provided at the Green Lane or Davis Drive area, potentially in conjunction with the existing GO Station parking lots. However, these have not been explicitly included in the model.

**Table 5-3
Park and Ride Lot Capacities**

Viva Corridor	Station	Number of Parking Spaces
Yonge Street	Richmond Hill Centre (Langstaff) *	1,250
	19 th /Gamble	200
	Bloomington	200
	Aurora	100
	Newmarket W	150
	Newmarket E	150

Assumes 50% of the 2,050 spaces used by Viva and 50% by GO Rail.

5.3 2031 RIDERSHIP FORECASTS

The following section presents the 2031 ridership forecasts for rapid transit services in the North Yonge Street Corridor. Surface rapid transit (BRT and/or LRT) in dedicated lanes with extensive transit priority treatments is assumed, with each service operating on a minimum of one minute headway during peak periods within the study area. As noted previously, the model results are based on the extension of the Yonge Subway to Highway 7. These assumptions are intended to represent a maximum service level, and hence, a best case scenario for transit ridership for planning and design purposes.

5.3.1 Rapid Transit Passenger Volumes

Table 5-4 presents a 2031 ridership summary for the portion of the rapid transit network in the study area (19th Avenue/Gamble Road to Green Lane). The peak hour link volume within the study area is 5,000 passengers per hour occurring at 19th Avenue. On a daily basis, approximately 26,000 transit trips are generated from within the study area representing roughly 50% of the total North Yonge Street Corridor (Viva

Blue) boardings for the full segment from Richmond Hill Centre to Newmarket.

Figure 5-3 provides a plot of the link volumes for the rapid transit services, with total loadings at various sections on the network. On Yonge Street within the study area, the a.m. peak hour, peak direction volume increases from about 1,800 south of Davis Drive to approximately 5,000 north of 19th Avenue. Assuming a capacity of 70 persons per bus (articulated bus capacity), the service would require a capacity of just over 70 buses per hour, which is consistent with the assumed headway of one minute for modelling purposes.

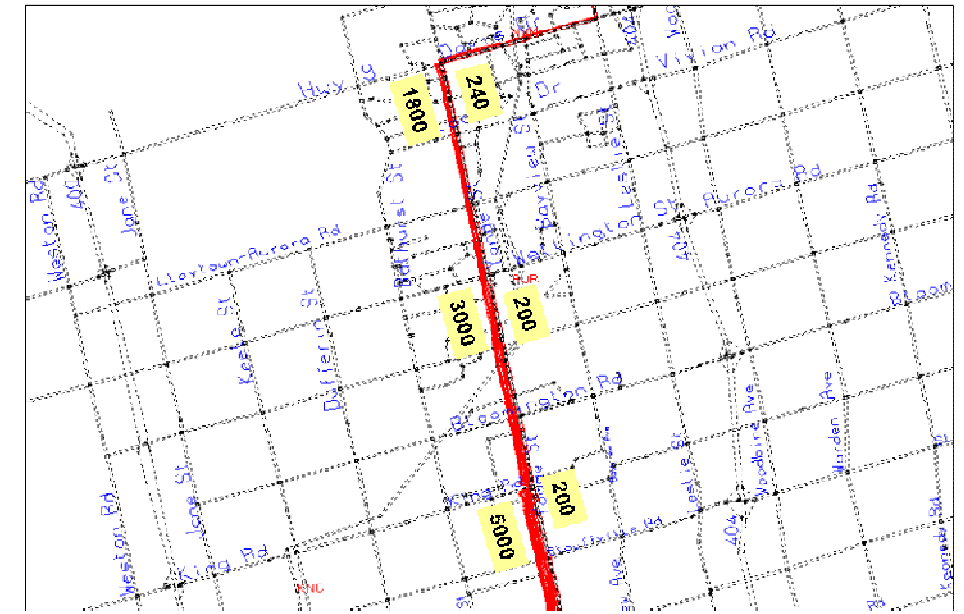
**Table 5-4
2031 Yonge Street Corridor (Viva Blue) Ridership Summary**

Statistic	19 th Ave – Newmarket (Study Area)
Headway (min)	1
Average Speed (km/h)	35
Route length (km)	16.5
AM Peak (3-Hour) Period:	
Passenger Boardings	7,460
Passenger-km	79,400
Peak Hour Volume	5,000
Peak Point Location	SB @ 19 th Ave
Daily Boardings	26,110

Table 5-5 shows various ridership indicators such as peak volume, boarding, alighting, and passenger-km by segment within the study corridor, for the 2031 a.m. peak hour for the Base Case (Viva buses in mixed traffic) and full Viva surface rapid transit scenario in 2031. The full Viva scenario assumes that buses or LRT vehicles (in southern segments) operate in dedicated lanes. With full BRT/LRT services, the passenger boardings in the corridor is projected to increase from approximately 4,410 in the Base Case to 10,200, an increase of 130%. The peak load point volume between 19th Avenue and Newmarket in the southbound direction increases from 1,400 to 5,000 with full BRT/LRT.

**Table 5-5
2031 AM Peak Hour Ridership by Segment for Yonge Street Corridor**

Segment	Future Base Case (VIVA 1 in mixed traffic)				Full dedicated BRT/Subway			
	Link Volume (Peak Direction)	Ons	Offs	Passenger-km	Link Volume (Peak Direction)	Ons	Offs	Passenger-Km
19th Ave. to Newmarket	1,400	2,540	820	16,500	5,000	4,800	820	49,100
Corridor Total		4,410	1,600	40,600		10,200	1,930	116,200



**Figure 5-3
AM Peak Hour Link Volume – 2031 BRT/Subway
(Higher volumes represent southbound peak direction in AM)**

5.3.1.1 Travel Patterns and Modal Split

Table 5-6 provides travel characteristics for Richmond Hill/Aurora/Newmarket for 2001 and 2031 BRT/LRT conditions, indicating changes in total trips, transit trips and transit modal split between major origin-destination pairs. These are shown for the peak 3-hour period, which reflects a more average situation than the previous peak hour link results, which are required for design purposes.

Total travel from these three towns in the North Yonge Street Corridor is projected to grow by 62% (from 109,000 to 177,000) between 2001 and 2031. As shown in **Table 5-6**, the a.m. peak period (three-hour) transit trips from these towns are projected to almost triple, increasing from 10,500 trips in 2001 to 28,500 under the full rapid transit scenario. This will help to increase the transit mode share from 9.6% to 16.1% for trips originating in Richmond Hill, Aurora and Newmarket.

5.3.1.2 Boarding and Alighting Patterns

Figure 5-4 presents the station boardings and alightings (exits) for the Yonge Street Corridor for the a.m. peak 3-hour period in a graphical form. The passenger boarding includes all those transferring from the east-west routes as well as the park-and-ride travellers accessing Viva to travel to the City of Toronto.

Richmond Hill Centre Intermodal Terminal (Langstaff) is the transfer point

for the northerly surface rapid transit modes to access the proposed subway extension from Finch. It is also the major transfer point for east-west services. Between Newmarket and Richmond Hill the cumulative southbound load (3 hour period) increases from approximately 3,000 to approximately 12,000 passengers (refer to right graph axis). Northbound a.m. peak hour boardings are substantially less than southbound boardings, but these are likely underestimated by the model.

Table 5-6
2001 and 2031 AM Peak (3-Hour) Period Total Trips and Transit Modal Split

From	To	Total Trips (000's)			Transit Trips (000's)		Transit Modal Split	
		2001	2031	Growth	2001	2031-BRT	2001	2031-BRT
Richmond Hill + Newmarket + Aurora	RH + NM +Aurora	45.6	77.7	32.1	2.0	5.0	4.4%	6.5%
	Vaughan	8.3	12.4	4.1	0.2	0.9	2.0%	6.9%
	Markham	12.1	21.4	9.3	0.4	1.6	3.0%	7.6%
	PD1	10.3	19.8	9.5	6.1	15.5	59.3%	78.6%
	Rest of Toronto	23.5	27.6	4.1	1.7	5.2	7.4%	18.8%
Other	9.1	18.4	9.3	0.1	0.3	0.8%	1.4%	
Vaughan	Richmond Hill + Newmarket + Aurora	3.5	7.4	3.9	0.1	0.4	2.2%	5.4%
Markham	Richmond Hill + Newmarket + Aurora	4.8	9.0	4.2	0.2	0.6	3.4%	6.9%
Toronto	Richmond Hill + Newmarket + Aurora	10.7	12.8	2.1	0.5	1.2	4.5%	9.3%
Other	Richmond Hill + Newmarket + Aurora	12.6	37.1	24.5	0.1	0.6	0.4%	1.5%
RH + NM +Aurora	All	109.0	177.2	68.2	10.5	28.5	9.6%	16.1%
All	RH + NM +Aurora	31.7	66.4	34.7	0.8	2.8	2.5%	4.2%

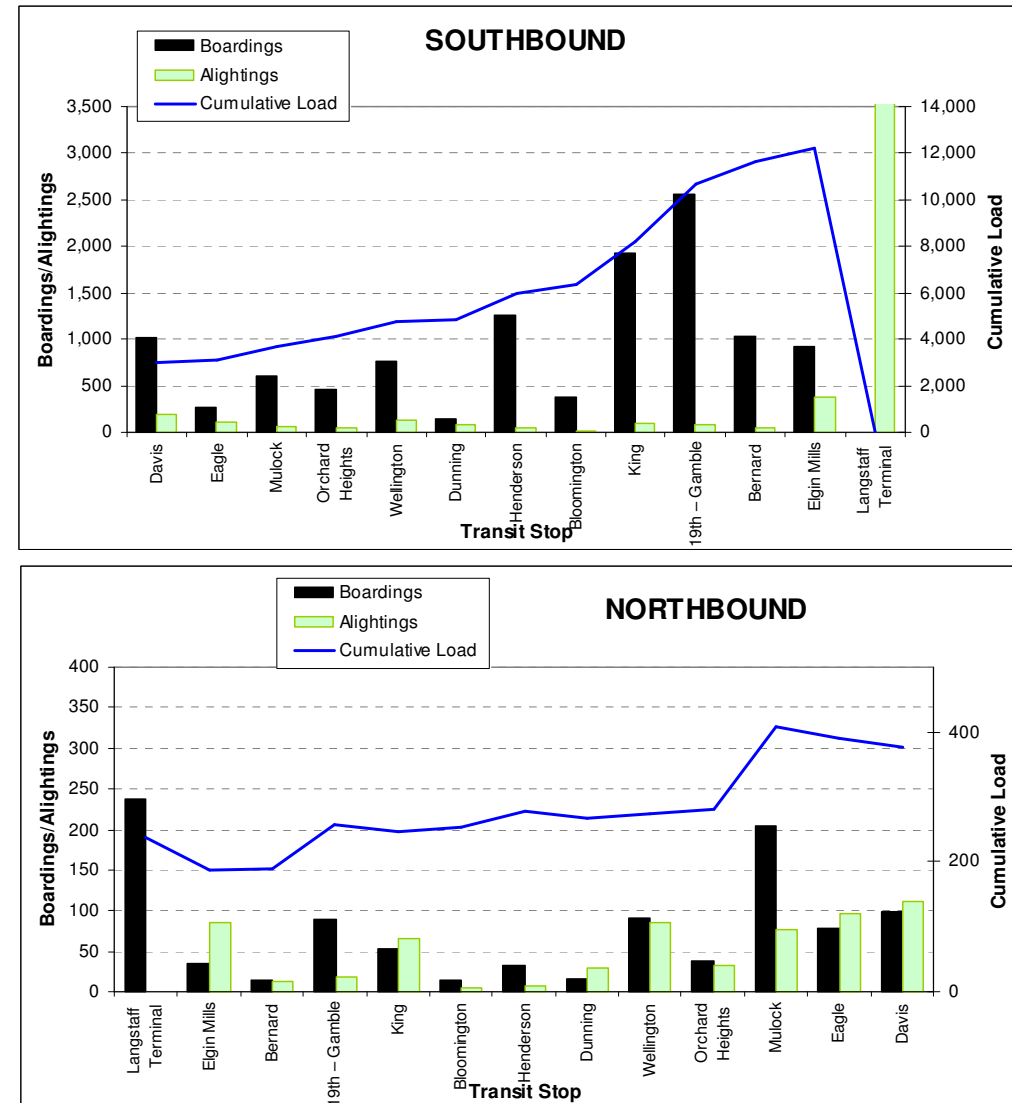


Figure 5-4
2031 BRT AM Peak (3-Hour) Period Boarding / Alighting on Yonge Street Corridor

6. ALTERNATIVE DESIGN CONCEPTS FOR THE PREFERRED SOLUTION: RAPID TRANSIT ROUTES AND TECHNOLOGIES (CLASS EA PROCESS – PHASE 3)

This chapter describes the analysis and initial screening of the alternative design concepts for improving public transit in the study area. York Region's TMP (June 2002) recommended the introduction of rapid transit service as the most effective method to achieve a significant increase in transit mode split for the major travel patterns within the Region and across its boundary with Toronto as well as connecting the Regional Centres along Yonge Street and Highway 7. The TMP analyzed a range of corridors leading to the rapid transit network of north-south and east-west corridors recommended in the TMP for implementation by 2031 (refer to **Figure 1-1**).

As a first step in assessing the alternative design concepts for public transit improvement, north-south route alternatives throughout the study area were assessed and an initial screening of their response to the project's objectives was undertaken. For some alternatives, a short east-west segment was included to transition between north-south segments.

Secondly, the potential rapid transit technologies are introduced and evaluated for application on the network. As a precursor to detailed evaluation of rapid transit alignments along the routes, described in **Chapter 8**, this chapter also compares generic alternatives for location of rapid transit infrastructure in a road right-of-way forming all or part of a route.

6.1 RAPID TRANSIT ROUTES

The South Yonge Street Corridor EA, approved by the Ministry of the Environment in April 2006, determined the details of a rapid transit network along Yonge Street to the south of the study area for this EA. The link to the rapid transit network in the South Yonge Street EA will complete the link to the Newmarket Regional Centre as envisioned by the Region's TMP, Official Plan and Centres and Corridors Study.

6.1.1 Preliminary Screening of Route Options

6.1.1.1 General Objectives for Routes

The following general objectives, consistent with the purpose of the project described in **Section 2.4.3** have been used in identifying the corridor alternatives for the rapid transit system in north York Region:

- Provide access to the Regional Centres in the corridor;
- Service existing medium to high-density residential development;
- Allow access to major generators/attractors of potential ridership such as town centres, employment centres, retail centres; hospitals, community facilities, schools, etc...;
- Provide inter-connectivity with other modes of transportation, such as the 400-series highways to promote park and ride;
- Facilitate inter-connectivity with existing and planned GO Transit and other YRT services;
- Promote opportunities for intensification of development or new transit-oriented development in;
- Minimize the impact on environmentally sensitive features in the corridor;
- Feasible implementation in potential rights-of-way; and
- Implementation sensitive to the surrounding community.

The corridor alternatives could consist of different route combinations in order to satisfy the objectives listed above. The route options available follow existing road rights-of-way and run adjacent to existing rail rights-of-way.

6.1.1.2 Description of Route Alternatives

A broad range of route alternatives was identified following existing arterial or collector road rights-of-way or the GO Bradford Line rail right-of-way by assuming a parallel right-of-way adjacent to the rail right-of-way. These routes in each municipality are shown in **Figures 6-1 to 6-3**.

All routes commence at the northern limit of the approved South Yonge Corridor transitway alignment, the intersection of Yonge Street and 19th Avenue in Richmond Hill.

6.1.1.3 Assessment and Evaluation of Alternative Routes

Routes were evaluated using a two-step process. An initial evaluation was undertaken to screen out alternatives that clearly would not meet the needs of rapid transit in the corridor and/or may not be feasible due to significant community or environmental impact or unacceptable property requirements. In order to undertake this evaluation, three segments were developed which correspond to the municipality boundaries. The segments were as follows

- Richmond Hill (RH) from 19th Avenue to Bloomington Road.
- Aurora (A) from Bloomington Road to the south municipal boundary of Newmarket, just north of St. John's Sideroad.
- Newmarket/East Gwillimbury (NE) from the south municipal boundary of Newmarket to Green Lane.

The findings of this screening evaluation are presented in tabular form in

Tables 6-1 to 6-3, for Richmond Hill, Aurora and Newmarket/East Gwillimbury respectively.

6.1.1.4 Results of screening of Alternative Routes

Based on the route option preliminary screening results presented in **Tables 6-1 to 6-3** inclusive, a short-list of candidate route options was identified for further assessment in the second stage in the alternatives analysis process. The routes that were carried forward for further evaluation, by segment, are as follows:

Richmond Hill: 19th Avenue/Gamble Road to Bloomington Road

- **RH2 Yonge Street**

Aurora: Bloomington Road to Newmarket Municipal Boundary, north of St. John's Sideroad

- A2 Yonge Street
- A3 Yonge Street/Industrial Parkway/St. John's Sideroad
- A4 Yonge Street/Industrial Parkway/adjacent to GO Bradford ROW

Newmarket/East Gwillimbury: Newmarket Municipal Boundary, north of St. John's Sideroad to Green Lane

- NE2 Yonge Street/Green Lane
- NE3 adjacent to GO Bradford ROW to Green lane
- NE5 Yonge Street/ Eagle Street West/Newmarket GO Bus Terminal
- NE6 Yonge Street/Davis Drive/Main Street/Green Lane
- NE7 Yonge Street/Davis Drive to Leslie Street
- NE8 Yonge Street/Davis Drive/Bayview Parkway/Green Lane

The analysis to select a preferred route within the combination of the subject corridors is described in **Chapter 8**.

**Table 6-1
Alternative Rapid Transit Systems – Richmond Hill Route Options Preliminary Screening**

Objectives and Goals	Route Segment				
	RH 1- Yonge Street/King Road/Bathurst Street	RH 2 - Yonge Street	RH 3 - Yonge Street/Stouffville Road/Bayview Avenue	RH 4 - Yonge Street/Stouffville Road/Leslie Street	RH5 - Yonge Street/Stouffville Road/Highway 404
<p>PROVIDE AN EFFECTIVE TRANSPORTATION SERVICE</p> <ul style="list-style-type: none"> Maximize ridership potential and compatibility with existing and future travel patterns Maximize connectivity to existing and future transit network Serve employment nodes Serve major residential areas Maximize access to inter-modal terminals Consistent with York Region Transportation Master Plan 	<ul style="list-style-type: none"> Does not serve all higher-density residential and commercial land uses. Lower ridership potential as primary land use along route is low-density residential. Not consistent with York TMP. Longer route will increase travel time. 	<ul style="list-style-type: none"> High ridership potential as route serves all of Oak Ridges commercial district and follows centroid of major residential areas Route has potential to access GO Rail in Aurora Recommended in York TMP. Shortest route and direct connection to rapid transit south of the study area. 	<ul style="list-style-type: none"> Lower ridership potential as primary land uses along route are low-density residential, rural and open space. Does not serve employment node in Oak Ridges and potential higher density development along Yonge St. Not consistent with York TMP. Longer route will increase travel time. 	<ul style="list-style-type: none"> Lower ridership potential as primary land uses along route are low-density residential, rural and Oak Ridges Moraine. Does not serve employment node in Oak Ridges and potential higher density development along Yonge St. Not consistent with York TMP. Longer route will increase travel time. 	<ul style="list-style-type: none"> Would duplicate future 400-series highway transit plans. Does not serve potential high-density development along Yonge St. and bypasses Oak Ridges commercial district. Not consistent with York TMP Longer route will increase travel time.
	☐	●	☐	☐	☐
<p>PROTECT AND ENHANCE SOCIAL ENVIRONMENT</p> <ul style="list-style-type: none"> Minimize displacement or partial acquisition of residential or commercial property Minimize adverse noise and vibration effects Minimize adverse effects on cultural resources Maximize access to community facilities. Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics Minimize adverse effects on community safety 	<ul style="list-style-type: none"> Potential property impacts due to narrower rights-of-way. Possible noise impact in residential areas with low ambient levels. Only serves southern Oak Ridges community facilities and bypasses King village. 	<ul style="list-style-type: none"> Provides access to the numerous community centres (i.e. Oak Ridges library, Bond Lake Arena) and commercial/institutional developments. Potential property impacts through Oak Ridges due to ROW constraints. 	<ul style="list-style-type: none"> Potential property impacts around Lake Wilcox. Possible noise impact in residential areas with low ambient levels. Bypasses community facilities on Yonge Street. Potential impact on community vistas. 	<ul style="list-style-type: none"> Potential property impacts due to narrower rights-of-way. Possible noise impact in residential areas with low ambient levels. Bypasses community facilities on Yonge Street. 	<ul style="list-style-type: none"> Potential property impacts in developing rights-of-way along Hwy 404. Bypasses community facilities on Yonge Street. Minimal impact on community vistas.
	☐	☐	☐	●	●
<p>PROMOTE SMART GROWTH/ECONOMIC DEVELOPMENT</p> <ul style="list-style-type: none"> Maximize access to planned growth and intensification areas, including Regional Centre Potential to stimulate more transit-oriented development. Consistency with Official Plan urban form objectives 	<ul style="list-style-type: none"> Serves only the southern portion of the Oak Ridges commercial centre. Low density along route not compatible with transit-oriented development zoning. Not consistent with OP urban form objectives. 	<ul style="list-style-type: none"> Provides most direct route and serves the entire Oak Ridges core area well. Several existing and planned residential and commercial developments on adjacent land will benefit from the rapid transit system. Consistent with York Region OP designation of Yonge Street as a rapid transit corridor. 	<ul style="list-style-type: none"> Bypasses the Oak Ridges core area. Low density along route not compatible with transit-oriented development zoning. Not consistent with OP urban form objectives. 	<ul style="list-style-type: none"> Bypasses the Oak Ridges core area. Low density along route not compatible with transit-oriented development zoning. Not consistent with OP urban form objectives. Route requires greater length to serve Newmarket Regional Centre. 	<ul style="list-style-type: none"> Bypasses the Oak Ridges core area. Serves employment zone along Hwy 404 but low density along route not compatible with transit-oriented development zoning. Not consistent with OP urban form objectives. Route requires greater length to serve Newmarket Regional Centre
	☐	●	☐	☐	☐
<p>PROTECT NATURAL ENVIRONMENT</p> <ul style="list-style-type: none"> Potential to utilize existing corridors Minimize impact on: Wetlands and Watercourses, Wildlife and Aquatic Habitat, Surface and Ground Water Quality and Quantity Avoid local adverse Air Quality effects 	<ul style="list-style-type: none"> Crossing of German Mills Creek requires widening of existing structure. Potential for disruption to the area on west side of Bathurst Street since it is classified as a natural linkage area under the Oak Ridges Moraine Conservation Plan. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as an urban environment. 	<ul style="list-style-type: none"> Impacts minimized if the existing road ROW can accommodate transitway infrastructure. Traverses adjacent to Lake Wilcox and Lake St. George in the Bayview Avenue ROW. 	<ul style="list-style-type: none"> Impacts minimized if the existing road ROW can accommodate transitway infrastructure. Traverses adjacent to Haynes Lake in the Leslie Street ROW. The segments on Leslie Street and Stouffville Road west of Leslie Street are classified as natural linkage areas under the Oak Ridges Moraine Conservation Plan. 	<ul style="list-style-type: none"> Impacts minimized if the existing road ROW can accommodate transitway infrastructure.
	☐	●	●	☐	☐
<p>MAXIMIZE COST-EFFECTIVENESS OF RAPID TRANSIT</p> <ul style="list-style-type: none"> Minimize property acquisition costs Minimize infrastructure capital and system operating costs 	<ul style="list-style-type: none"> Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. Longer route will increase capital and operating costs. 	<ul style="list-style-type: none"> Property costs could be high in Oak Ridges core if the rapid transit system cannot be accommodated in existing ROW. Shortest route will lower capital and operating costs. 	<ul style="list-style-type: none"> Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. Longer route will increase capital and operating costs. 	<ul style="list-style-type: none"> Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. Longer route will increase capital and operating costs. 	<ul style="list-style-type: none"> Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. Longest route and CN rail grade separation will increase capital and operating costs.
	☐	☐	☐	☐	☐
OVERALL ASSESSMENT	ELIMINATED FROM FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION

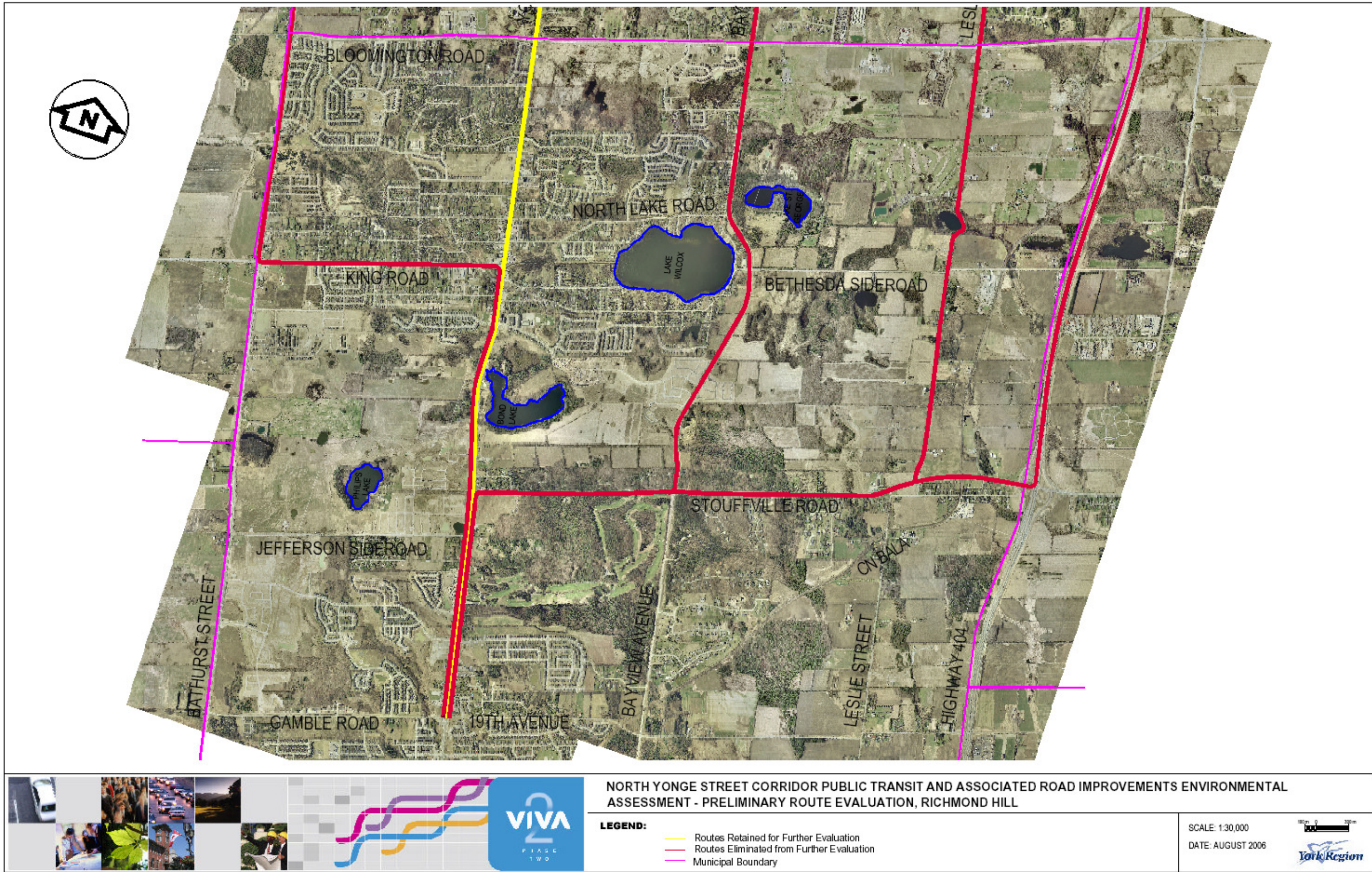


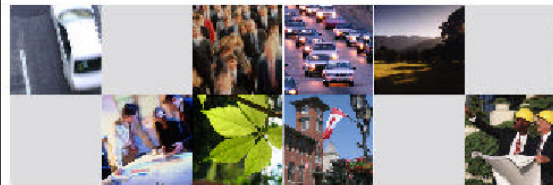
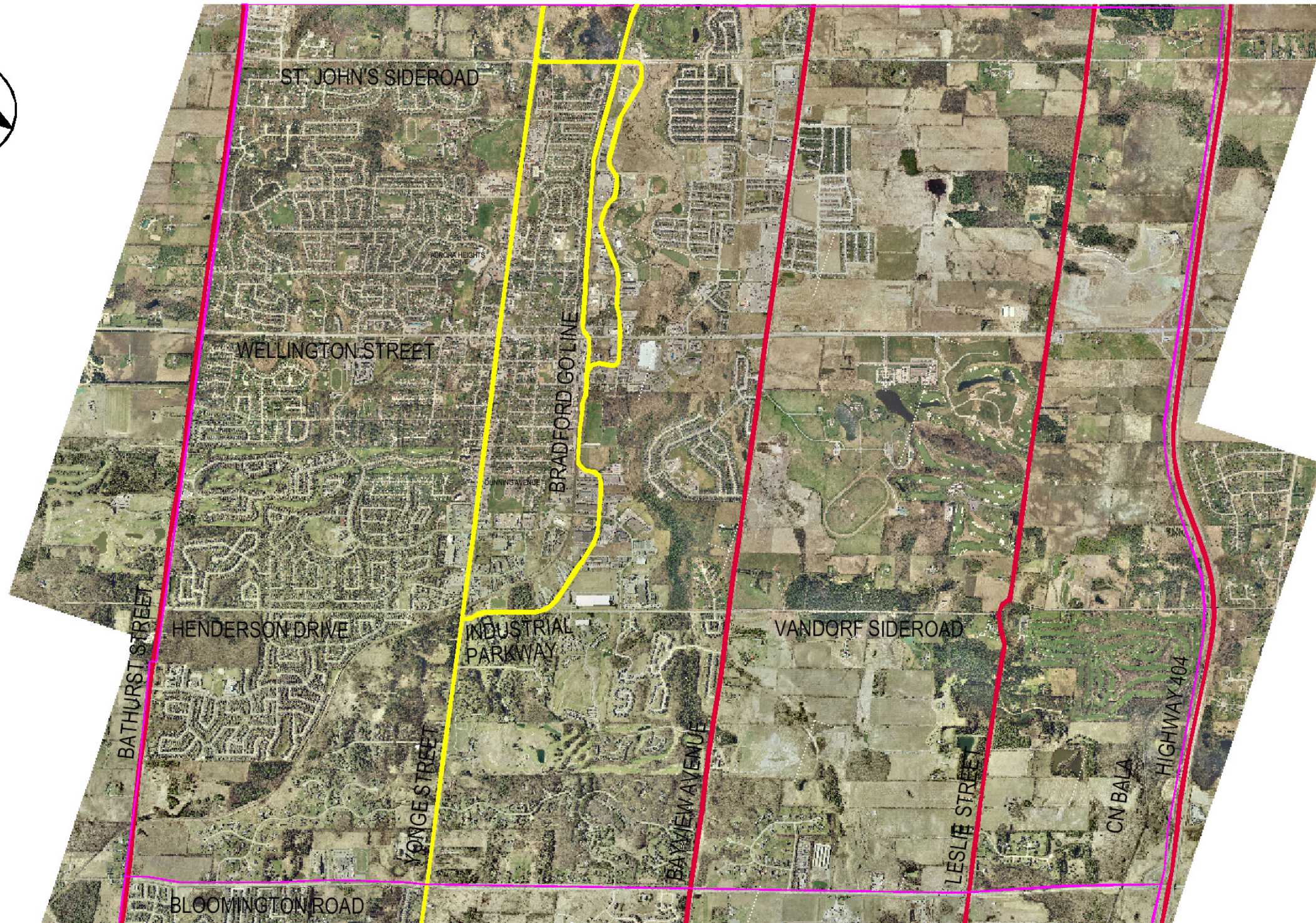
Figure 6-1
Richmond Hill Route Options

**Table 6-2
Alternative Rapid Transit Systems – Aurora Route Options Preliminary Screening**

Objectives and Goals	Route Segment						
	A1 - Bathurst Street	A2 - Yonge Street	A3 - Yonge Street/Industrial Parkway/St.John's Sideroad	A4 - Yonge Street/Industrial Parkway/GO Bradford ROW	A5 - Bayview Avenue	A6 - Leslie Street	A7 - Highway 404
PROVIDE AN EFFECTIVE TRANSPORTATION SERVICE <ul style="list-style-type: none"> Maximize ridership potential and relationship to existing and future travel patterns Maximize connectivity to existing and future transit Serves employment nodes Serves major residential areas Maximize access to inter-modal terminals Consistency with York Region Transportation Master Plan 	<ul style="list-style-type: none"> Lower ridership potential as primary land use served is low-density residential and non-developed land portion of the Oak Ridges Moraine Conservation Plan. Bypasses Aurora business district Not consistent with York TMP 	<ul style="list-style-type: none"> High ridership potential as route serves major commercial developments in Aurora business district and adjacent residential areas. Recommended in York TMP. 	<ul style="list-style-type: none"> Moderate ridership potential as route is on the fringe of commercial district and serves some employment and residential areas. Provides a reasonable connection to GO Transit at the Aurora GO Station. Consistent with York TMP. 	<ul style="list-style-type: none"> Moderate ridership potential as route is on the fringe of commercial district and serves some employment and residential areas. Provides a good connection to GO Transit at the Aurora GO Station. Consistent with York TMP 	<ul style="list-style-type: none"> Lower ridership potential as primary land use served is low-density residential. Bypasses Aurora business district and higher density land uses. Not consistent with York TMP 	<ul style="list-style-type: none"> Low ridership potential as route does not serve any of the medium and higher density residential developments located in Aurora. Bypasses Aurora central business district but serves the business park in the north. Not consistent with York TMP. 	<ul style="list-style-type: none"> Low ridership potential as route does not serve any of the medium and higher density residential developments located in Aurora. Bypasses Aurora central business district but serves the business park in the north. Not consistent with York TMP.
	☐	●	◐	◑	☐	☐	☐
PROTECT AND ENHANCE SOCIAL ENVIRONMENT <ul style="list-style-type: none"> Minimize displacement or partial acquisition of residential or commercial property Minimize adverse noise and vibration effects Minimize adverse effects on cultural resources Maximize access to community facilities. Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics Minimize adverse effects on community safety 	<ul style="list-style-type: none"> Potential property impacts due to narrower rights-of-way. Possible noise impact in residential areas with low ambient levels. Route bypasses community facilities in Aurora 	<ul style="list-style-type: none"> ROW constraints through the Aurora heritage business district will require operation of rapid transit in mixed traffic. Provides direct access to numerous community centres (i.e. Aurora Library and Aurora Community Centre) and commercial developments. 	<ul style="list-style-type: none"> Potential property impacts in areas where right-of-way is constrained. Low potential for noise impacts on adjacent properties. Route bypasses community facilities in Aurora 	<ul style="list-style-type: none"> Potential property impacts in areas where right-of-way is constrained. Low potential for noise impacts on adjacent properties. Route bypasses community facilities in Aurora 	<ul style="list-style-type: none"> Potential property impacts in areas where right-of-way is constrained. Higher potential for noise impacts on adjacent properties in areas with low ambient levels Route bypasses community facilities in Aurora 	<ul style="list-style-type: none"> Potential property impacts in areas where right-of-way is constrained. Low potential for noise impacts on adjacent properties. Route bypasses community facilities in Aurora. 	<ul style="list-style-type: none"> Potential property impacts in areas where right-of-way is constrained. Low potential for noise impacts on adjacent properties. Route bypasses community facilities in Aurora.
	◐	◑	◑	◑	◐	◑	◑
PROMOTE SMART GROWTH/ECONOMIC DEVELOPMENT <ul style="list-style-type: none"> Maximize access to planned growth and intensification areas, including Regional Centre Potential to stimulate more transit-oriented development Consistency with Official Plan urban form objectives 	<ul style="list-style-type: none"> Route bypasses the Aurora business district and major employers in Aurora. Low potential for transit-oriented developments along route 	<ul style="list-style-type: none"> Route provides direct access to the Aurora business district and some major employers. Good potential for transit-oriented developments along route. 	<ul style="list-style-type: none"> Route bypasses the Aurora business district and some commercial employers in Aurora. Serves employers along Industrial Parkway. 	<ul style="list-style-type: none"> Route bypasses the Aurora business district and some commercial employers in Aurora. Serves employers along Industrial Parkway 	<ul style="list-style-type: none"> Route bypasses the Aurora business district and some commercial employers in Aurora. Emerging residential development along Bayview Avenue is low to medium density. Does not serve major employers in Aurora. 	<ul style="list-style-type: none"> Route bypasses the Aurora business district and most commercial employers in Aurora. Route bypasses the majority of development in the Aurora segment. 	<ul style="list-style-type: none"> Route bypasses the Aurora business district serving only 404 commercial employers in Aurora. Route bypasses the majority of commercial development in the Aurora segment.. Low potential for transit-oriented developments along route.
	◑	●	◐	◑	◑	◑	◑
PROTECT NATURAL ENVIRONMENT <ul style="list-style-type: none"> Potential to utilize existing corridors Minimize impact on: Wetlands and Watercourses, Wildlife and Aquatic Habitat, Surface and Ground Water Quality and Quantity Avoid local adverse Air Quality effects 	<ul style="list-style-type: none"> Potential for disruption as area on the west side of Bathurst Street is classified as a natural linkage area under the Oak Ridges Moraine Conservation Plan. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as an urban environment. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as a mostly industrial, urban environment. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as a mostly industrial, urban environment 	<ul style="list-style-type: none"> Some land on east side of Bayview Avenue in southern portion of this segment is classified as countryside and natural linkage areas under the Oak Ridges Moraine Conservation Plan. Route crosses Holland River tributaries in three locations. 	<ul style="list-style-type: none"> Impacts minimized if the existing road ROW can accommodate transitway infrastructure. 	<ul style="list-style-type: none"> Impacts minimized if the existing road ROW can accommodate transitway infrastructure. May not be possible along entire segment.
	○	●	●	●	○	◑	◑

Table 6-2 (Continued)
Alternative Rapid Transit Systems – Aurora Route Options Preliminary Screening

Objectives and Goals	Route Segment						
	A1 - Bathurst Street	A2 - Yonge Street	A3 - Yonge Street/Industrial Parkway/St.John's Sideroad	A4 - Yonge Street/Industrial Parkway/GO Bradford ROW	A5 - Bayview Avenue	A6 - Leslie Street	A7 - Highway 404
MAXIMIZE COST-EFFECTIVENESS OF RAPID TRANSIT <ul style="list-style-type: none"> ▪ Minimize property acquisition costs ▪ Minimize infrastructure capital and system operating costs 	<ul style="list-style-type: none"> ▪ Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. ▪ Moderate capital and operating costs but CN rail crossing is required. 	<ul style="list-style-type: none"> ▪ Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. ▪ Moderate capital and operating costs but CN Rail crossing modifications may be required. 	<ul style="list-style-type: none"> ▪ Property costs could be high where the rapid transit system cannot be accommodated in existing ROW. ▪ Moderate capital and operating costs but CN Rail crossing modifications may be required. 	<ul style="list-style-type: none"> ▪ Potentially high property acquisition costs adjacent to the GO Bradford ROW. ▪ Moderate capital and operating costs but CN Rail crossing modifications may be required. 	<ul style="list-style-type: none"> ▪ Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. ▪ Moderate capital and operating costs. 	<ul style="list-style-type: none"> ▪ Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. ▪ Moderate capital and operating costs. 	<ul style="list-style-type: none"> ▪ Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. ▪ Moderate to high capital costs.
	☐	◐	◑	◒	◓	◔	◕
OVERALL ASSESSMENT	ELIMINATED FROM FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION



NORTH YONGE STREET CORRIDOR PUBLIC TRANSIT AND ASSOCIATED ROAD IMPROVEMENTS ENVIRONMENTAL ASSESSMENT - PRELIMINARY ROUTE EVALUATION, AURORA

- LEGEND:**
- Routes Retained for Further Evaluation
 - Routes Eliminated from Further Evaluation
 - Municipal Boundary

SCALE: 1:30,000
 DATE: AUGUST 2006


Figure 6-2
 Aurora Route Options

Table 6-3

Alternative Rapid Transit Systems – Newmarket/East Gwillimbury Route Options Preliminary Screening

Objectives and Goals	Route Segment				
	NE1 - Bathurst Street/Mulock Drive (alt. to Yonge from St. Johns-Mulock)	NE2 - Yonge Street/Green Lane	NE3 - GO Bradford ROW	NE4- Yonge Street/Eagle Street East/GO Bradford ROW	NE5 - Yonge Street/Eagle Street West/Newmarket GO Bus Terminal
<p>PROVIDE AN EFFECTIVE TRANSPORTATION SERVICE</p> <ul style="list-style-type: none"> Maximize ridership potential and relationship to existing and future travel patterns Maximize connectivity to existing and future transit Serves employment nodes Serves major residential areas Maximize access to inter-modal terminals Consistency with York Region Transportation Master Plan 	<ul style="list-style-type: none"> Low ridership potential as route does not serve high-density land uses. Primary land use is Oak Ridges Moraine and low-density residential. Does not serve commercial employers in southern Newmarket. Not consistent with York TMP. 	<ul style="list-style-type: none"> High ridership potential as route serves major commercial employment areas and some adjacent medium density residential development. Recommended in York TMP. Provides a good connection to GO Transit at the East Gwillimbury GO Station. 	<ul style="list-style-type: none"> Low ridership potential as route serves little commercial employment area and adjacent medium density residential development. Provides a good connection to GO Transit at both the Newmarket and East Gwillimbury GO Stations. Provides access to York Region Transit feeder routes on main arterials. 	<ul style="list-style-type: none"> Moderate ridership potential as route serves some commercial employment area and adjacent medium density residential development. Provides a good connection to GO Transit at both the Newmarket and East Gwillimbury GO Stations. Provides access to York Region Transit feeder routes on Davis Drive. 	<ul style="list-style-type: none"> Moderate ridership potential as route serves some commercial employment area and adjacent medium density residential development Provides a good connection to GO Transit bus services at the Newmarket GO bus terminal. Provides access to York Region Transit feeder routes on main arterials.
	☉	●	●	●	☉
<p>PROTECT AND ENHANCE SOCIAL ENVIRONMENT</p> <ul style="list-style-type: none"> Minimize displacement or partial acquisition of residential or commercial property Minimize adverse noise and vibration effects Minimize adverse effects on cultural resources Maximize access to community facilities Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics Minimize adverse effects on community safety 	<ul style="list-style-type: none"> Potential property impacts due to narrower rights-of-way. Possible noise impact in residential areas with low ambient levels. 	<ul style="list-style-type: none"> Yonge Street road widening may require some property acquisition. Provides direct access to Upper Canada Mall and the designated urban commercial developments along Yonge Street. Low potential for noise impact in area of higher ambient levels. Bypasses the Newmarket historical area along Main Street and South Lake Regional Health Centre. 	<ul style="list-style-type: none"> Potential property impacts to develop right-of-way. Provides direct access to the Newmarket historical area along Main Street and reasonable access to the South Lake Regional Health Centre. Bypasses York Regional Centre and Newmarket historical area along Main Street 	<ul style="list-style-type: none"> Yonge road widening may require some property acquisition. ROW constrained along Eagle Street East. Provides direct access to the Newmarket historical area along Main Street and reasonable access to the South Lake Regional Health Centre. Bypasses Upper Canada Mall and the designated commercial development along southern Yonge Street. 	<ul style="list-style-type: none"> Yonge road widening may require some property acquisition. Provides reasonable access to Upper Canada Mall and the designated urban commercial zone along southern Yonge Street. Does not serve the Newmarket historical area along Main Street and South Lake Regional Health Centre. Low potential for noise impact in area of higher ambient levels.
	☉	●	●	●	☉
<p>PROMOTE SMART GROWTH/ECONOMIC DEVELOPMENT</p> <ul style="list-style-type: none"> Maximize access to planned growth and intensification areas, including Regional Centre Potential to stimulate more transit-oriented development Consistency with Official Plan urban form objectives 	<ul style="list-style-type: none"> Bypasses the designated urban commercial zone along southern Yonge Street Limited potential for transit-oriented development. Inconsistent with OP urban form objectives. 	<ul style="list-style-type: none"> Provides direct route to the York Regional Centre. Serves potential transit oriented re-development opportunities around the Davis Drive intersection. 	<ul style="list-style-type: none"> Bypasses the York Regional Centre on Yonge Street. Bypasses Upper Canada Mall and the designated commercial zone on Yonge Street Some TOD potential at GO station on Davis Dr. 	<ul style="list-style-type: none"> Provides indirect access to the York Regional Centre. Bypasses Upper Canada Mall and the commercial zone on north Yonge Street. Some TOD potential at GO station on Davis Drive. 	<ul style="list-style-type: none"> Provides reasonable access to York Regional Centre, Upper Canada Mall and the designated urban centre along Yonge Street. Serves potential transit oriented re-development opportunities around the Davis Drive intersection.
	☉	●	☉	●	☉
<p>PROTECT NATURAL ENVIRONMENT</p> <ul style="list-style-type: none"> Potential to utilize existing corridors Minimize impact on: Wetlands and Watercourses, Wildlife and Aquatic Habitat, Surface and Ground Water Quality and Quantity Avoid local adverse Air Quality effects 	<ul style="list-style-type: none"> Widening of the existing Bathurst Street ROW is constrained since the adjacent land is in the Oak Ridges Moraine and therefore restricted for development. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as an urban environment. 	<ul style="list-style-type: none"> Possible disruption in the Holland River valley lands which run almost parallel to the existing GO Bradford ROW, north of Davis Dr. 	<ul style="list-style-type: none"> Possible disruption in the Holland River valley lands which run almost parallel to the existing GO Bradford ROW, north of Davis Drive. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as an urban environment
	☉	●	○	☉	☉
<p>MAXIMIZE COST-EFFECTIVENESS OF RAPID TRANSIT</p> <ul style="list-style-type: none"> Minimize property acquisition costs Minimize infrastructure capital and system operating costs 	<ul style="list-style-type: none"> Low property cost if significant ROW widening is avoided. Moderate capital and operating costs 	<ul style="list-style-type: none"> May involve some property cost for ROW widening. Moderate capital and operating costs. 	<ul style="list-style-type: none"> Potentially high property acquisition costs Moderate to high capital and moderate operating costs. 	<ul style="list-style-type: none"> Moderate to high property acquisition costs. Moderate capital and operating costs. 	<ul style="list-style-type: none"> May involve some property cost for Yonge ROW widening. Lower capital and operating costs (shorter route)
	●	●	☉	☉	☉
OVERALL ASSESSMENT	ELIMINATED FROM FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION

Table 6-3 (Continued)
Alternative Rapid Transit Systems – Newmarket/East Gwillimbury Route Options Preliminary Screening

Objectives and Goals	Route Segment				
	NE6 - Yonge Street/Davis Drive/Main Street/Green Lane	NE7 - Yonge Street/Davis Drive to Leslie Street	NE8 - Bayview Avenue/Prospect Street/Bayview Parkway/Green Lane	NE9 - Leslie Street/Green Lane	NE10 - Highway 404/Green Lane
PROVIDE AN EFFECTIVE TRANSPORTATION SERVICE <ul style="list-style-type: none"> Maximize ridership potential and relationship to existing and future travel patterns Maximize connectivity to existing and future transit Serves employment nodes Serves major residential areas Maximize access to inter-modal terminals Consistency with York Region Transportation Master Plan	<ul style="list-style-type: none"> High ridership potential as route serves major commercial employment areas and some adjacent medium density residential development. Provides a good connection to GO Transit at the East Gwillimbury GO Station and reasonable access to Newmarket GO Station. Recommended in York TMP south of Davis Dr. 	<ul style="list-style-type: none"> High ridership potential as route serves major commercial employment areas and some adjacent medium density residential development. Directly serves the York Regional Centre. Provides a reasonable connection to GO Transit at the Newmarket GO Station. Recommended in York TMP south of Davis Dr. 	<ul style="list-style-type: none"> Low ridership potential as route serves little commercial employment area and adjacent low density residential development. Provides a good connection to GO Transit at the Newmarket GO Station. Not consistent with York TMP. 	<ul style="list-style-type: none"> Low ridership potential as route serves little commercial employment area and adjacent low density residential development. Provides a good connection to GO Transit at the East Gwillimbury GO Station. Not consistent with York TMP. 	<ul style="list-style-type: none"> Low ridership potential as route serves little commercial employment area. Not consistent with York TMP.
PROTECT AND ENHANCE SOCIAL ENVIRONMENT <ul style="list-style-type: none"> Minimize displacement or partial acquisition of residential or commercial property Minimize adverse noise and vibration effects Minimize adverse effects on cultural resources Minimize changes to accessibility in communities Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics Minimize adverse effects on community safety 	<ul style="list-style-type: none"> Provides direct access to Upper Canada Mall and the designated urban centre along Yonge Street and Davis Drive. Provides direct access to the Newmarket historical area along Main Street and reasonable access to the South Lake Regional Health Centre. Potential property impacts due to narrower rights-of-way. Low potential for noise impact in area of higher ambient levels. 	<ul style="list-style-type: none"> Provides direct access to the Newmarket historical area along Main Street and the South Lake Regional Health Centre. Provides direct access to Upper Canada Mall and the designated urban centre along Yonge Street and Davis Drive. Potential property impacts due to narrower rights-of-way. Low potential for noise impact in area of higher ambient levels. 	<ul style="list-style-type: none"> Provides direct access to the South Lake Regional Health Centre and Pickering College. Provides reasonable access to the Newmarket historical area along Main Street. Bypasses the York Regional Centre and Regional Centre commercial core. Possible noise impact in residential areas with low ambient levels. Potential property impacts due to narrower rights-of-way. 	<ul style="list-style-type: none"> Bypasses the York Regional Centre and Regional Centre commercial core. Does not serve the Newmarket historical area along Main Street and South Lake Regional Health Centre. Possible noise impact in residential areas with low ambient levels. 	<ul style="list-style-type: none"> Bypasses the York Regional Centre and Regional Centre commercial core. Does not serve the Newmarket historical area along Main Street and South Lake Regional Health Centre.
PROMOTE SMART GROWTH/ECONOMIC DEVELOPMENT <ul style="list-style-type: none"> Maximize access to planned growth and intensification areas, including Regional Centre Potential to stimulate more transit-oriented development Consistency with Official Plan urban form objectives	<ul style="list-style-type: none"> Provides direct route to the York Regional Centre. Serves potential transit oriented re-development opportunities around the Davis Drive intersection. 	<ul style="list-style-type: none"> Provides direct route to the York Regional Centre. Serves potential transit oriented re-development opportunities around the Davis Drive intersection and along Davis Drive. Some TOD potential at GO station on Davis Dr. 	<ul style="list-style-type: none"> Bypasses the York Regional Centre and designated urban centre on Yonge Street. Bypasses Upper Canada Mall and the designated commercial zone on Yonge Street. Some TOD potential at GO stations on Green Lane and Davis Drive. 	<ul style="list-style-type: none"> Bypasses the York Regional Centre and designated urban centre on Yonge Street. Bypasses Upper Canada Mall and the designated commercial zone on Yonge Street. Some TOD potential along Leslie Street and East Gwillimbury GO Station. 	<ul style="list-style-type: none"> Bypasses the York Regional Centre and designated urban centre on Yonge Street. Bypasses Upper Canada Mall and the designated commercial zone on Yonge Street. Limited TOD potential along Highway 404.
PROTECT NATURAL ENVIRONMENT <ul style="list-style-type: none"> Potential to utilize existing corridors Minimize impact on: Wetlands and Watercourses, Wildlife and Aquatic Habitat, Surface and Ground Water Quality and Quantity Avoid local adverse Air Quality effects 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as an urban environment. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as an urban environment. 	<ul style="list-style-type: none"> Low potential for impact as segment is largely already developed as an urban environment, south of Davis Dr. Possible disruption in the Holland River valley lands which run almost parallel to the existing GO Bradford ROW, north of Davis Dr. 	<ul style="list-style-type: none"> Impacts minimized if the existing road ROW can accommodate transitway infrastructure. 	<ul style="list-style-type: none"> Impacts minimized if the existing road ROW can accommodate transitway infrastructure.
MAXIMIZE COST-EFFECTIVENESS OF RAPID TRANSIT <ul style="list-style-type: none"> Minimize property acquisition costs Minimize infrastructure capital and system operating costs 	<ul style="list-style-type: none"> May involve some property cost for ROW widening. Moderate capital and operating costs. 	<ul style="list-style-type: none"> May involve some property cost for ROW widening. Moderate capital and operating costs. 	<ul style="list-style-type: none"> Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. Moderate capital and operating costs. 	<ul style="list-style-type: none"> Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. Moderate capital and operating costs 	<ul style="list-style-type: none"> Property costs could be high if the rapid transit system cannot be accommodated in existing ROW. Moderate to high capital costs.
OVERALL ASSESSMENT	CARRIED FORWARD FOR FURTHER EVALUATION	CARRIED FORWARD FOR FURTHER EVALUATION	South of Davis Dr: ELIMINATED FROM FURTHER EVALUATION ; North of Davis Drive: CARRIED FORWARD FOR FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION	ELIMINATED FROM FURTHER EVALUATION

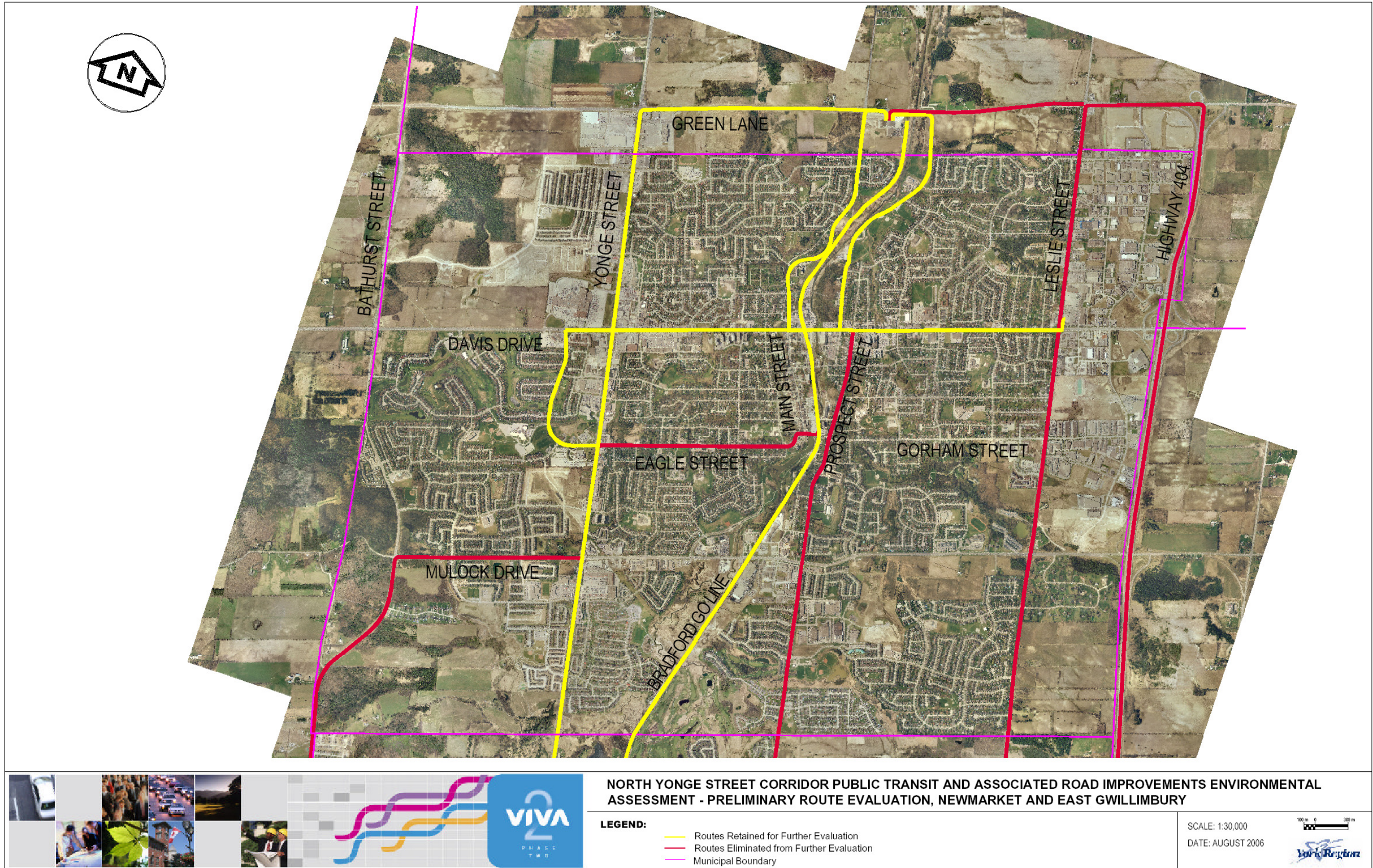


Figure 6-3
Newmarket/East Gwillimbury Route Options

6.2 RAPID TRANSIT TECHNOLOGIES

6.2.1 Transit Technologies Considered

Both *York Region's TMP* and the analysis and evaluation of alternative transportation solutions carried out during this EA have indicated that implementation of rapid transit service with the appropriate technology and associated infrastructure will constitute an effective form of public transit improvement in the North Yonge Street Corridor.

The broad range of technologies examined as part of the EA included the following:

- Conventional Bus
- Bus Rapid Transit (BRT) – in exclusive, HOV or general purpose lanes
- Light Rail Transit (LRT)
- Commuter Rail - Diesel Multiple Units (DMU)
- Automated Light Rail Transit – version of Automated Guideway Transit, and
- Heavy Rail (subway)

Each of these rapid transit technologies is briefly described below:

- *Conventional Bus*: Conventional buses would be an integral part of any enhanced transit system, either serving to feed a rapid transit system or as an integral part of a bus-based system.



- *Bus Rapid Transit (BRT)*: BRT is a flexible form of rapid transit that combines transit stations, vehicles, services, running way, and Intelligence Transportation System (ITS) elements into an integrated system.



- *Light Rail Transit (LRT)*: LRT is a flexible transportation mode that can operate in a variety of settings. It is a relatively low cost form of rail technology, usually obtaining electric power from overhead wires.



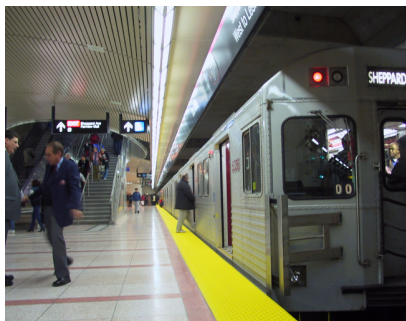
- *Commuter Rail (Diesel Multiple Units)*: This technology is a modern form of a diesel-powered rail car. Diesel Multiple Unit's are self-propelled and distinguished from current commuter rail equipment with each vehicle motorized rather than pushed or pulled by a heavy diesel engine. This technology operates on conventional rail tracks.



- *Automated Light Rail Transit*: This intermediate capacity technology uses fully automated driverless trains, necessitating fully grade-separated operations, typically on an elevated guideway and at high frequency to provide capacity in the 15-25,000 passengers per hour per direction.



- *Heavy Rail*: This technology would consist of high capacity rail cars operating in transit of two or more cars on fixed rails in separate rights-of-way. This concept is used to serve very high volume corridors with capacity requirements in the order of 20,000 to 50,000 peak hour passengers per direction.



6.2.2 Screening of Alternative Transit Technologies

The selection of a rapid transit technology should utilize a full range of information on the specific situation produced by an objective EA study. The general consensus of transit professionals is that there is no specific demand volume at which there is always a single, preferred rapid transit mode because of the importance of relative costs, benefits and impacts in decision making. Two ridership level thresholds do, however, have important impacts on development of alternatives and mode selection:

- It is difficult to justify providing an exclusive lane for rapid transit if expected ridership is not higher than the number of people who would use the same road space in general traffic, i.e. 800-1,000 persons per hour on an arterial road lane or 2200-2400 per hour on a freeway lane;
- Above a certain demand level (7,000-10,000 persons per hour per

direction), measures permitting BRT express service, partially grade separated rail transit (i.e., LRT) or fully grade separated rail transit (i.e. subway) are required to sustain reliable, high speed service.

Rapid transit modes and technologies can evolve in a particular corridor over time. As growth occurs and development patterns change, increases in transit demand may justify or even mandate more expensive and complex technologies over time. For example, rapid transit development in a corridor may begin with a conventional BRT service operating in mixed traffic with dedicated transit lanes along specific segments. Over time, as ridership increases, partially segregated transitways, station by-passes, larger and more complex vehicles, upgraded intelligent transportation systems and other technologies can be added.

In addition to capacity and operational reliability considerations, the relationship of a particular segment to adjacent parts of the network and hence the need for compatible technologies is a key determinant in selecting the optimum technology.

Table 6-4 summarizes the preliminary screening of the full range of transit technologies identified above for the candidate routes. The screening process compares the overall responsiveness of each technology to the set of primary objectives and evaluation criteria set out in the EA's Terms of Reference. The rationale for selection of the technology(ies) carried forward from the screening (Table 6-4) is outlined below.

- The use of heavy rail (subway) cannot be justified given that the long term travel demand generated by the planned land use in the North Yonge Street Corridor is projected to be well below the 15-20,000 passengers per hour range. Typically, this ridership level is required to make the high capital investment warranted and to gain the operating cost benefits implicit in high-volume subway technology. Furthermore, it is unlikely that Toronto's Yonge subway will be extended to the southern boundary of the study area in the foreseeable future.
- Similarly, since automated light rail transit has not been selected for the Yonge Street corridor south of the study area because the technology is not cost-effective at the demand levels projected, it is not a logical candidate for the lower passenger volumes projected in the North Yonge corridor.
- The analysis tabulated also shows that it would not be possible to achieve the rapid transit performance objectives with a service based on conventional buses, other than in a feeder role.
- Commuter rail, in the form of diesel multiple unit technology with stations at greater spacing, does not respond to the mobility, transit-

**Table 6-4
Preliminary Screening of Transit Technologies**

Objectives and Goals	Conventional Bus Service	Bus Rapid Transit (BRT)	Light Rail Transit (LRT)	Automated Light Rail Transit	Heavy Rail (Subway)	Diesel Multiple Unit
IMPROVE MOBILITY BY PROVIDING AN EFFECTIVE TRANSPORTATION SERVICE						
Enhance acceptance of transit	○ No change in service quality and attractiveness from status quo.	● Can be marketed as distinctive service with features that are more attractive than conventional bus service.	● Can be marketed as distinctive service with features that are more attractive than conventional bus service.	○ A distinctive service with features perceived as more attractive than partially-segregated service. Elevated system could be perceived as less accessible.	● Recognized as an efficient, high quality, high capacity travel option. System could be perceived as less accessible for some users.	● Can be marketed as distinctive service with features that are more attractive than conventional bus service. Route may be remote from areas with higher ridership potential.
Improve transit speed and travel times	○ Travel time achieved depends on road congestion levels.	● Time benefit depends on degree of separation from regular traffic (dedicated rapidway, HOV or general purpose lanes).	● Time benefit depends on degree of separation from regular traffic.	● Allows for maximum speeds due to full grade separation.	● Allows for maximum speeds due to full grade separation.	● Time benefits for trips with ODs within rail corridor.
Improve transit user comfort	● No change to current transit comfort levels.	● Facilities and vehicles can be designed for increased comfort. Stations usually partially enclosed.	● Facilities and vehicles can be designed for increased comfort. Stations usually partially enclosed.	● Facilities and vehicles can be designed for increased comfort. Stations usually fully enclosed.	● Facilities and vehicles can be designed for increased comfort. Stations usually fully enclosed.	● Facilities and vehicles can be designed for increased comfort. Stations usually partially enclosed.
Improve transit service reliability	○ No positive impact as operation in mixed traffic is subject to increasing congestion delay.	● Dedicated lanes improve reliability. Can be offered with real-time transit information. Rubber-tired vehicles allow overtaking of failed vehicles by using adjacent traffic lanes.	○ Tracks in dedicated lanes improve reliability. Can be offered with real-time transit information. Vehicle technical failure must be addressed promptly to avoid service delays due to obstructed track.	● Automated technology increases schedule adherence. Vehicle technical failure must be addressed promptly to avoid service delays due to obstructed track. Can be offered with real-time transit information.	● Fully segregated technology increases schedule adherence. Vehicle technical failure must be addressed promptly to avoid service delays due to obstructed track. Can be offered with real-time transit information.	● Service reliability may be impacted by other rail vehicles but not affected by auto congestion. Requires exclusive track to ensure reliability. Can be offered with real-time transit information.
Enhance continuity of transit services	● Fully compatible with existing transit service technology in corridor. Would require transfer to/from LRT if that technology is used in the South Yonge St. Corridor.	● Conventional Bus services can be interlined with BRT to provide seamless travel. Would require transfer to/from LRT if that technology is used in the South Yonge St. Corridor.	○ LRT technology in North Yonge would only be practical if operated as an extension from the South Yonge St. Corridor.	○ Automated LRT would not be practical as it has not been adopted for the South Yonge St. Corridor.	○ Heavy rail is only feasible if it is extended from the existing Toronto subway. Subway technology north of Hwy 7 has not been recommended in the South Yonge St. Corridor EA.	○ Requires adoption of the technology for transit service on rail rights-of-way in the South Yonge St. corridor.
PROTECT AND ENHANCE SOCIAL ENVIRONMENT						
Minimize effects on adjacent communities	○ Some noise impacts when operating within residential areas. Impacts are similar to the existing situation. Mixed traffic operation avoids property acquisition but congestion limits improvement in access to community facilities.	● Some right-of-way widening to develop dedicated BRT transitway. Vehicle noise generally screened by higher ambient levels due to traffic in roadway. Offers improved access to community facilities.	● Some right-of-way widening to develop dedicated BRT transitway. Vehicle noise generally screened by higher ambient levels due to traffic in roadway. Offers improved access to community facilities.	○ Elevated guideway generally required may be visually intrusive and may have noise impacts in certain community environments. Some noise impacts when operating within residential areas.	● If system operates mostly underground effects are confined to traffic impact around stations. If mostly underground, noise effects are confined to feeder bus activities at station locations.	● If existing rail corridor is used as the alignment, adjacent land use is largely industrial, therefore potential effects on communities are minimal. Some noise impacts when operating within residential areas. Offers improved access to some community facilities, (e.g. Hospital, Newmarket Town offices).
Minimize effects on cultural and heritage environment	● No change to existing conditions.	● Right-of-way development may require mitigation of effects.	● Right-of-way development may require mitigation of effects	● Guideway insertion must avoid conflict with existing cultural/heritage features	● Alignment selected must avoid existing cultural/ heritage features	● Existing rail alignment avoids cultural/ heritage features.
PROTECT AND ENHANCE NATURAL ENVIRONMENT						
Effects on aquatic habitat, natural vegetation and air quality	● No change in existing conditions at watercourse crossings. No effect on natural vegetation. No improvement in corridor air quality	● ROW widening causes minor change in existing conditions at watercourse crossings. Use of existing road rights-of-way will minimize effect on natural vegetation. Small improvement in corridor air quality due to increased transit use.	● ROW widening causes minor change in existing conditions at watercourse crossings. Use of existing road rights-of-way will minimize effect on natural vegetation. Reduces auto emissions by increasing transit use and produces minimal local emissions.	● Elevated alignment causes minimal effect on watercourse crossings. Use of existing road rights-of-way will minimize effect on natural vegetation. Reduces auto emissions by increasing transit use and produces minimal local emissions.	● Underground alignment avoids effects on existing watercourses but dewatering must be minimized. Largely underground alignment following existing road rights-of-way will minimize effect on natural vegetation. Reduces auto emissions by increasing transit use and produces minimal local emissions.	● Use of existing rail corridors will minimize effects on watercourses and natural vegetation. Small improvement in corridor air quality due to increased transit use but rapid transit vehicles will increase corridor diesel emissions marginally.

Table 6-4 (Continued)
Preliminary Screening of Transit Technologies

PROMOTE SMART GROWTH AND ECONOMIC DEVELOPMENT												
Consistency with York Region Transportation Master Plan Objectives	●	Consistent with need to expand transit in multiple corridors but offers minor contribution to increased transit modal split.	●	Consistent with recommended implementation of rapid transit. Contributes to an increase in transit modal split.	○	Not considered a candidate technology in TMP. Contributes to an increase in transit modal split.						
Consistency with municipal and provincial land use objectives	○	No significant positive impact and minimal reinforcement of centres and corridors policy. Low potential to attract investment in centres and corridors.	●	Provides service levels consistent with promoting more compact development. Creates permanent transit corridor to meet policy objectives and attract investment in centres and along corridor.	●	Provides service levels consistent with promoting more compact development. Creates permanent transit corridor to meet policy objectives and attract investment in centres and along corridor. Can be integrated at stations but may sterilize some lands.						
						○	Not considered a candidate technology in TMP. Contributes to an increase in transit modal split for certain trip types. Creates permanent corridor to meet policy objectives but more difficult to structure mixed use development around commuter rail corridor.					
MAXIMIZE COST-EFFECTIVENESS												
Minimize operating costs	○	May require more vehicles to provide same capacity as higher order modes.	●	Higher capacity vehicles may reduce fleet requirements.	○	Operating and maintenance costs cannot be justified by ridership in this corridor.	○	Operating and maintenance costs cannot be justified by ridership in this corridor.				
Minimize capital costs	●	Capital costs are limited to vehicle purchases and upgrading of existing stops.	●	BRT dedicated right-of-way infrastructure and specialized vehicles require medium levels of rapid transit capital investment. Operation in HOV or general purpose lanes reduces capital investment significantly.	○	LRT rail infrastructure and vehicles require medium to high levels of rapid transit capital investment.	○	High capital cost of intermediate-high capacity system not justified by projected ridership levels.				
								○	High capital cost of high capacity system not justified by projected ridership levels.			
OVERALL ASSESSMENT		Technology alternative does not meet the objectives of the rapid transit system but can be an integral part of public transit improvements solution as a feeder service. ELIMINATED FROM FURTHER EVALUATION	✓	Has potential to significantly improve public transit with minimal or positive impacts to social and natural environments CARRIED FORWARD FOR FURTHER EVALUATION	✓	Has potential to significantly improve public transit with minimal or positive impacts to social and natural environments. CARRIED FORWARD FOR FURTHER EVALUATION		Technology cannot be justified given current and projected land use and travel demand in corridor. Not compatible with technologies selected for corridor segment to the south. ELIMINATED FROM FURTHER EVALUATION		Technology cannot be justified given current and projected land use and travel demand in corridor. ELIMINATED FROM FURTHER EVALUATION		Adoption of technology is subject to numerous constraints and disadvantages imposed by having to follow the existing rail corridor. ELIMINATED FROM FURTHER EVALUATION

LEGEND: Least Responsive ○ ● ● ● ● Most Responsive

6

oriented development and right-of-way integration objectives in the study area. This technology is more appropriate for longer distance commuter trips such as those currently carried on the GO Barrie Line to downtown Toronto.

- In the context of the above findings, the choice of the appropriate rapid transit technology for the service in the near and medium term must therefore focus on cost effective, surface rapid transit alternatives that are compatible with the preferred rights-of-way and station spacing requirements identified in the route evaluation phase.

Consequently, the remaining surface alternatives which will be carried forward include BRT and LRT technologies.

In order to assess the effects of implementation and operation of these candidate technologies on the environment it is essential to document the basic characteristics of each technology family. These are summarized in the following sections as background to the alignment and technology insertion analysis presented in subsequent chapters.

6.2.2.1 Bus Rapid Transit (BRT)

Rapidway: BRT can operate mixed with general traffic, in HOV lanes, and/or exclusive bus lanes, and/or segregated transitways. The operating speed, capacity and reliability increases with the degree of segregation from general traffic and grade separation.

Vehicle Technology: BRT may use either conventional buses or specialized rubber-tired BRT vehicles. Available propulsion options range from conventional diesel to clean diesel, Compressed Natural Gas to turbine-electric hybrids and all-electric trolleys. Low-floor, multiple wide-door designs and optional guidance into stations enables quicker boarding and alighting thus reducing station dwell time. Vehicle lengths range from 12.2 metres to 18 metres for single units, with 25.5 metres bi-articulated units used in some systems. Typical passenger capacities are 60 (single unit) to over 110 (bi-articulated unit) standing and seated passengers per vehicle.



System Capacity: Segregated BRT service with station bypass lanes is

capable of handling over 12,000 persons per peak hour per direction, depending on the degree of segregation from other traffic and grade separation. The busiest BRT segment in North America, downtown Ottawa, carries approximately 10,000 passengers per hour in the peak direction during the single peak hour. The practical capacity without overtaking capability at stations is in the 8,000 passenger per hour range.

Intelligent Transportation Systems (ITS): Contemporary BRT systems usually incorporate ITS with an automatic vehicle location module that supports transit signal priority at intersections and real-time passenger information at stations, on-board and at home.

Stops or Stations: These generally comprise platforms varying in length from 15 m to 55 m with shelters and passenger amenities. They are generally designed to be accessible by the disabled and may also include support facilities such as park-and-ride lots or passenger pick-up and drop-off areas. Station spacing is approximately 0.5 km to 1 km in built-up sections of corridors increasing to 2 km in lower density areas.

Off Board Fare Collection: Prepaid fares are required to reduce dwell times at stations and for passenger convenience. Options include fare gates and fare-paid, segregated platforms in stations and proof of payment systems using passes, smart cards or tickets.

Capital Costs: Total costs, including transitways, stations, ITS, vehicles, fare collection system, etc. range from \$0.7M – \$4.0M per two-way km for on-street BRT in mixed traffic using existing lanes to \$20M - \$35M for a partially segregated transitway with mostly at-grade intersections. Costs can increase to \$60M+ per km for fully segregated, grade-separated segments. Implementation costs depend on the volumes to be carried, system complexity, the degree of segregation from general traffic and the type and degree of grade separation (e.g., at grade, in subway or elevated).

6.2.2.2 Light Rail Transit (LRT)

Rapidway: LRT can operate mixed with general traffic (i.e. streetcar systems), and/or on exclusive lanes, and/or on segregated transitways. The operating speed, capacity and reliability increase with the degree of segregation from general traffic and grade separation.



Vehicle Technology: LRT vehicles range from all-electric to diesel propelled, of both high and low-floor car designs. Lengths vary from 14 metres (single unit) to 45 metres (bi-articulated unit). Typical passenger capacities are approximately 75 (single unit) to as high as 200 (bi-articulated unit) standing and seated passengers per car. Vehicles can be coupled to form up to three or four car trains depending on vehicle length and demand. Direct, no-step station platform to vehicle boarding and alighting through multiple wide doors, often on both sides of cars, can be provided.

System Capacity: LRT systems are capable of carrying up to 18,000 persons per peak hour per direction, depending on the degree of segregation from other traffic and grade separation. Approximately, 10,000 people per hour (peak hour, peak direction) use the busiest light rail segments in North America in downtown Calgary and on the Green Line in downtown Boston.

ITS: LRT systems have a signal system to control train operations, provide data and voice communications and enhance safety and security. Contemporary LRT systems also have ITS capabilities to provide transit signal priority at intersections and real-time passenger information at stations, on-board and at home.

Stops or Stations: These generally comprise platforms varying in length from 15 m (streetcars) to 90 m (multi-car trains) with shelters and passenger amenities. They are generally designed to be accessible by the disabled and may also include support facilities such as park-and-ride lots or passenger pick-up and drop-off areas. Station spacing is approximately 0.75 km to 1 km in built-up sections of corridors increasing to 2 km in lower density areas.

Off-board Fare Collection: Pre-payment of fares is required to reduce dwell times at stations, take advantage of efficiencies of train operation and for passenger convenience. Options include fare gates and fare-paid, segregated platforms in stations and proof of payment systems using passes, smart cards or date and time-validated tickets.

Capital Costs: Total costs including stations, ITS, vehicles, fare collection system, etc. range from \$5M per km for single track diesel lines using former rail rights-of-way to \$40M per km for double track, partially segregated at-grade, electrified lines with mostly at-grade intersections. Fully segregated, grade separated electrified transitways can cost up to \$100M per km for double track. Implementation costs depend on volumes to be carried, system complexity, degree of segregation from general traffic and the degree and type of grade separation (e.g., at grade, underground or elevated).

6.2.3 Evaluation of Alternative Technologies

In order to assess the merits of various applications of the two surface rapid transit alternatives, BRT and LRT, a Regional rapid transit network configuration analysis was undertaken to ensure that the findings of EA's for each corridor in the network support a comprehensive and coordinated network of rapid transit lines and technologies. This analysis, undertaken prior to making final recommendations in any single corridor, recognizes that decisions on investment and operations in one corridor will have impacts on the others and the network as a whole.

For the network evaluation, two sets of criteria were developed, one allowing a quantitative assessment and the other a qualitative comparison. The evaluation comprised analysis of the alternatives in terms of both sets with the combination forming the basis for selection of the preferred technology. Criteria used were the following:

Quantitative Criteria

- Capital cost (total cost of infrastructure and vehicles for entire length of route);
- Operating and maintenance costs (annual cost to operate service required for projected demand in 2021); and
- Ridership to be carried (link volume at the maximum load point in the peak hour, peak direction and the total incremental daily riders on the rapid transit network over and above the baseline alternative, bus service in mixed traffic with some signal priority).

Qualitative Criteria

- Network connectivity with each technology alternative (direct connections with other GTA operators and modes,
- Service to logical termini,
- Ability to provide direct service to most important markets);
- Quality of service provided by each technology alternative (expected total O/D trip times for key markets, speed and reliability at forecasted demand levels, proportion of service and ridership under conditions approaching capacity of alternative);
- Influence of technology alternative on land use (Smart Growth potential at planned station locations, ability to influence development along route);
- Effect of technology on environment (significant natural, social and heritage environmental issues); and
- Risk of technology choice (implementation time and difficulty, flexibility to address changes in expected markets, investment risk if system is upgraded/expanded or unexpected changes occur).

Analysis findings to date indicate that initially, the network will comprise BRT technology in all network corridors feeding the two planned subway extensions to Highway 7 at the Richmond Hill and Vaughan Regional Centres. In the medium-longer term certain portions of the network may require conversion to LRT technology to overcome the potential loss of reliability of high-frequency BRT service in highly congested traffic zones. Consequently, the BRT infrastructure would be constructed to design standards facilitating an ultimate conversion to LRT technology when warranted.

In the case of the portion of the network in the North Yonge Street Corridor EA study area north of 19th Avenue, the analysis found that the land use and transportation factors that would trigger consideration of conversion from BRT to LRT technology are unlikely to be in place for some considerable time. Nevertheless, it is important to recognize the benefits of seamless transit service across networks and the need to protect for compatibility of infrastructure in all segments of the network. Therefore, it is recommended that the technically preferred design alternative developed through this EA incorporate design standards that do not preclude ultimate conversion to LRT technology, if and when warranted.

7. DESCRIPTION OF THE ENVIRONMENT

Chapter 7 summarizes the detailed existing conditions within the preferred alternative routes determined in **Chapter 6**. The municipalities included in the study area are the Towns of Richmond Hill, Aurora, Newmarket and East Gwillimbury. The detailed existing conditions are described under the following specific areas:

- Transportation Environment;
- Land-Use Planning
- Natural Environment;
- Social Environment;
- Cultural Environment; and
- Utilities

7.1 TRANSPORTATION ENVIRONMENT

This Section introduces the various aspects of the transportation environment in which the project is proposed to take place. The detailed transportation report is presented in **Appendix B**.

7.1.1 Local/Regional Transit Network

The existing bus routes operate in mixed traffic and consist of GO Transit, York Region Transit (YRT) and Viva services, as shown in **Figure 7-1**. There are no Toronto Transit Commission routes operating within the study area.

7.1.1.1 York Region Transit

There are several YRT routes that service the study corridors as follows:

- **YRT Route 22:** Operates from the Maple Community Centre to the Seneca King Campus. As part of this route, the buses travel on Yonge Street from south of King Road (Bond Crescent) to Bloomington Road.
- **YRT Route 34:** Operates along Industrial Parkway in Aurora as well as providing access along Yonge Street north from Industrial Parkway to the Aurora Shopping Centre.
- **YRT Route 44:** Operates from the Newmarket GO Bus Terminal to the Newmarket GO Station. As part of this route, the buses with full service travel on Yonge Street from Upper Canada Mall Driveway to Bristol Road. During the weekday AM peak hour, buses travel on Yonge Street from Davis Drive to Bristol Road.

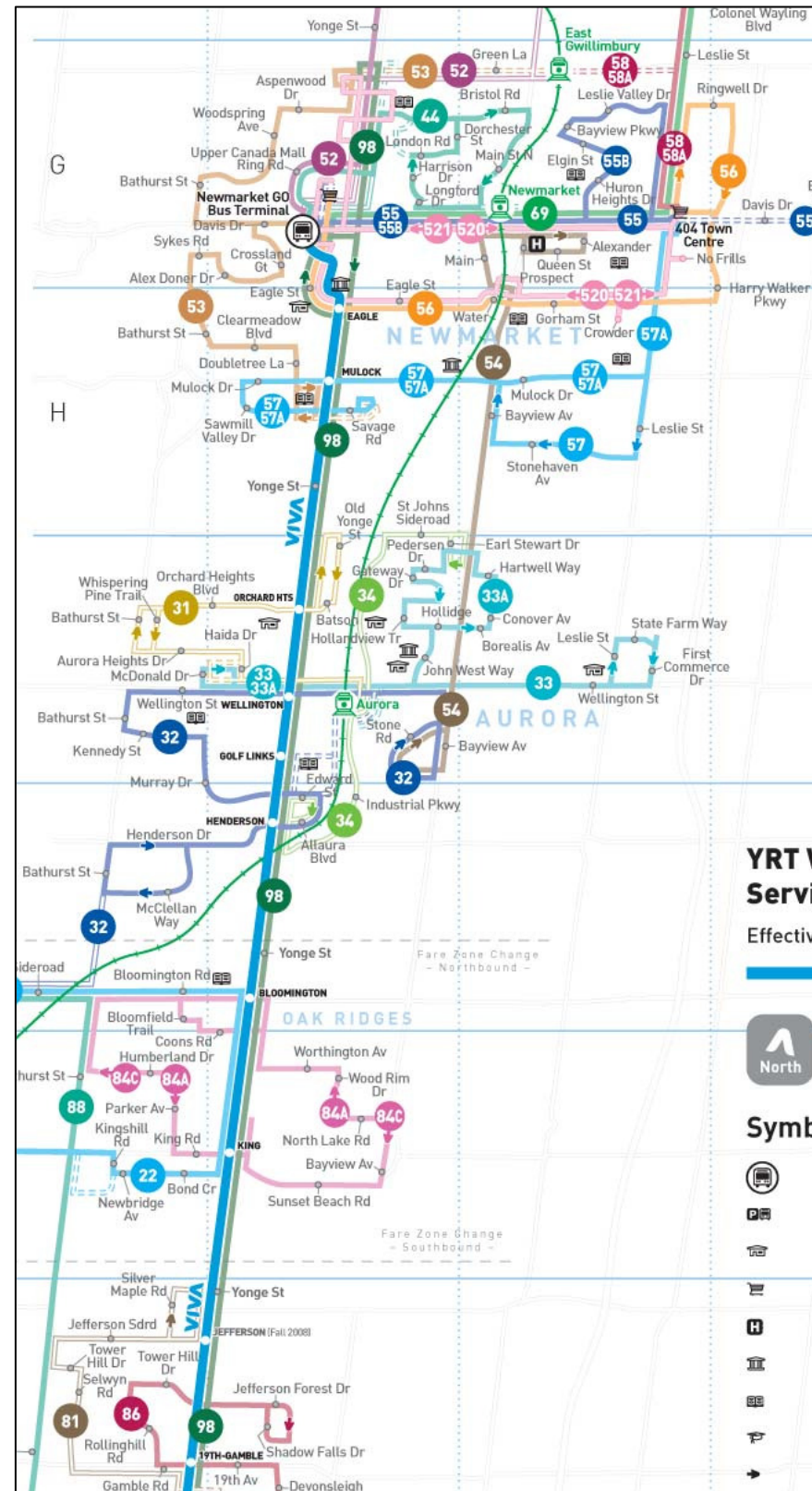


Figure 7-1
Transit Routes in Study Area

- **YRT Route 52:** Operates from the Newmarket GO Bus Terminal to the intersection of Yonge Street and Queensville Sideroad. As part of this route, the buses with full service travel on Yonge Street from the Upper Canada Mall Driveway to Green Lane. During the weekday AM peak hour, buses travel on Yonge Street from Davis Drive to Green Lane.
- **YRT Route 55:** Operates from Newmarket GO Bus Terminal to 404 Town Centre. As part of this route, the buses with full service travel on Davis Drive from Eagle Street to Leslie Street.
- **YRT Route 56:** Provides access to the Upper Canada Mall, Newmarket GO Bus Terminal and 404 Town Centre via Eagle Street, Leslie Street and Harry Walker Parkway.
- **YRT Route 69:** Operates along Davis Drive from the Newmarket GO Bus Terminal to Leslie Street and north on Leslie Street.
- **YRT Route 98:** Operates between the Upper Yonge Place to the intersection of Yonge Street and Green Lane. As part of this route, buses travel on Yonge Street from Gamble Road to Green Lane.
- **YRT Route 520:** Serves as a community transit route in the Town of Newmarket. The buses start and end at the Upper Canada Mall on every run. As part of this route, buses travel on Yonge Street from Davis Drive to south of Green Lane.
- **YRT Route 521:** Serves as a community transit route in the Town of Newmarket. The buses start and end at the Upper Canada Mall on every run. As part of this route, the buses travel on Yonge Street from Davis Drive to south of Green Lane.

7.1.1.2 Viva

The Viva Blue route services Yonge Street from the TTC Finch Terminal in the City of Toronto to the Newmarket GO Terminal at Davis Drive and Eagle Street. The frequency of service is ten minutes during the AM and PM peak periods and fifteen minutes in the off-peak periods. The stops along Yonge Street within the study area are as follows:

- Town of Richmond Hill: 19th/Gamble, King Road, and Bloomington Road;
- Town of Aurora: Henderson Drive, Golf Links Drive, Wellington Street, and Orchard Heights Boulevard; and
- Town of Newmarket: Mulock Drive, Eagle St and Newmarket GO Terminal at Davis Drive and Eagle Street.

7.1.1.3 GO Transit

Within the Corridor, GO Transit operates one rail service which is the Barrie Line running between Toronto Union Station and Barrie. There are four GO Transit Terminals in proximity to the study area, which are listed below.

- **East Gwillimbury GO Rail Station on Green Lane** – Located on Green Lane at 2nd Concession in East Gwillimbury.. GO trains operate on 30 minute headways during the weekday AM and PM peak periods, and there is no off-peak train service to this station. There is GO Bus Service to the terminal throughout the day.
- **Newmarket GO Bus Terminal** - Located on Davis Drive at Eagle Street, west of Yonge Street in Newmarket. This terminal is shared with York Region Transit.
- **Newmarket GO Train Terminal** - Located on Davis Drive east of Main Street, this terminal serves the train services on the Barrie Line. GO trains operate on 30 minute headways during the weekday AM and PM peak periods and there is no off-peak train service to this station. There is GO Bus Service to the terminal throughout the day.
- **Aurora GO Train Terminal** - Located on Wellington Street, east of Yonge Street in Aurora, this terminal serves the train services on the Barrie Line. GO trains operate on 30 minute headways during the weekday AM and PM peak periods. There is no off-peak train service to this station. There is GO Bus Service to the terminal throughout the day.

GO Transit operates the Newmarket 'B', Newmarket 'B' Express, and Newmarket-York University bus routes along Yonge Street within the Study Area. The frequency of the Newmarket 'B' bus service has been reduced significantly with the introduction of the Viva service in the Fall of 2005. An express bus service on Highway 404 operated by GO Transit was discontinued in 2006.

7.1.1.4 Park and Ride

There are park and ride lots located sporadically throughout the study area, all offering free parking to transit patrons. The following park and ride lots and their location are summarized below.

- **Aurora Community Centre** – Located on Aurora Heights Drive, one block north of Wellington Street;
- **Aurora GO Station** – Located on Wellington Street east of Yonge Street, provides 570 parking spaces;

- **Newmarket GO Bus Terminal** – Located at Davis Drive and Eagle Street, with 331 parking spaces;
- **Newmarket GO Station** – Located at Davis Drive and Main Street, accommodates 265 parking spaces; and
- **East Gwillimbury GO Station** - Located on Green Lane east of 2nd Concession Road, with approximately 640 parking spaces.

There are also carpool lots located at Aurora Sideroad and Highway 404; and Davis Drive and Highway 404.

7.1.2 Existing Transit Volumes

The Viva Blue route is a limited stop express type transit service and is primarily used by commuters travelling south in the morning and north in the evening. As of Spring 2008, this route carried an average of 2,000 passengers in the morning peak (3 hour) period. As shown on **Figure 7-2**, ridership on this route is higher in the south part of the Region than the north part, with the peak demand occurring between Highway 7 (where there are a large number of transfers from the main east-west Viva service) to the Finch subway station.

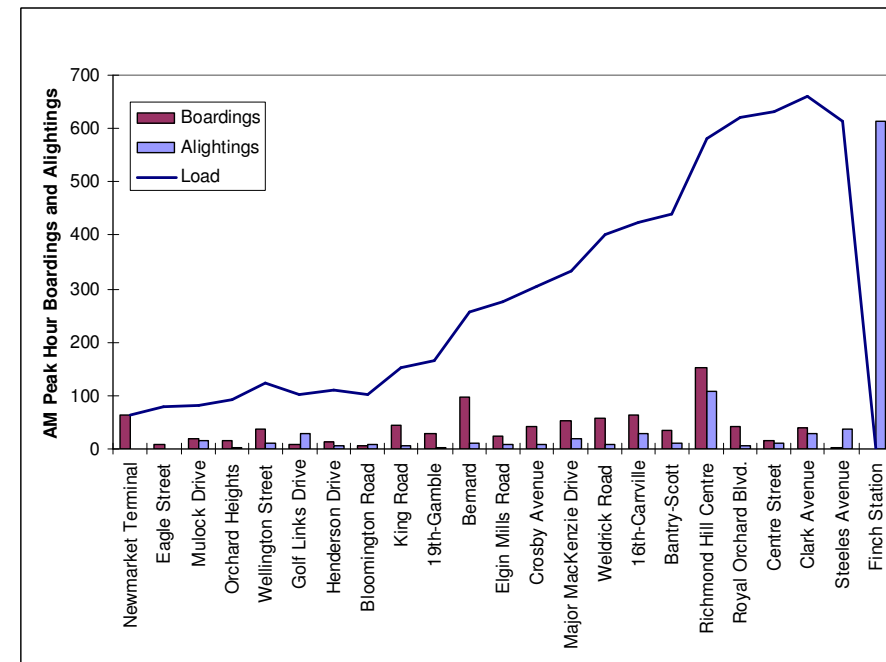


Figure 7-2
Existing (2008) Viva Blue Southbound AM Peak Hour Ridership Patterns

7.1.3 Existing Transit Performance

Existing transit performance can be quantified by looking at transit speeds for the current Viva service which operates on Yonge Street. **Figure 7-3**

plots the average AM Peak Period speed by location along the Viva Blue service (including dwell times at the upstream station). Within the North Yonge Street study area, average speeds range from 20 km/hr to 50 km/hr. Speeds are slowest through Aurora where Yonge Street is four lanes with no exclusive turning lanes.

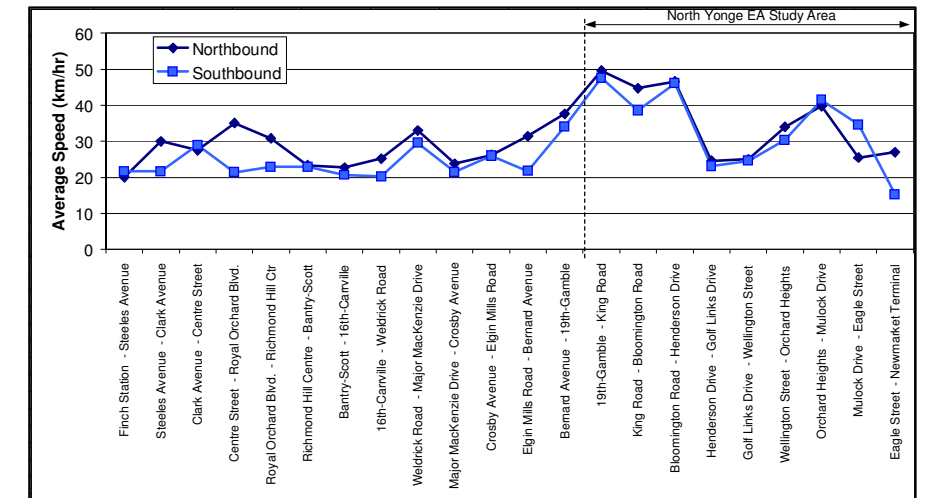


Figure 7-3
Average Speed for Existing Viva Blue Service

7.1.4 Pedestrian and Cycling Accesses within the Corridor

Sidewalks exist on the majority of arterial roadways within the study area. Pedestrian and cycling demands are a function of the amount of development and transit facilities adjacent to the road network. York Region completed and approved a cycling master plan in 2007. The existing and previously proposed cycling routes within the study area, as well as the candidate cycling routes from the pedestrian and cycling master plan study are listed in **Table 7-1**.

Table 7-1
Cycling Routes in the Corridor

Municipality	Candidate Cycling Routes	Existing and Previously Proposed Cycling Routes
Town of East Gwillimbury		Green Lane (east of Yonge St)
Town of Newmarket	Davis Dr Mulock Dr Ontario Hydro Corridor (north of Mulock Dr)	Bonshaw Ave/London Rd Millard Ave Mulock Dr Savage Rd
Town of Aurora	Wellington St	Orchard Heights Blvd/Batson Dr Aurora Heights Dr/Mark St Kennedy St Dunning Ave/Golf Links Rd Edward St Allaura Blvd/Henderson Dr

Municipality	Candidate Cycling Routes	Existing and Previously Proposed Cycling Routes
		Industrial Pkwy/Trail Hunter's Glen Rd/Elderberry Tr
Town of Richmond Hill	Bloomington Rd King Rd Sunset Beach Rd Stouffville Rd Gamble Rd	Coon's Rd Blackforest/Worthington Ave Maple Grove Ave/Ashfield Dr North Lake Rd/Aubrey Ave Estate Garden/Old Colony Rd Tower Hill Rd

Source: Pedestrian and Cycling Master Plan Study, York Region, 2007

7.1.5 Existing Roadway Network

The roadways of the routes carried forward for further evaluation from Chapter 6 are described in this section.

Yonge Street is an arterial roadway extending from Lake Ontario in Toronto to north of York Region and beyond. Within the study area, Yonge Street, from 19th Avenue to Green Lane is an arterial roadway under the jurisdiction of York Region, except for a section from the GO Transit overpass north of Industrial Parkway to the St. Andrew's College entrance which is under the jurisdiction of the Town of Aurora.

Throughout the study area, Yonge Street consists of four basic traffic lanes. The entire length of Yonge Street through the study area has a centre left-turn lane, with the exception of the 1.5 km section through downtown Aurora between Golf Links Drive and Aurora Heights Drive.

Davis Drive (formerly known as Highway 9) is an east/west arterial roadway under the jurisdiction of York Region and located within the Town of Newmarket. The study area extends from Eagle Street to west of Highway 404. The road generally consists of four lanes, with left turn lanes provided at very few intersections.

Green Lane is a four lane arterial roadway in the Town of East Gwillimbury, operated under the jurisdiction of York Region. Green Lane currently functions as a major by-pass route connecting Highway 404 and Yonge Street.

Industrial Parkway is a two lane collector roadway in the Town of Aurora, which potentially serves as a bypass to Yonge Street, however it terminates at St. John's Sideroad in the north.

Main Street North acts as an arterial roadway within the study area, from Davis Drive to Green Lane, where it is known as 2nd Concession. It is a two lane roadway that has access to a number of residential areas.

Bayview Parkway is a local roadway that intersects with Davis Drive and continues north providing access to residential areas. This roadway does not continue through to Green Lane.

Eagle Street is a collector roadway that intersects with Yonge Street and Davis Drive. It is a two lane roadway and is the current route for Viva vehicles travelling from Yonge Street to the Newmarket GO Bus Terminal at the Davis Drive and Eagle Street intersection.

7.1.5.1 Peak Traffic Periods

The North Yonge Street Corridor for the most part experiences peak travel demands during the weekday AM and PM peak hours associated with commuter/work related travel. Several sections of the corridor also generate traffic and pedestrian movements associated with retail/commercial development such as the section between Mulock Drive and Green Lane. Other areas are mainly residential and provide neighbourhood access.

Generally, the off peak time frames are significantly lower in comparison to the AM and PM peak hours. However, given the high density commercial/retail area between Mulock Drive and Green Lane, and along Davis Drive east of Yonge Street, turning movement volumes during the mid peak period are relatively high and at Davis Drive in particular, some of the turning movements are higher during the mid peak period compared to the AM peak hour. For consistency purposes the AM and PM peak hour have been analysed for the entire corridor. The Saturday peak hour, which occurs mid afternoon was analysed for the section of Yonge Street between Mulock Drive and Green Lane to capture the higher turning movement volumes in/out of the commercial/retail areas.

7.1.5.2 Existing Right-of-Ways

Existing right-of-way (ROW) widths vary substantially along the roadways within the study area depending on the function of the roadway and whether over the years property acquisition through road widening and redevelopment has taken place, which would affect the width.

7.2 NATURAL ENVIRONMENT

This section describes the existing conditions in the study area related to natural sciences, including physiography and soils, geology/hydrogeology, aquatic habitat and communities, vegetation and vegetation communities, wildlife and wildlife habitat, and designated natural areas. The detailed description of the Natural Environment is presented in **Appendix C, Natural Sciences Report**. A summary of the main Natural Environment features is presented in **Figure 3-11** in Chapter 3 of this ESR.

7.2.1 Horizontal Groundwater Movement

The physical setting of the study area indicates that the water table surface can be interpreted to be a subtle reflection of the ground surface topography. Groundwater in the study area will tend to move in the local downslope direction. In areas where a surface watercourse is present, the shallow groundwater flow will be toward the surface watercourse. Shallow groundwater flow can also be impacted by the presence of underground service trenches, which can result in complex local flow patterns.

7.2.2 Groundwater Recharge/Discharge Areas

Groundwater recharge will occur over the majority of the study area that is located along surface watercourses and their flood plains. Areas that are covered in impervious surfaces will not contribute significantly to groundwater recharge. Primary areas of groundwater recharge are located in areas of natural groundcover or where soil is exposed, e.g. open fields, grassed roadside ditches, lawns, etc...

The water table in discharge areas is usually close to or at the ground surface. Discharge areas within the study area are interpreted to occur at the surface watercourses, and adjacent flood plains. The water well database shows that there are four wells that have water levels about ground surface, and several that indicate a shallow water table condition. Refer to Section 2.2.3 of **Appendix C** for more details.

7.2.3 Well Distribution

The MOE well record database reports the historic presence of approximately 970 water supply wells along the corridor. The majority of the wells historically documented in the study area are no longer active and almost certainly have been demolished, buried over, or decommissioned following urbanization of the area. Most, if not all, residential, commercial and industrial sites are fully serviced by municipal water supplies. The Natural Sciences Report is located in **Appendix C**.

7.2.4 Aquatic Habitats and Communities

The North Yonge Street Corridor passes through a small portion of the East Humber River and Rouge River watersheds while the majority crosses through the East Holland River watershed.

7.2.4.1 East Holland River Watershed

The main branch of the East Holland River flows north from the Bloomington Road area and generally parallels the Barrie GO line to Green Lane. Several small tributaries and four larger tributaries namely; Tannery Creek, Leslie Creek, Western Creek and Bogart Creek, join the main branch. The surrounding land uses adjacent to these watercourses are predominantly residential/industrial/commercial built-up areas. This has contributed to the degradation of these streams and very few reaches can be classed as having natural aquatic habitat. Consequently, good fisheries habitat is so minimal that very few areas along these watercourses can support any game species. Sportsfish such as largemouth bass, brook trout and pumpkinseed have been recorded as being present in some sections along the main branch and at site specific locations in Tannery Creek, Leslie Creek and Bogart Creek. The only open water marsh/wetland complex in this watershed is represented by the provincially significant (PSW) Aurora McKenzie Marsh. This wetland complex is located on St. John's Sideroad, east of Yonge Street. The marsh provides significant aquatic habitat for resident and migratory species.

7.2.4.2 East Humber River Watershed

The main branch of the East Humber River flows in a westerly direction as it crosses Yonge Street at King Road. West of Yonge Street, between King Road and Bloomington Road, the watercourse is oriented in a north westerly direction as it flows toward Bathurst Street. This section of the East Humber River flows through a predominantly residential built-up area; consequently fisheries habitat is somewhat degraded and supports a baitfish and non- game fish species. The only natural habitat present along this section of the river is a locally significant wetland known as Mallard Marsh. East of Yonge Street the East Humber River watershed is characterized by several provincially significant wetlands (PSW). These include the Oak Ridges Bog, Forester Marsh-Swan Lake Wetland Complex, Wilcox Lake Bog, Wilcox-St. George Wetland Complex, Bond Lake Bog and Phillips-Bond-Thompson Wetland Complex. These areas provide the headwaters of the East Humber River and contribute significant aquatic habitat and linkage in an otherwise residential urban environment. The provincially threatened redbottom dace is known to reside in the East Humber River in the King City area.

Two un-named tributaries of the East Humber are also found in this section

of the proposed rapidway. One originates in the Wilcox-St.George Wetland Complex and crosses Yonge Street, in a south westerly direction, at Black Forest Drive. The water flow is conveyed under Yonge Street through a concrete culvert. Upstream of the crossing, the watercourse is undefined. A second tributary originates from the Phillips-Bond-Thompson Wetland Complex, south of Estate Garden Drive west of Yonge Street. The channel flows in a north westerly direction toward the East Humber River. One hundred metres north of Estate Garden Drive, the watercourse is piped underground to just south of King Road where it emerges and joins the main branch of the East Humber River. No part of this tributary crosses or is adjacent to Yonge Street.

7.2.4.3 Rouge River Watershed

The southeast section of the study area bounded by Bethesda Road, 19th Avenue, Bathurst Street and Highway 404 is drained by the Rouge River and several tributaries. The vegetated sections along these tributaries are classified as provincially significant wetlands and together form the Rouge River Headwater Wetland Complex. With the exception of these forested areas, the watercourses flow through a rural agricultural or urban environment and would provide minimal aquatic habitat.

One of these tributaries of the Rouge River, specifically Tributary 'C', originates from north of Jefferson Sideroad, west of Yonge Street. The channel flows in a south easterly direction crossing Yonge Street approximately 800 metres north of Gamble Road at Jefferson Forest Drive/Tower Hill Road. The creek flows under Yonge Street through a 2mx2m concrete box culvert. Tributary 'C' is classed as having a cold water thermal regime; however this is currently under stress from surrounding development and increased sedimentation in the watercourse.

7.2.4.4 Rare, Threatened or Endangered Aquatic Species

In the study area, fish species representative of all three temperature regimes (coldwater, coolwater and warmwater) were found to occur. Of the 29 species identified, approximately 70% fell within the cool water guild, represented predominately by Catostomids (white sucker), Cyprinids (minnows, shiners and dace) and Percids (perch and darters); 30% fell within the warm water guild including Centrarchids (bass, bluegill and pumpkinseed) and Ictalurids (brown bullhead); while only 10% fell within the cold water guild, represented by Salmonids (brook trout) and Cottids (sculpins). Overlap between the cool water and warm water guilds was evident in fish communities exhibiting Centrarchid and Cyprinid species. The overlap occurred with species having preferred temperature regimes within the 21°C to 26°C range. No species at risk were collected by the TRCA, LSRCA or MNR in any of the watercourses along the North Yonge

Street Corridor. Refer to Table 2 of **Appendix C** for a detailed listing of fish species collected at the inventoried watercourses.

7.2.4.5 Vegetation and Vegetation Communities

The study area is comprised primarily of anthropogenic communities that have resulted from past agricultural land use. A total of 18 natural/semi-natural vegetation communities were identified within the study routes. These community types include: cultural meadows, cultural thickets, cultural savannah, cultural woodlands, cultural plantations, coniferous forests, deciduous forests, meadow marshes, shallow marshes, open water aquatic, and shallow aquatic communities. Refer to Table 4 **Appendix C** for a detailed listing of vegetation communities within the corridor.

To date, a total of 291 vascular plant taxa have been recorded within the vicinity of Yonge Street, Green Lane and Davis Drive. Approximately 48 percent of the recorded flora are considered introduced and non-native to southern Ontario. Refer to Appendix A of **Appendix C** for a list of the vascular plants in the study area.

7.2.4.6 Rare, Threatened or Endangered Plant Species

Two significant (endangered and threatened) species were found within the corridor which are the Butternut (*Juglans cinerea*) tree and the Kentucky Coffee-tree (*Gymnocladus dioica*). The Kentucky coffee-tree was planted within the right-of-way (ROW) and considered to be in poor condition. The butternut tree is located south of Bond Lake and is identified as being outside of the Yonge Street ROW. Butternut is regulated by the Endangered Species Act, and cannot be harmed in any way without prior written consent from the MNR.

Several species considered regionally or locally uncommon or rare and species of concern were found within the Corridor. The vegetation communities identified within the study area are considered widespread and common in Ontario and secure globally and locally.

7.2.5 Wildlife and Wildlife Habitat

The detailed wildlife habitat assessment summary is presented in Appendix B of **Appendix C**. The habitats observed range from large areas of urbanization, agricultural fields and farming residences to isolated and often fragmented natural heritage areas of mature forests, wetlands, riparian zones, cultural thickets and cultural meadows. The most continuous patches of wildlife habitat are located along Yonge Street at the south end of the study area adjacent to and opposite from the Bond Lake area. One hundred and twelve wildlife species (14 herpetofauna, 78 birds and 20 mammal species) were recorded within the area of investigation. Most of

the wildlife biodiversity occurred in and around the natural heritage sections, especially at the south end of the study area along the Oak Ridges Moraine. Refer to Table 7 of **Appendix C** for a summary of wildlife documented in the study area.

7.2.5.1 Rare, Threatened or Endangered Wildlife Species

The recently designated Chimney Swift (*Chaetura pelagica*) was recorded within the study area and has been ranked as a threatened species by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). The milk snake, not seen during the investigation but recorded based on previous data for the area and suitable habitat types, is ranked as special concern by COSEWIC and by the Ministry of Natural Resources (MNR)/Committee on the Status of Species at Risk in Ontario (COSSARO). *The Migratory Birds Convention Act* (MBCA) protects 64 of the 78 bird species recorded. Eight species are also protected under the *Fish and Wildlife Conservation Act* (FWCA). The FWCA also protects six of the 14 herpetofaunal species recorded and 17 of the 20 mammal species. The TRCA also considers seven of the herpetofaunal species, 21 of the bird species and three of the mammal species recorded as species of concern in their jurisdiction. Thirty-one of the bird species listed are also recognized as a priority species of conservation for the York Region by Bird Studies Canada. The LSRCA does not consider any of the herpetofauna, bird or mammal species recorded as species of concern in their jurisdiction.

7.2.6 Contaminated Sites

The Contaminated Sites Report is included in **Appendix E** of the ESR. Preliminary screening information on properties that may have contributed to or have the potential to contribute to environmental contamination along proposed roadway and rail routes was obtained from an EcoLog Environmental Risk Information Service (ERIS) Report for the study area. The ERIS Report contains a summary of environmental and historical information compiled from Government and private sources for all properties within the study area. Properties located within 200m of the various route alternatives were included in the compilation of contaminated sites. Based on the information presented in the various lists, the properties were categorized as having low, moderate, or high risk potential to contribute to environmental contamination in the study area. A detailed discussion of the risk ranking scheme and the criteria used is provided in **Appendix E**. The risk ranking scheme was developed to assist in the qualitative evaluation of possible subsurface environmental risks. A detailed list and exhibit of the properties showing potential environmental concern is included in **Appendix E**. A summary of properties which represent a potential environmental concern within the study area is presented in **Table 7-2**.

Table 7-2
Total Number of Properties Representing Potential Environmental Concern

Environmental Risk Ranking	Route Alternatives
Low	108
Medium	41
High	78
Total	227

7.3 SOCIAL ENVIRONMENT

The land uses within the study area are a mix of residential, commercial, industrial, institutional and park/open spaces. For the most part, the areas adjacent/closest to Yonge Street along the entire route are characterized by commercial uses. Residential uses are generally set back from Yonge Street, but there are pockets of residential developments that front onto Yonge Street. The highest density of residences fronting onto Yonge Street is a concentration of mix residential/commercial land uses extending north from Dunning Avenue to about Wellington Street in the Town of Aurora. There are also several offices, institutional and industrial buildings fronting onto Yonge Street at various points along the corridor.

The existing land use on Davis Drive includes residential, commercial, industrial, institutional, open space, vacant lands and transportation corridors, including rail. The majority of residential uses back onto Davis Drive. While most of these residential uses are of low density, there are a few medium density dwellings located near the intersections of Huron Heights Drive and Hill Street. Most of the lands designated commercial are located near the Yonge Street, the Main Street, the Charles Street and the Leslie Street intersections with Davis Drive and adjacent to the Southlake Regional Health Centre. Most of the industrial properties are located near or adjacent to Highway 404. The largest institutional use found within the Study Area is Southlake Regional Health Centre. This hospital is located on the south side of Davis Drive between Prospect Street and Roxborough Road. Other institutional uses that fall within or near the Study Area include retirement facilities, places of worship, education facilities (e.g., secondary school, two elementary schools) and medical offices.

The existing land use along Green Lane within the Study Area is predominantly open space and vacant parcels. The areas immediately bordering the Holland River or its tributaries are often designated as Open Space. The commercial lands are located at the intersection of Yonge Street and Green Lane. A number of residents with farmland are located in the vicinity of 2nd Concession Road and the East Gwillimbury GO Station.

The rest of the land is vacant. Green Lane is currently not developed but classified as an urban buffer zone. East Gwillimbury is undergoing a review on their Official Plan as well as the Secondary Plans such that the future land use is not available.

7.3.1 Land Ownership Patterns

The North Yonge Street Corridor is a distinct and vibrant transportation corridor that encompasses a wide variety of land uses. Yonge Street has historically been a focal point for mixed-use development consisting of higher density residential, institutional, retail and highway service commercial land uses. The combination of the recently developed, and future visions, mixed-use areas with the historical centres of the past (Oak Ridges, Aurora and Newmarket) creates a mosaic of uses and densities which contributes to the unique character that makes Yonge Street the prominent choice for the development of a rapid transit corridor.

The properties in proximity to the alternative corridor alignments along the Yonge Street Corridor vary in size as the corridor itself has developed continuously over the course of history.

As indicated in TRCA's letter dated November 27, 2008 they own property within the project study limits, however the design plates indicate that the widening of Yonge Street between Gamble Road/19th Avenue and Jefferson Sideroad will not encroach onto TRCA's property on the west side. TRCA has requested that at the detailed design stage their landholdings are verified to confirm that no acquisitions will be required from the TRCA. Should acquisitions be required, contact in writing will need to be made with TRCA's Archaeologist and TRCA's Real Estate Coordinator. TRCA also noted that the land acquisition process and archaeological investigation process can be lengthy and this requirement needs to be incorporated into the timeline, if necessary.

Town of Richmond Hill

The Yonge Street corridor through Richmond Hill from 19th Avenue/Gamble Road to Bloomington Road has a mix of residential and commercial developments. The corridor in its entirety is located within the Oak Ridges Moraine, which limits development in this environmentally sensitive geological landform. Refer to **Section 3.2.1.3** of the ESR for details of the land classification within the Oak Ridges Moraine.

Town of Aurora

Yonge Street traverses through the Historic Core Community of Aurora, centering around the Wellington Street intersection. The land use surrounding the Yonge Street Corridor, from Bloomington Road to St. John's Sideroad, is primarily a mix of commercial and residential development, with some institutional. The area from Bloomington Road to

Vandorf Sideroad is classified as a settlement area under the Oak Ridges Moraine Conservation Plan.

Town of Newmarket

Traversing through Newmarket along Yonge Street from the municipal boundary with Aurora to the municipal boundary with East Gwillimbury, there is a variety of land uses in close proximity to the roadway. The corridor is made up of predominantly commercial and retail, with new residential developments backing onto the west side of Yonge Street south of Eagle Street and Mulock Drive. The York Regional Headquarters are located on the west side of Yonge Street south of Davis Drive.

Davis Drive is a highly developed corridor with the Southlake Regional Health Centre located on the south side at Prospect Street. This area is undergoing significant development including a pedestrian overpass linking medical buildings on either side of Davis Drive, as well as the construction of the Regional Cancer Centre. There are numerous commercial developments as well as some residential properties that back on to Davis Drive.

The lands surrounding Bayview Parkway and Main Street are predominantly residential with park and open space surrounding the Holland River.

Town of East Gwillimbury

The study area includes a very small portion of East Gwillimbury predominantly along Green Lane, which is currently not developed but classified as an urban buffer zone.

7.3.2 Land Use Along the Corridor

7.3.2.1 Residential Neighbourhoods

Town of Richmond Hill

There is existing residential neighbourhoods adjacent to the North Yonge Street corridor on the west side of Yonge Street south of Stouffville Road, as well as on the east side north of 19th Avenue. Through the Oak Ridges area there are several residential developments within a very close proximity to Yonge Street.

Town of Aurora

The Oak Ridges Moraine is located south of Vandorf Sideroad along the Yonge Street Corridor. Within this area, only low density residential development is permitted. There are some higher density residential complexes located in the downtown area.

Town of Newmarket

The majority of residential areas within the North Yonge Street Corridor are low density, with medium density residential areas south of Savage Road on both the east and west sides of Yonge Street. Along Davis Drive there are high-density complexes in the vicinity of Lorne Avenue as well as lower density areas further east towards Leslie Street.

7.3.2.2 Commercial Areas

The North Yonge Street Corridor provides an endless supply of commercial uses, which are a combination of large Regional shopping centres (Upper Canada mall) to big box retailers to small 'mom and pop' shops.

Town of Richmond Hill

In Richmond Hill there are some general commercial areas just north of 19th Avenue, as well as through the Oak Ridges area from Old Colony Road to Worthington Avenue.

Town of Aurora

There are three Community Commercial Centres identified along Yonge Street in the Town of Aurora's Official Plan which are: Yonge Street South, the Historic Core, and Yonge Street North. The Yonge Street South Commercial Centre extends from south of Henderson Drive north to Kennedy Street on the east side of Yonge Street and Ransom Street on the west side. This area includes a variety of car dealerships, as well as commercial plazas such as the Aurora Shopping Centre, and Aurora Village.

The Historic Core is located primarily around the Yonge Street and Wellington Street intersection. There are a variety of shops and banks within this area.

The Yonge Street North Commercial Centre includes the land on the south side of Aurora Heights Drive to those located north of Orchard Heights Boulevard. Within this area is the Aurora Heights Plaza and St. Andrew's Centre which boast a variety of clothing and general use stores.

Town of Newmarket

The Yonge Street Regional Centre in the Town of Newmarket is the major commercial area in the Town. With over 200 stores, the Upper Canada Mall, located at the intersection of Yonge Street and Davis Drive, is considered the "Regional commercial anchor" in the Town's Official Plan. To the south and north of Bonshaw Avenue is the Woodland Hills Commercial Centre, which is a large big box development including The Home Depot, Future Shop and Walmart.

Town of East Gwillimbury

Within the Town of East Gwillimbury at the northernmost boundary of the study area on the southwest and southeast corners of Yonge Street and Green Lane is located the Yonge Street Commercial Centre. On the east side of Yonge Street there is a 16 screen Famous Players Silver City Theatre, and on the west side there is the Green Lane Centre comprising of 185,000 square feet of commercial development including Costco. There are also numerous restaurants on both sides of Yonge Street in this area.

7.3.2.3 Business Areas

A wide variety of business areas exist within the North Yonge Street Corridor. There are no employment/business parks designated in Richmond Hill within the study area. The industrial/employment area in Aurora is located primarily along the Industrial Parkway corridor. The Business Park area within Newmarket is primarily between Leslie Street and Highway 404 from Mulock Drive to Green Lane, with some also located adjacent to the GO Barrie rail line. The Leslie Street Industrial Park, located just east of Leslie Street and south of Green Lane is East Gwillimbury's first fully serviced Industrial Park with a size of 90 acres.

7.3.3 Future Development Plans

Recently designated and emerging areas of land development identified within the corridor include:

- Commercial development on the west side of Yonge Street at Stouffville Sideroad;
- New high school at north-west corner of Yonge Street and Regatta Road;
- Relocated Oak Ridges Library to the north-west corner of Yonge Street and Regatta Road; and
- Commercial/residential development at the south-west corner of Bloomington Road and Yonge Street.

The Southlake Regional Health Centre on Davis Drive in Newmarket is undergoing extensive development, which involves the following:

- 4-storey parking structure at the south-east corner of Davis Drive and Prospect Street.
- 6-storey Medical Arts Building opened in 2007, located at the north-east corner of Davis Drive and Prospect Street.
- Regional Cancer Centre scheduled to open in 2009 and will have the capacity for 70,000 annual visits.

7.3.4 Recreation and Tourism Areas

The recreation and tourism areas within the North Yonge Street Corridor cater to all members of society. From the vast number of parks, community centres, arenas, and libraries to the many shopping locales, the North Yonge Street Corridor provides a plethora of activities for everyone.

There are numerous tourist attractions surrounding the North Yonge Street Corridor as it passes through the Region including shopping centres, golf courses, parks and open spaces, all of which are within a reasonable distance of the corridor itself. All of these amenities are important factors in displaying the attractiveness of a community.

Within the Oak Ridges Moraine there is the Lake St. George Conservation Area, which surrounds Lake St. George. There are three other larger lakes also situated in the Moraine which are Lake Wilcox, Bond Lake and Philips Lake. Along the Holland River there is the Sheppard's Bush Conservation Area in the Town of Aurora and the Mabel Davis Conservation Area in the Town of Newmarket.

7.3.5 Noise and Vibration

This Section presents the results of the background noise and vibration monitoring within the study area. The detailed report for these topics can be found in **Appendix I**.

7.3.5.1 Regulatory Requirements

The noise and vibration assessment protocols applicable to transit development projects were developed in consultation with various governmental agencies including the Ministry of the Environment, the Ministry's Environmental Assessment and Approvals Branch, and Central Region Office and Air and Noise Unit. The impact assessment for this project will follow the same specific protocols, which are:

- For existing/future noise, the impact will be established based on the higher of either a daytime limit of 50 dBA or existing levels, and that nighttime limits be based on the higher of either 45 dBA or existing levels, determined either by traffic noise predictions and/or measurements;
- Mitigation will be considered if the existing established sound levels at the closest receptor is exceeded by > 5 dBA;
- Stationary noise sources, if any, will be assessed in accordance with NPC-205; and
- Vibration impact to be assessed in accordance with the MOEE/TTC Protocol.

Table 3.1 of **Appendix I** summarizes the key criteria specified in the above mentioned protocols. Additional details on the protocols, NPC-205 and NPC-115, are included in Appendix A of that report.

York Region released the final traffic noise mitigation policy for regional roads in January 2008 ("Draft York Region's Standard Operating Procedures for Traffic noise Mitigation on Regional Roads"), which has been followed in the noise assessment for this project.

In general terms, the noise and vibration impact will be assessed as follows:

Traffic Noise Impact

- Establishing existing (2005) sound levels on the North Yonge Street Corridor;
- Establishing future baseline (2021) sound levels on the North Yonge Street Corridor; and
- Estimating future sound levels with the Project (i.e., with dedicated transit lanes) in 2021.

Vibration Impact

- Establishing existing (2005) vibration levels on the North Yonge Street Corridor; and
- Establishing future vibration levels due to bus rapid transit.

7.3.5.2 Sound Level Monitoring at Receptor Locations

Based on reconnaissance throughout the study area, review of zoning and land use information for the municipalities in the study area, various residential and institutional (churches, schools, seniors residences) land uses were identified. The closest receptors to Yonge Street, Davis Drive and Green Lane along the entire proposed North Yonge Street Corridor were selected for noise impact assessment to evaluate potential impact from the road widening. The receptor locations are listed in **Table 7-3** and shown in Maps 1 to 10 of **Appendix I**.

7.3.5.3 Traffic Noise Prediction Results for Existing Conditions

A summary of the traffic noise prediction results for existing conditions at the closest receptor locations along the North Yonge Street Corridor are presented in **Table 7-4**, for both daytime and nighttime. The detailed model data sheets are presented in Appendix B of the detailed report.

Table 7-3
Summary of Receptor Locations

Receptor No.	From	To	Type of House	Location of the house	Closest Daytime distance (m) to the roadway
Yonge Street					
R1	Gamble Rd.	Stouffville Rd.	Townhouses	East of Yonge St.; North of 19th Ave.	21
R2	Stouffville Rd.	King Rd.	Townhouses	East of Yonge St. -N of old colony Rd.	18
R3	North Lake Rd.	Blackforest/Worthington	Single family dwellings	East of Yonge St.; North of Ashfield Dr.	15
R4	Blackforest/Worthington	Bloomington Road	Single family dwellings	West of Yonge St.; South of Coon's Rd	27
R5	Bloomington Road	Industrial Pkwy	Seniors Residence	East of Yonge St.; North of Bloomington Rd.	44
R6	Bloomington Rd	Industrial Pkwy	Single family dwellings (Bungalow)	West of Yonge St.; South of Coon's Rd.	30
R7	Industrial Pkwy	Henderson/Allaura	Townhouses	West of Yonge St.; North of Industrial Pkwy	35
R8	Henderson/Allaura	Kennedy Street	Apartment building	West of Yonge St.; South of Kennedy St.	19
R9	Kennedy Street	Wellington Street	Retirement Residence	East of Yonge St.; North of Kennedy St.	21
R10	Wellington Street	Aurora Heights	Single family dwellings	East of Yonge St.; South of Aurora Heights Dr.	7 (15 m is used for modelling)
R11	Aurora Heights	Orchard Heights	Hotel	West of Yonge St.; North of Aurora Heights Dr.	19
R12	Orchard Heights	St. John's Sideroad	Single family dwellings	East of Yonge St.; North of Orchard Heights	66
R13	St. John's Sideroad	Mulock Drive	Seniors apartment	East of Yonge St.; North of St. John's Sideroad	15
R14	Mulock Drive	Eagle Street	Townhouses	East of Yonge St.; North of Mulock Drive	26
R15	Eagle Street	Millard Avenue	Single family dwellings	East of Yonge St.; South of Millard Ave.	84
R16	Davis Drive	London Road	Single family dwellings	East of Yonge St.; North of Davis Drive	26
R17	London Road	Bristol Road	Single family dwellings	East of Yonge St.; North of London Rd.	35
Green Lane					
R18	Yonge Street	Main Street N	Single family dwellings	North of Green Lane; East of Yonge St.	27
Davis Drive					
R19	Yonge Street	Main Street N	Semi-detached	North of Davis Drive; East of Yonge St.	42

Receptor No.	From	To	Type of House	Location of the house	Closest Daytime distance (m) to the roadway
			house		
R20	Bayview Avenue	Leslie Street	Single family dwellings	North of Davis Drive; East of Huron Heights Dr.	27

The table shows high daytime and nighttime sound levels at receptors closest to Yonge Street, Davis Drive and Green Lane in most segments of the corridor. The high existing sound levels (over 60 dBA) reflect the high traffic volumes on these roadways.

**Table 7-4
Predicted Existing Daytime and Nighttime Traffic Sound Level**

Receptor No.	From	To	Predicted Sound Level (dBA)	
			Daytime	Nighttime
Yonge Street				
R1	Gamble Road	Stouffville Road	64.3	60.6
R2	Stouffville Road	King Road	70.5	61.7
R3	North Lake Road	Blackforest/Worthington	63.4	59.6
R4	Blackforest/Worthington	Bloomington Road	63.3	55.2
R5	Bloomington Road	Industrial Pkwy	60.9	52.9
R6	Bloomington Road	Industrial Pkwy	62.9	54.3
R7	Industrial Pkwy	Henderson/Allaura	50.9	47.1
R8	Henderson/Allaura	Kennedy Street	66.4	58.1
R9	Kennedy Street	Wellington Street	66.5	58.1
R10	Wellington Street	Aurora Heights	66.5	58.1
R11	Aurora Heights	Orchard Heights	65.8	57.2
R12	Orchard Heights	St. John's Sideroad	65.1	56.7
R13	St. John's Sideroad	Mulock Drive	67.4	54.9
R14	Mulock Drive	Eagle Street	57.1	56.8
R15	Eagle Street	Millard Avenue	61.2	52.9
R16	Davis Drive	London Road	56.9	53.7
R17	London Road	Bristol Road	60.7	52.4
Green Lane				
R18	Yonge Street	Main Street N	64.6	56.7
Davis Drive				
R19	Yonge Street	Main Street N	60.8	53.3
R20	Bayview Avenue	Leslie Street	57.3	54.2

7.3.5.4 Conclusions of Noise Impact Analysis

The key conclusions of the noise impact analysis for the North Yonge Street Corridor are as follows:

- Future traffic volumes on the North Yonge Street Corridor are expected to decrease with the BRT option in place;
- Existing baseline sound levels exceed 60 dBA at most of the receptors assessed where the influence of current traffic volumes is dominant;
- The BRT option is predicted to cause a marginal decrease in noise levels at most receptors along the North Yonge Corridor, with a marginal increase in sound levels expected at only a few receptors. The increase is predicted to be between 0 and 1 dB;
- No noise mitigation measures are required as the increases in sound levels are less than the 5 dB increase required for the consideration of mitigation, as specified in the protocol approved by the MOE for this project;

7.3.5.5 Existing Vibration Levels Along the Corridor

Since the vibration levels for Yonge Street in the *Yonge Street Corridor Public Transit Improvements Environmental Assessment Report* (July 2005) was largely dependent on the pass-by vehicular traffic, the vibration levels for Yonge Street in this study is expected to be similar. The vibration analysis for this EA is based on the previous analysis carried out on Yonge Street between Steeles Avenue and Gamble Road/19th Avenue. The inferences are drawn based on previous studies and no actual measurements are needed for the current corridor since the road condition and layout are similar to the previously assessed corridor. The previous results show that there are no perceptible vibration levels from existing traffic at the closest sensitive receptor locations along the (South) Yonge Street Corridor. Most of the measured vibration levels are well below 0.1 mm/sec. This is expected since the traffic consists of rubberized-tire vehicles and the levels from such traffic are negligible unless there are some anomalies, such as an expansion joint, in the roadbed. Similar results are expected for the North Yonge Street Corridor.

7.3.6 Air Quality and Criteria

This Section presents a brief description of the results of the air dispersion modelling in order to assess the air quality within the study area. A detailed report, *Air Quality Impact Assessment*, on these topics can be found in **Appendix J**.

Air quality is usually assessed through the examination of the pollutants that are linked with a particular project. In this case, the pollutants of concern are:

- Dust, i.e. Total Suspended Particulate (TSP) which are those particles

44 microns in diameter and smaller; PM₁₀ which are those particles 10 microns in diameter and smaller; and, PM_{2.5} which are those particles 2.5 microns in diameter and smaller.

- Carbon Monoxide (CO)
- Nitrogen Dioxides (NO_x)
- Volatile Organic Compounds (VOCs) – 1, 3 butadiene, acetaldehyde, acrolein, benzene and formaldehyde

A description of each of the above noted contaminants, including the air quality criteria for each can be found in Section 2.2 of **Appendix J**.

7.3.6.1 Existing Environmental Conditions

There are three key parameters that must be taken into account are wind, temperature and atmospheric structure.

Wind

There are two significant components of wind: direction and speed. Wind direction is reported as the direction from which the wind blows and is based on surface (10m) observations. Certain directions occur more frequently than others, which are known as the prevailing wind directions. **Figure 7-4** presents a wind rose for Pearson International Airport for the years 2001 to 2005. The prevailing winds are from the north and the west, with winds blowing from these sectors approximately 45 percent of the time.

The distribution of average wind speed at the Pearson International Airport station is also presented in **Figure 7-4**. The average wind speed, based on the 2001-2005 period, is 4.0 m/s, with calms (i.e. wind speeds less than 1 m/s) occurring approximately 3.2% of the time. As wind speed increases, the concentration of dust in the air decreases as a result of dilution and good dispersion of gases and particles throughout the atmosphere.

Temperature

There are two key temperature effects that influence air quality: temperature near the surface and temperature aloft.

Temperature near the surface can greatly affect the dispersion of particulate matter. The study area is typical of the Southern Ontario lakes region with relatively cool spring and fall seasons, hot humid summers and cold, wet winters. Temperature aloft is the change in temperature vertically, which is the key controlling parameter in the dispersion of gases and particles.

Atmospheric stability is an inherent feature of the vertical temperature structure. It is a measure of the amount of vertical motion in the atmosphere, and hence the atmosphere's ability to mix pollutants. A stable atmosphere has little vertical motion (is less turbulent) and cannot disperse

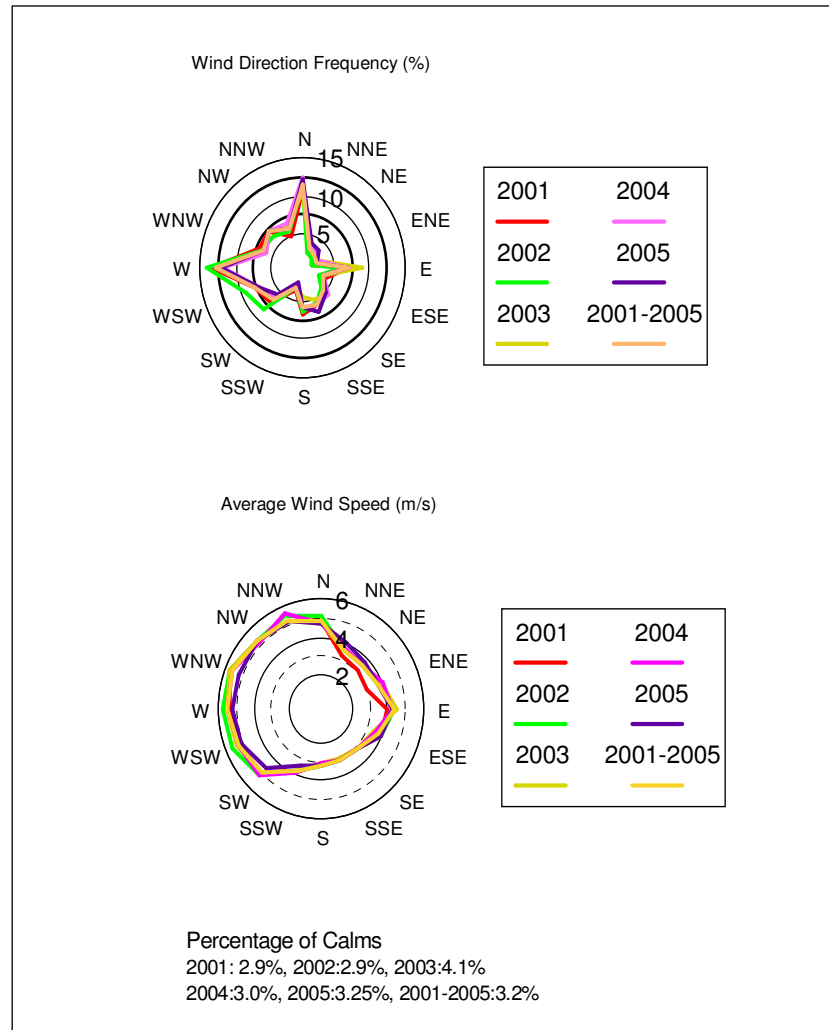


Figure 7-4
Wind Rose and Wind Speed Charts (2001-2005)

pollutants as well as a more turbulent, unstable atmosphere. A number of classification schemes have been developed for describing stability classes. The details of these classification schemes can be found in Section 2.1.3 of **Appendix J**.

Atmospheric Structure

The structure of the atmosphere is also defined by the vertical temperature change in another fundamental way: by setting a limit on the vertical dimension through which pollutants can mix. This vertical extent through which a plume of pollutants can be mixed is called the “mixing height”. In general, mixing height does not have much effect on modelled annual and 24-hour average ground level concentrations.

For 1-hour concentrations however, mixing height can be very important. Mixing height is calculated from the vertical temperature profile measured

by weather balloon ascents. The closest upper air station to Toronto is Buffalo, New York. The data measured in Buffalo, the closest upper air station to Toronto, is representative of conditions over Toronto since mixing height is a regional parameter.

The surface values and the twice-daily upper air measurements are processed through the U.S. EPA meteorological pre-processor to combine surface and upper air measurements in to the hourly mixing heights, which are required by the model. Mixing height calculated to be less than 50 metres, have been set to 50 metres.

7.3.6.2 Existing Air Quality

Historical Ambient Monitoring Data

Tables 7-5 to 7-7 outline the recent measurement history (2000 to 2004) at the Stouffville Works Yard, Newmarket, and Yonge and Hendon monitoring locations, and presents a summary of the data from the MOE sampling stations in terms of mean, 90th percentile, 1 hour maximum and 24 hour maximum values. It should be noted that the Stouffville Works Yard monitoring location operated in 2001 and was then moved to the Newmarket location where monitoring continues from 2002 until today. **Figure 7-5** illustrates the location of the three MOE air quality monitoring locations.

Table 7-5
Recent Ambient Air Quality Monitoring For PM_{2.5}

Station ID	Station Location	Averaging Time	AAQC	PM _{2.5} (µg/m ³)				
				Year				
				2001	2002	2003	2004	2005
#48002	Stouffville Works Yard	24-hr Mean	-	ND	ND	ND	ND	ND
		24-hr 90 th Percentile	-	ND	ND	ND	ND	ND
		1-hr Maximum	-	ND	ND	ND	ND	ND
		24-hr Maximum	30*	ND	ND	ND	ND	ND
		No. of Times above Proposed CWS	-	ND	ND	ND	ND	ND
#48006	Newmarket	24-hr Mean	-	ND	ND	7.3	6.4	7.7
		24-hr 90 th Percentile	-	ND	ND	14.1	14.7	19.3
		1-hr Maximum	-	ND	ND	59.0	59.0	65.0
		24-hr Maximum	30*	ND	ND	40.7	39.4	42.5
		No. of Times above Proposed CWS	-	ND	ND	4	11	12
#34020	Yonge and Hendon	24-hr Mean	-	ND	ND	8.3	7.7	9.4
		24-hr 90 th Percentile	-	ND	ND	15.6	17.3	23.7
		1-hr Maximum	-	ND	ND	67.0	69.0	65
		24-hr Maximum	30*	ND	ND	45.5	42.7	50.6
		No. of Times above Proposed CWS	-	ND	ND	7	12	19
Average Value From Three (3) Stations	24-hr 90 th Percentile	-	ND	ND	14.8	16.0	21.5	

ND = No Data
* Compliance is measured as the 98th percentile over three years, therefore 22 exceedances (2% of 365x3) of the 24-hr criteria is within compliance for three years or nominally 7 exceedances per year on average.

Table 7-6
Recent Ambient Air Quality Monitoring For Nitrogen Oxides

Station ID	Station Location	Averaging Time	AAQC	Nitrogen Oxides (µg/m ³)				
				Year				
				2001	2002	2003	2004	2005
#48002	Stouffville Works Yard	24-hr Mean	-	40	ND	ND	ND	ND
		1-hr 90 th Percentile	-	75	ND	ND	ND	ND
		24-hr 90 th Percentile	-	70	ND	ND	ND	ND
		1-hr Maximum	400	403	ND	ND	ND	ND
		24-hr Maximum	200	183	ND	ND	ND	ND
		No. of Times above 1-hr AAQC	-	1	ND	ND	ND	ND
#48006	Newmarket	24-hr Mean	-	ND	28	27	25	23
		1-hr 90 th Percentile	-	ND	58	60	56	47
		24-hr 90 th Percentile	-	ND	52	54	53	39
		1-hr Maximum	400	ND	391	468	489	324
		24-hr Maximum	200	ND	173	197	124	206
		No. of Times above 1-hr AAQC	-	ND	1	7	4	17
#34020	Yonge and Hendon	24-hr Mean	-	69	63	62	53	57
		1-hr 90 th Percentile	-	145	128	132	115	119
		24-hr 90 th Percentile	-	121	112	117	102	99
		1-hr Maximum	400	803	736	743	642	803
		24-hr Maximum	200	238	362	291	260	300
		No. of Times above 1-hr AAQC	-	41	32	33	21	35
Average Value From Three (3) Stations	1-hr 90 th Percentile	-	110	93	96	86	83	
	24-hr 90 th Percentile	-	95	82	86	78	69	

ND = No Data

The tables indicate that historically CO has been well within the accepted standards. NO_x and PM_{2.5} have exceeded the standard from time to time by as much as double the allowable concentration (usually during smog events). PM₁₀ has not been measured at these locations during the past five years. In summary, the historical data indicates a reasonably clean typical urban/suburban airshed with occasional smog periods during which air quality is significantly compromised. In Ontario, the smog season occurs from May through September, with most events of compromised air quality occurring due to transboundary pollution from polluted air masses that migrate from the Ohio Valley in the United States.

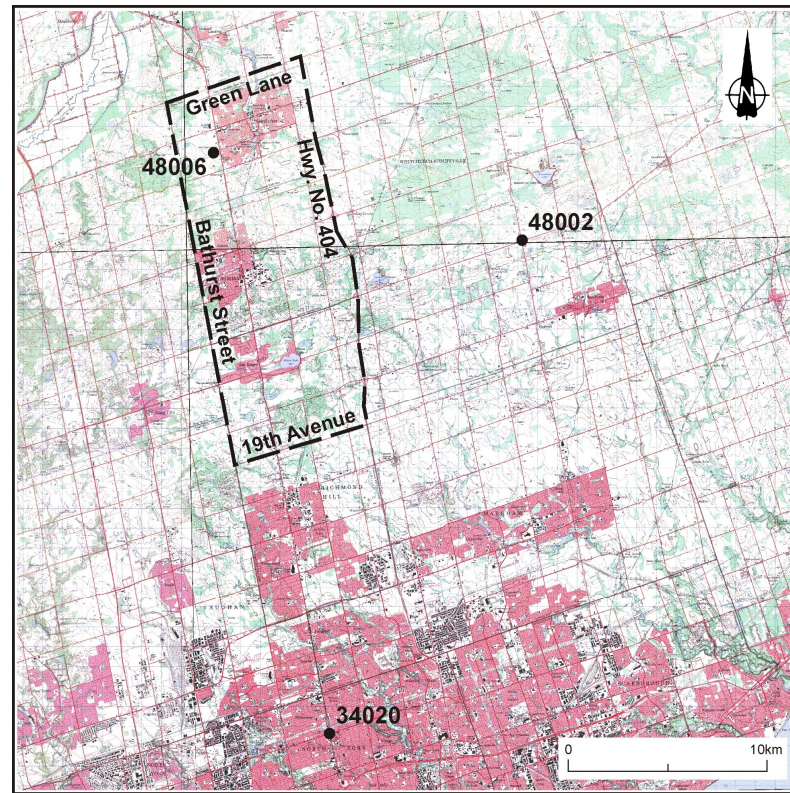


Figure 7-5
MOE Monitoring Stations

Table 7-7
Recent Ambient Air Quality Monitoring For Carbon Monoxide

Station ID	Station Location	Averaging Time	Carbon Monoxide (µg/m³)					
			AAQC	Year				
				2001	2002	2003	2004	2005
#48002	Stouffville Works Yard	8-hr Mean	-	ND	ND	ND	ND	ND
		8-hr 90 th Percentile	-	ND	ND	ND	ND	ND
		8-hr 90 th Percentile	-	ND	ND	ND	ND	ND
		1-hr Maximum	36,200	ND	ND	ND	ND	ND
		8-hr Maximum	15,700	ND	ND	ND	ND	ND
		No. of Times above 1-hr AAQC	-	ND	ND	ND	ND	ND
#48006	Newmarket	8-hr Mean	-	ND	610	495	467	ND
		1-hr 90 th Percentile	-	ND	973	813	721	ND
		8-hr 90 th Percentile	-	ND	962	802	717	ND
		1-hr Maximum	36,200	ND	2,577	8,074	4,134	ND
		8-hr Maximum	15,700	ND	1,636	1,938	1,570	ND
		No. of Times above 1-hr AAQC	-	ND	0	0	0	ND
#34020	Yonge and Hendon	8-hr Mean	-	ND	ND	ND	ND	ND
		1-hr 90 th Percentile	-	ND	ND	ND	ND	ND

	8-hr 90 th Percentile	-	ND	ND	ND	ND	ND
	1-hr Maximum	36,200	ND	ND	ND	ND	ND
	8-hr Maximum	15,700	ND	ND	ND	ND	ND
	No. of Times above 1-hr AAQC	-	ND	ND	ND	ND	ND
Average Value From Three (3) Stations	1-hr 90 th Percentile	-	ND	973	813	721	ND
	24-hr 90 th Percentile	-	ND	962	802	717	ND

ND = No Data

Note: All measured 8-hour values are based on three 8-hr periods during a 24-hr day and not 'rolling' 8-hr periods.

7.3.6.3 Background Concentrations

Background concentrations represent the extra contribution from sources that are not included in the dispersion model, such as upwind industrial facilities, other roadways not included in the modelling, transboundary contaminants, etc. To evaluate the accuracy of the established background values, contaminant concentrations are predicted at the MOE Newmarket monitoring station, which is within the study area, and compared to monitoring station data.

The background concentrations have been estimated conservatively high and are listed on Tables 7-8 to 7-10.

Table 7-8
24-Hour Background Particulate Concentrations (µg/m³)

Pollutant	TSP *	PM ₁₀ *	PM _{2.5} *
Background	86	43	21.5
AAQC	120	50	30

Note: * TSP and PM₁₀ concentrations were estimated by doubling the measured PM_{2.5} concentration (TSP:PM₁₀:PM_{2.5} = 4:2:1)
AAQC – Ambient Air Quality Criteria

Table 7-8 shows that the estimated background particulate concentrations are approximately 70% to 85% of the AAQC.

Table 7-9
Background NO_x and CO Concentrations (µg/m³)

Pollutant	NO _x 1-hr	NO _x 24-hr	CO 1-hr	CO 8-hr
Background	110	95	973	962
AAQC	400	200	36,200	15,700

Note: AAQC – Ambient Air Quality Criteria

Table 7-9 shows that the CO concentrations are well within the AAQC; however, the 90th percentile 24-hr NO_x concentration is approximately 50% of the AAQC. With most of the vehicular emissions, NO_x consists of, but not limited to, NO₂ and NO. For the purpose of this project, all NO_x was

considered to be NO₂ whereas, typically, approximately 25% of the NO_x in the southern Ontario atmosphere occurs as NO₂.

Table 7-10
Conservative Background VOC Concentrations (µg/m³)

Pollutant	Acetaldehyde		Acrolein		Benzene		1,3-Butadiene		Formaldehyde	
	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr	1-hr	24-hr
Background	4.0		0.7		44		21		6	
AAQC	500	500	0.2*	0.08	carc	carc	n/a	n/a	n/a	65

Note: AAQC – Ambient Air Quality Criteria

* Value converted from ½-hr to 1-hr

carc = carcinogen

Table 7-10 shows the urban concentrations measured in major cities similar to Toronto as the VOCs considered for this study are not generally monitored at any of the representative MOE Stations. The actual background concentrations are expected to be lower and considered to be a reasonable worst case background concentration.

7.3.6.4 Predicted Atmospheric/Vehicle Emissions

Traffic Volumes

The rate of contaminant emissions from a section of road is proportional to the number, type and speed of vehicles travelling along that road as well as vehicle speed. Hourly traffic flows for all major roads within the study area were calculated based on average daily traffic flows along with average weekday and weekend hourly traffic profiles.

Vehicle Emissions

All pollutants considered in this study are emitted in vehicle exhaust. Additionally, particulate (TSP, PM₁₀ and PM_{2.5}) are emitted from the roadway surface as a result of tire/break wear, and re-suspension of surface dust by (1) the action of the tires on the surface and (2) the wake created by the passing of the vehicle. Both tailpipe and mechanically generated fractions of particulate were included in this study. Tailpipe emissions from vehicles are a function of many variables. Some of the more important parameters are listed below.

- age of the vehicle (newer vehicles emit less);
- number of kilometres which the vehicle has driven;
- emission control equipment that may have been tampered with;
- type of fuel (gasoline, diesel);
- Reid Vapour Pressure (RVP) of gasoline used (adjusted seasonally);
- ambient air temperature;
- vehicle speed;
- rate of acceleration;

- time spent idling;
- type of vehicle (automobile, light truck, heavy truck, bus, etc.); and
- cold or hot start mode.

Vehicular emissions are generally estimated by using emission factors in units of mass of contaminant emitted per vehicle, per distance travelled. To obtain a mass emission rate for a particular road section, the length of the road section is multiplied by the number of vehicles using that section to obtain the total number of vehicle kilometres travelled (VKT). The VKT are then multiplied by the appropriate emission factors.

The vehicular emission rates were estimated for existing conditions (2005) and for the future year 2021, and are summarized in **Tables 7-11 and 7-12**, respectively.

Table 7-11
MOBILE6C Tailpipe Emission Factors for Existing Conditions (2005)

Cars					
Speed (km/h)	TSP	PM10	PM2.5	NOX	CO
Idle	0.129	0.129	0.086	4.71	68.90
60	0.032	0.032	0.022	1.58	15.03
70	0.032	0.032	0.022	1.72	15.50
80	0.032	0.032	0.022	1.72	15.50
100	0.032	0.032	0.022	1.72	15.50
Speed (km/h)	Benzene	Acetaldehyde	Formaldehyde	1,3 Butadiene	Acrolein
Idle	0.1309	0.0220	0.0519	0.0164	0.0028
60	0.0210	0.0035	0.0081	0.0026	0.0004
70	0.0208	0.0034	0.0080	0.0026	0.0004
80	0.0208	0.0034	0.0080	0.0026	0.0004
100	0.0208	0.0034	0.0080	0.0026	0.0004
Trucks					
Speed (km/h)	TSP	PM10	PM2.5	NOX	CO
Idle	0.680	0.680	0.590	14.96	7.05
60	0.170	0.170	0.148	5.64	0.88
70	0.170	0.170	0.148	6.69	0.94
80	0.170	0.170	0.148	6.69	0.94
100	0.170	0.170	0.148	6.69	0.94
Speed (km/h)	Benzene	Acetaldehyde	Formaldehyde	1,3 Butadiene	Acrolein
Idle	0.0161	0.0442	0.1201	0.0094	0.0054
60	0.0026	0.0071	0.0193	0.0015	0.0009
70	0.0025	0.0069	0.0189	0.0015	0.0008
80	0.0025	0.0069	0.0189	0.0015	0.0008
100	0.0025	0.0069	0.0189	0.0015	0.0008

Note: Emission factors are in g/hr for idle emissions and g/VKT for all indicated speeds.

Table 7-12
MOBILE6C Tailpipe Emission Factors for Future Conditions (2021)

Cars					
Speed (km/h)	TSP	PM10	PM2.5	NOX	CO
Idle	0.070	0.070	0.033	0.80	34.36
60	0.017	0.017	0.008	0.26	7.68
70	0.017	0.017	0.008	0.28	7.93
80	0.017	0.017	0.008	0.28	7.93
100	0.017	0.017	0.008	0.28	7.93
Speed (km/h)	Benzene	Acetaldehyde	Formaldehyde	1,3 Butadiene	Acrolein
Idle	0.0471	0.0082	0.0177	0.0053	0.0009
60	0.0080	0.0014	0.0029	0.0009	0.0002
70	0.0080	0.0014	0.0029	0.0009	0.0002
80	0.0080	0.0014	0.0029	0.0009	0.0002
100	0.0080	0.0014	0.0029	0.0009	0.0002
Trucks					
Speed (km/h)	TSP	PM10	PM2.5	NOX	CO
Idle	0.111	0.111	0.066	1.50	1.01
60	0.028	0.028	0.017	0.57	0.13
70	0.028	0.028	0.017	0.68	0.14
80	0.028	0.028	0.017	0.68	0.14
100	0.028	0.028	0.017	0.68	0.14
Speed (km/h)	Benzene	Acetaldehyde	Formaldehyde	1,3 Butadiene	Acrolein
Idle	0.0069	0.0189	0.0514	0.0040	0.0023
60	0.0011	0.0030	0.0083	0.0006	0.0004
70	0.0011	0.0030	0.0081	0.0006	0.0004
80	0.0011	0.0030	0.0081	0.0006	0.0004
100	0.0011	0.0030	0.0081	0.0006	0.0004

7.3.6.5 Air Dispersion Modelling Approach

An atmospheric dispersion model was used to calculate the concentration at a given location near an emissions source. These models take the emissions from a source and disperse them into the surrounding area, typically using historical hourly meteorological data from a local weather station. The model used for this study was CAL3QHCR, which is described in Section 4.2 of the detailed technical report in **Appendix J**. It was run using five years of meteorological data for ten contaminants over the three scenarios to determine maximum contaminant concentrations at sixteen sensitive receptors. Two sets of receptors were placed along the road. In addition to the modelling grid, a series of sixteen discrete/sensitive receptors were chosen to help summarize the modelling results and at which a comparison was made to applicable criteria.

7.3.6.6 Conclusions of Air Quality Analysis

The analysis results shows that within the study area, when compared to future without transit improvements (2021), future air quality with transit improvements (2021) will result in:

- a small net decrease for all gaseous pollutant concentrations including greenhouse gases throughout the study area; and,
- a small net decrease in particulate based pollutant concentrations throughout the study area.

Overall, implementation of the proposed transit improvements will slightly mitigate future transportation related air quality impacts within the study area.

The results also show that compared to existing conditions (2005) for both future-with and without transit improvements (2021), air quality will slightly improve for gaseous pollutants due to newer engine technologies and fuels despite the predicted increase in traffic due to population growth, but will slightly deteriorate for particulate based compounds due to increased traffic flows.

7.4 CULTURAL ENVIRONMENT

This section provides a synopsis of the historical development of the study corridor and identifies built heritage features and cultural landscape units that may be affected by the project.

7.4.1 Environmental Assessment and Cultural Heritage Resources

7.4.1.1 19th Century Development

Yonge Street was planned by Lieutenant-Governor John Graves Simcoe as a military road to connect York (Toronto) on Lake Ontario to the naval base at Penetanghishene on Georgian Bay. Augustus Jones surveyed the route in the winter and spring of 1794 and 200 acre lots were laid out on either side of the right-of-way. By August of 1794, Yonge Street had been opened to just below Thornhill with the labour of the Queen's Own Rangers and settlers. Simcoe then arranged with William Von Berczy that he would contract the construction of a wagon road from York to Holland Landing for the end of 1795 in exchange for land in the Thornhill area and in Markham Township. Berczy defaulted and by the end of 1795 Simcoe had arranged for Augustus Jones to complete Yonge Street. Jones and the Queen's Rangers completed Yonge Street to Lake Simcoe early in 1796, although it

was in very poor condition and impassable in many areas.

Between 1799 and 1812 the Northwest Company used the Yonge Street route and contributed money to improve the road conditions. By the late 1820s, Yonge Street was a regular stagecoach route from York to Holland Landing. The stagecoach trade ensured the economic prosperity of the early Yonge Street communities like Thornhill, Langstaff and Richmond Hill. It was established as a toll road in 1831 and portions were macadamized and toll-gates were built. The provincial government took over the upkeep of the road in 1846. By 1850 Yonge Street was macadamized as far as Holland Landing.

With the introduction of the railway in 1853 Yonge Street's monopoly on the north-south trade as the only viable overland transportation route was dealt a severe blow, threatening the livelihoods of the communities along its route. The new railway line bypassed both Thornhill and Richmond Hill on the west. The stagecoach service died out in the late 19th century. The interurban electric railway was established along Yonge Street from Toronto in the late 1890s serving many communities including Richmond Hill and Thornhill.

A number of individuals and groups who participated in the survey and construction of Yonge Street settled on land adjacent to the road. They included Provincial Land Surveyor Augustus Jones, members of the Queen's (York) Rangers, Berczy settlers, Mennonites, Comté de Puissaye settlers, Quakers and United Empire Loyalists. Thornhill, Langstaff and Richmond Hill in Vaughan and Markham Townships were early settlements along the road.

Richmond Hill, Langstaff and Thornhill are the three principal areas of settlement that were established in the early nineteenth century within the Yonge Street study corridor. Further detailed historical facts can be found in **Appendix G**.

7.4.1.2 Identification of Built Heritage Features and Cultural Landscapes

The Ministry of Culture (MCL) describes heritage buildings and structures, cultural heritage landscapes and archaeological resources as cultural heritage resources.

MCL Guidelines state two basic ways of visually experiencing cultural heritage resources in the environment: as cultural heritage landscapes and as built heritage features. Cultural heritage landscapes are a geographical area perceived as a collection of individual person-made built heritage features set into a whole such as historical settlements, farm complexes, waterscapes, roadscape, and railways. They emphasize the inter-

relationship of people and the natural environment, and convey information about the processes and activities that have shaped a community. Built heritage features are individual, person-made or modified, parts of a cultural heritage landscape such as buildings or structures of various types, cemeteries, planting and landscaping structures, etc.

The cultural heritage resources in the study area include those aboveground, person-made heritage features over 40 years old. The application of this rolling forty-year principle is an accepted federal and provincial practice for the preliminary identification of cultural heritage features that may be of heritage value. Its application does not imply however that all built heritage features or cultural landscapes that are over 40 years old are worthy of the same levels of protection or preservation.

For the purposes of built heritage feature and cultural heritage landscape identification, the following section provides a brief description of the existing environment, the principal built heritage features and the principal cultural heritage landscapes identified within the North Yonge Street Corridor Study Area including the alternative alignments.

7.4.1.3 Description of the Existing Environment

The North Yonge Street Corridor has historically provided a focus for mixed-use development comprised of a combination of low-medium density residential, institutional, retail and highway commercial land uses. There is a mix of recently planned mixed-use areas and historic cores (Aurora and Newmarket) that incorporate a variety of uses and development densities. Recently designated or emerging mixed-use areas identified in the study area include the designated regional centre in Newmarket (between Mulock Drive and Green Lane), Yonge Street through Aurora and Main Street in Newmarket.

In general, the North Yonge Street Corridor mixed-use development is bounded by stable low-density residential development. The most significant emerging mixed-use area of North Urban Development Area is in the Oak Ridges/Lake Wilcox area of Richmond Hill.

Historical centres of settlement along Yonge Street within the study area include the former village centres of Aurora, and Main Street and Davis Drive in Newmarket. These areas are important to the local community and have historic streetscapes and the local plans promote their retention and enhancement. Vestiges of former crossroads settlements are found at King Road and Yonge Street (Oak Ridges) and Jefferson Sideroad and Yonge Street (Jefferson). The Bond Lake area has traces of the former summer/recreational community that flourished in the area in the early to mid 20th century.

Two railway lines are located within the study area, namely, CN Rail's Bala subdivision to the east and the GO Transit Barrie line. Both lines form an integral part of CN's and GO's mainline network and are significant built features and cultural heritage landscapes within the study area.

A part of the Oak Ridges Moraine is located within the study area, principally between 19th Avenue/Gamble Road in the Town of Richmond Hill and just south of Wellington Street in the Town of Aurora. It has a unique composition of environmental, geological and hydrological features that make its ecosystem vital to southern-central Ontario.

The Directory of Cemeteries in the Municipality of Metropolitan Toronto and the Regional Municipality of York indicates several cemeteries along Yonge Street that are no longer visible. They include: the Hughes Burial Ground located in Newmarket on the east side of Yonge Street north of Mulock Drive; and in the Town of Aurora three sites, namely, No. 58 Yonge Street, the Harman Burying Ground on the west side of Yonge Street south of Murray Drive; and, the Graham Family Cemetery on Lot 77, Concession 1E.

7.4.1.4 Description of the Identified Built Heritage Resources and Cultural Heritage Landscapes

Table 7-13 lists both the cultural heritage landscapes (CHL) and the built heritage resources (BHR) that were identified as standing within or adjacent to the North Yonge Street Corridor study area. In total there were 11 CHL's identified and 33 BHR's identified

Table 7-13
Identified Cultural Heritage Landscapes and Built Heritage Resources in the Corridor

Site No.	Resource Type	Category	Location/Description
1	CHL	Farm Complex	No. 574 Green Lane, north side at top of Main Street North, Town of East Gwillimbury
2	BHR	Residence	No. 1786? Yonge Street, east side, Town of Newmarket. 19th C. brick residence with Gothic Revival details. Plaque on building noting "Summit View". Set close to Yonge Street.
3	BHR	House	309 Davis Dr., Early 1900's, 2 storey brick residence with a front gable roof
4	BHR	House	330 Davis Dr., circa 1900, 1 ½ storey brick residence
5	BHR	House	338 Davis Dr., 19 th Century, 1 ½ storey brick residence
6	BHR	House	345 Davis Dr., late 1890's/early 1900's vernacular brick residence
7	BHR	House	355 Davis Dr. circa 1900, 2 storey frame residence with alterations
8	BHR	House	359 Davis Dr. circa 1900, 2 storey frame residence with front gable roof
9	BHR		371 Davis Dr. Listed as a heritage building by the Town of Newmarket

Site No.	Resource Type	Category	Location/Description
10	BHR		383-385 Davis Dr. 2 storey double 19 th Century residence with side gable roof
11	BHR	Bridge/culvert	Immediately west of 435 Davis Dr.
12	BHR	Residence	415 Davis Dr. nw corner of Main St. and Davis Dr. Early 20 th Century. Listed as a heritage building by the Town of Newmarket.
13	BHR	Commercial	425 Davis Dr. ne corner of Main St. and Davis Dr. Former Union Hotel, plaque on building notes date of 1881. Set very close to Davis Drive and Main Street North right-of-ways. Listed as a heritage building by the Town of Newmarket.
14	BHR	Commercial	431 Davis Dr. Building linked with 425 Davis Dr.
15	BHR	Former Railway Station	450 Davis Dr. Built in 1899 and set far back from Davis Dr. Designated municipally under the Ontario Heritage Act.
16	CHL	Railscape	ROW at Davis Dr. of Ontario, Simcoe and Huron Railway, later Northern Railway and Canadian National. Built in 1853.
17	CHL	Waterscape	Tributary of the East Holland River crossing Davis Drive east of railway tracks in Town of Newmarket. The Keith Bridge crosses over the former Newmarket Canal, which was originally conceived to assist the Newmarket District by linking it to Lake Simcoe and the Trent-Severn Waterway. Begun in 1906 and almost completed, the project was cancelled in 1912 by the federal Government. The area known as Lock 3, the area to the north was constructed as a turning basin for vessels. Remnants of the original solid limestone walls for the turning basin are still existent and according to original bridge drawings the abutments for Lock 3 are in place beneath the riverbed. Not designated.
18	BHR	Residence	556-558 Davis Dr. Vernacular 19 th Century 2 storey residence with side gable roof and eaves returns.
19	BHR	Residence	560 Davis Dr. Late 19 th Century 1 ½ storey residence with front gable roof.
20	BHR	Residence	564 Davis Dr. Post World War II.
21	BHR	Residence	568 Davis Dr. Vernacular 19 th Century 1 ½ storey front gable residence cladding, re clad in modern siding (2008).
22	BHR	Residence	572 Davis Dr. Early 19 th Century 1 ½ storey frame residence with a cross gable roof. Listed as a heritage building by the Town of Newmarket.
23	BHR	Residence	631 Davis Dr. 20 th Century 1 ½ storey stucco residence with gable roof and double and triple windows.
24	BHR	Residence	17380 Yonge St. Maple Gables. Set back a distance from Yonge Street. Designated municipally under the Ontario Heritage Act.
25	BHR	Museum (Former residence)	17100 Yonge St. Doan House, nw corner of Eagle St. and Yonge St. Built by Seneca Doan in 1845, set in Eldred King Park to south of York Region Municipal building. Designated municipally under the Ontario Heritage Act.
26	CHL	Church/Cemetery	17030 Yonge St. Member of the Society of Friend's Quaker Meeting House built in 1811. Frame building was the first permanent place of worship built in this part of Ontario. Designated municipally under the Ontario Heritage Act. Ontario Heritage Trust Plaque on site.
27	CHL	Cemetery	16580 Yonge St. Hicksite Friend Burying Ground, established in 1830 with a meeting house which is now demolished. Designated municipally under Section 29 the Ontario Heritage Act. Set back from Yonge Street. Designated municipally under the Ontario Heritage Act. Commemorative plaque on

Site No.	Resource Type	Category	Location/Description
			site by Newmarket Historical Society and Newmarket LACAC
28	BHR	Former Residence	16003 Yonge St. 19 th Century brick residence converted to Oakland Restaurant.
29	CHL	Historical Settlement	Historic core of Town of Aurora, generally from Aurora Heights Dr./Mark St. to north and Kennedy Rd. to south. Includes numerous buildings of 19 th and 20 th Century and several listed as heritage buildings or designated under the Ontario Heritage Act. The Northeast Old Aurora Heritage Conservation District designated under Part V of the Ontario Heritage Act. It includes Yonge St. from just north of Armour Heights Dr. to just south of Catherine St. Hilary Hosuse at 15372 Yonge St. built in 1862 is owned by the National Historic Sites and Monuments Board as one of Canada's best examples of Gothic Revival architecture.
30	BHR	Residence	15029 Yonge St. Located on the east side at Kennedy St. 20 th Century residence with a stone decorative fence on Yonge St.
31	CHL	Park	War Memorial Peace Park, Town of Aurora. Cenotaph to World Wars I & II.
32	CHL	Cemetery	14253 Yonge St. Aurora Cemetery, with gate-house, fence with gate pillars, plaque noting established in 1869 and dead house on grounds. Set close to Yonge Street. Designated municipally under the Ontario Heritage Act. The Dead house in the cemetery is also designated under the Ontario Heritage Act.
33	BHR	Residence	13580 Yonge St. Circa 1920 residence. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
34	BHR	Residence	13554 Yonge St. Circa 1880 residence of Philip Mackenzie, now in commercial use with centre front gable. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
35	CHL	Hamlet of Oak Ridges	Oak Ridges. Located at Bond Lake it comprises a few scattered buildings including as store at 12919 Yonge St.; a former residence at 12850 (1920); residences at 12800 (ca. 1920) and 12764 (Mitchell House ca. 1920); and cobblestone residence at 12761 (J. H. C. Durham Cottage, ca. 1915). All are listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
36	BHR	Former Residence	12611 Yonge St. John Beverley Robinson Cottage, circa 1836, located on east side of Bond Lake. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
37	BHR	Railway Station	12500 Yonge St. east side at Bond Lake. Site of Metropolitan Railway Arrestor House and Power House Remnants at Bond Lake Park circa 1900. Set back from road. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
38	BHR	Residence	12345 Yonge St. Ryan-Paxell House built in 1892. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
39	BHR	Residence	12261 Yonge St. Frank Legge House built in 1915 at the ne corner of Stouffville Road. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
40	CHL	Church & Cemetery	12125 Yonge St. St. John's Anglican Church and Cemetery. Church built in 1848 and re clad in brick in 1912, and is oldest

Site No.	Resource Type	Category	Location/Description
			church building in Richmond Hill. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance. Also site of OHT commemorative plaque to de Puisaye Settlement of late 1790s.
41	BHR	Residence	12001 Yonge St. Dentmore Downs, home of Joseph Morton circa 1846. Set close to Yonge Street. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance. Vacant as of 2006.
42	CHL	Recreation lands	11901 Yonge St. Summit Golf and Country Club site of Younger Street Commemorative Cairn, National Historic Site. Buildings of golf course set back from Yonge St. Both the Cairn and Golf Club are included on the Town of Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.
43	BHR	Residence	11666 Yonge St. Residence of Wm. H. Legge, and post office known as Hillcrest and built in 1902. Associated with former hamlet of Jefferson. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance. Moved to a new plaza in 2008.
44	BHF	Former Schoolhouse	11575 Yonge St. Former Jefferson Public School, now in commercial use. Listed on Richmond Hill's Inventory of Buildings of Architectural and Historical Importance.

Note: CHL - Cultural Heritage Landscape; BHR - Built Heritage Resource

7.4.2 Archaeological Resources

The detailed report examining the potential for Archaeological resources within the study area is presented in **Appendix H, Stage 1 Archaeological Assessment**.

Three sources of information were consulted in order to compile an inventory of archaeological resources for the study area: the site record forms for registered archaeological sites (housed at the Ministry of Culture), published and unpublished documentary sources, and the files of Archaeological Services Inc.

In Ontario, information concerning archaeological sites is stored in the Ontario Archaeological Sites Database (OASD), maintained by the Ministry of Culture (MCI). This database contains archaeological sites registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 kilometres east to west, and approximately 18.5 kilometres north to south. Each Borden block is referenced by a four-letter designator, and sites within a Borden block are numbered sequentially as they are found. The study area under review is located in Borden blocks AIGu, BaGu and BaGv.

The data collected from the MCI to date covers 151 registered archaeological sites within the limits of this archaeological assessment. Of

special significance corresponding to the routes retained for further evaluation in Chapter 6 are a total of 32 sites, which are described in Appendix A of **Appendix H**. These sites will be considered the most sensitive archaeological resources for this study. Of the 32 sites identified as significant, 7 sites have either been intensively surveyed and/or salvage excavated or recommended for further investigation (as noted in Section 2.2 of **Appendix H**).

Based on the presence of Bond Lake and the Holland River within approximately 150 metres of the corridor, and the fact that Yonge Street was part of the historic settlement network, the study area has the potential for the presence of pre-contact and historic archaeological sites depending on the intensity of more recent development and landscape alterations. The archaeological site potential of the project study area is also attested to by the presence of the 151 registered archaeological sites within a one-kilometre radius of the study area.

A Stage 2 archaeological assessment of the Quaker Cemetery as part of the Yonge Street Watermain EA, Regional Municipality of York Ontario, was conducted in July 2007 (refer to Appendix C of **Appendix H**). The assessment concluded that above mentioned study was considered free of further archaeological concern and Ministry of Culture concurred with the recommendations.

Along Davis Drive, a Stage 1 archaeological assessment for the Davis Drive Class EA has been completed and is included in Appendix D of **Appendix H**. This study recommended that a Stage 2 archaeological assessment be undertaken for the areas that exhibit archaeological site potential.

A field review determined that parts of the study area have been previously disturbed by typical road construction, and residential/commercial development, portions of the study area have remained undisturbed and are considered to have archaeological potential.

The conclusions of the archaeological assessment are as follows:

- Conduct Stage 2 archaeological assessment on the lands determined to have archaeological potential as noted on Figures 3-1 to 3-3 in **Appendix H**; and
- Stage 3 archaeological assessment will be required if construction activities are proposed along the existing right-of-way immediately adjacent to: the Quaker Cemetery or the Aurora Cemetery; or immediately adjacent to the Quaker Cemetery or St. John's Anglican Cemetery.

7.5 SERVICES AND UTILITIES

The major utilities located in the vicinity of the North Yonge Street Corridor alternative routes have been identified through direct contacts with the respective companies, and these utilities are the following:

- PowerStream Inc.
- Newmarket Hydro;
- Watermains;
- Sanitary Sewers;
- Enbridge Gas;
- Rogers Cable;
- Allstream Corporation (formerly AT&T Canada);
- Telus; and
- Group Telecom.

A thorough review of the necessary relocations or modification of utility plants will be undertaken during the detailed design stage.

PowerStream Inc

PowerStream Inc operates both aerial and buried facilities along Yonge Street from Gamble Road/19th Avenue to St. John's Sideroad. Newmarket Hydro operates both aerial and buried facilities along Davis Drive and Green Lane from Yonge Street to Leslie Street; it also operates facilities along the west side of Yonge Street from Savage Road to Green Lane, and along the east side of Yonge Street from St. John's Side Road to Davis Drive.

Watermains

There are watermains present throughout the entire corridor on the various roadways.

Sanitary Sewers

Along Yonge Street, the Regional Municipality of York operates sanitary sewers from 19th Avenue to King Road; from Worthington Avenue to Wellington Street and; from Orchard Heights Boulevard to St. John's Sideroad; and from Bonshaw Ave/London Road to Green Lane. It also operates sanitary sewers along Davis Drive and Green Lane from Yonge Street to Leslie Street.

Enbridge Consumers Gas

Enbridge Consumers Gas operates pressure gas mains along both sides of Yonge Street, and along south side of Davis Drive.

Rogers Cable/Allstream Corporation/Group Telecom/FCI Broadband

Rogers Cable operates aerial and buried coax cable and buried fibre optic

cable in the study area. Allstream Corporation has an underground plant at the Yonge Street and Savage Road intersection. Group Telecom owns aerial plants along Yonge Street from Savage Road to Davis Drive, and along Davis Drive from Yonge Street to Leslie Street; it also operates buried plants along Davis Drive from Bayview Avenue to Leslie Street, and along Yonge Street at the intersections of Savage Road, William Roe Boulevard, and Gladman Avenue. FCI Broadband has a combination of aerial and buried fiber Optic Facilities along Green Lane from Yonge Street to Leslie Street.

8. DEVELOPMENT AND SELECTION OF PREFERRED DESIGN

8.1 PLANNING AND DESIGN PARAMETERS

This Chapter sets out the desirable features and standards for designing the rapid transit system encompassing both infrastructure and service. The development of the design alternatives (alignments and technologies) in **Chapter 9** is based on meeting the design criteria described in this Chapter.

For consistency throughout the York Region Rapid Transit Plan network, the planning and design parameters described here generally correspond to those already approved for the South Yonge Street Transitway.

8.1.1 Rapid Transit Design Objectives

Rapid transit services and infrastructure in the North Yonge Street Corridor will be designed to provide the essential features for its role as an important new member of the family of rapid transit services available to the Region's communities, as defined in the Transportation Master Plan. This family is intended to comprise:

- Local services through neighbourhoods and business districts using conventional buses of various sizes;
- Rapid transit service operating on a Regional network fed by local services and inter-connected with commuter services and rapid transit in Toronto and adjacent Regions; and
- Long distance inter-regional commuter service provided by GO Transit buses and trains.

The primary objectives in designing the rapid transit infrastructure and service are to achieve the following:

- A flexible, permanently integrated high-performance system with a strong customer-oriented identity;
- An integrated assembly of elements appropriate to urban environment for current and future market(s) to be served;
- High service speeds offering superior travel times competitive with those of the private automobile;
- Demonstrated service reliability providing high frequency (an average wait of 5 minutes) and a high degree of on-time performance;
- Comfort and convenience by providing a smooth ride, level boarding in a user-friendly, quality station environment, easy transfers between systems and innovative fare pre-payment and passenger information services; and

- Environmental compatibility manifested by reductions in energy use, pollution, noise and visual intrusion as well as environmentally sensitive urban design.

The key components of the ultimate North Yonge Street Corridor rapid transit improvements are as follows:

- An exclusive two-lane, at-grade rapidway that uses the centre median of an existing street right-of-way (ROW) to enable operation of both Bus Rapid Transit (BRT) and Light Rail Transit (LRT) rapid transit services with no loss of current traffic capacity, or a segregated exclusive ROW remote from existing streets such as alongside rail rights-of-way;
- Sections of mixed traffic operation for the rapid transit service, where an exclusive ROW is not feasible;
- High-frequency BRT service of 10 minute headway or less during peak travel periods;
- Transit signal priority to speed the movement of buses through busy intersections and limited stops (approximately 1 kilometre station spacing) to improve overall travel times;
- Attractive BRT stations, designed and landscaped for integration with the surrounding communities (the rapidway alignment includes high-density commercial and residential nodes, and a Historic Core community commercial centre);
- Access facilities at stations to encourage and support pedestrian and bicycle modes of transportation;
- Proof-of-payment fare policy and systems to speed passenger boarding and facilitate "smart card" technology;
- "Real-time" passenger information displays at stations and on-board vehicles;
- Intelligent Transportation Systems (ITS) technology to track vehicles and interface with transit priority measures for reliable service; and
- Integrated communications to increase public awareness and overall ridership with a corresponding decrease in automobile use.

8.1.2 Design Criteria

In the York Region network, rapid transit facilities will initially use BRT technology and convert to LRT technology at such time when BRT service reliability can no longer be assured or the use of LRT will result in operating cost benefits or attract greater transit oriented development.

This section outlines the basic criteria adopted for the planning and design of the main components of the facilities for each technology.

Rapidway alignment geometry will influence the system riding quality, especially for standing passengers. The design aims to provide alignments which reduce sags, crests and directional changes to a minimum,

consistent with reasonable economy. In developing the rapid transit alignment, consideration must be given to the following:

- Safety;
- BRT and LRT horizontal and vertical alignment standards;
- Sight distance and visibility;
- General appearance;
- Passenger comfort;
- Impact on at-grade crossings;
- Intended operating and service plan;
- Adjacent roadways and railways;
- Vehicle performance;
- Impact on adjacent property;
- Underground and overhead utilities;
- Cost-effectiveness;
- BRT and LRT horizontal and vertical clearances; and
- Type of construction.

8.1.3 Bus Rapid Transit (BRT)

The BRT system is one in which predominantly exclusive rights-of-way with on-line stations are provided for the use of the rubber-tired vehicles delivering the service. These rapid transit vehicles can operate on and off the rapid transit ROW and therefore offer the opportunity to link certain feeder and line haul express services to reduce the need for passengers to transfer. In the early stages of system development, BRT services may be provided by buses operating in exclusive bus or HOV lanes in streets or even in mixed traffic.

Wherever practical, BRT station design will allow vehicles to pass other vehicles that are picking up and dropping off passengers. This means that skip stop and express services can be combined with local stopping services in the same ROW. The typical BRT operating configuration consists of a high frequency service running the full length of the corridor and stopping at each station. It provides a service not unlike that of LRT except the vehicle used is rubber tired (usually articulated for greater capacity). On top of this service various express services can be overlain and, where appropriate, services can be started or terminated off of the rapidway.



Passengers access the service as they would an LRT service by walking or cycling to the stations, transferring from feeder buses and by using park-and-ride and pick-up/drop-off facilities where provided. In addition, some trips could be made without a transfer.

Table 8-1 summarizes the principal BRT running way design criteria adopted for the development of alternative designs for rapidway facilities. These criteria have been developed keeping in mind the possibility of future conversion to LRT.

Table 8-1
Summary of BRT Running Way Geometric Design Criteria

CRITERIA	Preferred min./max.	Absolute min./max.
Design Speed – Rapidway between stations	90 kph	40 kph
Design Speed – Station and Business Dist. Areas	-	50 kph
Design Speed - Arterial Ramps and Access Roads	-	40 kph
Stopping Sight Distance: 90 kph design speed	-	236 m
60 kph design speed	-	84 m
Minimum Horizontal Curve Radius, Rapidway	200m	40 m
Minimum Horizontal Curve Radius, Stations and CBD	120m	50 m
Minimum Horizontal Curve Radius, Access Ramps	-	45 m
Minimum Horizontal Curve Radius in Maintenance Facility	30m	15m
Minimum Turning Radii at Intersections	25m	15 m
Maximum Rapidway Superelevation (above 50 kph)	-	7%
Maximum Superelevation at Stations	-	2%
Minimum Tangent at end of Station Platforms	20 m	14 m
Maximum Grade of Rapidway	3%	7%
Minimum Rapidway Grade between Stations	0.5%	0.35%
Maximum Grade in Stations	0.5%	4%
Rapidway Grade: Access Roads and Ramps	6%	10%
Minimum Grade in Stations	0.5%	0.3%

8.1.4 Light Rail Transit (LRT)

LRT is a flexible, rail-based transit mode that can operate in a variety of urban ROW settings. Depending on the degree of segregation of the ROW, it is a relatively low cost form of rail technology and is usually electrically propelled, obtaining power from overhead catenary wires.



LRT can provide a broad range of passenger capacities due to its ability to use coupled vehicles. It can operate in exclusive or semi-exclusive lanes or in mixed traffic on tracks embedded in the street. The overhead power supply feature allows LRT systems to interface safely with other at-grade transportation modes and with pedestrians.

The electrically powered vehicles are virtually pollution free (a major benefit for local and Regional air quality) although the primary power generating source may produce some pollution. Vehicles are generally bi-directional, low-floor and articulated with multiple doors on both sides. LRT has the ability to be placed into built-up urban areas and is designed to operate harmoniously with vehicular and pedestrian traffic. It is possible for LRT vehicles to share a rapidway with buses operating in a BRT service as the vehicle dynamic envelope is similar to a BRT lane width.

Table 8-2 provides a summary of the LRT running way geometric design criteria.

Table 8-2
Summary of LRT Running Way Geometric Design Criteria

CRITERIA	Preferred	Absolute
HORIZONTAL ALIGNMENT		
Minimum Radius of Circular Curves: On Running Line	250 m	40 m
In Stations	Tangent	800 m
In Yards	50 m	35 m
Minimum Length of circular curves:	Design Speed (V) / 2	35 m
Minimum length of spiral curves, the greater of the following:		
- considering roll rate or	$8.75E_a \times V$	14 m
- considering vehicle torsion	$400E_a$	14 m
- considering lateral acceleration	$6.45E_u \times V$	14 m
Minimum Length of tangent between spiral curves	100 m	25 m
Minimum Length of tangent track preceding a point of switch	15 m	10 m
Minimum Length of tangent beyond the ends of platforms	20 m	15 m
VERTICAL ALIGNMENT		
Maximum Gradient: On running line	4.5%	7.0%
In Stations	0.3%	0.5%
Minimum Grade on running lane	0.3%	0.0%
Minimum Length of vertical curves	100 m	60 m
Maximum Length of vertical curves	-	200 m
Maximum applied superelevation on running track (E_a)	110 mm	130 mm
Maximum unbalanced superelevation (E_u): On running line	75 mm	100 mm
In turnouts		90 mm

8.1.5 Station Design Features

The stations are normally unattended and designed to stress passenger safety, convenience, comfort, low maintenance and accessibility. The station location and layout will facilitate convenient transfer between the rapid transit service and local service and also to any pick-up/drop-off

facility, where provided. Stations will be fully accessible to persons with disabilities and configured to allow convenient access by pedestrians and cyclists. Space for bike lockers will be identified adjacent to sidewalks near most stations.

Stations are normally spaced such that the majority of walk-in passengers walk less than 400 metres to and from the station however, some passengers can be expected to walk up to 750 metres. This provision results in spacings between 0.8 and 1.5 kilometres.

The preferred station layout consists of two parallel side-loading platforms preferably offset head-to-head on either side of an intersection or mid-block pedestrian crossing as illustrated in **Figure 8-1**. For major through stations with high passenger volumes, the rapidway may be widened to four lanes with a central fenced median to allow buses to bypass and pull out around stopped buses. Where hourly one-way bus volumes are less than the maximum capacity, the two-lane station configuration is recommended as illustrated.

Passenger shelters, benches, system maps, real-time passenger information and other amenities are provided on each platform. All designs will emphasize durability and minimize ongoing maintenance needs.

8.1.6 Roadway

The insertion of the exclusive rapidway ROW in the median of Yonge Street and other routing streets requires widening of these streets in order to maintain the existing number of traffic lanes and to meet the traffic demands. In addition, a section of Yonge Street from Mulock Drive to Green Lane in Newmarket may require widening from the existing four lanes to six lanes of general traffic, either integrated with or exclusive of the rapidway alignment. To ensure the safety and driver's comfort, the design criteria of these streets is generally conformed to the Geometric Design Standards for Ontario Highways (MTO, 1994) and with reference to Geometric Design Guide for Canadian Roads (TAC, 1999) and respective York Region design guidelines currently in use.

Table 8-3 provides a summary of the roadway geometric design criteria.

8.1.7 Fare Collection

The facilities provided at the stations will be those required for a fare system based on the off-board purchase of passes and tickets. Provision for pass and ticket dispensing machines and sufficient space for totally off-board fare collection in a protected environment wherever practical is a requirement of the station design.

Table 8-3
Summary of Roadway Geometric Design Criteria

CRITERIA	Preferred	Absolute
Design Speeds (Retains existing traffic speeds)	-	50 - 90 km/h
Minimum Stopping Sight Distance:		
50 km/h	-	65 m
60 km/h	-	85 m
70 km/h	-	110 m
80 km/h	-	135 m
90 km/h	-	160 m
Minimum Horizontal Curves Radius/ Spiral (A):		
50 km/h	-	90 m/ 79
60 km/h	-	130 m/ 99
70 km/h	-	200 m/ 125
80 km/h	-	250 m/ 149
90 km/h	-	340 m/ 180
Maximum Deflection Angle without Curve	-	0°30'
Superelevation	6%	-
Maximum Grade	6%	12.0%
Minimum Crest Vertical Curves (K):		
50 km/h	8	-
60 km/h	15	-
70 km/h	25	-
80 km/h	35	-
90 km/h	50	-
Minimum Sag Vertical Curves (K):		
50 km/h	12	-
60 km/h	18	-
70 km/h	25	-
80 km/h	30	-
90 km/h	40	-
Lane Width	3.50 m	3.40 m
Curb Lane Width	3.75m	-
Left Turn Deceleration Parallel Lane/ Taper Length:		
50 km/h	20 m/ 85 m	-
60 km/h	30 m/ 100 m	-
70 km/h	40 m/ 115 m	-
80 km/h	50 m/ 130 m	-
90 km/h	60 m/ 145 m	-
Right Turn Deceleration Parallel Lane/ Taper Length:		
50 km/h	20 m/ 40 m	-
60 km/h	30 m/ 50 m	-
70 km/h	45 m/ 60 m	-
80 km/h	60 m/ 70 m	-
90 km/h	70 m/ 75 m	-
Minimum Turning Radii at Intersections	18 m	15 m
Intersection Angle	-	< 70° (> 110°)

Reference: Geometric Design Standards for Ontario Highways (MTO, 1994)

Geometric Design Guide for Canadian Roads (TAC, 1999)

Note: A – Spiral Parameter

8.1.8 Streetscaping

A streetscaping plan, developed in conjunction with local municipalities, was adopted for the North Yonge Street Corridor Rapidway. A number of workshops were held to determine the optimum plan for the Corridor in order to create a streetscape that would be a catalyst for transit-oriented development and attract transit ridership. The vision for the roadway was

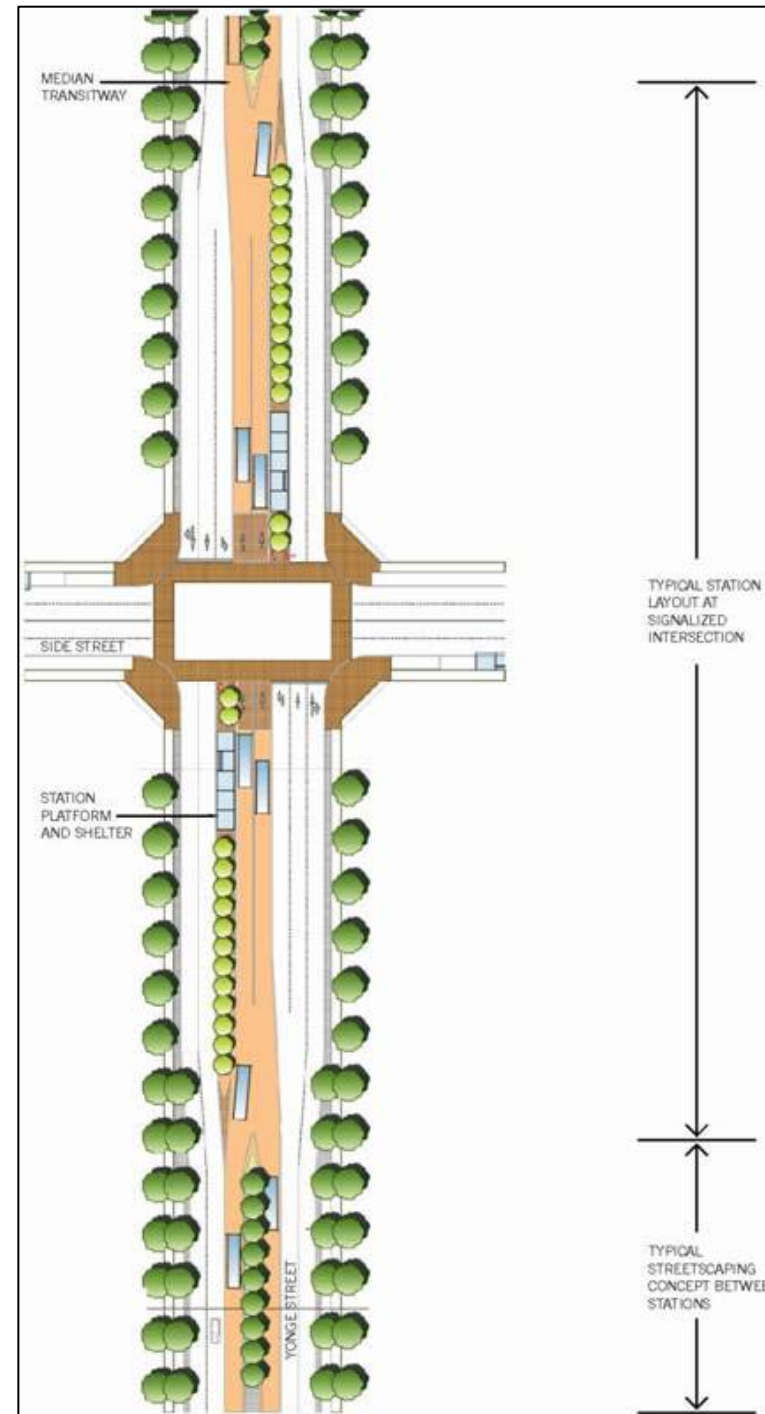


Figure 8-1
Typical Two-Lane Exclusive Rapidway

developed in consultation with technical staff from the Towns of Newmarket, Aurora, Richmond Hill, East Gwillimbury and York Region.

Measures to accommodate emergency response services must be incorporated in the design of rapidway infrastructure in situations where circulation of emergency vehicles and access to adjacent properties is modified from existing conditions.

8.1.9 Towards Great Regional Streets

In May 2007 York Region published the final version of the document, "Towards Great Regional Streets – A Path to Improvement, Design Guidelines for 6-lane Regional Streets". As York Region experiences significant population and employment growth that is to continue over the next decade, this initiative addresses the demands of increased traffic on the Region's transportation system as well as non-vehicular users such as transit riders, cyclists and pedestrians.

The six-lane cross-section of 42.6 metres, as outlined in the Towards Great Regional Streets document and shown in **Figure 10-4** of **Chapter 10** in this ESR, has been followed for the section of roadway in Newmarket along Yonge Street from Davis Drive to Green Lane. This six-lane cross-section includes a raised median for landscaping, provision for bike lanes and curb-side HOV lanes.

8.1.10 Other Parameters to be Considered

Network

The rapidway is part of a complex network reflecting how people move through the community. The linkages that connect private vehicles, drop off, park-and-ride, bicycles, local transit buses, GO buses, etc., to the future rapidway should be designed with an integrated approach making the experience of transitioning to transit services efficient and effortless.

Signage

A consistent approach to all types of signage, directional, proprietary advertising, etc., should be developed for the corridor to minimize visual clutter and the chronic symptom of competitive "sign wars".

Snow Plowing

The clearing, storage and removal of snow along traffic and transit lanes must be carefully planned. A generous splash and storage strip must be provided on the sidewalk side of the curb.

Emergency Response Services (ERS) Consideration

Currently, a two-way, mostly undivided roadway and occasionally continuous median left turn lane allows access into existing local streets and properties on both sides of Yonge Street, Davis Drive and Green Lane. This random access is available to all vehicles including ERS vehicles such

as fire trucks, emergency medical response vehicles (ambulances) and police vehicles. With the introduction of a raised, landscaped median between the dedicated transit lanes this access will be restricted to signalized intersections at regular intervals along the alignment. In order to mitigate the effect of this change in traffic operations, the rapidway design assumes ERS vehicles will use the dedicated transit lanes and incorporates a crossing treatment in the raised median to permit left turn access by ERS vehicles.

The objective of the design was to reinstate current operations of most ERS vehicles using the existing two-way median left turn lane on Yonge Street.

8.2 ROUTE ALTERNATIVES EVALUATION

The methodology described below was developed and used for evaluation of alignment designs for surface rapid transit technologies only. **Chapter 9** presents the evaluation of associated road improvements.

In order to select the Technically Preferred Alignment Design for surface rapid transit, the following methodology was adopted:

- Design Objectives for the project were identified and described in **Section 8.1**;
- Each route alternative was developed to a level that allowed all benefits and effects to be determined;
- Segment route alternatives were assessed and evaluated against a set of environmental factors, Evaluation Objectives and Goals;
- For each primary objective, “Goals” were developed as factors considered important in choosing between alternatives;
- For each factor, quantifiable and qualitative “Indicators” were identified;
- The Objectives, Factors and Indicators were distributed to the TAC members and specialist sub-consultants to ensure that they were appropriate and reflected the effects of the alternatives in relation to each specialist discipline;
- An evaluation methodology was developed to rank the alternatives;
- The evaluation was conducted by the project team and presented to the TAC members for their input;
- A Technically Preferred Alignment was then selected; and
- Local Area variations were also developed and evaluated as necessary to refine the Technically Preferred Alignment.

The evaluation methodology used ranked each alternative in terms of the indicators using a relative ranking between alternatives. The quantity unit was chosen to represent the responsiveness to the goal it was satisfying.

Once all indicators were ranked, the combined response to each goal was then ranked for each alignment alternative.

An overall most responsive alternative was then chosen for each objective by summarizing the degree to which each of the goals and objectives were met. A general synopsis of route evaluation findings was tabulated for each objective to explain the rationale behind the selection. This included a description of the advantages and disadvantages of each alternative and its merits regarding the objective and goals.

8.2.1 Evaluation objectives, goals and indicators

Evaluation Objectives were derived from the Design Objectives identified in **Section 8.1**. Goals and indicators were then developed to ensure a traceable process and by choosing indicators that were quantifiable subjective evaluations.

The Evaluation Objectives, Goals and Indicators used in the evaluation of Alignment Alternatives are listed in **Table 8-4**.

Table 8-4
Evaluation Objectives, Goals and Indicators

Objectives and Goals		Typical indicators measuring route's ability to achieve goals
OBJECTIVE A: To Improve mobility by providing a fast, convenient, reliable, and efficient rapid transit service		
A1	Increase attractiveness of rapid transit service	Projected travel time along each alternative Passenger volume at the peak load point Transit boardings (AM peak period NB and SB) Route features with potential to reduce service reliability
A2	Maximize transit connectivity	Connections to inter-regional services % of route > 3% grade
A3	Alignment geometry that maximizes speed and ride comfort and minimizes safety risks and maintenance costs	No. of running way sections > 3.5% No. of curves < 100 metres radius No. of curves with radius > 100 metres and < 300 metres radius
A4	Convenient service connections to maintenance and facility and storage yard	Proximity to nearest Maintenance and Storage Facility
A5	Station locations that maximize ridership potential of rapid transit service	Existing and future residents or residences within 500 m walking distance of station Existing and future employment within a 500 m walking distance of a station Major traffic generators or attractors within 500 m walking distance of proposed stations

Table 8-4
Evaluation Objectives, Goals and Indicators

Objectives and Goals		Typical indicators measuring route's ability to achieve goals
OBJECTIVE B: To protect and enhance the social environment in the corridor		
B1	Minimize adverse effects on and maximize benefits for communities in corridor	Potential for displacement/disruption of unique and distinctive community features No. and type of industrial uses displaced or disrupted No. and type of retail, office and service commercial businesses displaced or affected No. of residential properties displaced or disrupted Barrier impact – potential for division of communities by the facility right-of-way No. and type of community features/service effected Construction effects
B2	Maintain or improve road traffic and pedestrian circulation	No. of intersections with restricted access No. of driveways with restricted access due to the alignment Potential for infiltration of neighbourhoods by diverted traffic Loss of residential street parking Change in convenience of pedestrian crossing movements No. of instances where primary access routes to social or community institutions are made more indirect or otherwise disrupted No. of stations with the potential to increase traffic and parking on local streets
B3	Maintain a high level of public safety and security in corridor	No. of locations with potential to decrease public safety Effect of rapidway insertion on emergency vehicle circulation
B4	Minimize adverse noise and vibration effects	Approximate number of noise-sensitive receptors that may potentially experience an increase in ambient sound levels based on the proximity of the route alternative to existing and/or future receptors Approximate number of residences or vibration-sensitive buildings that may potentially experience an increase in vibration levels based on the proximity of the route alternative to existing and/or future receptors Construction effects
B5	Minimize adverse effects on cultural resources	Significance of built heritage and cultural heritage landscapes Number of archaeological resources displaced or disrupted Significance of archaeological resources displaced or disrupted
B6	Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	Visual impact on people living and working in and visiting the community

Table 8-4
Evaluation Objectives, Goals and Indicators

Objectives and Goals		Typical indicators measuring route's ability to achieve goals
OBJECTIVE C: To promote a sustainable environment by protecting and enhancing the natural environment in the corridor		
C1	Minimize adverse effects on Aquatic Ecology	No. of watercourse crossings Type of watercourse crossings to be affected Type and significance of fish habitat to be affected
C2	Minimize adverse effects on Terrestrial Ecology	No. and status of any species at risk Area, type and significance of wildlife habitat/vegetation communities to be affected
C3	Improve regional air quality and minimize adverse local effects	Predicted change in air quality No. of residential units potentially affected by local air quality degradation Construction effects
C4	Minimize adverse effects on corridor hydrogeological, geological, and hydrological and conditions	Minimization of total recharge area affected Change in potential for flooding by removal of storage capacity Potential for adverse effects on surface water quality/quantity. Preference for minimizing proximity to watercourses Number of sites with contaminants

OBJECTIVE D: To promote smart growth and economic development in the corridor

D1	Support Regional and Municipal Planning Policies and approved urban structure	Conformity with, and support for, policies of official plans and urban structures of Region, internal and adjacent municipalities, including GTA Conformity with land use designations, including compatibility with existing development Service to planned centres, major and minor
D2	Provide convenient access to social and community facilities in corridor	Proximity to hospitals, educational institutions, community centres, local government offices etc.
D3	Protect provisions for goods movement in corridor	Inventory of major truck routes, delivery and loading areas, manufacturing operations affected by rapidway insertion
D4	Promote transit-oriented development	Opportunities for re-development Potential opportunities for development and higher order uses, at stations, termini, and along the corridor

OBJECTIVE E: To maximize the cost-effectiveness of the rapid transit system

E1	Minimize capital cost of vehicles, facilities and systems required	Estimate of cost of capital works including: elevated, at-grade, cut and cover, tunnelled or open cut running way, stations, systems and major utility relocation works Estimated vehicle fleet cost
E2	Minimize cost effects of/on adjacent properties to implement facilities	Estimated value of residential units to be acquired Estimated value of industrial units to be acquired Estimated value of commercial units to be acquired Potential remediation costs for known or potentially contaminated sites

Table 8-4
Evaluation Objectives, Goals and Indicators

Objectives and Goals		Typical indicators measuring route's ability to achieve goals
E3	Minimize adverse effects of alignment characteristics on operating and maintenance costs	Influence of route length on O & M costs Influence of alignment characteristics on O & M costs

8.2.2 Development of Segment Route Alternatives

The routes for each segment that were carried forward for further evaluation from the analysis in **Chapter 7** are those that are discussed in this Chapter. The study area was divided into three segments, corresponding to municipal boundaries as described below.

- **Richmond Hill Segment:** 19th Avenue/Gamble Road to Bloomington Road;
- **Aurora Segment:** Bloomington Road to the Newmarket municipal boundary, just north of St. John's Sideroad, and
- **Newmarket/East Gwillimbury Segment:** Newmarket municipal boundary, just north of St. John's Sideroad, to Green Lane.

In addition to the above primary route alternatives, local alignment variations in all segments were developed to meet local constraints and create local opportunities. These local options were not evaluated with all factors but with factors relevant to the local environment. The following sections describe all the primary route alternatives as well as local options by segment.

8.2.3 Richmond Hill Segment – Route Alternatives

In **Chapter 6**, the selection of Yonge Street as the only feasible primary route alternative resulted from the evaluation of alternative technology/route combinations in the Richmond Hill Segment as illustrated in **Figure 8-2**. This alignment remains in the Yonge Street right-of-way from 19th Avenue to Bloomington Road. The alignment of this route was developed fully in order to assess its benefits and impacts in this segment as shown in **Figure 8-2**.

The south end of this segment at 19th Avenue is a continuation of the alignment shown in the Yonge Street Corridor Public Transit Improvements EA, which was approved by the Minister of the Environment in April 2006. The station at 19th Avenue was a component in that approved EA and therefore is considered existing for the purpose of this EA.

Within this segment, Yonge Street travels through the environmentally sensitive Oak Ridges Moraine. The widening required in this area to accommodate the rapidway will take place within the existing right-of-way therefore no direct impact occurs.

Through the village of Oak Ridges, between Stouffville Sideroad and Ashfield Drive, the option of operating the transit service in mixed traffic was reviewed at the request of the Town of Richmond Hill.

Detailed route alignment evaluation tables are included in **Appendix K**.

Potential Station Locations in Richmond Hill Segment

Potential station locations recommended for the alignment through Richmond Hill are at Jefferson Sideroad, King Road and Regatta Avenue. There is also a station located at 19th Avenue/Gamble Road which is not part of this EA as it is a component in the already approved South Yonge Street Corridor Public Transit Improvements EA. A potential future station location at Towerhill Road is also part of the undertaking should the need arise to construct one at this location.

8.2.4 Aurora Segment - Route Alternatives

The Aurora Segment extends through the Town of Aurora from Bloomington Road to the Newmarket municipal boundary, just north of St. John's Sideroad. There were three alternatives that were carried forward from the initial screening as shown in **Figure 8-3**, which are:

- **Route Alternative A2:** Yonge Street through the entire segment from Bloomington Road to the municipal boundary with the Town of Newmarket, just north of St. John's Sideroad.
- **Route Alternative A3:** Yonge Street from Bloomington Road to Industrial Parkway; Industrial Parkway from Yonge Street to St. John's Sideroad; St. John's Sideroad from Industrial Parkway to Yonge Street; and Yonge Street north to the boundary.
- **Route Alternative A4:** Yonge Street from Bloomington Road to Industrial Parkway; Industrial Parkway to Aurora GO Station at Wellington Street; and adjacent to GO Bradford ROW.

The following sections describe and evaluate these alignment alternatives in detail.

8.2.4.1 Route Alternative A2: Yonge Street

Alternative A2 shows the route solely on Yonge Street through the entire segment. As shown in **Figure 8-3**, for the purpose of the evaluation mixed traffic was considered through the downtown Aurora area from Golf Links

Drive to just north of Orchard Heights Boulevard. The roadway in this area has a very narrow right-of-way with the buildings close to the edge of the right-of-way. Due to these factors no widening is possible and therefore it is necessary that the rapid transit network operate in mixed traffic.

Potential Station Locations in Alternative A2

Potential station locations considered for Alternative A2 were at Bloomington Road, Henderson Drive, Golf Links Drive, Wellington Street, Aurora Heights Drive, Orchard Heights Boulevard and St. John's Sideroad.

8.2.4.2 Route Alternative A3: Yonge Street/Industrial Parkway/St. John's Sideroad

Alternative A3 includes Yonge Street from Bloomington Road to Industrial Parkway where it turns east onto Industrial Parkway and follows north to St. John's Sideroad.

Potential Station Locations in Alternative A3

Potential station locations considered for Alternative A3 were at Bloomington Road, Industrial Parkway, Englehard Drive, Wellington Street, adjacent to the Aurora Family Leisure Complex, St. John's Sideroad at Industrial Parkway, and Yonge Street.

8.2.4.3 Route Alternative A4: Route Adjacent to GO Bradford Right-of-way

Alternative A4 includes Yonge Street from Bloomington Road to Industrial Parkway where it turns east. South of the Aurora GO Station the alignment follows adjacent to the GO rail right-of-way continuing north to St. John's Sideroad.

Potential Station Locations in Alternative A4

Potential station locations considered for Alternative A4 were at Bloomington Road, Industrial Parkway, Englehard Drive, Aurora GO Station at Wellington Street, adjacent to the Aurora Family Leisure Complex, and St. John's Sideroad.

8.2.4.4 Evaluation of Alternatives Findings and Recommendation

Detailed evaluations were performed comparing Alternatives A2, A3 and A4. A synopsis of these evaluations is presented in **Table 8-5**. The detailed route alignment evaluation tables are included in **Appendix K**.

Although the evaluation indicated that both Alternatives A2 and A3 responded well to certain goals and objectives and are less responsive to others, **Alternative A2** is preferred because:

- The route attracts a greater number of boardings and the stations in the Yonge Street South Community (Henderson and Golf Links) have potential to maximize ridership for the rapid transit service;
- Is the most supportive alternative for supporting Regional planning policies and approved urban structure and there are some transit-oriented development/re-development opportunities along the route that are not available on Route A3;
- Even though the introduction of dedicated lanes along some of its length will potentially have more affect on the natural environment features than mixed traffic operation on Alternative A3, these can be mitigated by culvert and bridge widening design solutions that protect aquatic habitat in watercourses; and
- The effect of dedicated lanes on traffic circulation and access to adjacent properties can be mitigated by the provision of signalized intersections at regular intervals to allow alternative access routes.

8.2.5 Newmarket/East Gwillimbury Segment – Route Alternatives

The Newmarket Segment extends through the Town of Newmarket and into the Town of East Gwillimbury from the municipal boundary with Aurora, just north of St. John's Sideroad, to Green Lane. There were six alternatives that were carried forward for further evaluation, as shown in **Figure 8-4**, which are:

- **Route Alternative NE2:** Yonge Street through the entire segment from the municipal boundary with the Town of Aurora, and east on Green Lane to the East Gwillimbury GO Station.
- **Route Alternative NE3:** Adjacent to the GO Bradford ROW.
- **Route Alternative NE5:** Yonge Street from the boundary with the Town of Aurora; to Eagle Street; west on Eagle Street West to the Newmarket GO Bus Station at Davis Drive.
- **Route Alternative NE6:** Yonge Street from the boundary with the Town of Aurora to Davis Drive; east on Davis Drive; north on Main Street; and east on Green Lane to the East Gwillimbury GO Station.
- **Route Alternative NE7:** Yonge Street from the boundary with the Town of Aurora to Davis Drive; and east on Davis Drive to Leslie Street.
- **Route Alternative NE8:** Yonge Street from the boundary with the Town of Aurora to Davis Drive; east on Davis Drive; north on Bayview Parkway; and west on Green Lane to the East Gwillimbury GO Station.

The following sections describe and evaluate these route alternatives in detail.

8.2.5.1 Route Alternative NE2: Yonge Street and Green Lane to East Gwillimbury GO Station

Alternative NE2 follows Yonge Street to Green Lane then east to the East Gwillimbury GO Station.

Potential Station Locations in Alternative NE2

Potential station locations considered for Alternative NE2 were at Savage Road South, Mulock Drive, Eagle Street, Davis Drive, London Road, and Green Lane on Yonge Street; and East Gwillimbury GO Station on Green Lane. Also included in the undertaking is a potential future station located approximately half way between Yonge Street and the East Gwillimbury GO Station. This location will be determined in consultation with the Town of East Gwillimbury staff once secondary plans are completed with respect to the future road network and development in the area.

8.2.5.2 Route Alternative NE3: Adjacent to GO Bradford Right-of-way to East Gwillimbury GO Station

Alternative NE3, an extension of Alternative A4, continues in a new right-of-way running adjacent to the existing GO Bradford right-of-way. The alternative runs east of the GO right-of-way, and moves to the other side of the GO rail right-of-way at Queen Street, continuing to the East Gwillimbury GO Station.

Potential Station Locations in Alternative NE3

Potential station locations considered for Alternative NE3 were at Mulock Drive, Eagle Street, Newmarket GO Station, adjacent to the Mable Davis Conservation Area, and East Gwillimbury GO Station.

8.2.5.3 Route Alternative NE5: Yonge Street/Eagle Street West to Newmarket GO Bus Station

Alternative NE5 follows Yonge Street in a dedicated median rapidway to Eagle Street where the route turns west. The route uses Eagle Street West with operation in mixed traffic where it terminates at the Newmarket GO Bus Terminal on Eagle Street West at Davis Drive.

Potential Station Locations in Alternative NE5

Potential station locations considered for Alternative NE5 were at Savage Road South, Mulock Drive, and Eagle Street on Yonge Street; and at the Newmarket GO Bus Station on Eagle Street.

8.2.5.4 Route Alternative NE6: Yonge Street/Davis Drive/Main Street/Green Lane to East Gwillimbury GO Station

This alternative follows Yonge Street in a dedicated median rapidway to Davis Drive. Continuing in a dedicated median rapidway east on Davis Drive to Lorne Avenue, where the operation of the rapid transit system transitions to mixed traffic. At Main Street, the transit system turns north and follows the existing right-of-way to Green Lane where it continues east on Green Lane, terminating at the East Gwillimbury GO Station. Operation in mixed traffic is assumed on Main Street and Green Lane.

Potential Station Locations in Alternative NE6

Potential station locations considered for Alternative NE6 were at Savage Road South, Mulock Drive, Eagle Street, and Davis Drive on Yonge Street; Lorne Avenue and Main Street on Davis Drive, London Road on Main Street; and East Gwillimbury GO Station on Green Lane.

8.2.5.5 Route Alternative NE7: Yonge Street/Davis Drive to Leslie Street

Potential Station Locations in Alternative NE7

Potential station locations considered for Alternative NE7 were at Savage Road South, Mulock Drive, Eagle Street, Davis Drive on Yonge Street; Lorne Avenue, Prospect Street, Huron Heights Drive on Davis Drive; and at Leslie Street just north of Davis Drive.

Local Option – Southlake Regional Health Centre

The Southlake Regional Health Centre is located on Davis Drive on the south side, east of Prospect Street. The Hospital precinct covers a number of properties from Bayview Parkway to Roxborough Road, and Davis Drive south to Queen Street.

There were various options reviewed for locating the vehicle turn around in this area, in case the terminus on Davis Drive happened to be the Hospital. These are shown in **Figure 8-5**.

8.2.5.6 Route Alternative NE8: Yonge Street/Davis Drive/Bayview Parkway/Green Lane to East Gwillimbury GO Station

This alternative follows Yonge Street in a dedicated median rapidway to Davis Drive. Continuing in a dedicated median rapidway east on Davis Drive to Lorne Avenue, where the operation of the rapid transit system transitions to mixed traffic. At Bayview Parkway, the transit system turns north and follows the existing right-of-way. Where Bayview Parkway ends before entering into the Town of East Gwillimbury, there will be a new exclusive right-of-way for transit only continuing north to Green Lane. The rapidway turns west on Green Lane to the East Gwillimbury GO Station. Operation in mixed traffic is assumed on Bayview Parkway and Green Lane.

Potential Station Locations in Alternative NE8

Potential station locations considered for Alternative NE8 were at Savage Road South, Mulock Drive, Eagle Street, Davis Drive, Lorne Avenue, Bayview Parkway, adjacent to the Mabel Davis Conservation Area, and East Gwillimbury GO Station

8.2.5.7 Evaluation of Alternatives Findings and Recommendation

Detailed evaluations were performed comparing the six alternatives for the Newmarket/East Gwillimbury Segment. A synopsis of these evaluations is presented in **Table 8-6**, and the results highlighted below:

- Alternative NE3 can be eliminated since the overall responsiveness to most objectives is low in comparison to the other alternatives;
- Comparing the two alternatives that service the Regional Centre, Health care centre district and East Gwillimbury GO Station, NE6 and NE8, route NE8 attracts higher ridership and provides the most convenient access to the Regional Healthcare Centre node, hence Alternative NE6 can be eliminated from further consideration;
- The shortest route, NE5, although the least cost alternative, is less responsive to longer term urban form policies and does not link rapid transit to key nodes in Newmarket and East Gwillimbury. It relies on local transit service to feed ridership to the Regional Centre node;
- Of the three remaining routes (NE2, NE7, and NE 8), two of them connect to the East Gwillimbury GO Station on Green Lane thus providing a link to future urban development along the south boundary of East Gwillimbury. Providing service to the Regional Healthcare Centre is also advantageous as it will be the largest employer within the study area. Given that an adequate location for a terminal for rapid transit vehicles to turn around at Leslie Street in the NE7 alternative could be problematic, continuing route NE7.

The combination of NE2 and NE7 can be described as two branches continuing from the Yonge Street and Davis Drive node. One branch continues north on Yonge Street to Green Lane (NE2), and the second turns east on Davis Drive (NE7). The detailed route alignment evaluation tables are included in **Appendix K**.

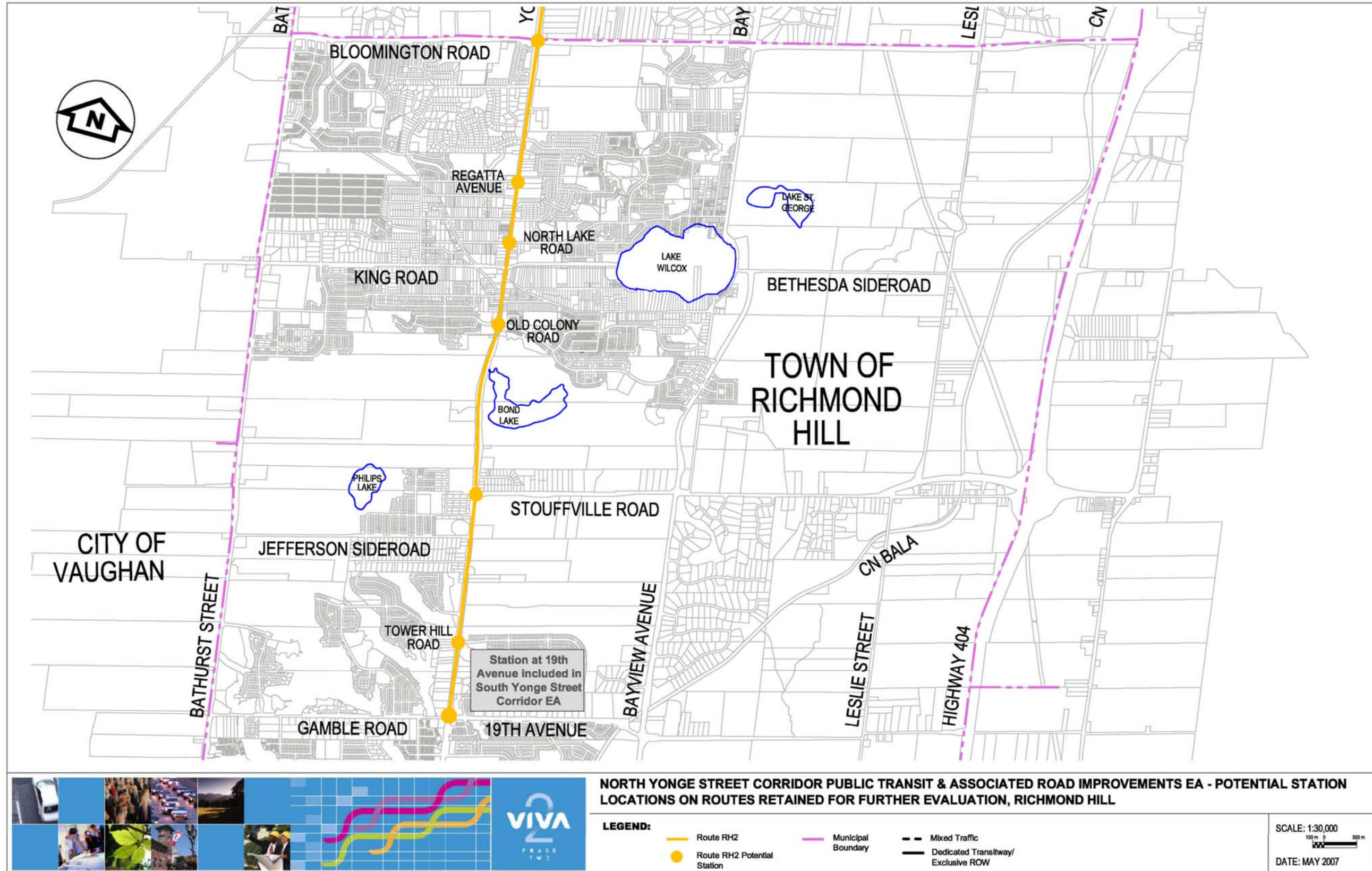
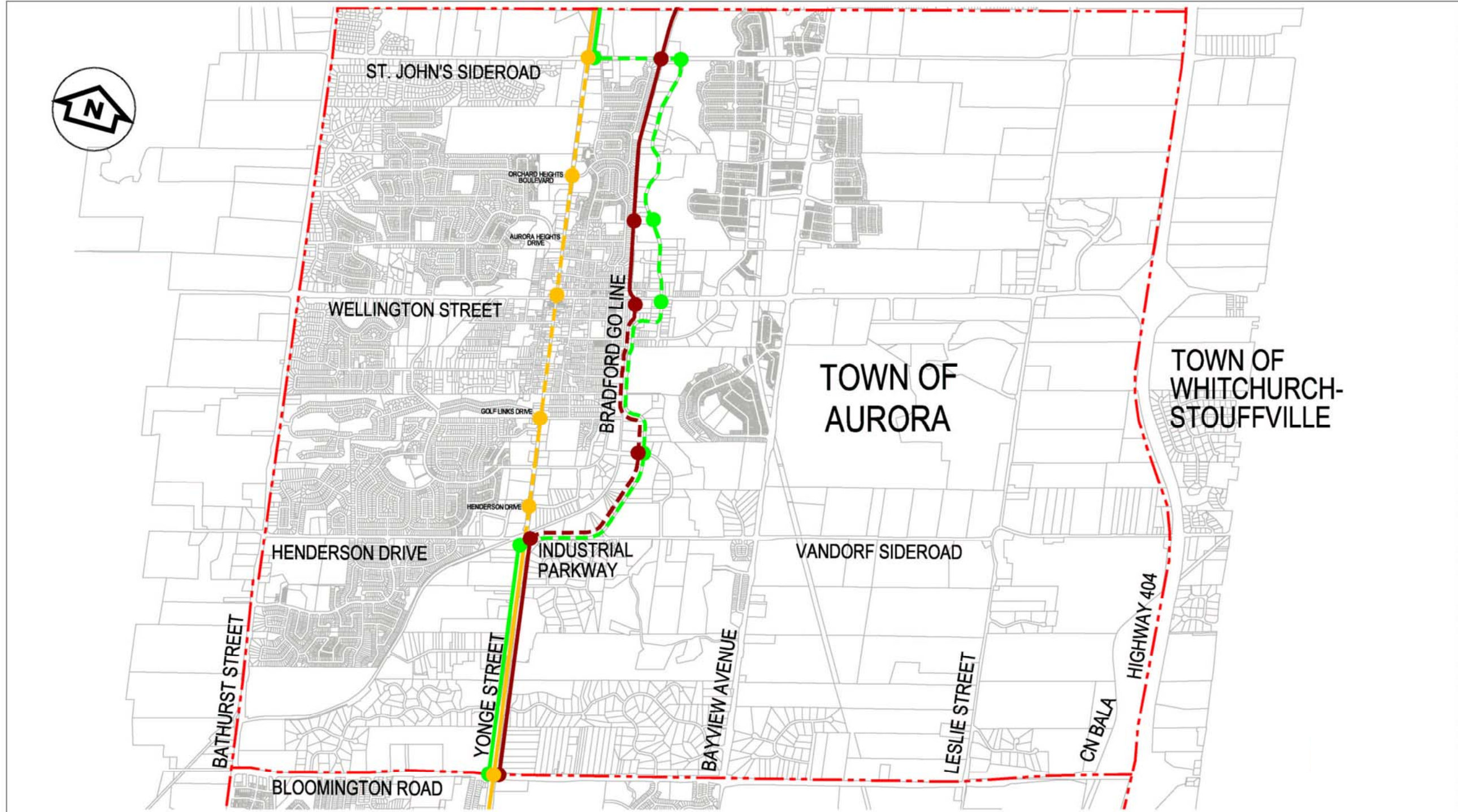


Figure 8-2
Richmond Hill Segment – Route Alternatives



NORTH YONGE STREET CORRIDOR PUBLIC TRANSIT & ASSOCIATED ROAD IMPROVEMENTS EA - POTENTIAL STATION LOCATIONS ON ROUTES RETAINED FOR FURTHER EVALUATION, AURORA

LEGEND:

- Route A2 (Yellow dashed line)
- Route A3 (Green dashed line)
- Route A4 (Red dashed line)
- Municipal Boundary (Red dashed line)
- Mixed Traffic (Black dashed line)
- Dedicated Transitway/Exclusive ROW (Black solid line)
- Route A2 Potential Station (Yellow dot)
- Route A3 Potential Station (Green dot)
- Route A4 Potential Station (Red dot)

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Figure 8-3
 Aurora Segment – Route Alternatives

Table 8-5

Synopsis of Primary Route Alternative Evaluation Findings for Aurora Segment

Objectives and Goals	Route A2 Yonge Street	Route A3 Yonge Street/ Industrial Parkway/St.John's Sideroad	Route A4 Yonge Street/ Industrial Parkway/adjacent to GO Bradford ROW
IMPROVE MOBILITY			
Increase attractiveness of rapid transit service	●	●	○
Maximize transit connectivity	○	○	●
Alignment geometry that maximizes speed and ride comfort, and minimizes safety risks and maintenance costs	●	○	○
Station locations that maximize ridership potential of rapid transit service	●	○	○
Overall Responsiveness	●	○	○
PROTECT AND ENHANCE SOCIAL ENVIRONMENT			
Minimize adverse effects on and maximize benefits for communities in corridor	●	○	○
Maintain or improve road traffic and pedestrian circulation	○	○	●
Maintain a high level of public safety and security in corridor	○	○	○
Minimize adverse noise and vibration effects	●	○	○
Minimize adverse effects on cultural resources	○	○	○
Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	●	○	○
Overall Responsiveness	○	●	○
PROTECT AND ENHANCE THE NATURAL ENVIRONMENT			
Minimize adverse effects on Aquatic Ecology	●	○	○
Minimize adverse effects on Terrestrial Ecology	●	○	○
Improve Regional air quality and minimize adverse local effects	○	○	○
Minimize adverse effects on corridor hydrogeological, geological, and hydrological conditions	●	○	○
Overall Responsiveness	●	○	○
PROMOTE SMART GROWTH/ ECONOMIC DEVELOPMENT			
Support Regional and Municipal Planning Policies and approved urban structure	●	○	○
Provide convenient access to social and community facilities in corridor	●	○	○
Protect provisions for goods movement in corridor	○	○	○
Promote transit-oriented development	●	○	○
Overall Responsiveness	●	○	○
MAXIMIZE COST-EFFECTIVENESS OF RAPID TRANSIT SYSTEM			
Minimize capital cost of vehicles, facilities and systems required	○	○	○
Minimize property acquisition cost to implement facilities	○	○	○
Minimize adverse effects of alignment characteristics on operating and maintenance costs	○	○	○
Overall Responsiveness	○	●	○
PREFERRED ALTERNATIVE			

LEGEND: Least Responsive ○ ○ ○ ● ● Most Responsive

NOTE: ROW – Right-Of-Way O&M – Operation and Maintenance

VCC – Vaughan Corporate Centre

The above indicators were presented to the public at Public Consultation Centre #3. Certain indicators shown at the time have been removed from this evaluation as there was no significant difference in the response of the three alignments options in meeting the goal, particularly effects on air quality.

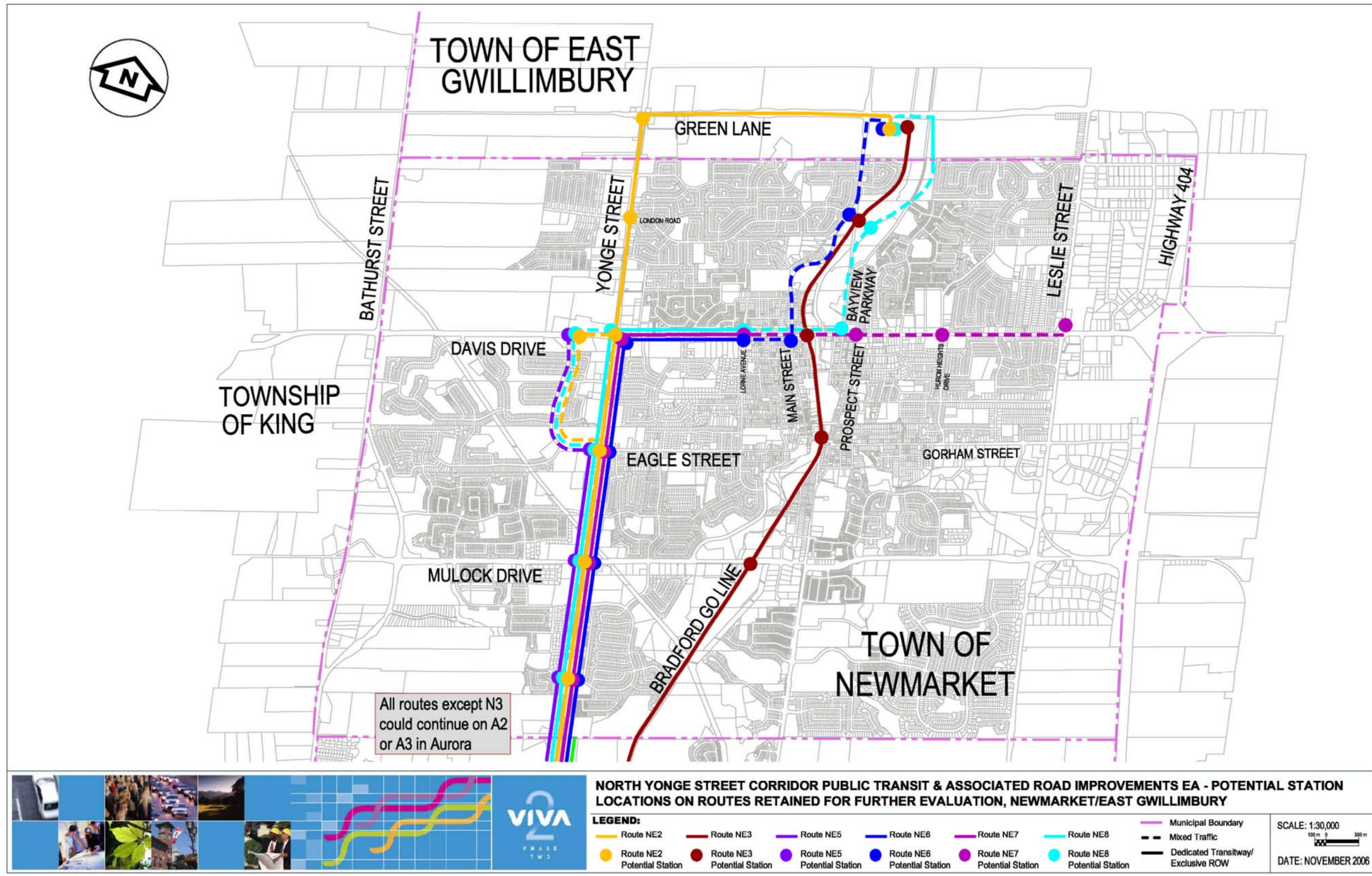


Figure 8-4
Newmarket/East Gwillimbury Segment - Route Alternatives

Table 8-6
Synopsis of Primary Route Alternative Evaluation Findings for Newmarket/East Gwillimbury Segment

Objectives and Goals	Route NE2 Yonge Street/Green Lane	Route NE3 Adjacent to GO Bradford ROW	Route NE5 Yonge Street/ Eagle Street West/Newmarket GO Bus Terminal
IMPROVE MOBILITY			
Increase attractiveness of rapid transit service	●	○	○
Maximize transit connectivity	○	●	○
Alignment geometry that maximizes speed and ride comfort, and minimizes safety risks and maintenance costs	●	○	●
Convenient service connections to maintenance facility and storage yard	○	○	●
Station locations that maximize ridership potential of rapid transit service	●	○	○
Overall Responsiveness	●	○	●
PROTECT AND ENHANCE SOCIAL ENVIRONMENT			
Minimize adverse effects on and maximize benefits for communities in corridor	●	○	●
Maintain or improve road traffic and pedestrian circulation	○	●	●
Maintain a high level of public safety and security in corridor	○	●	●
Minimize adverse noise and vibration effects	●	○	●
Minimize adverse effects on cultural resources	○	●	○
Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	●	○	○
Overall Responsiveness	●	○	●
PROTECT AND ENHANCE THE NATURAL ENVIRONMENT			
Minimize adverse effects on Aquatic Ecology	○	○	○
Minimize adverse effects on Terrestrial Ecology	●	○	●
Improve Regional air quality and minimize adverse local effects	●	○	●
Minimize adverse effects on corridor hydrogeological, geological, and hydrological conditions	○	○	●
Overall Responsiveness	●	○	●
PROMOTE SMART GROWTH/ ECONOMIC DEVELOPMENT			
Support Regional and Municipal Planning Policies and approved urban structure	●	●	○
Provide convenient access to social and community facilities in corridor	●	○	○
Protect provisions for goods movement in corridor	○	●	○
Promote transit-oriented development	●	○	○
Overall Responsiveness	●	○	○
MAXIMIZE COST-EFFECTIVENESS OF RAPID TRANSIT SYSTEM			
Minimize capital cost of vehicles, facilities and systems required	○	○	●
Minimize property acquisition cost to implement facilities	●	○	●
Minimize adverse effects of alignment characteristics on operating and maintenance costs	○	○	●
Overall Responsiveness	○	○	●

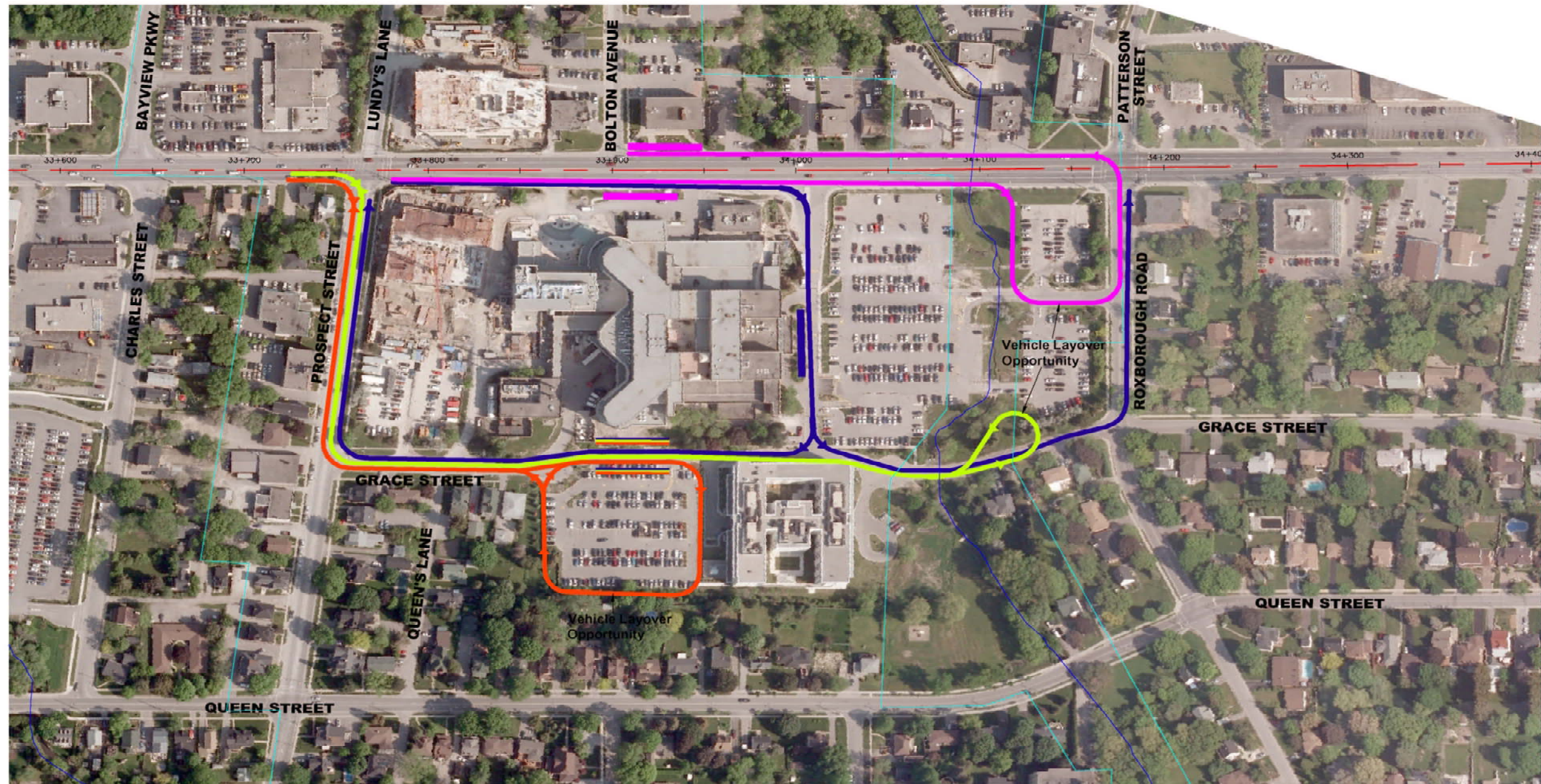
Objectives and Goals	Route NE6 Yonge Street/Davis Drive/Main Street/ Green Lane	Route NE7 Yonge Street/Davis Drive/Leslie Street	Route NE8 Yonge Street/Davis Drive/Bayview Parkway/ Green Lane	Routes NE2 and NE7 Combination of the two routes
IMPROVE MOBILITY				
Increase attractiveness of rapid transit service	●	●	●	●
Maximize transit connectivity	●	●	●	●
Alignment geometry that maximizes speed and ride comfort, and minimizes safety risks and maintenance costs	●	●	●	●
Convenient service connections to maintenance facility and storage yard	●	●	●	●
Station locations that maximize ridership potential of rapid transit service	●	●	●	●
Overall Responsiveness	●	●	●	●
PROTECT AND ENHANCE SOCIAL ENVIRONMENT				
Minimize adverse effects on and maximize benefits for communities in corridor	●	●	●	●
Maintain or improve road traffic and pedestrian circulation	●	●	●	●
Maintain a high level of public safety and security in corridor	●	●	●	●
Minimize adverse noise and vibration effects	●	●	●	●
Minimize adverse effects on cultural resources	●	●	●	●
Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	●	●	●	●
Overall Responsiveness	●	●	●	●
PROTECT NATURAL ENVIRONMENT				
Minimize adverse effects on Aquatic Ecology	●	●	●	●
Minimize adverse effects on Terrestrial Ecology	●	●	●	●
Improve Regional air quality and minimize adverse local effects	●	●	●	●
Minimize adverse effects on corridor hydrogeological, geological, and hydrological conditions	●	●	●	●
Overall Responsiveness	●	●	●	●
PROMOTE SMART GROWTH/ ECONOMIC DEVELOPMENT				
Support Regional and Municipal Planning Policies and approved urban structure	●	●	●	●
Provide convenient access to social and community facilities in corridor	●	●	●	●
Protect provisions for goods movement in corridor	●	●	●	●
Promote transit-oriented development	●	●	●	●
Overall Responsiveness	●	●	●	●
MAXIMIZE COST-EFFECTIVENESS OF RAPID TRANSIT SYSTEM				
Minimize capital cost of vehicles, facilities and systems required	●	●	●	●
Minimize property acquisition cost to implement facilities	●	●	●	●
Minimize adverse effects of alignment characteristics on operating and maintenance costs	●	●	●	●
Overall Responsiveness	●	●	●	●
PREFERRED ALTERNATIVE				

LEGEND: Least Responsive ○ ◐ ◑ ◒ ◓ Most Responsive

The above indicators were presented to the public at Public Consultation Centre #3. Certain indicators shown at the time have been removed from this evaluation as there was no significant difference in the response of the three alignments options in meeting the goal, particularly effects on air quality.

NOTE: ROW – Right-Of-Way O&M – Operation and Maintenance

VCC – Vaughan Corporate Centre



NORTH YONGE STREET CORRIDOR PUBLIC TRANSIT & ASSOCIATED ROAD IMPROVEMENTS ENVIRONMENTAL ASSESSMENT
Southlake Regional Health Centre Potential Integration Opportunities

Date: 2007-09-14
 Version: 2.0
 Scale: 1:1000

Figure 8-5
 Southlake Regional Health Centre – Potential Turn Around Locations

9. ALIGNMENT DESIGN ALTERNATIVES

9.1 RAPID TRANSIT PHYSICAL INFRASTRUCTURE LOCATIONS

This section describes the process of selecting a typical location for the two lane bi-direction rapidway on the North Yonge Street Corridor. This physical infrastructure location is crucial to the impacts, caused by implementing the rapidway, to the adjacent environment.

9.1.1 Alternative Locations Within a Road Right-of-way

The following alternative locations for rapid transit within an existing road right-of-way (ROW), were considered in the first stage evaluation:

- Exclusive lanes in the median or centre of arterial streets - an exclusive two-way running way and stations in the median of the roadway with general vehicular traffic lanes in each direction either side of the rapidway;
- Interior or off-set exclusive bus lanes - an exclusive two-way rapidway, including stations, on one side of the roadway adjacent to the curb; and
- Exclusive curb lanes - a partially-exclusive one-way transit lane in each direction adjacent to both curbs.

From the range of alternatives listed in the ToR, the priority measures in mixed traffic were not evaluated as a stand alone option because it would not meet the fundamental objectives for the undertaking of improved travel time by avoiding general traffic congestion. Also, reversible contra-flow lanes in a roadway median were not considered desirable as a continuous location for rapid transit due to operational constraints. Finally, exclusive lanes in a segregated ROW was not included in the evaluation given that most of the preferred route will share the existing Yonge Street and Davis Drive ROW with general traffic. The configuration of the above alternatives is shown in **Figure 9-1** and an evaluation of the relative merits of each is presented in **Table 9-1**.

9.1.1.1 Preliminary Evaluation

A multi-criteria comparative evaluation of the alternative locations for transit within the road ROW considered the effect of each location under three main factors:

- Transportation quality;
- Human environment; and
- Community economic environment.

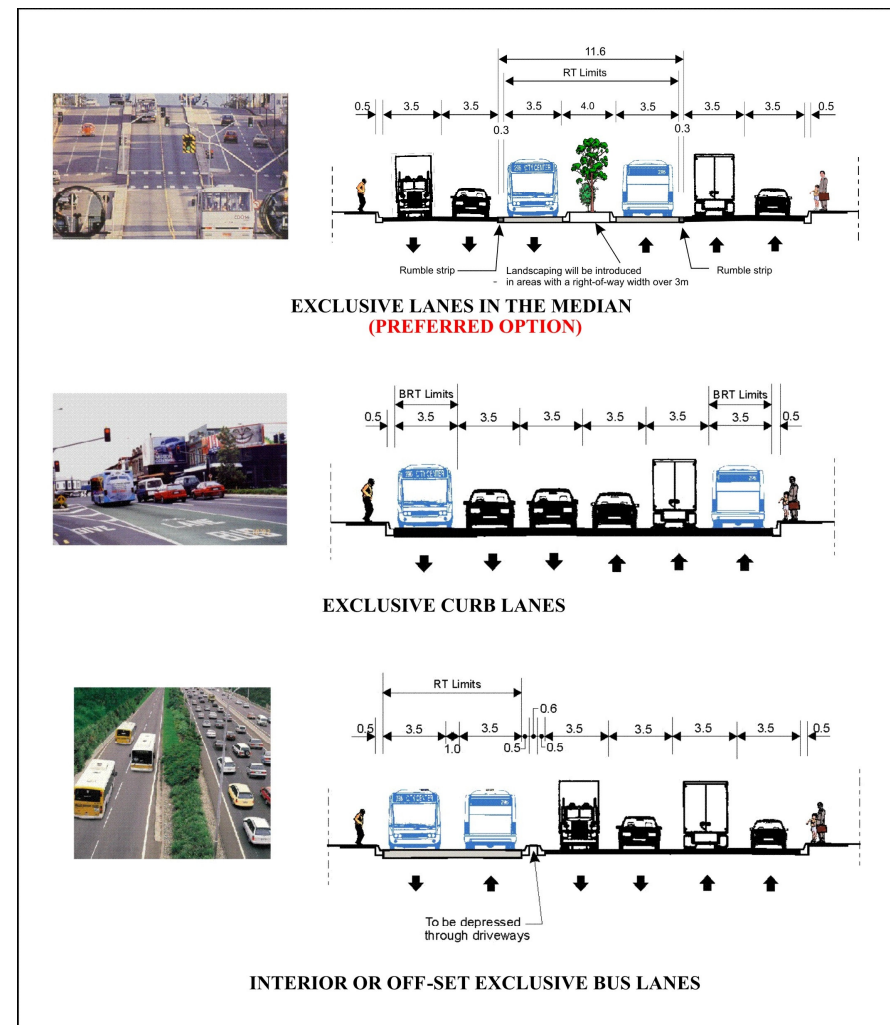


Figure 9-1
Options to Locate a Rapidway in a Roadway

Within each primary factor, the merits of each alternative were assessed against indicators considered most pertinent to the evaluation, as presented in **Table 9-1**.

9.1.1.2 Conclusion

The evaluation indicates that **exclusive lanes in the median** are the preferred location for rapid transit for the following reasons:

- Transit service quality will be highest;
- It is deemed the safest as it has the least potential conflicts with general traffic along the rapidway and at intersections;
- It provides good opportunities to mitigate the impact on local traffic and property access issues; and
- It allows better streetscaping and place-making opportunities while reinforcing the identity and visibility of the rapid transit system.

- It is consistent with the median rapidway approved for the remainder of the York Rapid Transit Network.

Table 9-1
Evaluation of Options to Locate a Rapidway in a Roadway

FACTOR & INDICATOR	ALTERNATIVE			EXPLANATION OF RANKING
	Exclusive Lanes in the Median	Exclusive Curb Lanes	Interior or Off-set Exclusive Bus Lanes	
TRANSPORTATION QUALITY				
Transit Service Reliability	●	○	●	<ul style="list-style-type: none"> With a median rapidway left turns across the rapidway are confined to signalized intersections. This reduces the potential for interference by vehicular traffic and increases service reliability especially if transit can be given priority at signals when required. A one-way curb side rapidway requires right-turning vehicular traffic to share the lane with transit vehicles. Frequent interference due to this conflict and the potential for illegal parking reduces transit reliability significantly. A two-way rapidway on one side reduces interference to one side only but requires control of vehicular access to driveways to achieve reliability and safety.
Effect on Traffic Operations	●	●	○	<ul style="list-style-type: none"> A median rapidway requires all left-turns to occur at signalized intersections. Also U-turning must be permitted to allow traffic to reach mid-block destinations. This decreases the capacity at intersections. A one-way curb-side rapidway results in conflicts with both left and right-turning traffic at intersections and between them if mid-block left turns are permitted.
Overall level of safety in right-of-way	●	●	○	<ul style="list-style-type: none"> A median rapidway is considered the safest as it has the least number of conflicts with road traffic. The interface with pedestrians and left turning vehicles can be controlled at signalized intersections. A two-way rapidway along one side is considered the least safe due to the potential for confusion with transit vehicles running in the opposite direction to vehicular traffic on one side of the roadway and the conflicts with both left and right-turning vehicles.
Vehicle Access to Adjacent Properties	●	●	○	<ul style="list-style-type: none"> A one-way curb-side rapidway must be shared by right-turning vehicles if access to adjacent properties is to be protected. A two-way curb-side rapidway requires strict control of access across the transit lanes or the addition of a service road to avoid conflicts with transit vehicles and provide access between intersections. The median rapidway option requires the provision of U-turns, either dedicated or at intersections to maintain access to adjacent properties.
HUMAN ENVIRONMENT				
Noise & Vibration Impacts	●	●	○	<ul style="list-style-type: none"> A median rapidway places transit operations the furthest from adjacent sensitive buildings and therefore has least impact on them. A two-way curb-side rapidway will be closest

Table 9-1
Evaluation of Options to Locate a Rapidway in a Roadway

FACTOR & INDICATOR	ALTERNATIVE			EXPLANATION OF RANKING
	Exclusive Lanes in the Median	Exclusive Curb Lanes	Interior or Off-set Exclusive Bus Lanes	
Passenger Convenience and Comfort in accessing Rapidway stations	●	●	●	<ul style="list-style-type: none"> to adjacent buildings on one side producing the most severe noise and vibration impacts. A one-way curb-side rapidway permits a more familiar platform arrangement for transit users but still requires a road crossing for one of the trip directions. Curb side platforms can be wider and feel safer as they are more remote from general road vehicles. Median rapidway station platforms require protective measures to overcome passenger discomfort due to road traffic passing behind a platform. All locations require a road crossing for some passengers and trip directions. The two-way rapidway on one side avoids a crossing for passengers originating on the same side.
Streetscape Improvement Opportunities	●	●	●	<ul style="list-style-type: none"> A median rapidway allows more opportunity for a distinctive streetscaping treatment. It also establishes a more visible identity for the transit system. Streetscaping enhancements are limited to station sites on a one-way curb-side rapidway. A two-way curb-side rapidway offers an unsymmetrical opportunity for streetscape improvements.
ECONOMIC ENVIRONMENT				
Capital & Operating Costs	●	●	●	<ul style="list-style-type: none"> A median rapidway will have the highest capital costs due to the wider cross section required at intersections where left turn lanes are reinstated. Capital costs of curb-side rapidways will be increased if service roads are required to permit mid-block access to adjacent properties. A one or two-way curb-side rapidway provides opportunities for combining platforms with adjacent sidewalks.
Land Acquisition Costs	●	●	●	<ul style="list-style-type: none"> Where right-of-way must be acquired to accommodate the wider roadway, the relative costs will be similar to that of construction cost due to the cross sectional requirements for each alternative.
Preferred Alternative				

QUALITY RANKING: Most Preferred ● ● ● ● ○ Least Preferred

9.1.2 Richmond Hill Segment Design Alternatives (19th Avenue to Bloomington Road)

In the Richmond Hill Segment, the preferred route, the existing Yonge Street ROW, is generally wide enough to accommodate the preferred median location for exclusive rapidway lanes without major effects on adjacent property. Consequently, insertion of exclusive median lanes can

be assessed as a feasible design alternative wherever future traffic congestion levels would make rapid transit service in general traffic lanes unreliable.

For the Richmond Hill and Aurora segments, **Figure 9-2** shows that projected Yonge Street traffic levels in 2021 will utilize most of, or exceed, the realistic theoretical lane capacity range (1800 vehicles per hour for a roadway with two lanes per direction).

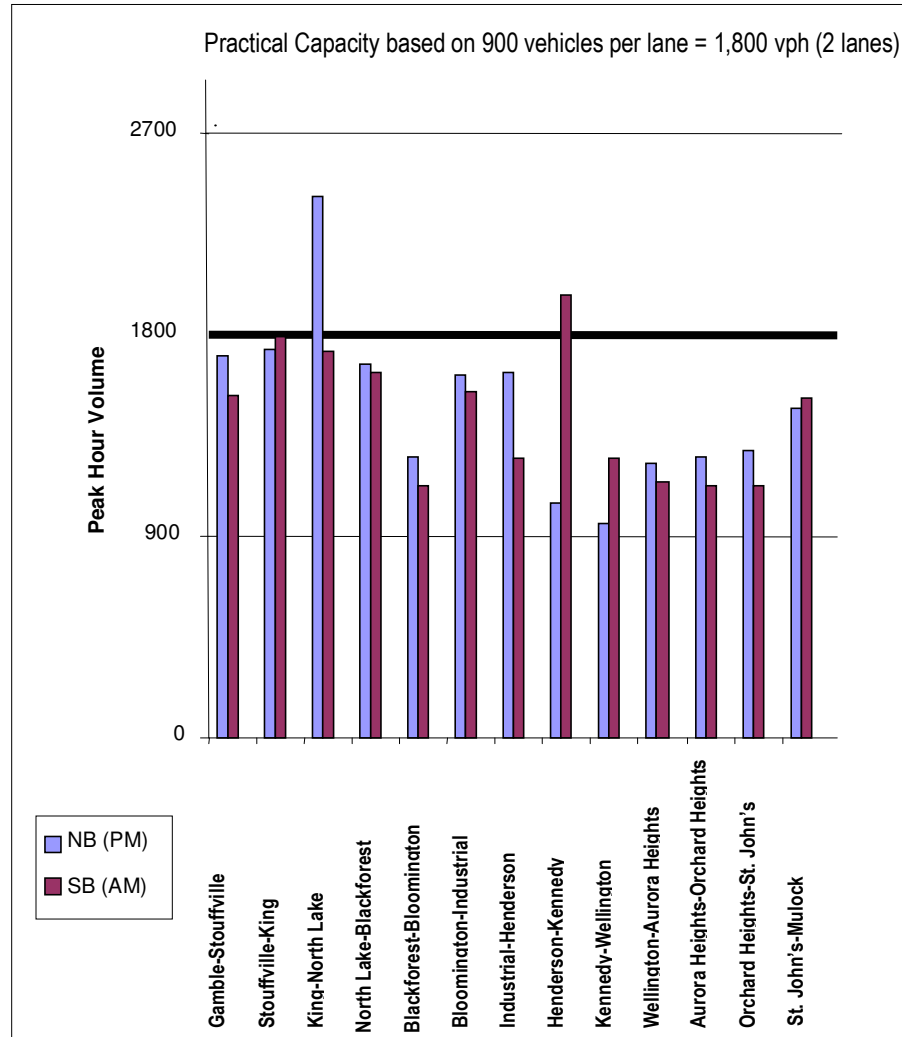


Figure 9-2
Future (2021) Traffic Levels on Yonge Street without Rapid Transit

In addition, major intersections such as King and Bloomington Roads will also be near or over capacity with poor levels of service. Although other intermediate intersections are projected to operate at a satisfactory level of service in 2021, it is considered preferable to extend the median rapidway design approved for the South Yonge segment of Richmond Hill continuously through this northern segment to the municipal boundary at

Bloomington Road. This continuity of exclusive transit lanes addresses the likely deterioration of through traffic flow beyond 2021 and avoids potential safety risks and driver confusion at transitions to and from the rapidway. Also, the recommended continuous rapidway cross-section maximizes urban design opportunities for streetscape enhancement and placemaking in communities such as the developing Jefferson – Stouffville area and the Oak Ridges business district.

9.1.3 Aurora Segment Design Alternatives (Bloomington Road to Savage Road)

9.1.3.1 Bloomington Road to Wellington Street

Through the Aurora segment, the preferred route again follows the existing Yonge Street ROW which varies in width through the Town. Between Bloomington Road and Henderson Drive the width ranges from 54 m to 40 m, a range which generally permits consideration of median rapidway insertion. North of Henderson Drive, the width reduces varying between 37 m and 20 m in the Aurora business district at Wellington Street. This reduced right-of-way width, constrained by sensitive existing commercial development, makes widening to insert dedicated median rapidway lanes problematic.

As discussed earlier for the section south of Bloomington Road in Richmond Hill, projected traffic volumes on Yonge Street between Bloomington Road and Kennedy Street will approach capacity in 2021 (see Figure 9-2). Level of service at intersections such as Industrial Parkway and Henderson Drive will also be degraded to the point where transit service in mixed traffic would be unreliable with significant delay potential. Consequently, insertion of dedicated median rapidway from Bloomington Road as far north as practical becomes the preferred design alternative to maximize transit speed and reliability through this section subject to acceptable mitigation of environmental effects described in a later Chapter.

While mitigation is possible in the section between Bloomington Road and Henderson Drive, significant acquisition of property and building removal along with business displacement and/or loss would be required north of Henderson Drive. Consequently, this severe social environmental impact precludes dedicated lanes making rapid transit operation in mixed traffic between Henderson Drive and Wellington Street the only feasible alternative (represents continuation of VIVA 1 service in mixed traffic along this segment).

Hence the preferred ultimate rapid transit improvement in this portion of the Aurora segment is dedicated median rapidway from Bloomington Road to

north of Henderson Drive and operation in mixed traffic from north of Henderson Drive to south of Orchard Heights Boulevard.

9.1.3.2 Wellington Street to Savage Road

From Wellington Street northward the Yonge Street ROW is again constrained in width by existing mixed use development to the 20 m range. The limited width extends as far north as Valhalla Court south of Orchard Heights Boulevard where the width increases and adjacent land use permits widening sufficient to consider inserting dedicated median rapidway. In this limited width section, significant acquisition of property and building removal along with business displacement and/or loss would be required north of Wellington Street. Consequently, this severe social environmental impact precludes dedicated lanes making the existing VIVA 1 rapid transit operation in mixed traffic between Wellington Street and Valhalla Court (Orchards Heights Boulevard) the only feasible alternative.

As noted above, north of Orchard Heights Boulevard, the feasibility and effects of dedicated rapidway insertion in the Yonge Street ROW warrant further evaluation. **Table 9-2** presents this evaluation of the two possible design alternatives for the section from Valhalla Court to Savage Road South, namely operation in mixed traffic or dedicated rapidway.

Key conclusions from the evaluation results can be summarized as follows:

- Insertion of dedicated median rapidway will provide greater assurance of improved transit travel time and service reliability when compared with the delay risk with mixed traffic operation;
- While widening to accommodate dedicated lanes will require mitigation of effects on adjacent watercourses, this can be achieved in the form of built-in attributes of the roadway design;
- The minor increase in stormwater runoff from the wider cross-section of the roadway with dedicated lanes can be mitigated by the stormwater management system;
- Right-of-way widening to accommodate the dedicated rapidway can be achieved without severe effects on adjacent properties or displacements; and
- Notwithstanding the significantly higher capital cost of the widened roadway with a dedicated rapidway, it is considered a cost-effective investment to achieve greater transit service benefits and an improved streetscape in the longer term.

Consequently, insertion of a dedicated median rapidway is the preferred design alternative for this section of the Corridor in Aurora into the southern limits of Newmarket at Savage Road South.

Table 9-2
Evaluation of Rapidway Alignment Design Options – Aurora/Newmarket:
Yonge Street from Valhalla Court to Savage Road South

Evaluation Factors and Criteria	Alignment Alternatives	
	Operation in Dedicated Median Rapidway	Operation in Mixed Traffic
Improve Mobility		
Effect on Viva (transit) travel time through segment	Delay potential at two traffic signals (Orchard Heights and St.John's). Rapid transit in dedicated rapidway ensures service speed and reliability even if general traffic congestion increases	● Delay potential at two traffic signals (Orchard Heights and St.John's). Projected future traffic level of service in this section could constrain rapid transit service speed and degrade reliability. ○
Potential to accommodate increased ridership and traffic volumes from change in adjacent land uses	Flood plain constraints and St. Andrew's College property limit opportunities for more intensified land use.	● Flood plain constraints and St. Andrew's College property limit opportunities for more intensified land use. ●
Potential to interconnect with local transit service	Connection with local transit service is possible at the median stations at Orchard Heights, St. John's and Savage South. Transfer to local services heading to the west or east can be achieved at St. John's.	● Connection with local transit service is possible at curbside stations at Orchard Heights, St. John's and Savage South. Transfer to local services heading to the west or east can be achieved at St. John's. ●
Protect and Enhance Natural Environment		
Effect on Tannery Creek valley lands at Orchard Heights Boulevard	Lengthening of culverts south and north of Orchard Heights Blvd required. Design must have built-in features to mitigate any effects on aquatic habitat. No major change to existing over-topping of Yonge Street for 25 year and greater storms. Water level drops 10mm under Regional storm. Under 100 and 50 yr storms: Backwater rise of 10mm. Under 25 yr storm: Backwater rise of 20mm.	● No change to existing watercourse crossing. Existing over-topping of Yonge Street for 25 year and greater storms would still occur. ●
Effect on Tannery Creek valley lands at St. John's Sideroad	Retaining wall required to prevent widened embankment from constricting culvert flow. Existing over-topping of Yonge Street for 25 year and greater storms would still occur.	○ No change to existing watercourse crossing. Existing over-topping of Yonge Street for 25 year and greater storms would still occur. ●
Effect on Tannery Creek Culvert– at Sta.27+900	Culvert lengthening required on both sides. Design must have built-in features to mitigate any effects on aquatic habitat. No change in existing over-topping of Yonge Street for 25 year and greater storms. No water level change under Regional and 100 yr storms. Under 25 and 50 yr storms: Backwater rise of 10mm.	○ No change to existing watercourse crossing. Existing over-topping of Yonge Street for 25 and greater storms would still occur. ●
Effect on water quality and quantity	Installation of rapidway increases runoff due to approx. 10% in impermeable area – storm water management system must include mitigation.	● No increase. ●
Potential for vegetation removal	Insignificant removal required.	● No removal required. ●
Protect and Enhance Social/Cultural Environment		
Effects on property - West side	Frontage taking required: a) Between Valhalla Court and Orchard Heights – 3-5m for boulevard b) Between Orchard Heights and St.John's – Minor at Orchard Heights for station; 0.-5m for blvd. c) Between St.John's and Savage South – Minor in SW quadrant	● Frontage taking required at curbside station locations: a) Orchard Heights – 2 m required for sidewalk b) St.John's – None c) Savage South - None ●
Effects on property - East side	Frontage taking required: a) Between Valhalla Court and Orchard Heights – 0-3m for boulevard b) Between Orchard Heights and St.John's – 2-6m for boulevard c) Between St.John's and Savage South – None	● No effect on property ●
Maximize Cost-Effectiveness		
Minimize capital cost of facilities, systems and vehicles required	Installation of rapidway lanes requires capital allocation for full reconstruction of existing roadway to accommodate dedicated transit lanes. Future operating cost savings due to higher average speed would offset some of this cost and long term service reliability makes investment cost-effective.	● Use of existing roadway for rapid transit reduces the capital cost of the service to the Newmarket Regional Centre without incurring additional operating costs of increased travel time due to traffic congestion. Future installation of dedicated lanes is not precluded and defers capital needs. ●

LEGEND: Least Responsive ○ ◐ ◑ ◒ ◓ Most Responsive

9.1.4 Newmarket/East Gwillimbury Segment Design Alternatives

9.1.4.1 Savage Road South to Mulock Drive

In the Town of Newmarket, it is appropriate to consider design alternatives for rapid transit on Yonge Street in two sections. These comprise a southern section between Savage Road South and Mulock Drive and the northern section between Mulock Drive and Green Lane.

As was the case in the northern Aurora section, the existing Yonge Street ROW between Savage Road South and Mulock Drive is generally wide enough to consider the addition of a dedicated median rapidway as the design method for improving public transit.

For this southern section of the Newmarket segment, Figure 9-2 shows that projected Yonge Street traffic levels in 2021 will utilize most of, or exceed, the realistic, theoretical lane capacity range (1400-1800 vehicles per hour for a roadway with two lanes per direction). In addition, the Mulock Drive intersection will also be near or over capacity with poor levels of service. Although other intermediate intersections are projected to operate at a satisfactory level of service in 2021, it is considered preferable to extend the median rapidway design northward through the entire southern section to maximize transit travel time savings wherever practical. Generally within this section the preferred alignment follows the centre-line of the existing road with widening for the rapidway distributed equally on the east and west sides of Yonge Street.

9.1.4.2 Mulock Drive to Green Lane

This northern portion of the Newmarket/East Gwillimbury Segment is made up of two sections. These are the section from Mulock Drive to Davis Drive south of the proposed branch of rapid transit service along Davis Drive to the east and secondly, the section north of Davis Drive up to Green Lane.

a) Transportation Needs

In considering design alternatives for the North Yonge Street Corridor, it is important to provide a context on existing and future traffic volumes. **Figure 9-3** shows the existing mainline traffic volumes between Mulock Drive and Green Lane. Both the PM peak and Saturday peak, volumes currently exceed the practical capacity of a typical four lane arterial roadway (i.e. 1,800 vehicles per hour/direction). The impacts of this over-capacity situation are evident in the daily congestion that occurs in the corridor, specifically north of Davis Drive. A unique characteristic of traffic volumes in this corridor is that the volumes in the PM peak period (peak direction)

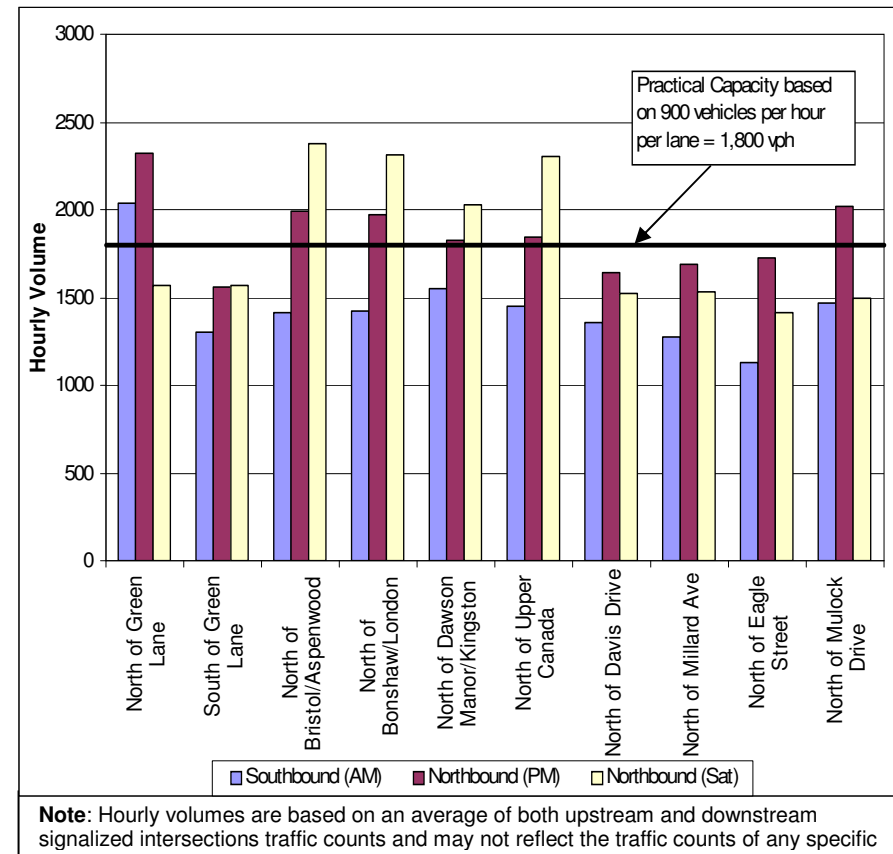


Figure 9-3
Yonge Street Existing (2005) Traffic Levels

are significantly higher than the AM peak period due to the overlaying of commercial traffic from the big box developments with commuter traffic. South of Davis Drive, existing mainline traffic volumes are generally below the theoretical capacity of Yonge Street.

Projections of future traffic levels have been prepared using the York Region Travel Demand Forecasting Model and indications are that traffic on this portion of Yonge Street will continue to grow at a rate of at least 2% per year. Transportation network changes such as the extension of Bathurst Street north to Yonge Street will have a mitigating impact on traffic growth as will the maturing of the retail development along Yonge Street, but this is out-weighted by the impacts of new development in Newmarket and East Gwillimbury. By all accounts, it can be expected that traffic demand will continue to increase by at least 1.5% to 2% per year for the next 20 years. The actual growth rate used in the analysis was 1% for turning movements and 2% for through movements. Given that Yonge Street is already over capacity in some locations, it is not possible for this growth to be accommodated without improvements to road capacity, or through diversion of trips to other modes, such as rapid transit.

b) Description of Alternative Design Methods

The following five design alternatives were evaluated for this specific portion of the corridor:

- Alternative 1: Existing road configuration with rapid transit operating in mixed traffic
- Alternative 2: Existing road configuration with some intersection improvements and rapid transit operating in mixed traffic
- Alternative 3: Widening of Yonge Street to 6 lanes with rapid transit operating in mixed traffic curb HOV lanes
- Alternative 4: Widening of Yonge Street to accommodate rapid transit operating in a dedicated median rapidway
- Alternative 5: Widening of Yonge Street to 6 lanes with rapid transit operating in a dedicated median rapidway

c) Objectives for Evaluation of Alternatives

For consistency, the same five objectives that were used in the evaluation of the transit route alternatives have been used for evaluation of these road improvement alternatives. These objectives are listed below:

- To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service;
- To protect and enhance the social environment in the corridor;
- To promote a sustainable environment by protecting and enhancing the natural environment in the corridor;
- To promote smart growth and economic development in the corridor; and
- To maximize the cost-effectiveness of the rapid transit system.

d) Results of the Evaluation of Alternatives

It was considered beneficial to perform the evaluation of the alternatives by splitting the section at Davis Drive into a southern and northern portion. This was done because the land use characteristics and traffic patterns differ enough between portions and the rapid transit network will branch into two routes at Davis Drive, with one continuing north on Yonge Street and the other turning east on Davis Drive. Also, transit ridership is projected to be significantly higher south of Davis Drive (1200 passengers per hour) compared to the volumes to be carried in the northern portion (300 passengers per hour).

For the southern portion, the results of the evaluation of all alternatives are presented in **Table 9-3** on Pages 9-6 and 9-7. Considering the overall response of each alternative to the project objectives, Alternative 4,

insertion of dedicated median rapidway lanes, is the technically preferred design for the following reasons:

- The median rapidway configuration would permit higher service speed thus attracting higher transit ridership, and hence mitigating some of the projected traffic growth;
- From an improved mobility for both modes perspective, Alternative 4 offers an optimum solution as it maximizes operational benefits and the attractiveness of rapid transit while accommodating projected traffic growth with enhancements of the existing four lane roadway;
- It offers good streetscaping and pedestrian safety enhancement opportunities without significant property taking from business frontages and impact to heritage features;
- Alternative 4 avoids most watercourse affects while offering the air quality benefits of an improved alternative to private auto use;
- Although modified business access is necessary, pedestrian crossing safety is improved by the rapidway insertion with Alternative 4;
- This alternative provides the best response as a catalyst for both transit oriented development and urban form objectives and a safer more pedestrian friendly environment; and
- Although other alternatives require much lower initial capital investment, they are not cost-effective as a medium to longer term solution for either transport mode. Alternative 4 maximizes transit benefits, optimizes road improvement costs and avoids major property acquisition costs.

Findings for the northern portion to Green Lane follow in **Table 9-4** on Pages 9-8 and 9-9. In this portion, the need to increase road capacity and improve operations on Yonge Street coupled with initial lower projected transit ridership due to existing land use are key factors in selecting the technically preferred alternative. Alternative 3, widening Yonge Street to the Region's Standard six lane cross-section with curb lanes designated HOV lanes is the preferred initial response to immediate and medium-term needs for the reasons listed below.

- It provides the additional through traffic capacity and improved service levels on Yonge Street to address urgent congestion problems;
- Short and near-term rapid transit frequencies do not justify dedicated lanes and could operate in an HOV lane with reasonable transit service reliability and speed;

- The six-lane cross-section can be readily converted to incorporate a dedicated median rapidway if and when required by growth of population served and degraded transit reliability due to congestion;
- The widened right-of-way can be achieved with a moderate amount of property acquisition and the increase in noise level on residential land uses is expected to be minor;
- The raised median provides both an opportunity to enhance the streetscape with appropriate landscaping and a safe refuge for pedestrian's unable to cross the widened roadway in one signal cycle;
- The minor effects on the natural environment can be mitigated by built-in attributes in the design such as storm water run-off management facilities;
- The increased road capacity addresses near-term business and through traffic deficiencies while future conversion to median rapidway will support the planned intensification of mixed uses required by Provincial growth plans; and
- Two-stage capital investment defers the costs of full median rapidway facilities until required by transit ridership growth due to land use intensification in the north of the study area.

As noted above, increased transit demand from the significant population growth proposed for East Gwillimbury and the consequent higher traffic volumes and congestion levels can be expected in the longer term. In addition, in the longer-term, this northern portion of the Yonge corridor in Newmarket will evolve into a mature Regional centre as defined in the approved Regional and local Official Plans. The associated intensification in and around the big-box commercial areas with a focus on transit-oriented development will change the mode split for travel in the corridor. Transit ridership can be expected to increase and traffic movement will comprise a greater proportion of through trips with less in-and-out access to auto-oriented commercial development.

Consequently, conversion of the six-lane cross-section to four lanes with a dedicated median rapidway is preferred as a second stage design solution. This would be implemented when transit ridership exceeds the capacity of a general traffic lane thus justifying dedication of an exclusive lane to overcome delays to transit service due to traffic congestion. Left and U-turn lanes at the signalized intersections shown in the plans will maintain safe access to the adjacent local street network and the intensified mixed-use development envisioned in the Official Plans.

Table 9-3
Evaluation of Route Capacity and Improved Public Transit Design Alternatives on Yonge Street Between Mulock Drive and Davis Drive

Objectives and Goals	Alternative 1 Rapid Transit Operation in Mixed Traffic in Existing Road Configuration	Alternative 2 Rapid Transit Operation in Mixed Traffic With Some Intersection Improvements	Alternative 3 Rapid Transit Operation in Mixed Traffic With Widened Yonge St. to 6 Lanes	Alternative 4 Rapid Transit Operation in Dedicated Median Rapidway (Accommodated by a Widened Yonge St.)	Alternative 5 Rapid Transit Operation in Dedicated Median Rapidway plus Widened Yonge St. to 6 Lanes
IMPROVE MOBILITY					
Increase attractiveness of rapid transit service	○ Road capacity will be exceeded in the future by 40% in some locations if no improvements are made to the road network. Rapid transit running times would be severely degraded under this alternative.	○ With the assumed future improvements to some intersections, there are marginal reductions in delay and therefore severely degrading transit running times.	● There is an opportunity to operate the curb lane as a dedicated HOV/transit lane during the peak periods.	● The median rapidway would permit higher service speed thus attracting higher transit ridership, and hence mitigating traffic growth. However, the reduction in traffic volumes is somewhat off-set by the impact of adding a dedicated signal phase to allow for protected left and u-turn movements.	● The median rapidway would permit higher service speed thus attracting higher transit ridership, and hence mitigating traffic growth. However, the reduction in traffic volumes is somewhat off-set by the impact of adding a dedicated signal phase to allow for protected left and U-turn movements. Wider roadway will impact pedestrian crossing times at intersections and reduce attractiveness of corridor.
Effect of through traffic delay on overall operations	○ The growth expected in the corridor will not be accommodated by the existing road network.	○ Even with some intersection improvements, most intersections, including through movements would continue to fail in 2021.	● It is likely that over time available through capacity would be absorbed by vehicles using Yonge St. as an alternative to other congested routes.	● Although over time through traffic capacity will be absorbed in the four general purpose lanes, rapid transit operation will remain a fast, reliable alternative in the rapidway lanes	● Although in the very long term, through traffic capacity will be absorbed in the six general purpose lanes, rapid transit operation will remain a fast, reliable alternative in the rapidway lanes
Effect of mixed traffic level of service on reliability	○ Most of the major intersections will operate at level of service F (i.e. failure). All delays experienced would be considered unacceptable.	○ Marginal improvement in delay at major intersections, however delays would still be considered unacceptable.	● Delays would still exist during peak times at the major intersections, but less than those for Alternatives 1 and 2.	● Delays would still exist during peak times at the major intersections, but less than for Alternatives 1 and 2 due to mode shift toward transit.	● Alternative maximizes level of service for both automobiles and transit vehicles. Level of service for regular traffic similar to Alternative 3.
Ability to address traffic demand and reduce congestion	○ The existing road configuration will not be able to handle the demand forecasted and therefore will not improve the level of congestion in the corridor	○ The improvement at intersections will have little to no effect on the level of congestion.	● The level of congestion will decrease initially, however over time traffic demand will require the six lanes and congestion will become an issue.	● The level of congestion would be slightly reduced, however still exist to some degree. As mode shift towards transit occurs the traffic demand will reduce slightly.	● This alternative will provide the best relief to congestion in the corridor and therefore be able to deal with the traffic demand in the corridor.
Overall Responsiveness	○	○	●	●	●
PROTECT AND ENHANCE SOCIAL ENVIRONMENT					
Minimize adverse effects on and maximize benefits for communities in corridor	● No affect to adjacent properties.	● Only localized widening at intersections where improvements are implemented is required. No affect to adjacent properties.	● Partial property acquisition is moderate.	● Partial property acquisition is moderate.	○ Partial property acquisition is significant.
Maintain or improve road traffic and pedestrian circulation	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.
Maintain a high level of public safety and security in corridor	● No improvement to public safety would take place.	● No improvement to public safety would take place.	● Pedestrians would have a longer crossing length due to widened ROW.	● A U-turn phase is required to provide access to properties that currently have direct access from Yonge St. but are not served by a signalized intersection. Pedestrian crossing safety is improved by the rapidway insertion since there will be a refuge area in the median.	○ An 8-lane cross-section does not promote a pedestrian-friendly environment, and in fact will be wider at intersections where left and/or right turn lanes need to be accommodated. A two-stage pedestrian crossing would almost be mandatory at some intersections due to the roadway cross-section. A U-turn phase is required to provide access to properties that currently have direct access from Yonge St. but are served by a signalized intersection.
Minimize adverse noise and vibration effects	● Noise impact is low.	● Noise impact is low.	● Widened road ROW may have minimal noise impact due to closer proximity to adjacent commercial and residential land use.	● Widened road ROW may have minimal noise impact due to closer proximity to adjacent commercial and residential land use.	○ Widened road ROW may have moderate noise impact due to closer proximity to adjacent commercial and residential land use.
Minimize adverse effects on cultural resources	● No affect on cultural resources.	● No affect on cultural resources.	● Any widening required can be configured to avoid any affect on cultural resources (e.g. Quaker Meeting House and adjacent cemetery).	● Any widening required can be configured to avoid any affect on cultural resources (e.g. Quaker Meeting House and adjacent cemetery).	● Any widening required can be configured to avoid any affect on cultural resources (e.g. Quaker Meeting House and adjacent cemetery).
Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	○ No significant opportunities for streetscaping enhancement.	○ No significant opportunities for streetscaping enhancement.	○ No significant opportunities for streetscaping enhancement.	● Good streetscaping enhancement opportunity along route.	● Good streetscaping enhancement opportunity along route.
Overall Responsiveness	●	●	●	●	●

Table 9-3 (Continued)
Evaluation of Route Capacity and Improved Public Transit Design Alternatives on Yonge Street Between Mulock Drive and Davis Drive

Objectives and Goals	Alternative 1 Rapid Transit Operation in Mixed Traffic in Existing Road Configuration	Alternative 2 Rapid Transit Operation in Mixed Traffic With Some Intersection Improvements	Alternative 3 Rapid Transit Operation in Mixed Traffic With Widened Yonge St. to 6 Lanes	Alternative 4 Rapid Transit Operation in Dedicated Median Rapidway (Accommodated by a Widened Yonge St.)	Alternative 5 Rapid Transit Operation in Dedicated Median Rapidway plus Widened Yonge St. to 6 Lanes
PROTECT NATURAL ENVIRONMENT					
Minimize adverse effects on Aquatic Ecology	● Use of existing road rights-of-way minimizes adverse effects on aquatic ecology.	● Use of existing road rights-of-way minimizes adverse effects on aquatic ecology.	○ Minimal effect to crossing of Western Creek, just north of Eagle St., since small amount of ROW widening required.	○ Minimal effect to crossing of Western Creek, just north of Eagle St., since small amount of ROW widening required.	○ Greatest effect to crossing of Western Creek, just north of Eagle St., since this alternative requires the most amount of ROW widening..
Minimize adverse effects on Terrestrial Ecology	● Use of existing road rights-of-way minimizes adverse effects on terrestrial ecology.	● Use of existing road rights-of-way minimizes adverse effects on terrestrial ecology.	● Minimal adverse effects expected to terrestrial ecology due to the nature of those that exist adjacent to the corridor.	● Minimal adverse effects expected to terrestrial ecology due to the nature of those that exist adjacent to the corridor.	○ Minimal adverse effects expected to terrestrial ecology due to the nature of those that exist adjacent to the corridor.
Improve Regional air quality and minimize adverse local effects	○ Continuing congestion will increase emissions, worsening local air quality.	○ Continuing congestion will increase emissions, worsening local air quality.	● Potential for local air quality effects is low due to adjacent land use being mainly commercial with residential set back from ROW.	● Potential for local air quality effects is low due to adjacent land use being mainly commercial with residential set back from ROW.	● Potential for local air quality effects is low due to adjacent land use being mainly commercial with residential set back from ROW
Minimize adverse effects on corridor hydrogeological, geological, and hydrological conditions	● Use of existing road rights-of-way minimizes adverse effects.	○ Additional run-off from the extra impermeable surface will have to be accommodated.	○ Additional run-off from the extra impermeable surface will have to be accommodated.	○ Additional run-off from the extra impermeable surface will have to be accommodated.	○ Additional run-off from the extra impermeable surface will have to be accommodated.
Overall Responsiveness	●	●	●	●	○
PROMOTE SMART GROWTH/ ECONOMIC DEVELOPMENT					
Support Regional and Municipal Planning Policies and approved urban structure	○ Supports Regional and Municipal planning policies, however does not entirely support the planned urban structure.	○ Supports Regional and Municipal planning policies, however does not entirely support the planned urban structure.	○ Supports Regional and Municipal planning policies, however does not entirely support the planned urban structure. The growth in traffic congestion would be slow and therefore business development would continue.	● Supports Regional and Municipal planning policies and planned urban structure. Rapid transit nodes have encouraged higher density land use, increased business activity, and enhanced access to community facilities.	● Supports Regional and Municipal planning policies and planned urban structure. Rapid transit nodes have encouraged higher density land use, increased business activity, and enhanced access to community facilities.
Provide improved access to social and community facilities in corridor	○ Access to social and community facilities will be degraded due to significant loss of mobility.	○ Access to social and community facilities will be degraded due to significant loss of mobility.	● Improvements to traffic flow due to the additional ROW will provide better access to the various facilities.	○ The dedicated rapidway will provide an alternative form of travel from the automobile. Access to the various facilities using the general purpose travel lanes will be degraded due to increased congestion resulting in loss of mobility.	● The dedicated rapidway will provide an alternative form of travel from the automobile. Improvements to traffic flow due to the additional ROW will provide better access to the various facilities.
Effect on business activities	○ Will discourage business development due to significant loss of mobility (i.e. access).	○ Will discourage business development due to significant loss of mobility (i.e. access).	○ The growth in traffic congestion would be slow and therefore business development would continue.	○ The dedicated rapidway will provide an alternative form of travel from the automobile. Access to the various facilities using the general purpose travel lanes will be degraded due to increased congestion resulting in loss of mobility.	○ The growth in traffic congestion would be slow and therefore business development would continue. The dedicated rapidway will provide an alternative form of travel from the automobile. Potential significant impact to business access and parking resulting from wider ROW.
Promote transit-oriented development	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Mulock Dr. and Davis Dr.	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Mulock Dr. and Davis Dr.	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Mulock Dr. and Davis Dr.	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Mulock Dr. and Davis Dr. Alternative is the best reference as a catalyst for both transit-oriented development and urban form objectives and a safer more pedestrian friendly environment.	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Mulock Dr. and Davis Dr. Alternative is the best reference as a catalyst for transit-oriented development.
Overall Responsiveness	○	○	○	●	○
MAXIMIZE COST-EFFECTIVENESS					
Minimize capital cost of vehicles, facilities and systems required	● Potential for additional vehicles due to possible congestion delay in mixed traffic resulting in increased round trip times.	● Potential for additional vehicles due to possible congestion delay in mixed traffic resulting in increased round trip times	○ Moderate to high infrastructure cost due to construction of a widened Yonge Street.	○ High infrastructure cost due to construction and maintenance of rapidway.	○ High infrastructure cost due to construction and maintenance of rapidway.
Minimize property acquisition cost to implement facilities	● No property acquisition required.	● Minimal to no property required.	● Low partial property cost due to ROW widening.	○ Moderate partial property cost due to ROW widening for rapidway.	○ Highest partial property cost since ROW widening for rapidway and additional 2 lanes is greatest.
Overall Responsiveness	●	●	○	○	○
PREFERRED ALTERNATIVE					

LEGEND: Least Responsive ○ ○ ○ ● ● Most Responsive

NOTE: TOD – Transit-oriented Development

O&M – Operation and Maintenance

OP – Official Plan

ROW – Right-of-Way

**Table 9-4
Evaluation of Route Capacity and Improved Public Transit Design Alternatives on Yonge Street Between Davis Drive and Green Lane**

Objectives and Goals	Alternative 1 Rapid Transit Operation in Mixed Traffic in Existing Road Configuration	Alternative 2 Rapid Transit Operation in Mixed Traffic With Some Intersection Improvements	Alternative 3 Rapid Transit Operation in Mixed Traffic With Widened Yonge St. to 6 Lanes	Alternative 4 Rapid Transit Operation in Dedicated Median Rapidway (Accommodated by a Widened Yonge St.)	Alternative 5 Rapid Transit Operation in Dedicated Median Rapidway plus Widened Yonge St. to 6 Lanes
IMPROVE MOBILITY					
Increase attractiveness of rapid transit service	○ Road capacity will be exceeded in the future by 60% in some locations if no improvements are made to the road network. Rapid transit running times would be severely degraded under this alternative.	○ With the assumed future improvements to some intersections, there will be marginal reductions in delay and therefore transit running times would remain severely degraded.	● The alternative provides an opportunity to operate the curb lane as a dedicated HOV/transit lane during the peak periods. General traffic level of service with near-term development intensification levels would not affect speed and reliability of initial rapid transit service frequency.	● The median rapidway would permit higher service speed thus attracting higher transit ridership, and hence mitigating traffic growth. However, the reduction in auto trips is somewhat offset by the impact of adding a dedicated signal phase to allow for protected left and U-turn movements.	● The median rapidway would permit higher service speed thus attracting higher transit ridership, and hence mitigating traffic growth. However, the reduction in traffic volumes is somewhat off-set by the impact of adding a dedicated signal phase to allow for protected left and U-turn movements.
Effect of through traffic delay on overall operations	○ The growth expected in the corridor will not be accommodated by the existing road network.	○ Even with some intersection improvements, most intersections, including through movements would continue to fail in 2021.	● It is likely that over time available through capacity would be absorbed by vehicles using Yonge St. as an alternative to other congested routes.	● Although over time through traffic capacity will be absorbed in the 4 general purpose lanes, rapid transit operation will remain a fast, reliable alternative in the rapidway lanes	● Although in the very long term, through traffic capacity will be absorbed in the 6 general purpose lanes, rapid transit operation will remain a fast, reliable alternative in the rapidway lanes
Effect of mixed traffic level of service on reliability	○ Most of the major intersections will operate at level of service F (i.e. failure). All delays experienced would be considered unacceptable.	○ Marginal improvement in delay at major intersections, however delays would still be considered unacceptable.	● Delays would still exist during peak times at the major intersections, but less than those for Alternatives 1 and 2.	○ Delays would still exist during peak times at the major intersections, but less than for Alternatives 1 and 2 due to mode shift toward transit.	● Alternative maximizes level of service for both automobiles and transit vehicles. Level of service for regular traffic similar to Alternative 3.
Ability to address traffic demand and reduce congestion	○ The existing road configuration will not be able to handle the demand forecasted and therefore will not improve the level of congestion in the corridor	○ The improvement at intersections will have little to no effect on the level of congestion.	● The traffic demand in this section of Yonge St would benefit from an HOV lane due to significant volumes being driven by the commercial developments.	● As transit oriented intensification replaces "big box" shopping, transit ridership is expected to grow and justify using some of the road space.	● This alternative will provide the best relief to congestion in the corridor and therefore be able to deal with the traffic demand in the corridor.
Overall Responsiveness	○	○	●	●	●
PROTECT AND ENHANCE SOCIAL ENVIRONMENT					
Minimize adverse effects on and maximize benefits for communities in corridor	● No affect to adjacent properties.	● Only localized widening at intersections where improvements are implemented is required. No affect to adjacent properties.	● Partial property acquisition is moderate.	● Partial property acquisition is moderate.	○ Partial property acquisition is significant.
Maintain or improve road traffic and pedestrian circulation	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.	● Neighbourhood infiltration/parking potential is low.
Maintain a high level of public safety and security in corridor	○ No improvement to public safety would take place.	○ No improvement to public safety would take place.	○ Pedestrians would have a longer crossing length due to widened ROW.	● A U-turn phase is required to provide access to properties that currently have direct access from Yonge St. but are not served by a signalized intersection. Pedestrian crossing safety is improved by the rapidway insertion since there will be a refuge area in the median.	○ An 8-lane cross-section does not promote a pedestrian-friendly environment, and in fact will be wider at intersections where left and/or right turn lanes need to be accommodated. A two-stage pedestrian crossing would almost be mandatory at some intersections due to the roadway cross-section. A U-turn phase is required to provide access to properties that currently have direct access from Yonge St. but are served by a signalized intersection.
Minimize adverse noise and vibration effects	● Noise impact is low.	● Noise impact is low.	○ Widened road ROW may have minimal noise impact due to closer proximity to adjacent commercial and residential land use.	○ Widened road ROW may have minimal noise impact due to closer proximity to adjacent commercial and residential land use.	○ Widened road ROW may have moderate noise impact due to closer proximity to adjacent commercial and residential land use.
Minimize adverse effects on cultural resources	● No affect on cultural resources.	● No affect on cultural resources.	● No affect on cultural resources.	● No affect on cultural resources.	● No affect on cultural resources.
Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	○ No significant opportunities for streetscaping enhancement.	○ No significant opportunities for streetscaping enhancement.	○ No significant opportunities for streetscaping enhancement.	● Good streetscaping enhancement opportunity along route.	● Good streetscaping enhancement opportunity along route.
Overall Responsiveness	●	●	●	●	●

Table 9-4 (Continued)
Evaluation of Route Capacity and Improved Public Transit Design Alternatives on Yonge Street Between Davis Drive and Green Lane

Objectives and Goals	Alternative 1 Rapid Transit Operation in Mixed Traffic in Existing Road Configuration	Alternative 2 Rapid Transit Operation in Mixed Traffic With Some Intersection Improvements	Alternative 3 Rapid Transit Operation in Mixed Traffic With Widened Yonge St. to 6 Lanes	Alternative 4 Rapid Transit Operation in Dedicated Median Rapidway (Accommodated by a Widened Yonge St.)	Alternative 5 Rapid Transit Operation in Dedicated Median Rapidway plus Widened Yonge St. to 6 Lanes
PROTECT NATURAL ENVIRONMENT					
Minimize adverse effects on Aquatic Ecology	● Use of existing road rights-of-way minimizes adverse effects on aquatic ecology.	● Use of existing road rights-of-way minimizes adverse effects on aquatic ecology.	○ Design of widened roadway can include features to mitigate effects of culvert extensions	○ Design of widened roadway can include features to mitigate effects of culvert extensions	○ Design of excessively widened roadway must include greater measures to mitigate effects of culvert extensions
Minimize adverse effects on Terrestrial Ecology	● Use of existing road rights-of-way minimizes adverse effects on terrestrial ecology.	● Use of existing road rights-of-way minimizes adverse effects on terrestrial ecology.	● Minimal adverse effects expected to terrestrial ecology due to the nature of those that exist adjacent to the corridor.	● Minimal adverse effects expected to terrestrial ecology due to the nature of those that exist adjacent to the corridor.	○ Minimal adverse effects expected to terrestrial ecology due to the nature of those that exist adjacent to the corridor.
Improve Regional air quality and minimize adverse local effects	○ Continuing congestion and queuing will increase emissions, worsening local air quality.	○ Continuing congestion and queuing will increase emissions, worsening local air quality.	● Potential for local air quality effects is low due to adjacent land use being mainly commercial with residential set back from ROW.	● Potential for local air quality effects is low due to adjacent land use being mainly commercial with residential set back from ROW.	● Potential for local air quality effects is low due to adjacent land use being mainly commercial with residential set back from ROW
Minimize adverse effects on corridor hydrogeological, geological, and hydrological conditions	● Use of existing road rights-of-way minimizes adverse effects.	○ Additional run-off from the extra impermeable surface will have to be accommodated.	○ Additional run-off from the extra impermeable surface will have to be accommodated.	○ Additional run-off from the extra impermeable surface will have to be accommodated.	○ Additional run-off from the extra impermeable surface will have to be accommodated.
Overall Responsiveness	●	●	●	●	○
PROMOTE SMART GROWTH/ ECONOMIC DEVELOPMENT					
Support Regional and Municipal Planning Policies and approved urban structure	○ Supports Regional and Municipal planning policies, however does not entirely support the planned urban structure.	○ Supports Regional and Municipal planning policies, however does not entirely support the planned urban structure.	○ Supports Regional and Municipal planning policies, however does not entirely support the planned urban structure. The growth in traffic congestion would be slow and therefore business development would continue.	● Supports Regional and Municipal planning policies and planned urban structure. Rapid transit nodes will encourage higher density land use, increased business activity, and enhanced access to community facilities.	● Supports Regional and Municipal planning policies and planned urban structure. Rapid transit nodes have encouraged higher density land use, increased business activity, and enhanced access to community facilities.
Provide improved access to social and community facilities in corridor	○ Access to social and community facilities will be degraded due to significant loss of mobility.	○ Access to social and community facilities will be degraded due to significant loss of mobility.	● Improvements to traffic flow due to the additional ROW will provide better access to the various facilities.	○ The dedicated rapidway will provide an alternative form of travel from the automobile. Access to the various facilities using the general purpose travel lanes will be degraded due to increased congestion resulting in loss of mobility.	● The dedicated rapidway will provide an alternative form of travel from the automobile. Improvements to traffic flow due to the additional ROW will provide better access to the various facilities.
Effect on business activities	○ Will discourage business development due to significant loss of mobility (i.e. access).	○ Will discourage business development due to significant loss of mobility (i.e. access).	● The initial growth in traffic congestion would be slow and therefore business development would continue. Improved access to existing commercial areas.	○ The dedicated rapidway will provide an alternative form of travel from the automobile. Access to the various facilities using the general purpose travel lanes will be degraded due to increased congestion resulting in loss of mobility.	○ The growth in traffic congestion would be slow and therefore business development would continue. The dedicated rapidway will provide an alternative form of travel from the automobile. Potential significant impact to business access and parking resulting from wider ROW.
Promote transit-oriented development	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Davis Dr. and Green Ln.	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Davis Dr. and Green Ln.	● Introduction of rapid transit in HOV lanes provides the initial stimulus for transit-oriented development along Yonge St., especially at the station nodes at Davis Dr. and Green Ln.	● Greater stimulus for transit-oriented development along Yonge St., especially at the station nodes at Davis Dr. and Green Lane. Alternative is the best reference as a catalyst for both transit-oriented development and urban form objectives and a safer more pedestrian friendly environment.	● There is opportunity for transit-oriented development along Yonge St., especially at the station nodes at Davis Dr. and Green Ln. Alternative is the best reference as a catalyst for transit-oriented development.
Overall Responsiveness	○	○	●	●	○
MAXIMIZE COST-EFFECTIVENESS					
Minimize capital cost of vehicles, facilities and systems required	● Potential for additional vehicles due to possible congestion delay in mixed traffic resulting in increased round trip times.	● Potential for additional vehicles due to possible congestion delay in mixed traffic resulting in increased round trip times	● Potential for additional vehicles due to possible congestion delay in mixed traffic resulting in increased round trip times	○ High infrastructure cost due to construction and maintenance of rapidway.	○ High infrastructure cost due to construction and maintenance of rapidway and widened general purpose lanes.
Minimize property acquisition cost to implement facilities	● No property acquisition required.	● Minimal to no property required.	● Low partial property cost due to ROW widening.	○ Moderate partial property cost due to ROW widening for rapidway.	○ Highest partial property cost since ROW widening for rapidway and additional 2 lanes is greatest.
Overall Responsiveness	●	●	●	○	○
			PREFERRED INITIAL ALTERNATIVE	PREFERRED FUTURE ALTERNATIVE	

LEGEND: Least Responsive ○ ○ ● ● ● Most Responsive

NOTE: TOD – Transit-oriented Development

O&M – Operation and Maintenance

OP – Official Plan

ROW – Right-of-Way



9.1.4.3 Davis Drive between Yonge Street and Highway 404

As described in Chapter 8, the preferred routing for rapid transit service in the North Yonge Street Corridor involves splitting the rapid transit route at Davis Drive, with one service extending north on Yonge Street to Green Lane and then east to East Gwillimbury GO Station, and the other extending east along Davis Drive to Highway 404.

a) Existing Traffic Volumes

In considering design alternatives for the Davis Drive Corridor, it is important to provide a context on existing and future traffic volumes. **Figure 9-4** shows 2005 mainline (through) traffic volumes on Davis Drive between Yonge Street and Highway 404 for the PM peak hour, the period of highest volumes for Davis Drive. These volumes are lower than what would be considered a reasonable upper capacity for a typical four-lane roadway with provisions for turning movements (assuming 800 vehicles per hour per lane), but are in excess of the capacity of Davis Drive when taking into account that the few left turn lanes are often blocked and the centre left and through lanes operate at well below their through capacity potential. This highlights the major deficiency contributing to the observed traffic operations along Davis Drive, which tend to be quite poor during the peak hours. Poor traffic operations along Davis Drive are largely a function of roadway design and access management. A lack of left turns for major traffic generators tends to degrade mainline traffic flow.

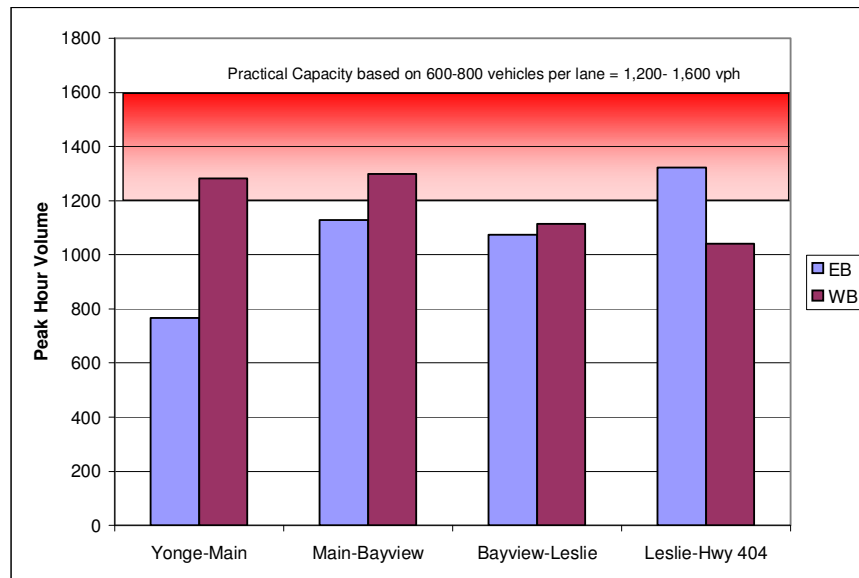


Figure 9-4
Existing (2005) Traffic Levels

Similarly, there are a number of private developments with closely spaced driveways accessing directly onto Davis Drive, further degrading traffic operations. Realistically, given the lack of turning movement provisions, the theoretical capacity of the two through lanes in each direction is nearer to 1200 vehicles per hour given the interruption of through traffic flow by turning vehicles.

A review of traffic operations undertaken in 2006 confirmed the above conclusion, namely that traffic operations on Davis Drive are hindered by roadway design and a lack of access management. **Table 9-5** shows the level of service by roadway segment for existing conditions. As shown, current travel speeds in the afternoon peak hour in the westbound direction are in the order of 26 km/hr (from Harry Walker Drive to Yonge Street).

Table 9-5
Existing (2005) PM Peak Hour Arterial Performance

Eastbound							
Cross Street	Flow Speed (km/h)	Running Time (s)	Signal Delay (s)	Travel Time (s)	Distance (km)	Arterial Speed (km/h)	Arterial LOS
Yonge Street	60	17.1	46.8	63.9	0.24	13.5	F
George Street	60	14.9	21.7	36.6	0.21	20.5	F
Barbara Road	60	20.2	18.7	38.9	0.28	26.2	E
Parkside Drive	60	9.4	24.2	33.6	0.13	14.1	F
Longford Road	60	6.1	12.1	18.2	0.09	16.8	F
Lorne Street	60	31.7	10.4	42.1	0.50	42.8	C
Main Street	60	29.1	19.1	48.2	0.43	31.8	D
Prospect Street	60	36.5	11.3	47.8	0.59	44.7	C
Roxborough Road	60	28.4	20.0	48.4	0.42	30.9	D
Alexander Road	60	26.3	19.2	45.5	0.38	30.4	D
Carlson Drive	60	31.4	26.6	58.0	0.50	30.8	D
Leslie Street	60	36.2	28.0	64.2	0.61	34.0	D
Forhan Drive	60	13.1	17.2	30.3	0.18	21.8	E
Harry Walker Drive	60	20.6	17.5	38.1	0.29	27.3	D
Total		321.0	292.8	613.8	4.84	28.4	D
Westbound							
Cross Street	Flow Speed (km/h)	Running Time (s)	Signal Delay (s)	Travel Time (s)	Distance (km)	Arterial Speed (km/h)	Arterial LOS
Harry Walker Drive	60	22.6	25.5	48.1	0.32	23.7	E
Forhan Drive	60	20.6	21.0	41.6	0.29	25.0	E
Leslie Street	60	13.1	30.0	43.1	0.18	15.4	F
Carlson Drive	60	36.2	17.9	54.1	0.61	40.4	C
Huron Heights	60	31.4	18.3	49.7	0.50	35.9	C
Patterson Street	60	26.3	23.6	49.9	0.38	27.8	D
Lundy's Lane	60	28.4	34.9	63.3	0.42	23.6	E
Main Street	60	36.5	26.3	62.8	0.59	34.0	D
Lorne Street	60	29.1	26.6	55.7	0.43	27.5	D
Longford Road	60	31.7	9.6	41.3	0.50	43.7	C
Parkside Drive	60	6.1	10.1	16.2	0.09	18.9	F
Barbara Road	60	9.4	22.3	31.7	0.13	14.9	F
George Street	60	20.2	23.1	43.3	0.28	23.5	E
Yonge Street	60	14.9	73.4	88.3	0.21	8.5	F
Total		326.5	362.6	689.1	4.92	25.7	E

b) Future Traffic Volumes

Projections of future traffic levels have been prepared using the York Region Travel Demand Forecasting Model and indications are that traffic on this portion of Davis Drive will continue to grow between a rate of 1% and

1.5% per year depending on location. Future growth rates will be a function of how quickly some of the major parcels of land are redeveloped. All indications are that significant growth and intensification will occur in Newmarket's Davis Drive corridor as this has been identified as an Urban Growth Centre in the Province's Growth Management Strategy (Places to Grow) and is designated an Urban Centre in the Town's Official Plan update.

Figure 9-5 provides an indication of future traffic levels on Davis Drive assuming no major road capacity improvements and current transit services. As shown, both eastbound and westbound directions will utilize or exceed the realistic theoretical capacity range (1200-1600 vehicles per hour per lane) in most segments. This growth in traffic will undoubtedly exacerbate current traffic operational issues and translate into additional delay for road users. Specifically, the Draft Davis Drive Traffic Operations Report prepared by NCE in 2006 predicted that average travel speeds would decrease from 26 km/hr currently to 17 km/hr in 2015 assuming no capacity improvements are made.

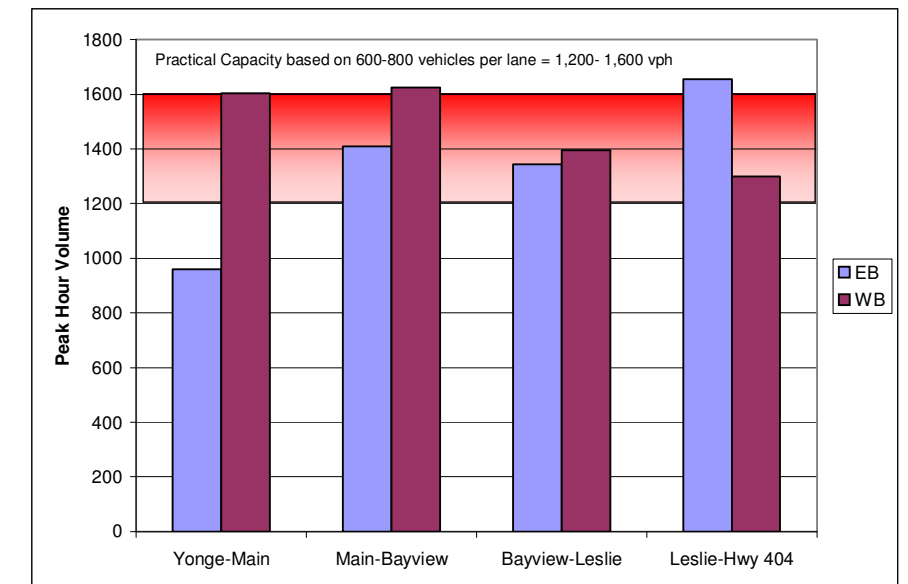


Figure 9-5
Future (2021) Traffic Levels on Davis Drive without Rapid Transit

The following sections set out the various design alternatives considered for the Davis Drive portion of the rapid transit network, the evaluation of their response to project objectives and the resulting preferred design solution.

c) Description of Alternative Design Solutions

The following three design alternatives were evaluated for the Davis Drive corridor:

- *Alternative 1: Rapid Transit Operation in Mixed Traffic in Existing Road Configuration (Do Nothing)*
- *Alternative 2: Rapid Transit Operation in Mixed Traffic With Some Intersection Improvements and Transit Priority Measures*
- *Alternative 3: Rapid Transit Operation in Dedicated Median Rapidway from Yonge Street to Southlake Regional Health Centre*

Alternative 3 is based on the provision of four through lanes of traffic for regular vehicles with widening to accommodate turning movements at certain intersections. In addition, this alternative involves further road widening to provide for the median rapidway.

d) Objectives for Evaluation of Alternatives

For consistency, the same five objectives that were used in the evaluation of the transit route alternatives in the North Yonge Street EA have been used for evaluation of these road improvement alternatives. These objectives are listed below:

- To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service;
- To protect and enhance the social environment in the corridor;
- To promote a sustainable environment by protecting and enhancing the natural environment in the corridor;
- To promote smart growth and economic development in the corridor; and
- To maximize the cost-effectiveness of the rapid transit system.

e) Evaluation of Design Alternatives

The evaluation findings showing the response of the three alternatives to the above objectives are presented in **Table 9-6**. The level of response to the project goals is depicted graphically in terms of each individual goal and does not imply any weighting relative to the other goals.

Given that none of the alternatives meets all objectives without significant shortcomings or adverse effects it is necessary to apply a “reasoned argument” approach summarizing, in terms of the key factors, the degree to which each alternative achieves the primary objectives for urban growth and mobility in Newmarket’s Davis Drive corridor.

Improving Mobility

Alternative 1 does not meet the mobility improvement objective in that no improvements are made to road capacity hence several intersections along Davis Drive will be operating at a very poor level of service by 2021 or before. In addition, a new rapid transit service mixed with these traffic

conditions would experience considerable delays, therefore making the transit service slow and unreliable and consequently, unattractive as an alternative to auto use.

For **Alternative 2**, intersection improvements would include the addition of left turn lanes at several locations as well as some consolidation of access points. Transit priority would be provided through the application of Transit Signal Priority (TSP). These improvements help to improve traffic operations fairly significantly, as shown in **Table 9-6**. However, several locations would still be operating at LOS F and a large portion of the through movement capacity would be utilized by 2021. These localized capacity restrictions have the effect of reducing the reliability, and hence attractiveness, of new rapid transit services along Davis Drive. Beyond 2021, mixed traffic rapid transit operations would progressively deteriorate as general traffic volumes approach the through capacity of the largely 5-lane cross-section. Since the rapid transit services on Davis Drive would be continuous with services on Yonge Street, delays on Davis Drive would affect the performance and attractiveness of the entire north-south rapid transit spine.

Alternative 3 further improves mobility for transit riders in that it would allow rapid transit vehicles to by-pass congestion between the Hospital and Yonge Street, particularly between Main Street and the expanding Health Centre precinct. In this alternative at 2021 traffic levels, it is projected that the median rapidway will save transit riders up to 4 minutes compared to the mixed traffic operation in Alternative 2. Also, the extent of dedicated lanes will achieve segregation for rapid transit for the full length of the proposed Davis Drive urban centre proposed in Newmarket’s recently updated Official Plan. Similar to Alternative 2, this alternative maintains the same level of road capacity for regular vehicles. However, due to the increased attractiveness of transit, the growth in auto demand will potentially reduce when compared to Alternatives 1 and 2.

From the perspective of improving mobility for both modes, Alternative 3 offers an optimum solution as it maximizes operational benefits and the attractiveness of rapid transit while incorporating projected traffic growth with enhancements of the existing four lane roadway.

Protecting and Enhancing Social Environment

Alternative 1 would not require any property acquisition since the right-of-way remains as is. The lack of road capacity and traffic operational improvements will encourage neighbourhood infiltration as congestion increases over time. Also, doing nothing to the road infrastructure makes little contribution to place-making or the pedestrian environment and safety in this segment. Access to community facilities and amenities by road will worsen and the reliability of improved transit service will be unpredictable.

Property acquisition would be moderate for **Alternative 2** due to widening required at the intersections where additional left and/or right turns are needed. While property impacts are moderate, this alternative’s contribution to place-making or the pedestrian environment and safety in this segment will be limited. The potential for an increase in neighbourhood infiltration decreases with reduced congestion from the Davis Drive operational improvements proposed for Alternative 2.

For **Alternative 3**, property acquisition is significant in order to accommodate the widened cross-section throughout the rapidway segment. Also required are measures to mitigate effects on, or relocate heritage buildings. Insertion of the median rapidway in this alternative, modifies business access by restricting all left-turns and U-turns to signalized intersections. Direct access to properties between signalized intersections would be right-in/right-out only. Pedestrian crossing safety is improved and the reliability of transit access to community facilities is maximized by the rapidway insertion.

This alternative also reduces the potential for an increase in neighbourhood infiltration and provides good urban design and streetscaping enhancement opportunities through the Town’s designated urban centre (Yonge Street to the Hospital).

Protecting and Enhancing Natural Environment

With **Alternative 1**, there is no affect to the Holland River and tributaries which cross Davis Drive between the Hospital and Yonge Street. However, queuing and associated air quality impacts will be an issue for Alternative 1 due to the projected road capacity deficiencies at the major intersections.

For **Alternatives 2 and 3** widening of the road right-of-way requires bridge or culvert extension in this area. Alternative 3 will require the most widening or replacement of watercourse structures due to addition of two new lanes to accommodate the median rapidway.

Additional run-off from the extra impermeable surface will have to be accommodated with Alternatives 2 and 3, the effect being the least for Alternative 2 and the most for Alternative 3. The potential for local adverse air quality effects is reduced for these alternatives that progressively improve traffic flow. Both Alternatives 2 and 3 will minimize local air quality degradation due to reduced queuing.

In summary, Alternative 3 will have the most watercourse affects requiring mitigation, but has the greatest potential to achieve the longer term air quality benefits of an improved alternative to private auto use.

Table 9-6
Evaluation of Improved Public Transit Design Alternatives on Davis Drive

Objectives and Goals	Alternative 1 Rapid Transit Operation in Mixed Traffic in Existing Road Configuration (Do Nothing)	Alternative 2 Rapid Transit Operation in Mixed Traffic With Some Intersection Improvements and Transit Priority Measures	Alternative 3 Rapid Transit Operation in Dedicated Median Rapidway from Yonge Street to Southlake Regional Health Centre plus associated Intersection Improvements
IMPROVE MOBILITY			
Increase attractiveness of rapid transit service	○ Sub-standard geometric conditions and access management result in significant localized congestion and low operating speeds. Rapid transit running times would be severely degraded to the 18-20 minute range.	● Addition of left turn lanes at selected intersections reduces congestion therefore improving transit running times to the 14-16 minute range.	● The median rapidway would permit higher service speed thus attracting higher transit ridership by allowing running times in the 9-10 minute range.
Effect of improvements on overall road operations and capacity	○ Traffic growth resulting from new development will degrade traffic operations and reduce average traffic speeds by 35% 2021 road capacity of existing road and intersections will be limited to approximately 1200 veh/hr or 1320 persons/hr	● Even with intersection left turn improvements, many intersections, including through movements would continue to fail in 2021 with road capacity limited to approximately 1600 veh./hr or 1760 persons/hr.	● Even with intersection left turn improvements, many intersections, including through movements would continue to fail in 2021 with road capacity limited to approximately 1600 veh./hr or 1760 persons/hr.
Effect of improvements on combined road and transit capacity of right-of-way and on transit reliability	○ Projected 2021 transit trips attracted – 300/hr. Combined ROW capacity : 1620 persons/hr. Several major intersections operate at level of service F (i.e. failure) causing delays considered unacceptable.	● Projected 2021 transit trips attracted – 500/hr. Combined ROW capacity : 2260 persons/hr. Marginal reduction in delay at major intersections would still leave potential for unacceptable transit reliability.	● Projected 2021 transit trips attracted – 900/hr. Combined ROW capacity : 2660 persons/hr. Level of service increased for both automobiles and transit vehicles. Transit reliability would be improved significantly.
Ability to address traffic demand and reduce congestion	○ Will not reduce the congestion levels in the corridor, which at existing levels are significant. Traffic demand in the corridor will continue to grow, and hence congestion without improvements.	● Provision for turning movements at intersections will minimally improve congestion at these locations, but for the most will degrade over time.	● The traffic demand remains significant in the future and congestion levels will be minimally improved as for Alternative 2.
Overall Responsiveness	○	●	●
PROTECT AND ENHANCE SOCIAL ENVIRONMENT			
Minimize adverse effects on and maximize benefits for, communities in corridor	● No Davis Drive right-of-way widening from adjacent properties required. Continuing increase in traffic congestion and no improvement in access to community amenities/businesses	● Right-of-way widening from frontage of adjacent properties (50-70) required at several intersections due to insertion of left turn lanes. Improvement in access to community amenities/businesses will be moderate.	○ Right-of-way widening along entire rapidway length requires partial or full takings from adjacent properties (100-120) for insertion of dedicated lanes for rapidway. Improvement in access to community amenities/ businesses by road will be moderate and good by transit.
Maintain or improve road traffic and pedestrian circulation	○ High potential for an increase in neighbourhood traffic infiltration as drivers seek out alternative routes to avoid localized congestion along Davis Drive.	● Improved left turn capacity at selected Davis Drive intersections will reduce localized congestion and potential for neighbourhood traffic infiltration.	● Median rapidway with left and U-turn capacity at major intersections will reduce general & localized congestion and potential for neighbourhood traffic infiltration.
Maintain a high level of public safety and security in corridor	○ Increasing congestion on Davis Drive and neighbourhood street activity will result in a deficient transportation system potentially decreasing public safety and increasing the accident risk.	● Left turn lanes inserted at certain intersections would improve traffic operations and therefore marginally improve existing public safety conditions. Increasing congestion on Davis Drive and neighbourhood street activity will potentially decrease public safety and increase accident risk.	● Signalizing all left and U-turns at intersections within the dedicated rapidway portion (approx. 2.6km) would improve traffic operations and hence public safety. The median pedestrian refuge at signalized intersections, will improve safety if pedestrians require two stages to cross Davis Drive. .
Minimize adverse noise and vibration effects	○ No change to existing high ambient noise levels.	○ Minor improvement of traffic flow will have minimal impact on existing high ambient noise levels.	○ Increase in ambient levels due to widened roadway being closer to adjacent residential land uses will not be discernable. Improved transit alternative will slow general traffic growth and resulting increase in ambient levels.
Minimize adverse effects on cultural resources	● No effect on cultural facilities but increasing traffic congestion will degrade access to resources.	○ Widening of the road ROW will affect 18 properties identified as having built heritage features (11 partial, 7 full). The registered former Union Hotel on the NE corner of the Main St. and Davis Dr. intersection will require relocation and other full takings will require some form of mitigation.	○ Widening of the road ROW will affect 18 properties identified as having built heritage features (11 partial, 7 full). The registered former Union Hotel on the NE corner of the Main St. and Davis Dr. intersection will have to be relocated and other full takings will require some form of mitigation.
Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	○ No significant opportunities for streetscaping enhancement.	○ Opportunities for minor streetscaping enhancement at certain intersections.	● Opportunities for significant streetscaping enhancement along the dedicated rapidway portion of the route in the median, widened boulevards and at stations.
Overall Responsiveness	○	●	●

Table 9-6 (Continued)
Evaluation of Improved Public Transit Design Alternatives on Davis Drive

Objectives and Goals	Alternative 1 Rapid Transit Operation in Mixed Traffic in Existing Road Configuration (Do Nothing)	Alternative 2 Rapid Transit Operation in Mixed Traffic With Some Intersection Improvements and Transit Priority Measures	Alternative 3 Rapid Transit Operation in Dedicated Median Rapidway from Yonge Street to Southlake Regional Health Centre plus associated Intersection Improvements
PROTECT NATURAL ENVIRONMENT			
Minimize adverse effects on Aquatic Ecology	● Use of existing road right-of-way minimizes adverse effects on aquatic ecology since modifications or extensions of bridges and culverts over watercourses are not required.	● Widening of both the box culvert between Vincent/Niagara Streets and Main Street, and the bridge structure over the East Holland River tributary just east of the Newmarket GO Station. Mitigation will be built-into design and construction methods for both crossings to avoid or minimize adverse effects.	● Widening of both the box culvert between Vincent/ Niagara Streets and Main Street, and/or replacement of the bridge structure over the East Holland River tributary just east of the Newmarket GO Station. Mitigation will be built-into design and construction methods for both crossings to avoid or minimize adverse effects.
Minimize adverse effects on Terrestrial Ecology	● Use of existing road right-of-way minimizes adverse effects on terrestrial ecology.	● The terrestrial features located in the corridor will not be affected by right-of-way or road widening since these features are not directly adjacent to Davis Dr.	● The terrestrial features located in the corridor will not be affected by right-of-way widening since these features are not directly adjacent to Davis Dr.
Improve Regional air quality and minimize adverse local effects	○ Continuing, worsening traffic congestion will increase emissions, degrading local air quality.	● Continuing congestion levels will increase emissions, worsening local air quality.	● Improved alternative transit mode supports reduced adverse impacts on corridor air quality. Potential for adverse, local, air quality effects is low since adjacent land use is mainly .commercial with residential set back from ROW.
Minimize adverse effects on corridor hydrogeological, geological, and hydrological conditions	● Use of existing road rights-of-way minimizes adverse effects.	● Additional run-off from the minor increase in impermeable surface will have to be accommodated in stormwater management system design.	○ Additional run-off from the major increase in impermeable surface will have to be accommodated in stormwater management system design.
Overall Responsiveness	●	●	●
PROMOTE SMART GROWTH / ECONOMIC DEVELOPMENT			
Support Regional and Municipal Planning Policies and approved urban structure	○ No increase in road or transit capacity provides minimal support for Newmarket OP classification of Davis Dr. as an urban centre from Yonge St. to Southlake Regional Health Centre.	● Some capacity and operational improvements provide a minor increase in support for Newmarket OP classification of Davis Dr. as an urban centre from Yonge St. to Southlake Regional Health Centre.	● Segregated rapid transit with road capacity and operational improvements provide significant support for Regional and Municipal planning policies including Newmarket OP classification of Davis Dr. as an urban centre from Yonge St. to Southlake Regional Health Centre.
Provide improved access to social and community facilities in corridor	○ Access to social and community facilities will be degraded due to worsening congestion and loss of mobility from surrounding neighbourhoods.	● Left turn additions to some intersections will improve the traffic operations within the corridor providing moderately better access to the various facilities. Transit benefits limited by congestion growth over time.	● Rapid transit in a dedicated rapidway will provide an alternative form of travel from the automobile. Provides improved road access to facilities and a direct, uninterrupted new mode of access to Southlake Regional Health Centre, the Town's largest employer.
Effect on corridor business activities	○ Increasing congestion will discourage business growth and redevelopment due to access constraints and inconvenience.	○ Road operational improvements will benefit business access but alternative will not support much growth and redevelopment due to continued road congestion..	● Road operational improvements will benefit business access and dedicated rapid rapidway will improve general mobility in redeveloped urban centre corridor.
Promote transit-oriented development	○ Maintaining existing road system with an unreliable rapid transit service will do little to encourage transit-oriented development and achieve the desired urban centre land use along Davis Dr.. Densities supported would be limited to Residential Units – 7/ha ; Commercial 600sq. m/ha	● Capacity increase could promote transit-oriented development at the station nodes and SLRHC vicinity. Unreliable rapid transit contributes little to urban centre growth potential. Densities supported could be in the range of Residential Units – 10/ha ; Commercial 700sq. m/ha	● Major opportunity for transit-oriented development mainly at station nodes and around Southlake Regional Health Centre. Increased transportation capacity will provide the greatest impetus for this re-development.and is the best catalyst for urban centre densities in the range of Residential Units – 50/ha ; Commercial 2400sq. m/ha
Overall Responsiveness	○	●	●
MAXIMIZE COST-EFFECTIVENESS			
Minimize capital cost of vehicles, facilities and systems required relative to road and transit capacity improvements	● Transit stops capital cost under \$10 million but potential need for additional fleet vehicles due to possible congestion delay in mixed traffic resulting in increased round trip times and potential for additional fleet vehicles. Low cost alternative but minimal transportation capacity benefits to support urban growth.	○ Transit and road capacity capital cost \$30-40 million but potential for additional fleet vehicles due to possible congestion delay in mixed traffic resulting in increased round trip times. Medium cost and some transportation capacity benefits to support planned urban growth.	● Transit and road capacity capital cost \$90-100 million due to construction and maintenance of rapidway. Minimum fleet required due to speed and reliability of segregated rapidway. High costs but significant transportation capacity benefits to support planned urban growth.
Minimize property acquisition cost to implement facilities	● Minimal property acquisition necessary. Potentially at rapid transit stops only.	● Moderate property cost, mostly at intersections for new turning lanes (approx. 50-70 properties affected)	○ High property cost since ROW widening for rapidway is largest (approx. 100-120 properties affected).
Overall Responsiveness	●	●	●
PREFERRED ALTERNATIVE			PREFERRED ALTERNATIVE

LEGEND: Least Responsive ○ ○ ● ● ● Most Responsive

NOTES: SRHC – Southlake Regional Health Centre TOD – Transit-oriented Development O&M – Operation and Maintenance OP – Official Plan ROW – Right-of-Way

Smart Growth

Alternative 1 will support neither revitalization of the Davis Drive corridor nor achievement of the designated “urban centre” land use due to the major deficiency in transportation capacity inherent in this alternative.

Given that both **alternatives 2 and 3**, with road capacity and transit improvements, follow the same route along Davis Drive, they both support to varying degrees, Regional and Municipal planning policies and approved urban structure. However, the less attractive, mixed traffic transit service in alternative 2, will only support lower re-development densities.

Alternative 3 will provide the greatest support and impetus for the transit-oriented, mixed-use intensification along Davis Drive, and particularly closest to Yonge Street, required by the Town’s Official Plan and the Provincial growth plan. Commitment to a dedicated rapidway with an enhanced streetscape is a cornerstone in place-making within the desired urban centre. Also, the improved transit service with dedicated lanes maximizes the benefits in terms of access to community facilities and employment areas.

Although alternative 3 results in significantly greater short term affects on adjacent businesses, it provides the greatest support as a catalyst for both transit oriented development and the provincial and municipal urban form objectives of a higher-density but more pedestrian-friendly, mixed-use environment.

Cost-effectiveness

Although **Alternatives 1 and 2** require the least initial capital investment, they are not cost-effective as a medium- to longer-term solution for rapid transit and do not completely address long term road capacity needs.

Alternative 3 carries a substantially higher property cost since the right-of-way widening is the greatest for this alternative and requires several potential property buy-outs. In order to gain travel time and reliability benefits, Alternative 3 involves higher infrastructure costs due to the construction and maintenance of the dedicated rapidway. The vehicle fleet cost is potentially the same for all five alternatives since the route length is consistent, however over time, congestion delay in mixed traffic operation could increase round trip times to the point where additional vehicles are needed for Alternatives 1 and 2. Notwithstanding its higher initial capital costs, Alternative 3 maximizes near and long-term transit benefits while optimizing road improvement costs hence it becomes a cost-effective option.

Summarizing, Alternative 3 is the technically preferred alternative because:

- It maximizes traffic operational benefits and rapid transit attractiveness while responding to projected traffic growth;
- The initial effects on adjacent properties and businesses are offset in the longer term by improved access to community facilities, reduced neighbourhood infiltration potential, a safer, more pedestrian friendly environment and an enhanced streetscape;
- While it will have the most watercourse affects requiring mitigation, it has the greatest potential to achieve the longer term air quality benefits of an improved alternative to private auto use;
- It will provide the greatest support and impetus for the transit-oriented, mixed-use intensification along Davis Drive required by the Town’s Official Plan and the Provincial growth plan;
- Notwithstanding its higher initial capital costs, it becomes a cost-effective option as it maximizes near and long-term transit benefits while optimizing road improvement costs.

The preferred design, Alternative 3, includes mixed traffic operation along Davis Drive between Roxborough Road and Highway 404, the eastern limit of the recommended rapid transit route along Davis Drive. Mixed traffic operation in this section is considered feasible because existing residential neighbourhoods preclude major intensification of mixed-use development hence future traffic volumes and intersection delays will not increase to the point where transit service reliability will deteriorate. Also, the anticipated transit passenger volumes east of the Southlake Regional Health Centre are not expected to be high enough to justify dedicated rapidway lanes in this section.

Extension of rapid transit service to Highway 404 will support the opportunity for future intensification of development at the Leslie Street node and provide an opportunity for network connectivity with a future Highway 404 transit service. In this segment, the proposed rapid transit service will operate in the curb lane with other general traffic. Stations will be located at curbside and will comprise a paved surface at curb level, a shelter with passenger information and fare payment equipment. The extent of rapid transit service in this segment may be staged but ultimately will reach the Highway 404/Davis Drive interchange where vehicles will leave Davis Drive and terminate at the existing car pool lot in the southwest quadrant. Limited expansion of the existing parking and a passenger pick-up and drop-off platform will be implemented if and when service reaches the Highway 404 interchange terminus.

Modifications to the existing Davis Drive roadworks in this segment are confined to the addition of a third lane in each direction between Leslie Street and Harry Walker Parkway. This section of Davis Drive is currently a 4-lane arterial roadway with a centre left turn lane between the intersections to accommodate traffic turning into and exiting out of, the commercial developments adjacent to the roadway. In addition, right turn lanes are also provided at all signalized intersections including Leslie Street, Forhan Avenue, and Harry Walker Parkway. Based on the EA study traffic analysis, if no improvements are undertaken on this segment of the roadway, the operational performance of Davis Drive is anticipated to be below an acceptable level by 2015.

In addition, in previous meetings the Town of Newmarket has indicated their desire to elevate the importance of streetscaping along Davis Drive, particularly the segment close to Highway 404 as this represents a gateway into the Town of Newmarket. Therefore, design alternatives for Davis Drive between Leslie Street and Harry Walker Parkway were generated to address the operational concerns and enhance streetscaping. This widening, to address through road capacity and turning movement deficiencies, is shown on **Plates 10-87 to 10-93** at the end of **Chapter 10**.

9.2 DAVIS DRIVE INTERSECTION CONSOLIDATION DESIGN ALTERNATIVES

A key purpose of the original Class EA for Davis Drive Operational Improvements was to identify and evaluate alternative design methods to improve intersection capacity and optimize spacing along Davis Drive. This section describes the analysis and evaluation of alternatives to overcome operational deficiencies and accommodate the median rapidway in two areas with closely-spaced, off-set intersections. The results of the micro-simulation analysis are included in **Appendix N**.

9.2.1 George Street and Wilstead Drive Intersections

The George Street and Wilstead Drive intersections are spaced 50 metres apart approximately 200 metres east of the Yonge Street/Davis Drive intersection. At present, George Street, north of Davis Drive is a four-way full-moves, signalized intersection while Wilstead Drive, joins Davis Drive from the south at a full-movement, unsignalized T-intersection. The fourth leg of the George Street intersection is the entrance to and exit from a shopping centre in the southeast quadrant of the Yonge Street/Davis Drive intersection.

The short distance between these offset intersections makes it necessary to analyze methods of incorporating them into the median rapidway or

consolidating them into a single four-way intersection. **Table 9-7** on page 9-16 presents the findings of the evaluation of the four alternative configurations considered.

From the comparative data for each alternative in the table, it is evident that the preferred design solution to meet both road and transit improvement objectives is initial implementation of Alternative 3 with subsequent conversion to Alternative 1 when redevelopment and intensification of the adjacent lands takes place south of Davis Drive. The rationale for this staged design solution can be summarized as:

- Retaining a four-way signalized intersection at George Street is most effective in accommodating high volume traffic movements in both an initial and an ultimate configuration. Initially, u-turns for traffic entering or leaving Wilstead Drive can be made safely at the George Street and Barbara Road intersections.
- Adopting alternative 3 as an initial design defers subsequent conversion to Alternative 1 until the supporting re-configuring of south side property is implemented through redevelopment.
- Existing left turn demand at Wilstead Drive (25 during peak hour) is very modest and can be accommodated with U-turns.
- Ultimate consolidation of Wilstead Drive into a single four-way intersection at George Street (Alt. 1) achieves the most improvement in traffic operations and safety in the mature median rapidway cross-section of Davis Drive.
- Ultimate property impacts are similar for both long term alternatives 1 and 2.
- Adverse effects on vegetation and aquatic habitat are either avoided or easily mitigated by replanting when Alternative 3 is implemented.

9.2.2 Parkside Drive and Longford Drive Intersections

The Parkside Drive and Longford Drive intersections are spaced 60 m apart approximately 150m east of the Davis Drive/Barbara Road intersection. At present, both Parkside Drive, south of Davis Drive and Longford Drive, joining from the north are full-moves, signalized T-intersections. Again, the short distance between these offset intersections makes it necessary to analyze methods of incorporating them into the median rapidway or consolidating them into a single four-way intersection. **Table 9-8** on pages 9-18 and 9-19 following, presents the findings of the evaluation of the four alternative configurations considered.

From the comparative data for each alternative in the table, it can be seen that the preferred design solution to meet both road and transit improvement objectives is implementation of Alternative 1 to resolve traffic congestion and turning movements with unacceptable delays after installation of the median rapidways. The rationale for this design solution can be summarized as:

- Alternative 1 significantly improves traffic operations and safety in the central area of Davis Drive, by consolidating closely-spaced intersections.
- Fairly heavy left turn demand during peak hour (240 vehicles) would benefit significantly from intersection realignment.
- Locating the rapid transit station at Longford Drive optimizes station spacing between Yonge Street and the Hospital precinct.
- Adopting Alternative 1 as the first step in developing an improved local area road network supports re-configuring of south side property redevelopment and acquisition.
- U-turns with associated delays for traffic needing to make left turns at the right-in/right-out Parkside Drive T-intersection in Alternative 3 can be avoided by the new single 4-way intersection.
- Adverse effects on vegetation and aquatic habitat are either avoided or easily mitigated by replanting when Alternative 1 is implemented.

Table 9-7
George Street/ Wilstead Drive Intersection Evaluation

FACTOR / CRITERIA	Alternative 1 Realign George St to the east to make through intersection with Wilstead Dr	Alternative 2 Realign Wilstead Dr to the west to make through intersection with George St	Alternative 3 No change in street configuration; Wilstead Dr converted to right-in/right-out
IMPROVE MOBILITY			
Potential effect on traffic operations and safety: - traffic movements precluded as a result of intersection reconfiguration, - effect of median rapidway on property access.	Improves traffic operations and safety by consolidating traffic from two intersections into one signalized four-way intersection. All movements from and to George Street and Wilstead Drive are accommodated by new combined signalized intersection at Wilstead Drive. New intersection will permit U-turn access to mid-block properties for both eastbound and westbound traffic on Davis Drive.	Improves traffic operations and safety by consolidating traffic from two intersections into one signalized four-way intersection. All movements from and to George Street and Wilstead Drive are accommodated by new combined signalized intersection at George Street. New intersection will permit U-turn access to mid-block properties for both eastbound and westbound traffic on Davis Drive.	Improves traffic operations and safety by retaining existing signalized intersection at George and converting Wilstead to a right-in, right out intersection. All movements from and to George St and shopping centre are accommodated at existing signalized intersection at George St. Length of left turn lane into George would be constrained by proximity of intersection to Yonge St. Westbound left turn movements from Wilstead Dr can be accommodated by a U-turn at Barbara Rd. Left-turn access into Wilstead for approaching westbound traffic requires a U-turn at George signal. Analysis of above traffic movements at Wilstead intersection indicates that delays for all movements will remain at acceptable levels.
Effects on rapid transit operations (number of intersections along rapidway)	Potential delay from one signalized intersection, at Wilstead Drive.	Potential delay from one signalized intersection, at George Street.	Potential delay from one signalized intersection, at George Street.
Overall Responsiveness	●	●	●
PROTECT NATURAL ENVIRONMENT			
Potential for removal of existing vegetation.	Realignment requires removal of some hedge and lawn. Landscaping of realigned George Street and Davis Drive can mitigate vegetation loss.	Realignment requires some removal of landscaping (a small amount of lawn and 3-5 young street trees). Landscaping of realigned Wilstead Drive and Davis Drive can mitigate vegetation loss.	No adverse effects on existing vegetation other than Davis Drive Boulevard removal and replacement required for all alternatives.
Potential effects on existing wildlife habitat.	No affect on existing wildlife habitat.	Potential effect on wildlife habitat through the removal of 3-5 young street trees will be mitigated through replanting.	No effect on existing wildlife habitat.
Overall Responsiveness	●	●	●
PROTECT AND ENHANCE SOCIAL ENVIRONMENT			
Potential to require property taking (full or partial taking)	Full property taking required at NE cnr. of Davis Drive and George Street (8,157 sq m.) Possible partial net cost recovery from resale of surplus property.	Partial property taking required at SW cnr. of Davis Drive and Wilstead Drive. (area required: 4,653 sq m of 21,423 sq m) Possible partial net cost recovery from resale of surplus property.	No property taking required for cross-street changes.
Potential to displace existing businesses and/or residences.	One owner with business tenants displaced at NE corner. Possible minor effects on adjacent property to the north.	One owner with business tenants displaced at SW corner.	No existing businesses would be displaced.
Potential short-term construction related effects on existing area businesses or residences.	Construction on George Street would result in short-term effects on traffic movement and property access. Noise and dust from construction activities would be mitigated by Contractor controls but may have a minor residual adverse affect on area businesses and residences along George Street.	Construction on Wilstead Drive would result in short-term effects on traffic movement and property access. Noise and dust from construction activities would be mitigated by Contractor controls but may have a minor residual adverse affect on area businesses. No affect on area residences.	No construction related effects on existing businesses and residences due to work on cross-streets. Effects will be from Davis Drive widening which is common to all alternatives.
Potential effects on archaeological resources.	Based on the degree of previous land disturbance, there is little to no potential for the presence of historic archaeological sites.	Based on the degree of previous land disturbance, there is little to no potential for the presence of historic archaeological sites.	No potential for impacting archaeological resources.
Overall Responsiveness	○	●	●
PROMOTE SMART GROWTH / ECONOMIC DEVELOPMENT			
Support for transit-oriented development around intersection. Flexibility to stage works to coincide with redevelopment of surrounding lands	Consolidation of intersection promotes redevelopment opportunities within walk-in catchment of Davis Station. Requires relocation of George Street intersection after insertion of Rapidway and rapid transit operation if Alternative 3 is adopted as the initial stage solution.	Consolidation of intersection promotes redevelopment opportunities within walk-in catchment of Davis Station. Realignment of Wilstead can be implemented as a second ultimate stage without any relocation of intersection during rapid transit operation.	Double intersection with right-in/right-out constraint does not strongly encourage future transit-oriented development and road grid development. Avoids rapidway modifications when intersection is consolidated at George in future and defers property and business disruption until owner proposes redevelopment.
Overall Responsiveness	○	●	●

Table 9-7 (Continued)
George Street/ Wilstead Drive Intersection Evaluation

FACTOR / CRITERIA	Alternative 1 Realign George St to the east to make through intersection with Wilstead Dr	Alternative 2 Realign Wilstead Dr to the west to make through intersection with George St	Alternative 3 No change in street configuration; Wilstead Dr converted to right-in/right-out
MAXIMIZE COST-EFFECTIVENESS			
Potential capital costs of implementation excluding property.	Cost of low-height demolition and construction of approx. 100m of new, local street. ●	Cost of low-height demolition and construction of approx. 100m of new, local street. ●	Low roadworks capital costs for conversion of Wilstead Drive to right-in/right-out. ●
Potential costs associated with property taking.	Assessed value of businesses and commercial buildings – moderate to high cost. ●	Assessed value of businesses and commercial buildings – moderate to high cost. ●	No property taking costs for cross-streets. Davis Drive right-of-way widening only - common to all alternatives. ●
Overall Responsiveness	●	●	●
PREFERRED ALTERNATIVE		*Ultimate Stage	*Initial Stage

LEGEND: Least Responsive ○ ◐ ◑ ◒ ◓ Most Responsive

Table 9-8
Parkside Drive/ Longford Drive/ Lindsay Avenue Intersection Evaluation

EVALUATION FACTOR & CRITERIA	Alternative 1 Relocate Parkside Drive eastward to achieve through intersection with Longford Drive; Rapid Transit Station at Longford	Alternative 2 Close access to Longford and extend Lindsay Avenue to the south to form a T-intersection with Davis Drive; Rapid Transit Station at Lindsay	Alternative 3 No change in street configuration, Left turns restricted at Parkside Drive. Rapid Transit Station at Longford	Alternative 4 No change in street configuration, Left turns restricted at Longford Drive. Rapid Transit Station at Parkside
IMPROVE MOBILITY				
Potential effect on traffic operations and safety: - traffic movements precluded as a result of intersection reconfiguration, - effect of median rapidway on property access.	Improves traffic operations and safety by consolidating traffic from two T-intersections into one 4-way intersection. New intersection would provide all-moves access to both Longford and Parkside Drives. Significantly reduces traffic delay on Davis Dr. New intersection will permit U-turn access to mid-block properties for both eastbound and westbound traffic on Davis Dr. Requires reconfiguration of driveways and circulation pattern at gas station (166 Davis Drive) and reconfigured access to properties west of current Parkside Drive.	Retains two signalized intersections with potential for accidents and queuing delay. Minimal impact to traffic delay along Davis Dr from greater spacing of intersections. Current full moves Longford Ave intersection would be closed and become a cul-de-sac. Access to north neighbourhoods would be via new Lindsay Ave extension and Penn Ave to Longford Ave. Existing Parkside Dr and new Lindsay Ave intersections will permit U-turn access to mid-block properties for both east and westbound Davis Dr traffic.	Retains one signalized intersection at Longford Ave with potential for accidents and queuing delay near new right-in/right-out Parkside Dr intersection. Parkside Dr would become a right-in, right out intersection with Davis Dr serving eastbound traffic only. Westbound traffic must make a U-turn at Barbara to access southbound Parkside. Exiting traffic from Parkside Dr must make a U-turn at Longford Ave to travel west on Davis Dr (traffic analysis shows significant left-turn queuing in the PM peak at Longford Drive intersection). Analysis indicates delay along Davis Dr resulting from heavy left turn demand from Parkside Dr having to make a U-turn at Longford would be unacceptable. Longford Ave would remain fully accessible from both directions as at a typical station intersection. Storage capacity of eastbound left/U-turn lane at Longford Ave is limited.	Retains one signalized intersection at Parkside Dr with potential for accidents and queuing delay near new right-in/right-out Longford intersection. Longford Ave would become a right-in, right out intersection with Davis Dr serving westbound traffic only. Eastbound Davis Dr traffic must make a U-turn at Lorne Ave to access northbound Longford. Exiting traffic from Longford Ave would need to make a U-turn at Parkside Dr to travel east on Davis Dr (traffic counts show a moderately –significant volume in the AM peak) Parkside Dr would remain fully accessible from both directions as at a typical station intersection but limited storage capacity of westbound left/U-turn lane at Parkside Dr has a high potential to cause queues to extend into the through traffic lane .
Effects on rapid transit operations (number of intersections along rapidway)	Potential delay from one consolidated signalized intersection at Parkside/Longford.	Potential delay from two signalized intersections remaining, at Parkside and Lindsay	Potential delay at one signalized intersection remaining, at Longford Drive	Potential delay at one signalized intersection remaining, at Parkside Dr
Effect on Rapid Transit station location and spacing	Distances from a station at Longford Drive to adjacent stations planned at Yonge Street and Main Street are within standards for rapid transit. (770 m from Yonge Station and 910 m from proposed Main Street Station)	Distances from a station at Lindsay Ave Extension to adjacent stations planned at Yonge Street and Main Street are within standards for rapid transit. (910 m from Yonge Station and 770 m from proposed Main Street Station.)	Distances from a station at Longford Dr T-intersection to adjacent stations planned at Yonge St and Main St are within standards for rapid transit. (770 m from Yonge Station and 910 m from proposed Main St Station).	Distances from a station at Parkside Dr T-intersection to adjacent stations planned at Yonge St and Main St are within standards for rapid transit. (680 m from Yonge Station and 1000 m from proposed Main Street Station). Station platform conflicts with left turn storage lane at Barbara Rd.
Overall Responsiveness	●	●	●	●
PROTECT NATURAL ENVIRONMENT				
Potential for removal of existing vegetation.	Potential to remove some lawn and mature trees and shrubs on existing private property. Landscaping of realigned Parkside can mitigate vegetation loss.	Removal of open field (cultural meadow) vegetation. Landscaping of Lindsay Ext. boulevard can mitigate vegetation loss.	No adverse effects on existing vegetation other than Davis Drive boulevard removal and replacement required for all alternatives.	No adverse effects on existing vegetation other than Davis Drive boulevard removal and replacement required for all alternatives.
Potential effects on existing wildlife habitat.	Negligible effect on wildlife habitat will be mitigated through replanting on boulevards and surplus lands.	Negligible effect on wildlife habitat will be mitigated through replanting on boulevards and surplus lands.	No effect on existing wildlife habitat.	No effect on existing wildlife habitat.
Overall Responsiveness	●	●	●	●
PROTECT AND ENHANCE SOCIAL ENVIRONMENT				
Potential to require property (partial or full taking)	Potential for full property takings on Parkside Drive (3 residences with commercial uses) and on Davis Drive (one commercial property). Partial property taking from gas station property and Industrial Site.	Full or partial property taking for Lindsay Avenue extension to Davis Drive. Two or three owners would be involved for these unimproved properties.	No property taking required for cross-street changes.	No property taking required for cross-street changes.
Potential to displace existing businesses and/or residences.	Tenants in the commercial building involving full buy-out would be displaced. Gas station carwash and convenience building affected. (possibility to relocate carwash elsewhere on-site and modify building). Potential for temporary disruption of industrial site operation.	No existing businesses or residences would be displaced.	No existing businesses or residences would be displaced.	No existing businesses or residences would be displaced.

Table 9-8 (Continued)
Parkside Drive/ Longford Drive/ Lindsay Avenue Intersection Evaluation

EVALUATION FACTOR & CRITERIA	Alternative 1 Relocate Parkside Drive eastward to achieve through intersection with Longford Drive; Rapid Transit Station at Longford		Alternative 2 Close access to Longford and extend Lindsay Avenue to the south to form a T-intersection with Davis Drive; Rapid Transit Station at Lindsay		Alternative 3 No change in street configuration, Left turns restricted at Parkside Drive. Rapid Transit Station at Longford		Alternative 4 No change in street configuration, Left turns restricted at Longford Drive. Rapid Transit Station at Parkside	
Potential short-term construction related effects on existing businesses or residences.	Construction on Longford Drive and Parkside Drive would result in short-term effects on traffic movement and property access. Noise and dust would be mitigated by contractor controls.	①	Construction on Longford Drive and the new Lindsay Avenue extension would result in short-term effects on traffic movement and property access. Noise and dust would be mitigated by contractor controls.	①	No construction related effects on existing businesses and residences due to work on cross-streets. Effects will be from Davis Drive widening which is common to all alternatives.	●	No construction related effects on existing businesses and residences due to work on cross-streets. Effects will be from Davis Drive widening which is common to all alternatives, at initial stage.	●
Potential long-term operational effects on existing businesses not acquired.	Need to reconfigure gas station at 166 Davis Drive, including relocation of car wash unit. Removal of some parking at 180 Davis Drive.	①	No long-term operational effects on existing businesses	●	No long-term operational effects on existing businesses	●	No long-term operational effects on existing businesses.	●
Potential long-term operational effects on existing residences not acquired.	Access to Queen Street neighbourhood south on Parkside Drive may be improved by consolidation of intersections on Davis Drive and relocated commercial access.	●	New access from Davis Drive on Lindsay Extension to north-side neighbourhood will potentially encourage traffic infiltration.	①	No long-term operational effects on existing residences.	●	No long-term operational effects on existing residences.	●
Potential effects on archaeological resources.	Based on the degree of previous land disturbance, there is little to no potential for the presence of historic archaeological sites.	●	The lack of previous land disturbance in the area of the new Lindsay Avenue extension increases the potential for the presence of archaeological sites. A Stage 2 archaeological resource assessment may be required.	●	No potential for impacting archaeological resources.	●	No potential for impacting archaeological resources.	●
Overall Responsiveness		①		●		●		●
PROMOTE SMART GROWTH / ECONOMIC DEVELOPMENT								
Support for transit-oriented development around intersection. Flexibility to stage works to coincide with redevelopment of surrounding lands	Consolidation of intersection improves traffic flow and promotes redevelopment opportunities within walk-in catchment of Parkside Station. No flexibility to stage works as new intersection must coincide with rapidway installation to avoid unacceptable traffic delays	●	<ul style="list-style-type: none"> ▪ Redevelopment opportunities within walk-in catchment of Lindsay Station limited by adjacent low-density residential uses. ▪ No flexibility to stage works as new intersection must replace closure of Longford access to Davis Drive 	①	Unacceptable local congestion levels will discourage transit oriented development in catchment area of Longford Station Deferral of intersection consolidation and rationalizing of road network not feasible due to unacceptable delays in intersections after rapidway installation.	①	Unacceptable local congestion levels will discourage transit oriented development in catchment area of Parkside Station	①
Overall Responsiveness		●		①		①		①
MAXIMIZE COST-EFFECTIVENESS								
Potential capital costs of implementation excluding property	Cost of construction of approx. 100m of new, local street. Added costs are rearrangement of uses and relocation of facilities at gas station and demolition of residential/commercial buildings.	①	Cost of construction of new, local street across. 50m of unimproved property and conversion of Longford Drive to cul-de-sac.	①	Minimal cross-street roadworks capital costs to convert Parkside Drive intersection to right-in/right-out.	●	Low roadworks capital cost.	●
Potential costs associated with property taking	Replacement of taken property by similar land now within the Parkside right-of-way may significantly reduce net property costs.	①	Cost of unimproved property acquisition for Lindsay extension.	①	No property taking costs for cross-street roadworks.	●	No property taking costs for cross-street roadworks.	●
Overall Responsiveness		①		①				●
	Preferred Alternative							

LEGEND: Least Responsive ○ ① ● ● Most Responsive

9.3 LOCAL AREA ALIGNMENT DESIGN OPTIMIZATION: MAIN STREET TO PROSPECT STREET

The preferred design alternative for Davis Drive rapid transit operation requires insertion of dedicated rapidway lanes between Yonge Street and the Southlake Regional Health Centre to Roxborough. Road widening to accommodate the additional lanes in the Davis Drive median and left turn lanes at key intersections requires property acquisition to achieve the right-of-way width needed.

Generally, the widening has been distributed between the north and south side properties by maintaining the existing centre-line of Davis Drive for the new cross-section. However, in the area between Main Street and Prospect Street three alignment alternatives were investigated and evaluated to optimize the design in terms of its response to transportation and constructability objectives, the effect on the natural and social environment (including property) and cost-effectiveness. These three alternatives are shown in **Figures 9-6 to 9-8** with the evaluation findings summarized in **Table 9-9** on page 9-25.

In the table, the quality of each alternative under the project criteria is depicted graphically in terms of each individual criterion and does not imply any weighting relative to the other criteria. The quality ranking is based on the five levels depicted in the Pie symbols, ranging from poor through fair, medium, good to very good. From the individual quality rankings, overall quality under each of the major factors considered in the evaluation was assessed for all alternatives. From this point, the selection of the preferred alternative was made using the “reasoned argument” approach.

On this basis, Alternative 3, largely south side widening with replacement of the E. Holland River Bridge was selected as the preferred design solution for this segment for the following reasons:

- The realigned curved Davis Drive centre-line permits placement of the rapidway through the new Hospital pedestrian bridge while also avoiding the need to acquire several properties and businesses on the south side of the existing right-of-way near Main Street;
- Although initial construction and property acquisition costs are higher, the Alternative 3 design replaces the Keith Bridge which only has a third of its service life left remaining;
- Replacement of the existing bridge avoids the need to develop complex longitudinal joints with the existing bridge and their on-going maintenance;
- Mitigation of the conflict with the Heritage inventoried former Union Hotel building on the Northeast corner of Main Street is common to all alternatives;

- The more southerly Alternative 3 alignment avoids any major effects on the remaining sections of the walls and dam foundations of the historically significant former turning basin on the East Holland River.
- Minor modifications to the Davis Drive roadway surface profile can be built into the design of the new bridge to optimize the river crossing and multi-use trail passing beneath the bridge;
- The curved Alternative 3 alignment confines all Stage 1 bridge construction to one side of the existing bridge and allows 4 lanes of traffic to be accommodated on the completed first stage while the existing bridge is demolished and Stage 2 of the new bridge is constructed.
- Temporary bridging is not required and the number of stages and construction duration is minimized.
- Replacement of the Keith Bridge concurrent with the rapidway construction and Davis Drive widening avoids a second disruption of traffic and transit operations at the end of its service life at a future date;
- Davis Drive alignment modification required at the GO Barrie Line crossing will have no affect on GO Rail operations.
- Effects on East Holland River due to in-water work required for bridge replacement can be mitigated with construction timing, erosion and sediment control and stormwater treatment measures.

9.4 SEGMENTS WITH RAPID TRANSIT IN MIXED TRAFFIC

9.4.1 Yonge Street between Davis Drive and Green Lane

Initially, as indicated earlier in this chapter, rapid transit service in this segment will operate in new curb-side HOV lanes added to the existing 4-lane cross-section. Stations will be located at curb-side and will comprise a paved surface at curb level, a shelter with passenger information and fare payment equipment.

In the longer-term, this northern portion of the Yonge corridor in Newmarket will evolve into a mature Regional centre as defined in the approved Regional and local Official Plans. The associated intensification in and around the big-box commercial areas with a focus on transit-oriented development will change the mode split for travel in the corridor. Transit ridership can be expected to increase and traffic movement will comprise a greater proportion of through trips with less in-and-out access to auto-oriented commercial development. Hence, at some point in the future, if and when the reliability of rapid transit service in mixed traffic is jeopardized by congestion levels due to land-use changes, the cross-section will be converted to accommodate dedicated median rapidway lanes and

associated stations. Details of this cross-section conversion are shown in Chapter 10.

9.4.2 Green Lane between Yonge Street and the East Gwillimbury GO Station

Following assessment of existing and future land use and traffic volumes on this 2.5 km segment of the recommended route in East Gwillimbury, the recommended implementation of facilities for rapid transit service is a two stage approach. Initially, given the current traffic levels and status of development of land uses in the corridor, the service is proposed to operate with mixed traffic in the curb lanes. If required by surrounding development, curb-side intermediate stations will be constructed at approximately 800m intervals (to be coordinated with adjacent land use planning) between the Yonge Street/Green Lane Station and the GO Transit East Gwillimbury Commuter Rail Station. The service will terminate within the existing station property at existing bus terminal platforms assigned to Regional transit services.

Ultimately, in response to population and employment growth and associated development in accordance with the Town of East Gwillimbury’s Official Plan, dedicated median rapidway lanes and stations will be implemented to segregate rapid transit service from increased traffic congestion and hence improve transit service speeds. Ultimate signalized intersection and station locations will be determined from the Town’s road network planning to serve the development along the route and encourage nodes of transit-oriented development.

9.4.3 Yonge Street between Henderson Drive and Orchard Heights Boulevard

Right-of-way constraints and the existing built environment in this segment of Yonge Street in Aurora make widening to accommodate median rapidway lanes impractical hence the recommended design solution is operation of rapid transit with mixed traffic in the existing Yonge Street curb lanes. Transition from adjacent segments with median rapidway is proposed immediately north of the Henderson Drive intersection and south of the Orchard Heights Boulevard intersection.

Stations will be located at curbside and will comprise a paved surface at curb level, a shelter with passenger information and fare payment equipment.



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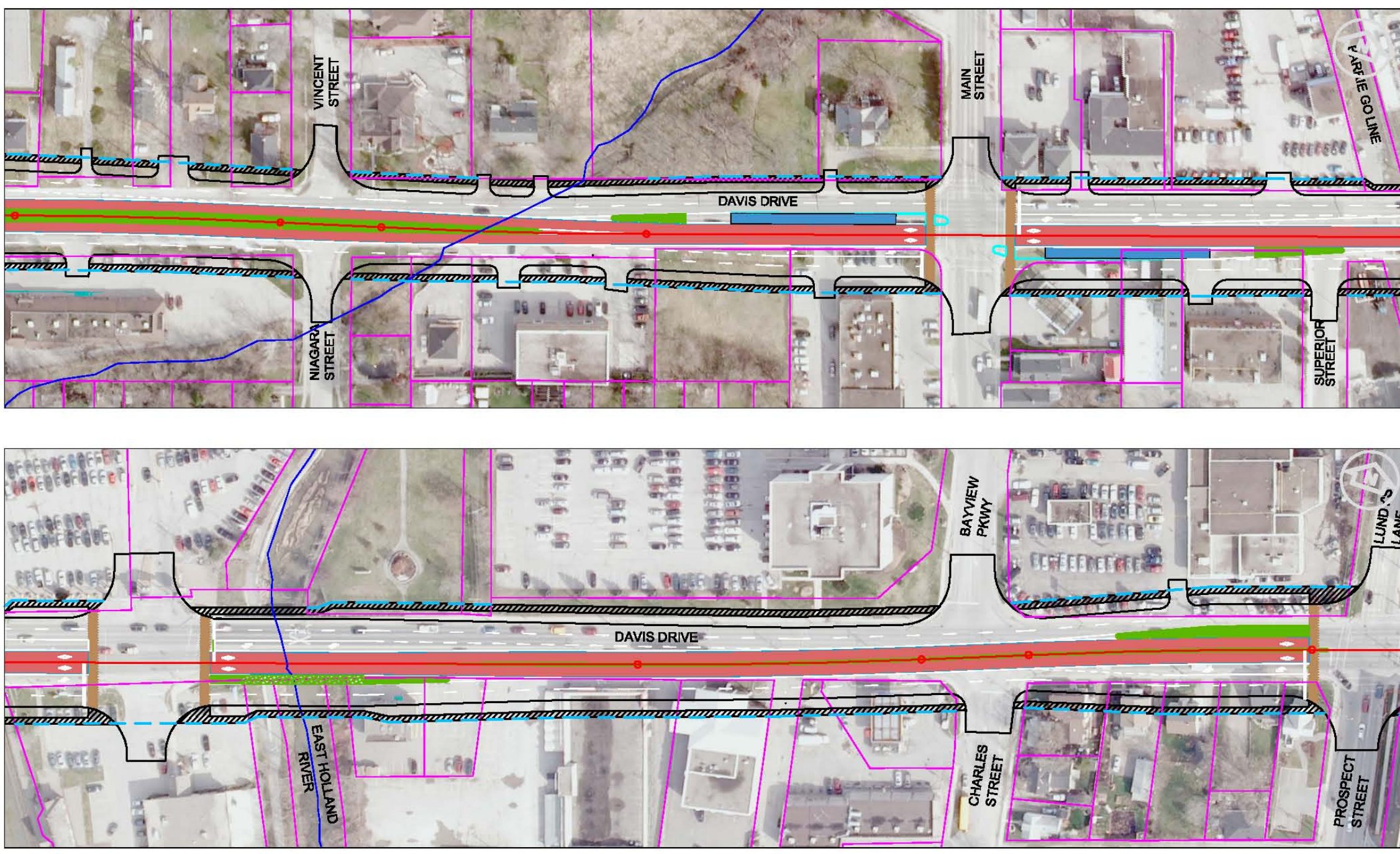
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SCALES

STATIONS SHOWN ALONG CURVE IN MIXED-Traffic HEAVY	PROPOSED SIDEWALK	ROW REQUIREMENT	WATERCOURSE
RAPIDWAY	PROPOSED LANDSCAPE	PROPOSED CROSSWALK	
PROPOSED TRAFFIC LANES	PROPOSED BIKE LANE (BL)	EXISTING RIGHT OF WAY	

ALTERNATIVE 1
Right-of-way and Holland River bridge
widened to North

9-6
 FIGURE

METRIC



DRAWING NAME: \\VITA\projects\08 - Deliverables (Drawing)\North Yonge Corridor\July 2008\Drawings\Systems\Stationing\Main Street to Proposed - Complete\Alternative 2 - South Widening Main Street.mxd
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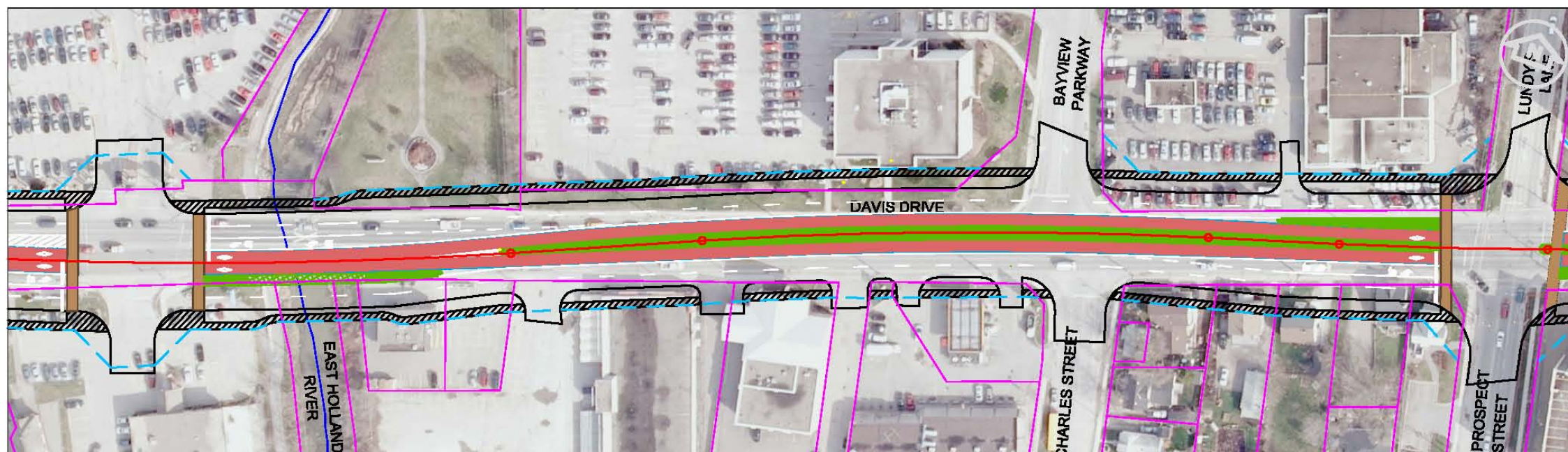
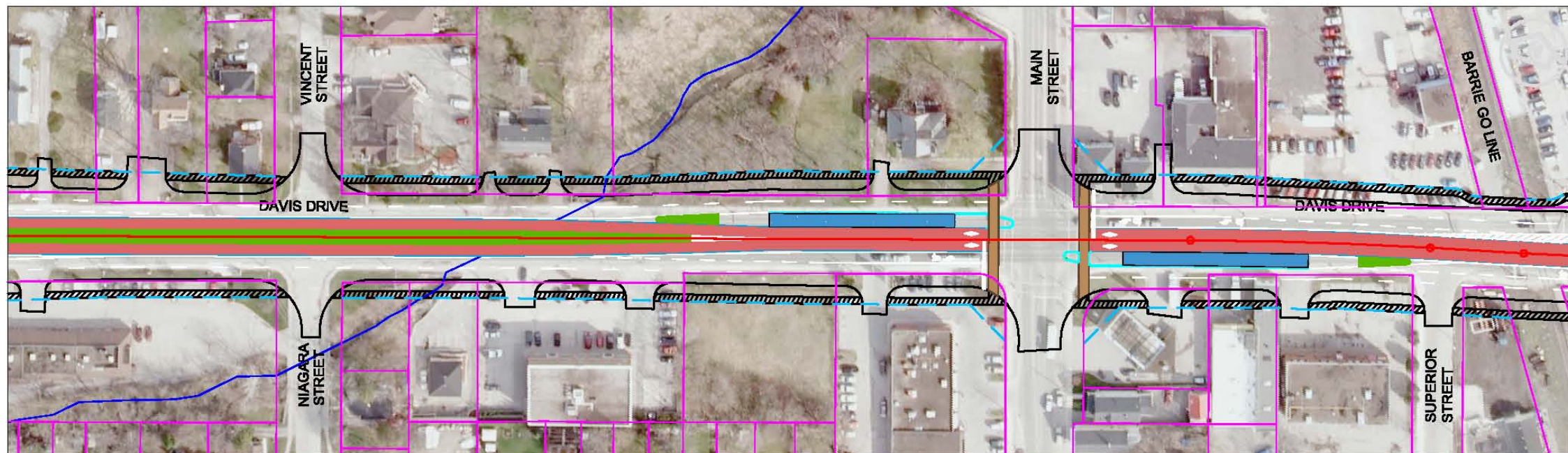
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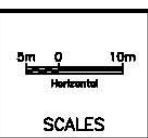
STATIONS RECOMMENDED CLINO IN USED TRAFFIC AREA	PROPOSED SIDEWALK	FLOW REQUIREMENT	WATERCOURSE
RAPIDWAY	PROPOSED LANDSCAPE	PROPOSED CROSSWALK	
PROPOSED TRAFFIC LANES	PROPOSED BIKE LANE (BL)	EXISTING RIGHT OF WAY	

ALTERNATIVE 2
Right-of-way and Holland River bridge
widened to South

9-7
 FIGURE



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 MODIFIED: 04/25/2008 10:00:00 AM



STATIONS (SHOWN ALONG CURB IN MIXED-TRAFFIC AREAS)	PROPOSED SIDEWALK	ROW REQUIREMENT	WATERCOURSE
RAPIDWAY	PROPOSED LANDSCAPE	PROPOSED CROSSWALK	
PROPOSED TRAFFIC LANES	PROPOSED BIKE LANE (BL)	EXISTING RIGHT OF WAY	

ALTERNATIVE 3
 Right-of-way widened both sides
 with a New Holland River bridge

9-8
 FIGURE

**Table 9-9
Evaluation of Rapidway Alignment Alternatives on Davis Drive : Main Street to Prospect Street**

Evaluation Factors and Criteria	Alignment Alternatives					
	Alternative 1 - Right-of-way and Holland River bridge widened to North and station placed at Main Street	Alternative 2 - Right-of-way and Holland River bridge widened to South and station placed at Main Street	Alternative 3 - Right-of-way widened mainly to the south with a new East Holland River Bridge and station placed at Main Street			
IMPROVE MOBILITY AND CONSTRUCTION WORKS						
Effect on Viva (transit) travel time through segment.	Delay potential at two traffic signals and GO crossing	●	Delay potential at two traffic signals and GO crossing	●	Delay potential at two traffic signals and GO crossing	●
Potential to attract Viva ridership: Development potential within 500m walk-in distance; Convenience of transfer to/from GO Train Sta. (walk dist. for 10-15 % boardings.)	Transit oriented development opportunity from Lorne Ave. to 100m W of Bayview Pkwy both sides of Davis Drive No overlap of walk-in catchment with Hospital Station 185 metres	●	Transit oriented development opportunity from Lorne Ave. to 100m W of Bayview Pkwy both sides of Davis Drive No overlap with Hospital Station 185 metres	●	Transit oriented development opportunity from Lorne Ave. to 100m W of Bayview Pkwy both sides of Davis Drive No overlap with Hospital Station 185 metres	●
Effect on present GO Train operation at Newmarket Station	Requires GO modifications to stop 7 m further north	○	No effect on train stopping location	●	No effect on train stopping location	●
Complexity of E. Holland R. bridge works	Clearance requires absolute min. structure depth in widening; Crossfall dictated by ex. bridge	●	Clearance requires absolute min. structure depth in widening; Crossfall dictated by ex. bridge	●	Entirely new bridge allows minor Davis regrading and optimum crossfall	●
Maintainability of longitudinal joints in widened bridge	Risk of damage to joint req'd in rumble strip (GP lanes/ rapidway)	●	Good since joints can be placed out of travel lanes in raised elements	●	Very good as no longitudinal joints are required.	●
Overall Responsiveness	●		●		●	
PROTECT NATURAL ENVIRONMENT						
Effect on E. Holland River valley lands	No water level change under Regional storm:-Valley inundated Under 100yr storm: Backwater rise (90mm at bridge, 40mm upstream) remains in channel	●	No water level change under Regional storm- Valley inundated Under 100yr storm: Backwater rise (90mm at bridge, 40mm upstream) remains in channel	●	No water level change under Regional storm- Valley inundated Under 100yr storm: Backwater rise (90mm at bridge, 40mm upstream) remains in channel	●
Effect on Aquatic Habitat	Widening for pier extensions requires in-water work in the dry with construction timing restrictions, stormwater treatment and erosion and sediment control.	●	Widening for pier extensions requires in-water work in the dry with construction timing restrictions, stormwater treatment and erosion and sediment control.	●	Demolition and new bridge constr. requires in-water work in the dry with construction timing restrictions, stormwater treatment and erosion and sediment control.	●
Overall Responsiveness	●		●		●	
PROTECT AND ENHANCE SOCIAL ENVIRONMENT						
Effect on Heritage Features	Requires relocation of Heritage Inventory Hotel; Requires removal of Heritage Inventory residential size building on SW cnr. of Davis and Prospect and 3 similar adjacent buildings with heritage features Bridge widening design must mitigate conflict with heritage canal walls and buried dam foundations.	●	Requires relocation of Heritage Inventory Hotel; Requires removal of Heritage Inventory residential size building on SW cnr. of Davis and Prospect and 3 similar adjacent buildings with heritage features Bridge widening to the south avoids conflict with heritage canal walls and buried dam foundations.	●	Requires relocation of Heritage Inventory Hotel; Requires removal of Heritage Inventory residential size building on SW cnr. of Davis and Prospect and 3 similar adjacent buildings with heritage features. Bridge widening to the south avoids conflict with heritage canal walls and buried dam foundations.	●
North side property requirements	Total frontage taking – 0.43ha Ford dealer (0.08ha veh.display), Dickinson Med. (20 parking sp.) Town Park; Tannery frontage; GO to AEKH (435-441) (0.22ha); Displacement of Hotel & AEKH Bldg.; Frontage W. of Main (0.13ha)	○	Total frontage taking – 0.22 ha Prospect St. to Bayview Pkwy. (Ford 0.08ha veh. display) Minor frontage taking from Bayview Pkwy. to Hotel and west of Main St. (0.14ha) Displacement of Hotel & AEKH Bldg.	○	Total frontage taking – 0.32 ha Ford dealer (0.09ha veh. Display), Dickinson Medical Bldg. (12 parking sp.); Town Park; Tannery frontage; GO to AEKH (435-441) (0.15ha); Displacement of Hotel & AEKH Bldg; Frontage W. of Main (0.08ha)	○
South side property requirements	Displacement of all 5 properties from Prospect St. to Charles St.; Frontage taking: 0.12 ha - Charles St. to River and Superior St. to Main St. (11 properties); W. of Main St. (3 properties).	●	Displacement of all 10 properties from Prospect St. to Holland R.; Displacement of 3 properties - Superior to Main St. Frontage taking: 0.41 ha - river to Superior St; W. of Main St. (3 properties)	○	Displacement of all 5 properties from Prospect St. to Charles St.; Displacement of all or part of 5 properties – Charles St. to Main St. Frontage taking: 0.2 ha - Charles St. to Superior St.; W. of Main St. (3 properties)	○
Effect on multi-use trail along Holland River	North side re-profiling required. New trail on East side feasible.	●	South side re-profiling required. New trail on East side feasible	●	North side re-profiling required. New trail on East side feasible	●
Traffic accommodation during construction	Temporary S. bridge required as first stage of bridge widening allows only 3 lanes.	●	Temporary N. bridge required as first stage of bridge widening allows only 3 lanes	●	First stage of bridge construction allows 4 lanes during construction with a minor bridge width over-build	●
Overall Responsiveness	●		○		○	

Table 9-9 (Continued)
Evaluation of Rapidway Alignment Alternatives on Davis Drive : Main Street to Prospect Street

Evaluation Factors and Criteria	Alignment Alternatives		
	Alternative 1 - Right-of-way and Holland River bridge widened to North and station placed at Main Street	Alternative 2 - Right-of-way and Holland River bridge widened to South and station placed at Main Street	Alternative 3 - Right-of-way widened mainly to the south with a new East Holland River Bridge and station placed at Main Street
PROMOTE SMART GROWTH / ECONOMIC DEVELOPMENT			
Support of Prov. intensification and OP urban growth and form objectives	Redevelopment opportunities between Charles and Prospect. Moderate support opportunities in remainder of Main – Charles segment ●	Redevelopment opportunities between Charles and Prospect. Largest property need increases opportunities in remainder of Main – Charles segment ●	Redevelopment opportunities between Charles and Prospect. Property need increases opportunities in remainder of Main – Charles segment ●
Overall Responsiveness	●	●	●
MAXIMIZE COST-EFFECTIVENESS			
Width of new bridge required	North side addition to 45 year old bridge: 10.1m plus new 3.3m sidewalk N. and S. sides	South side addition to 45 year old bridge: 9.8m plus new 3.3m sidewalk N. and S. sides	Completely new bridge: 28.2m plus 3.3m sidewalks both sides
Bridge construction cost range	\$2.3-2.7 million	\$2.2-2.4 million	\$4.8-5.2 million
Property cost range	Moderate to High ●	High ●	Moderate to High ●
Overall Responsiveness	●	●	●
PREFERRED ALTERNATIVE			Preferred Alternative

LEGEND: Least Responsive ○ ◐ ◑ ◒ ◓ Most Responsive

10. THE PREFERRED DESIGN FOR THE PROJECT

10.1 DESCRIPTION OF THE PREFERRED DESIGN

The surface rapidway alignment plan and profile for the entire North Yonge Street Corridor preferred design is shown in **Plates 10-1 to 10-93** at the end of the Chapter. **Plates 10-1 to 10-47** show the alignment on Yonge Street from 19th Avenue/ Gamble Road to Davis Drive; **Plates 10-62 to 10-68** show the ultimate alignment on Yonge Street between Davis Drive and Green Lane; **Plates 10-69 to 10-75** illustrate the Green Lane ultimate alignment; **Plates 10-76 to 10-93** show the alignment on Davis Drive; **Plates 10-48 to 10-54** show the interim HOV stage on Yonge Street between Davis Drive and Green Lane; and **Plates 10-55 to 10-61** illustrate the Green Lane alignment in the interim stage. **Figure 10-1** summarizes the overall alignment and station locations.

The following sections describe the main features of the preferred surface rapid transit design:

Two-Lane Median Dedicated Rapidway (Ultimate Scenario)

For the most part, a 24 km two-lane rapidway is proposed in the median of Yonge Street, Davis Drive and Green Lane. The limits on Yonge Street are from 19th Avenue/Gamble Road to Green Lane; on Davis Drive from Yonge Street to Roxborough Road; and on Green Lane from Yonge Street to the East Gwillimbury GO Station.

Six-Lane HOV Section (Interim Scenario)

As an interim scenario, Yonge Street between Davis Drive and Green Lane will be widened to six lanes, three lanes in each direction, with transit operation taking place in the curb side HOV lanes. At such time as ridership in this section warrants dedicated lanes and transit reliability in mixed traffic is degraded, the cross-section will be converted to include a two-lane median dedicated rapidway and four lanes of general traffic (i.e. the HOV lanes convert to median rapidway lanes).

Mixed Traffic Sections

Due to certain local constraints described earlier in Chapter 9, mixed traffic operation is proposed at the following locations:

- On Yonge Street from Henderson Drive to Orchard Heights Boulevard, in Aurora; and
- On Davis Drive from Roxborough Road to Highway 404 in Newmarket.

Station Locations

Stations, including appropriate amenities, are planned at 25 locations generally at arterial or major collector roads listed below:

Yonge Street:

1. 19th Avenue/Gamble Road;
2. Tower Hill Drive;
3. Jefferson Sideroad;
4. King Road;
5. Regatta Avenue;
6. Bloomington Road;
7. Henderson Drive;
8. Golf Links Road;
9. Wellington Street;
10. Orchard Heights Drive;
11. St. John's Sideroad;
12. Savage Road South;
13. Mulock Drive;
14. Eagle Street;
15. Davis Drive;
16. London Road; and
17. Green Lane.

Davis Drive:

1. Parkside Drive;
2. Main Street;
3. Southlake Regional Health Centre;
4. Huron Heights Drive;
5. Leslie Street; and
6. Highway 404.

Green Lane:

1. A Mid-block location between Yonge Street and East Gwillimbury GO Station to be determined in coordination with adjacent land use planning; and
2. East Gwillimbury GO Station.

Connectivity to Other Public Transit Systems

The existing East Gwillimbury GO Transit Station on Green Lane will allow for convenient connections between the North Yonge Street rapid transit services, local bus services, GO Transit bus and rail services and the park and ride lot immediately adjacent to the site.

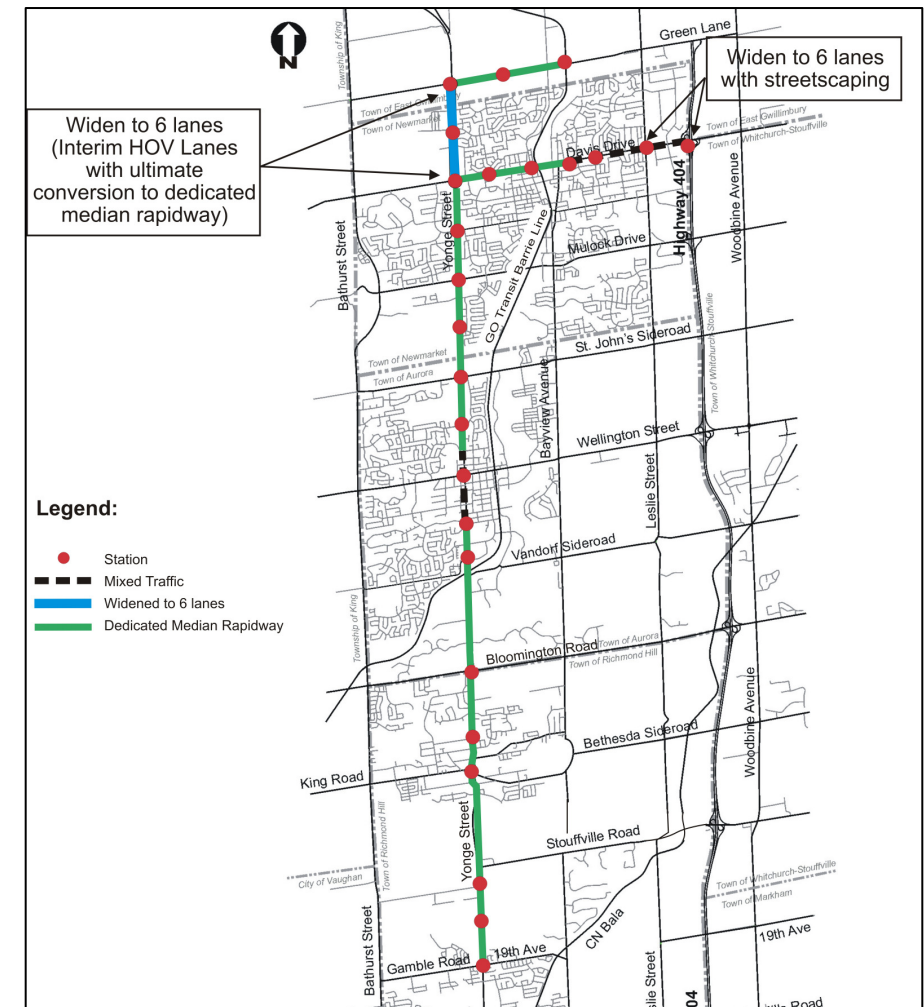


Figure 10-1
Preferred Alignment and Station Locations

Similarly, the proposed station adjacent to GO Transit's Newmarket Station at Main Street on Davis Drive will permit convenient transfers to the commuter rail and bus system. Local York Region Transit bus routes will interface with the rapidway stations at numerous points along the corridor, allowing seamless transfers to and from each of the services.

At the southern boundary of this study at 19th Avenue/Gamble Road, the rapidway will connect to the South Yonge Street rapidway, previously approved by the Ministry of the Environment in April 2006.

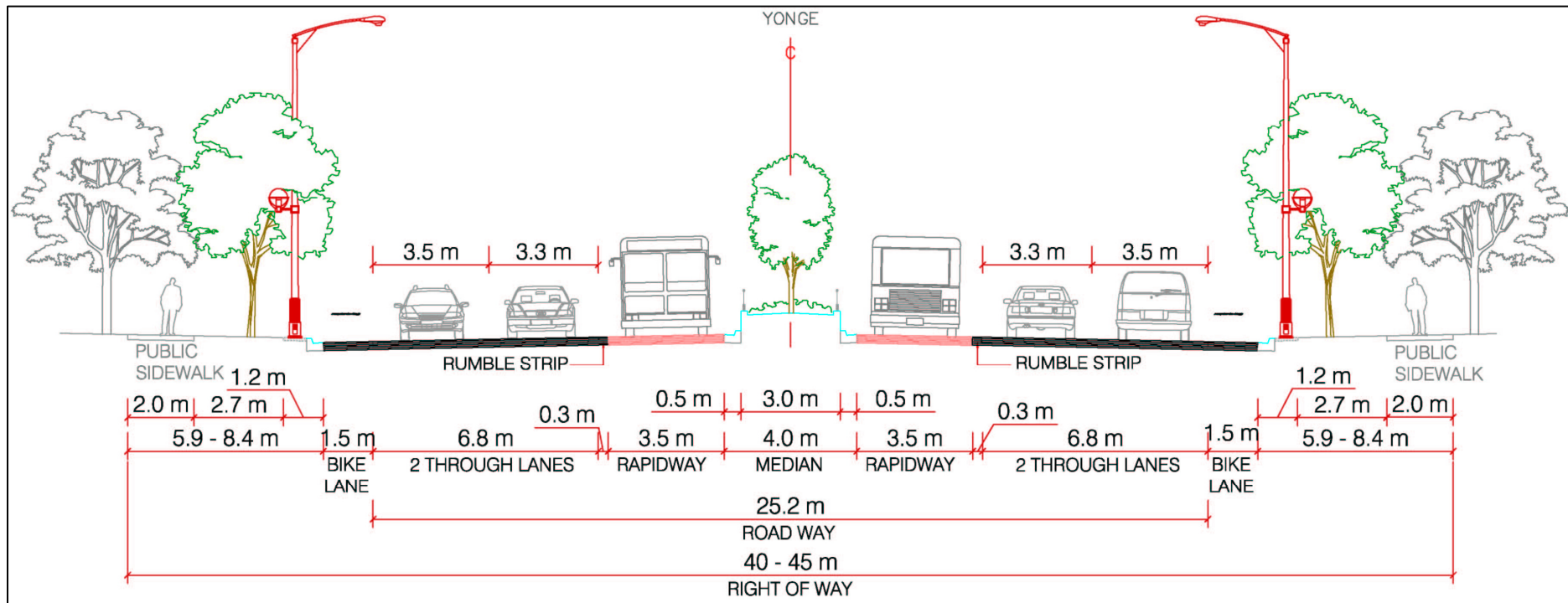


Figure 10-2
40 - 45 m Right-of-Way

Transit Terminal Facilities

At the time of this report, York Region Transit was reviewing the terminal needs in Newmarket including two locations along the preferred corridor of this project. The two locations are at the Yonge Street and Davis Drive intersection, and at Southlake Regional Health Centre. As re-development occurs in the quadrants of the Yonge Street/Davis Drive intersection, opportunity exists to incorporate a transit terminal with the built form.

The Southlake Regional Health Centre is undertaking a planning study to review their future plans and will include discussions with York Region and York Region Transit staff regarding integration of transit facilities with an expanded Hospital area. At the time of this study, the Hospital is just beginning the planning study and therefore we have noted that the integration of the rapid transit facilities on the Hospital property will be determined during the detailed design phase (refer to Plate 10-86).

10.1.1 Rapidway Elements

The proposed typical cross-sections for the rapidway are shown in **Figures 10-2 to 10-4**. The 40-45 m ROW cross-section refers to Yonge Street and Green Lane (**Figure 10-2**); the 36 m ROW cross-section is for the Davis Drive alignment (**Figure 10-3**); and the 42.6 m ROW cross-section is for the interim HOV stage on Yonge Street between Davis Drive and Green Lane (**Figure 10-4**).

The North Yonge Street Corridor Rapidway includes not only Yonge Street itself, but also service on Davis Drive and Green Lane. These existing roadways have a range of cross-sections from four lanes to five lanes (includes both directions). The preferred design maintains the existing through lane configurations on these roadways wherever necessary. All median left turning lanes are displaced by the exclusive median rapidway. Access to adjacent properties and cross-streets will be facilitated by signalized left and U-turns at regular intervals. All right turn lanes in the 6-lane cross-section will be eliminated in accordance with the Region's directive as part of the Towards Great Regional Streets initiative. In addition, at the designated locations where the transit service will be operated in mixed traffic to avoid impacting major physical features, the cross-sections of the roadway will remain unchanged.

Lane Widths: The width of existing general traffic lanes on the North Yonge Street Corridor generally varies from 3.5 m to 3.75 m and 4 m to 5 m for the median left-turn lane at various locations. These will be replaced by 3.5 m transit lanes, 3.3 m general-purpose traffic lanes and 3.5 m curb lanes. A 300 mm wide rumble strip is proposed to delineate and provide separation between the transit and general-purpose lanes. The transit

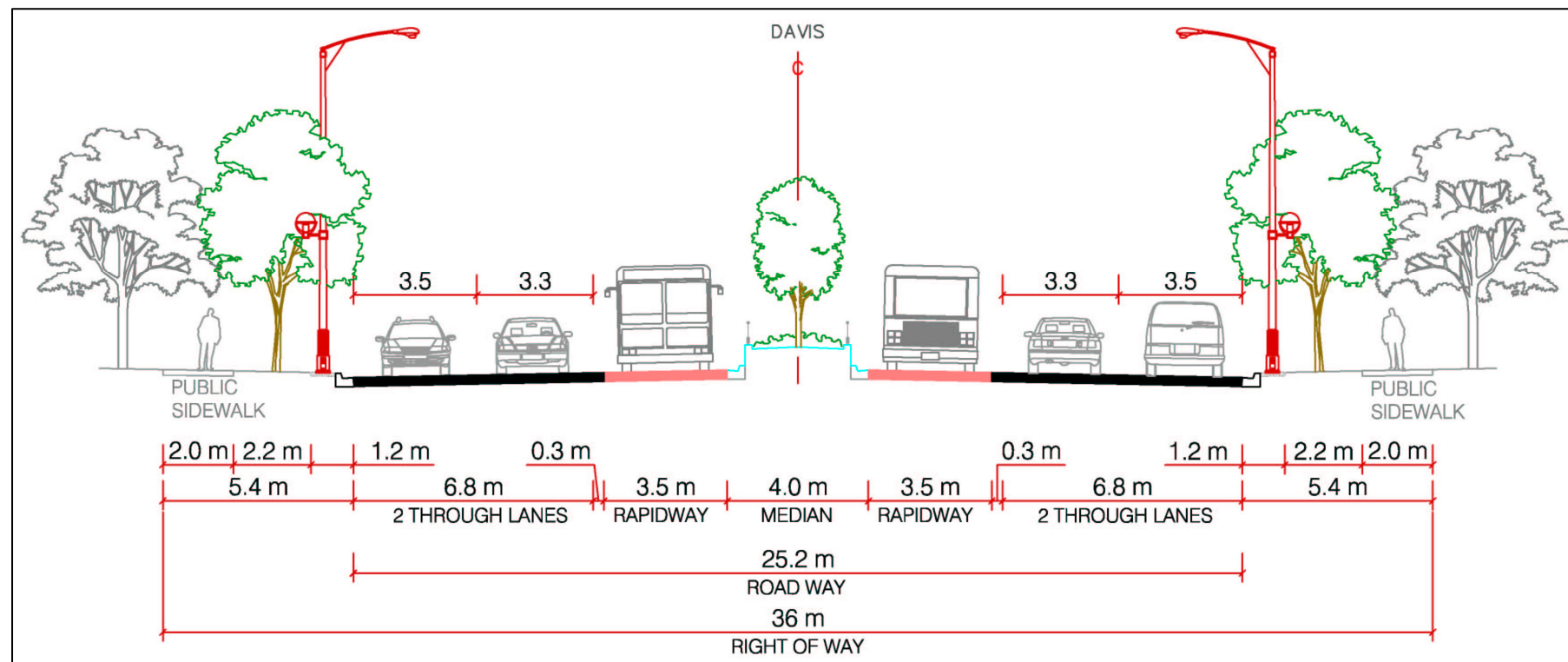


Figure 10-3
36 m Right-of-Way

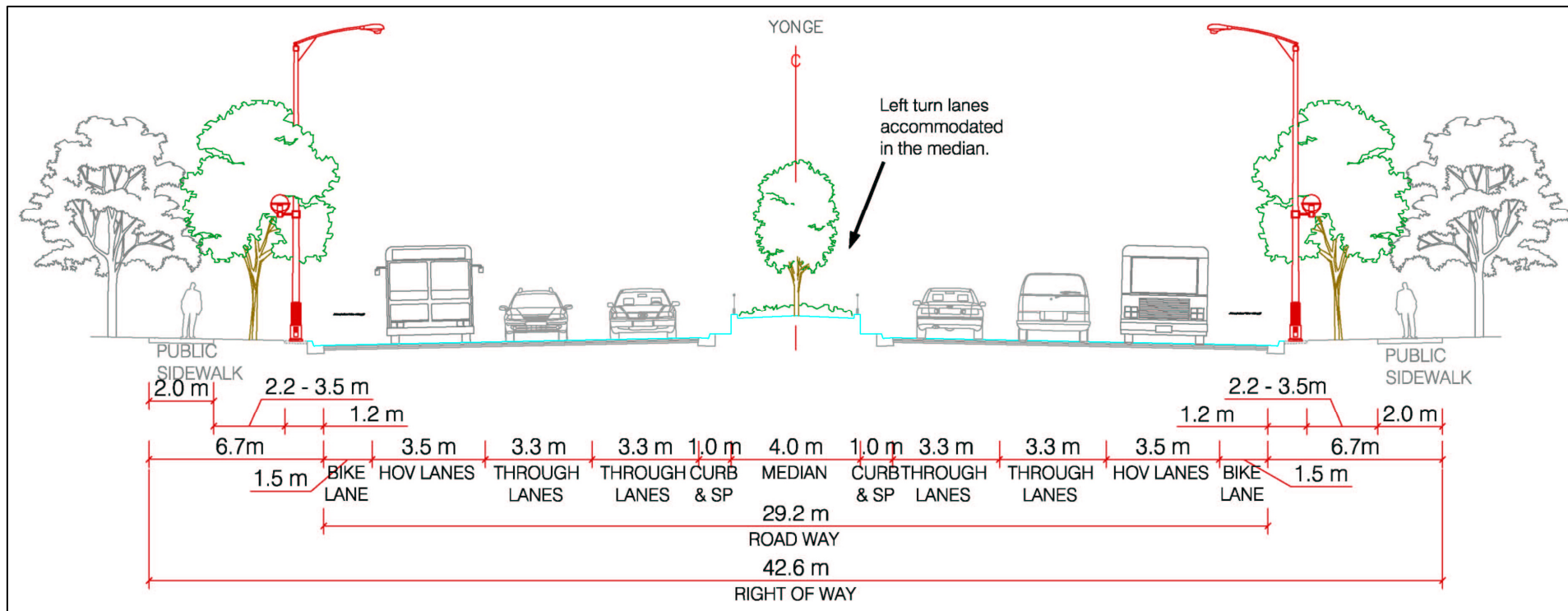


Figure 10-4
42.6 m Right-of-Way

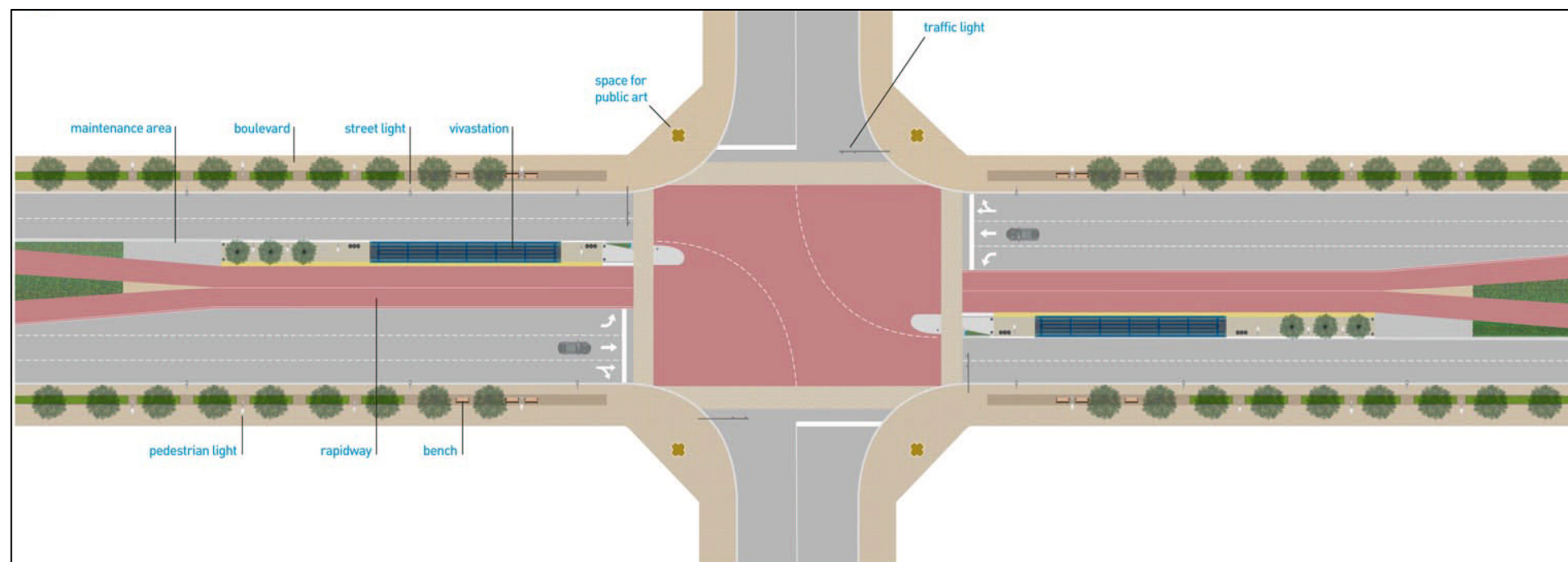


Figure 10-5
Streetscaping Plan

lanes and traffic lanes are proposed flush with each other to facilitate easy crossing of emergency vehicles, surface drainage and snow clearance.

Streetscaping: A streetscaping plan, shown in **Figure 10-5**, developed in conjunction with local municipalities, was adopted for the North Yonge Street Corridor Rapidway. This plan is also consistent with what has been developed for the other rapid transit networks. The optimum streetscaping plan for North Yonge Street Corridor will create a streetscape that will be a catalyst for transit-oriented development and to attract transit ridership. The vision for the roadway was developed in consultation with technical staff from York Region, and the Towns of Richmond Hill, Aurora, Newmarket, and East Gwillimbury.

In order to fully mitigate the effects of roadway widening in the Davis Drive corridor and sensitive areas on Yonge Street, the streetscaping plan has been developed with the intent of achieving 5.9 m to 8.4 m (Yonge Street and Green Lane median rapidway cross-section), 5.4 metre (Davis Drive median rapidway cross-section) or 6.7 metre (curb-side HOV cross-section) boulevard width wherever practical. Right-of-way widening for this purpose will be pursued at the time of rapidway implementation where existing development permits cost effective acquisition and through the site plan approval process in other areas that are redeveloped over time.

The following are some of the Urban Design Principles on which the current conceptual design has been based and which are recommended for future detail design:

- **Consistency and Coherency:** To avoid a circumstantial and inconsistent look to the corridor, it is important to establish a consistent cross-section and curb line. The corridor should also communicate a legible and understandable appearance that clearly puts forward the idea of transit as the future.
- **Identity:** The transit system should be broken down into subsystems that have their own character and sense of place that riders can identify with. Heritage districts should be designed to reflect the heritage of the specific area in question. Green Technology should be the principle on which amenities should be designed, such as solar power for everything from lighting to ticket dispensing to heating of bus shelters. Landscaping and tree planting are identified as essential in portraying a green image.
- **Environment and Median:** A range of climate issues can be dealt with through careful planning, e.g. trees can be planted

to provide shelter from the wind and shade for pedestrians as well screening from the road for adjacent buildings. Trees also act as a solid body for air pollutants to settle on and therefore reduce negative effects in the atmosphere. The type of materials and colour in pavement of the rapidway itself, sidewalks, splash strips, etc. should be carefully chosen to reinforce the identity and character of the rapidway that is proposed.

- **Median is the Message:** A number of options were developed for providing a landscaping plan within the corridor. These included three main alternatives:
 - A median landscape area with transit either side;
 - Two landscape areas either side of the rapidway separating the transit from the roadway; and
 - A minimal separator in the median (1 metre) with landscaping at the outer curb areas only.

In choosing between these options some fundamental requirements were established such as the need for landscaping in the public space especially in the boulevard. In addition, it was recognized that paving for transit would create additional hard asphalt areas that would result in extensive and undesirable expanses of asphalt once appended to the existing road surface. To alleviate this it was established that median landscaping was necessary.

The option with two landscape areas either side of the rapidway was not considered desirable to use along the corridor as the standard. However it was used in some area in Richmond Hill (through Oak Ridges) where the right-of-way width was constrained.

The option of no median was considered less acceptable, as it did not meet the fundamental requirements of breaking up wide expanses of asphalt, did not result in a pleasing aesthetic look to the corridor and did not provide a mid-crossing refuge for pedestrians crossing the North Yonge Street Corridor.

The preferred alternative was to have a median of at least four metres in width to allow tree growth. To limit salt/snow splash it was recommended that trees should be housed in raised planters. A buried irrigation system would be desirable and only select species of trees that were known to be more resistant to salt spray would be chosen. Evergreens would also be selected in certain locations to ensure that some landscaping remained in the winter months.

The above arrangement has been used successfully in many locations in a North American environment and was arrived at in consultation with the team's landscape architects.

Although not desirable, the option of the 1 m median was also accepted at locations where the opportunities to widen the existing right-of-way are limited.

Network: The rapidway is part of a complex network reflecting how people move through the community. The linkages that connect private vehicles, passenger pick-up and drop-off, park-and-ride, bicycles, local transit buses, GO Transit buses, etc., to the future rapidway should be designed with an integrated approach making the experience of transitioning to transit services efficient and effortless.

Signage: A consistent approach to all types of signage, directional, proprietary advertising, etc., should be developed for the corridor to minimize visual clutter and the chronic symptom of competitive "sign wars".

Snow Plowing: The clearing, storage and removal of snow along traffic and transit lanes must be carefully planned. A generous splash and storage strip must be provided on the sidewalk side of the curb.

Emergency Response Services (ERS) Considerations: Currently, a two-way, mostly undivided roadway and occasionally continuous median left turn lane allows access into existing local streets and properties on both sides of Yonge Street, Davis Drive and Green Lane. This random access is available to all vehicles including ERS vehicles such as fire trucks, emergency medical response vehicles (ambulances) and police vehicles. With the introduction of a raised, landscaped median between the dedicated transit lanes this access will be restricted to signalized intersections at regular intervals along the alignment. In order to mitigate the effect of this change in traffic operations, the rapidway design assumes ERS vehicles will use the dedicated transit lanes and incorporates a crossing treatment in the raised median to permit left turn access by ERS vehicles. The design has been refined as part of the preliminary engineering task for the South Yonge Street Corridor Rapidway. The objective of the design was to reinstate current operations of most ERS vehicles using the existing two-way median left turn lane on the Corridor roadways.

The proposed typical emergency service median crossing treatment is shown in **Figure 10-6**. The crossing consists of an inclined, minimum 3.5 m wide opening to allow an emergency vehicle to reach the opposing transit lane from which a left turn can be made either to an existing roadway/driveway or to reach the curb facing opposing traffic. To limit

access to ERS vehicles only, regulatory signing will be provided and the appropriate by-law enforced.

Generally, the proposed spacing of these crossings is approximately 100 metres and they will be placed strategically to ensure effective access. Figure 10-6 illustrates how ERS vehicles would use the dedicated transit lanes in-lieu of the existing two way median left turn lane, either at intersections or after a median crossing to access sideroads or driveways. When an ERS vehicle is using the transit lane in the normal direction, transit vehicles will be required to move to the right into general traffic lanes to allow ERS vehicles to pass. When a transit lane is being used in the opposing direction for a left turn manoeuvre, transit vehicles will stop, as is currently the case, to avoid the possibility of collisions between ERS and transit vehicles.

It is anticipated that a detailed crossing plan will be developed for the entire North Yonge Street Corridor in consultation with ERS organizations during the detail design phase to ensure that all properties and streets can be accessed safely and within current response times.

Other items: These include street lighting and public art. For street lighting it was stressed that light spillage is to be avoided and excess light reduced. For the section of rapidway through the Oak Ridges Moraine, the appropriate lighting guidelines will be followed as set out in the Oak Ridges Moraine Act. Heritage or decorative lighting is to be included in the appropriate sections of the rapidway corridor. For public art, it was articulated that the design components, such as paving, light standards, benches, stations, etc. should include the provision for a rich variety of public art that will express community character throughout the corridor.

10.1.2 Horizontal Alignment

The proposed North Yonge Street route including Yonge Street, Davis Drive and Green Lane comprises relatively straight roads with horizontal curve radii ranging from 800 metres to 8,000 metres.

For rapidway design the horizontal alignment conforms to minimum BRT standards as much as the situation permits. The roadway design conforms to the existing posted speeds ranging from 50 km/h to 70 km/h and is in accordance with the Geometric Design Manual for Ontario Highways.

New tangents and horizontal curves are incorporated to shift the existing alignment where necessary to minimize the impacts on properties. The horizontal alignment has been modified in this way at the following location:

- **Aurora Cemetery:** The existing property line for the Aurora Cemetery, located on the east side of Yonge Street north of Ridge Road, was

10.1.3 Vertical Alignment and Pavement Widening

Vertical alignment for the North Yonge Street Corridor will generally follow the profile of the existing roadways. In order to obtain good ride quality and the required service speeds for rapid transit, a best-fit vertical profile has been designed to achieve a smooth profile for the median rapidway lanes.

Additional pavement width is required to incorporate the median transit lanes or HOV lanes, and the landscaped median. The additional lanes and streetscaping will require widening of the curb lines as well as some local right-of-way widening. Pavement depths for the transit lanes may be different from those of the traffic lanes as well as the landscaped median. With the above changes necessary it is anticipated that complete reconstruction of the cross-section may be required (to be confirmed during detailed pavement design). Whenever possible, right-of-way widening or impact on commercial properties including parking has been minimized by the provision of retaining walls or other grading measures.

The proposed vertical alignment generally conforms to design speeds ranging from 50 km/hr to 70 km/hr for general-purpose traffic. Vertical alignment standards for BRT stated in **Chapter 8** are met.

At some locations the grades at stations exceed the maximum gradient standard for BRT due to the need to match existing road grades on the running ways. However, these grades are considered acceptable variations from the desirable standard and thus it is proposed to retain these grades. If in the future LRT technology is introduced, grades through some stations will have to be reviewed as per the design standards for LRT vehicles.

10.1.4 Intersection Design

Intersection design has been undertaken in accordance with the Geometric Design Manual for Ontario Highways. An important feature of the new intersections is the provision for general-purpose traffic to negotiate U-turns at signalized intersections. Therefore, signalized intersections have been designed to allow for trucks of size WB17 to make a U-turn with signal protection. However, it is anticipated that most heavy vehicles would adopt an alternative routing to reach destinations to avoid making U-turns. Non-signalized intersections have been designed to maintain existing turning radii with these intersections becoming right-in/right-out with the introduction of the median rapidway. Left and right turn lanes with appropriate lengths, have been incorporated into the design based on traffic requirements. Property will be acquired as part of the roadway/transit improvements to provide for adequate day-lighting triangles for all intersections.

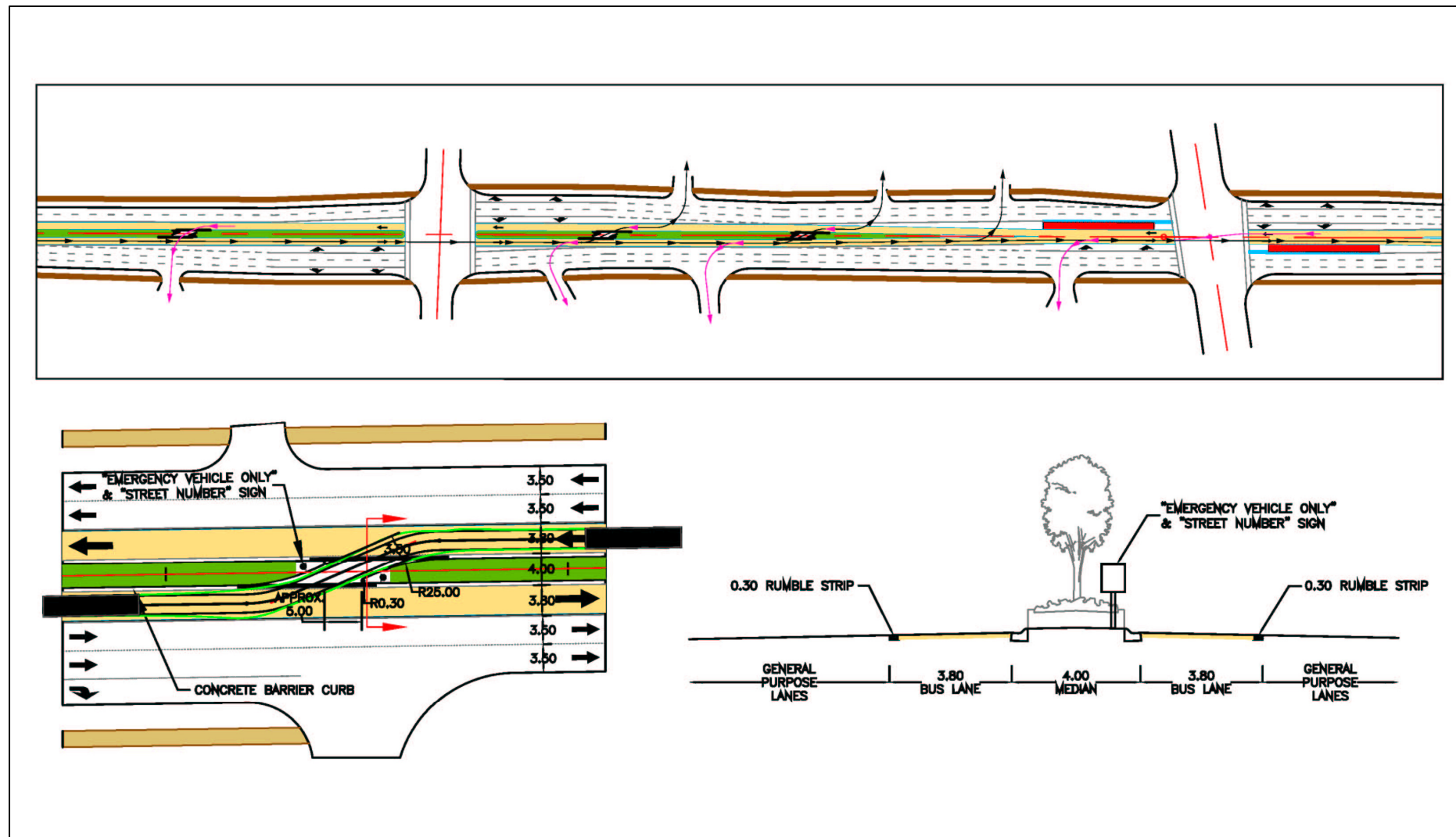


Figure 10-6
Typical Emergency Service Median Crossing Treatment

matched. In order to fit in the required cross-section, the alignment was shifted slightly to the west and a reduced boulevard on the east side was necessary adjacent to the main building on the cemetery property. This was achieved by introducing two 2000 metre radius reverse curves.

- **Yonge Street alignment adjacent to the Cemetery at the Quaker Meeting House:** In order not to impact the cemetery on the west side of Yonge Street adjacent to the Quaker Meeting House, the alignment was shifted to the east. This was achieved by introducing two 2000 metre radius reverse curves.
- **North of Upper Canada Mall on Yonge Street:** The alignment has been shifted to the west in order to avoid affecting several residential

properties on the east side. There is an existing wide boulevard on the west side with commercial developments set back a significant distance from the roadway right-of-way. This was achieved by introducing two 2000 metre radius reverse curves.

- **Davis Drive alignment at the Keith Bridge:** The alignment has been shifted to the south side of Davis Drive just west of Bayview Parkway to west of the East Holland River in order to avoid possible effects to the heritage features that are part of the waterway. The alignment meets the existing roadway centreline west of the Barrie GO line to minimize widening of the existing railway crossing.

10.1.5 Structures

One structure along the North Yonge Street Corridor will need to be replaced due to the introduction of the rapidway, which is the Keith Bridge. This bridge crosses the East Holland River, located on Davis Drive east of the Tannery Mall and GO Barrie rail line. The existing structure will be replaced with a wider bridge having the cross-section as illustrated in **Figure 10-7**. The existing bridge span of approximately 30 metres will remain the same. For construction staging, the first stage will be to construct four lanes to the south of the existing structure keeping four lanes of traffic on the existing structure. Traffic would then be diverted onto the new structure while the existing structure is being demolished. The remaining cross-section would be constructed in place of the old structure and once complete all lanes of traffic would be opened on the new Keith bridge. The details of lane geometry for the construction staging and temporary conditions will be developed during detailed design.

Two other structures of interest along the corridor are the GO Barrie underpass in Aurora and the Southlake Regional Health Centre pedestrian bridge.

The GO Barrie underpass in Aurora on Yonge Street north of Industrial Parkway, is a significant structure however it will not be affected. The proposed cross-section at this location is shown in **Figure 10-8**. During detailed design, access provision for pedestrians and cyclists will need to be reviewed and located outside of the cross-section behind the existing bridge abutments. The project staging of rapidway through this section of Yonge Street in Aurora is discussed in Section 10.4.

The pedestrian bridge spanning Davis Drive connects the parking garage to the medical arts building and was completed in 2007. The cross-section of Davis Drive with rapidway illustrated in **Figure 10-9** shows how clearances and sidewalks are maintained.

10.1.6 Watercourse Crossings

There are 14 watercourse crossings throughout the corridor, which are noted below, as well in more detail in **Appendix C**.

- Tributary 'C' Rouge River – Yonge street north of Gamble Road
- East Branch Humber River – Yonge Street at King Road
- Tributary of East Humber River – Yonge Street at Black Forest Drive
- East Branch of Tannery Creek – Yonge Street between Kennedy Street and Church Street

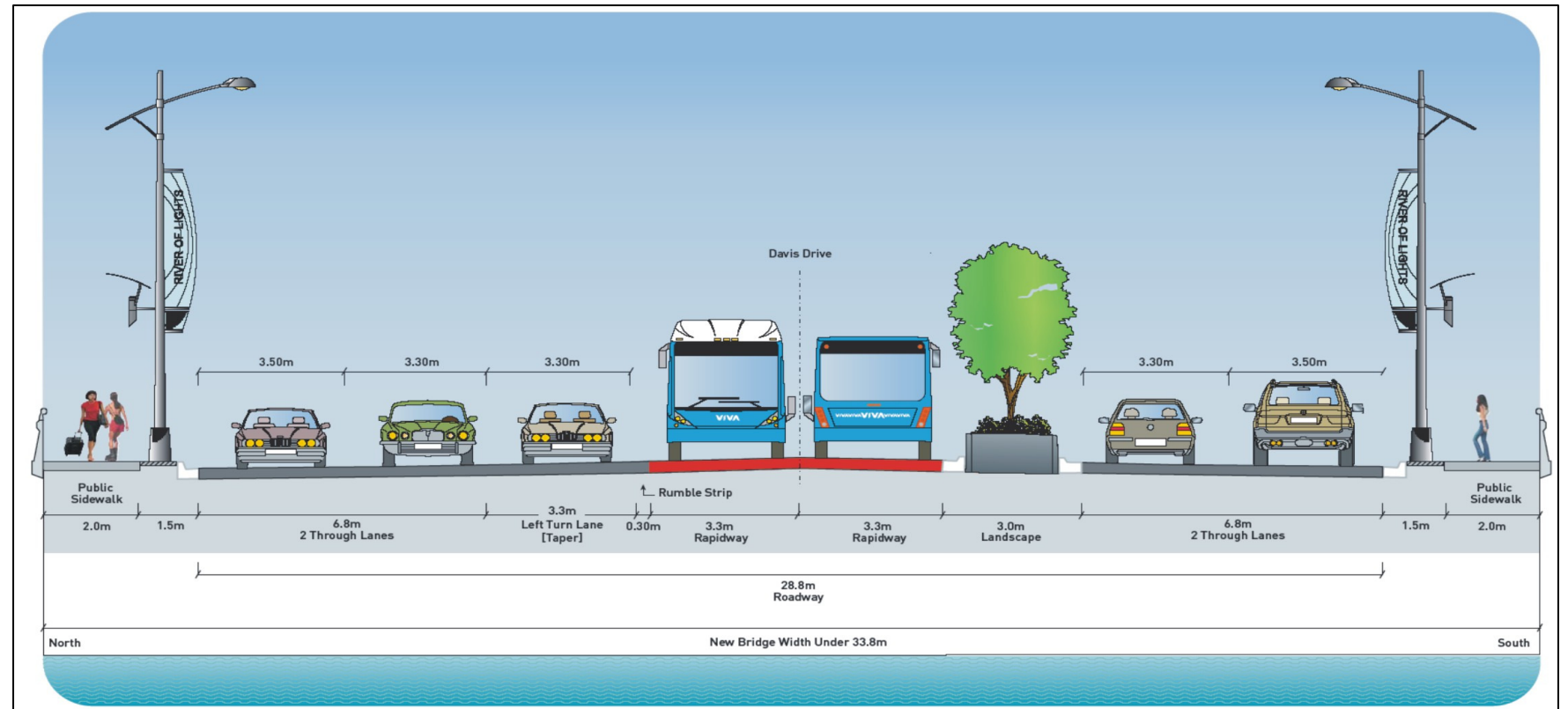


Figure 10-7
Keith Bridge Cross-Section

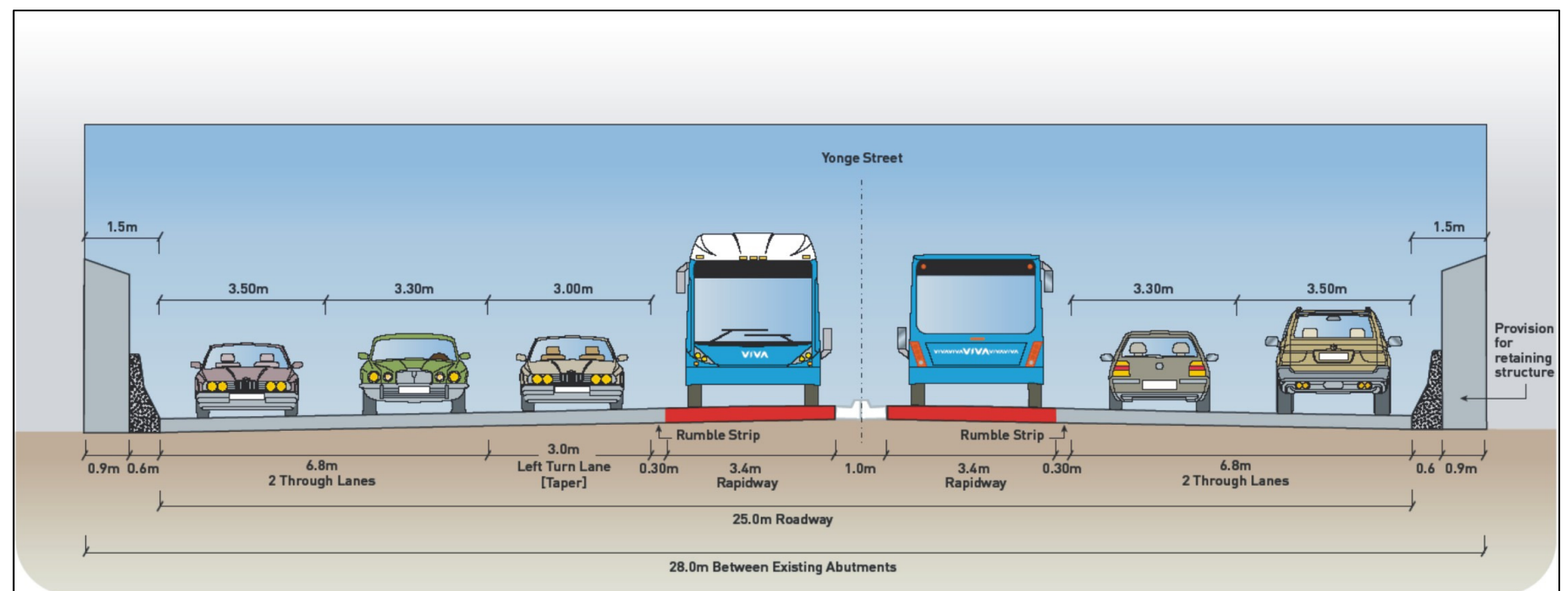


Figure 10-8
Cross-Section under GO Barrie Bridge in Aurora

- Main Branch of Tannery Creek – Yonge Street south and north of Orchard Heights Boulevard; and Yonge Street north of St. John's Sideroad
- Western Creek – Yonge Street north of Eagle Street; and Davis Drive west of Main Street
- Unnamed Tributaries of East Holland River – Green Lane east of Yonge Street; Green Lane west of Concession #2
- East Holland River - Davis Drive east of Main Street
- Eastern Creek – Davis Drive west of Patterson Avenue

As discussed in Section 10.1.5, the crossing of the East Holland River requires a new structure. The majority of the crossings require extension to the existing culverts, as detailed in Table 8 of Appendix C. The crossing of the East Branch of Tannery Creek will not require any widening, and the culvert of Western Creek north of Eagle Street on Yonge Street will be avoided with the application of a retaining wall (on the west side of Yonge Street). Similarly, the culvert on the west side of Yonge Street at Tributary 'C' – Rouge River, will be avoided with the application of a retaining wall. The culverts at the East Humber River tributary crossing do not require any modifications.

10.1.7 Stations

Station conceptual designs were developed based on the criteria outlined in **Chapter 8**. The objective was to develop a typical or prototype station that incorporates a set of common elements that would create a clear identity and allow for ease of installation and maintenance.

The prototype station includes:

- Consideration of the station precinct and the connections to the local community as part of the station development;
- Far-side stops, with the end of the passenger platform located as close to the pedestrian crosswalk as possible;
- Safe refuge areas located in the median for pedestrians who are not able to cross the entire roadway width in one signal phase;
- Distinctive, modular shelters to provide weather protection and contribute to the visual identity of the system; and
- Provision for amenities including fare collection equipment, signage, system maps and real-time passenger information.

Opportunities to incorporate art to enhance the image of the system and to incorporate elements of the historic nature of the station areas or the corridor will be introduced.

The station precinct includes the station site itself and consideration of how pedestrians access the transit service from the local neighbourhood. This

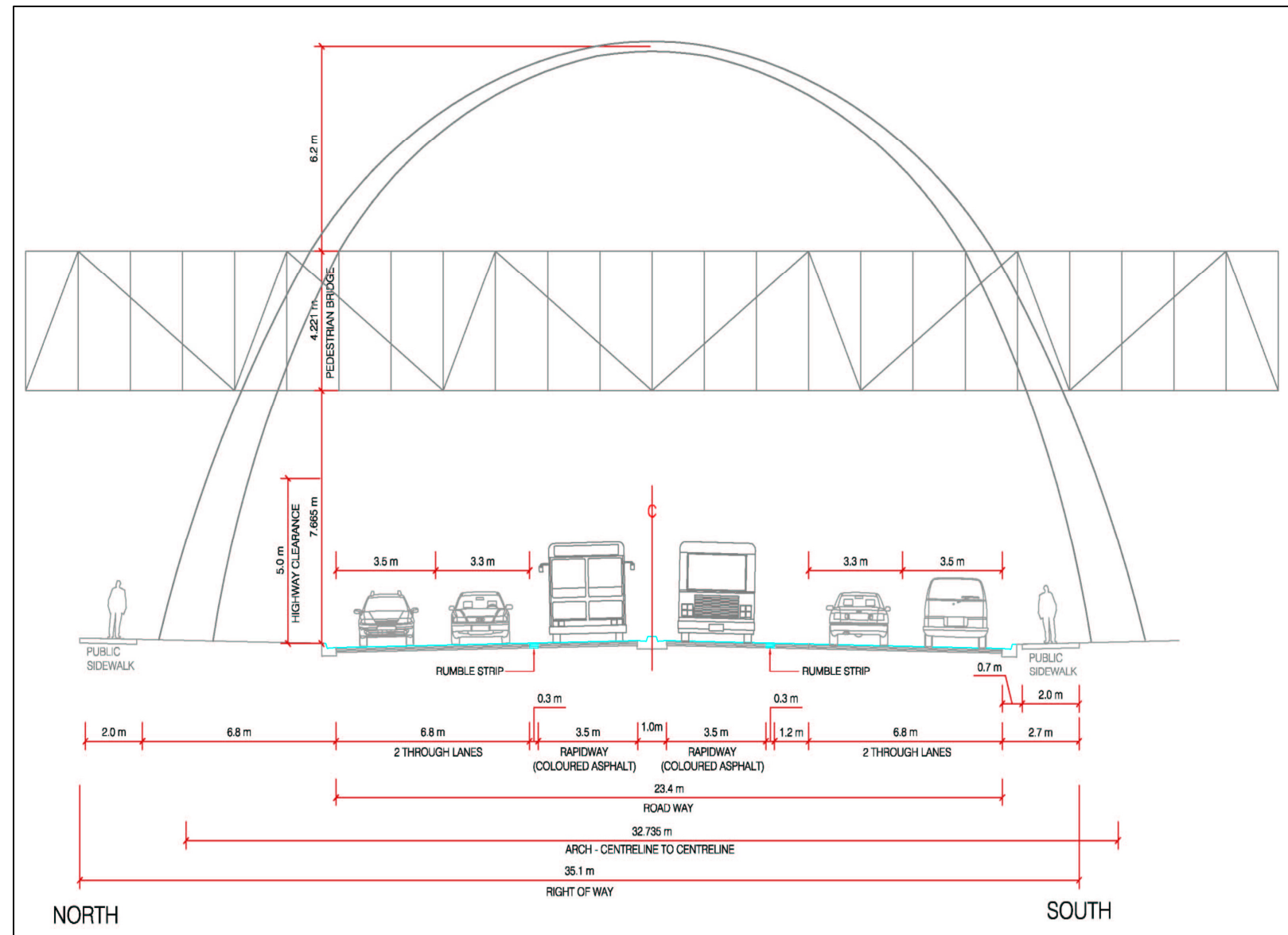


Figure 10-9
Davis Drive Cross-Section at Southlake Regional Health Centre Pedestrian Bridge

includes the sidewalk system, crosswalks and signage and wayfinding systems. The identity of the system and the access to the system are clearly defined by the various prototype elements. The stations are conveniently located at signalized intersections where pedestrians and cyclists can easily access the station through the intersection.

Far-side stations allow rapid transit vehicles to pass through signalized intersections before stopping at the platform, minimizing lost time at signals and minimizing vehicle-pedestrian interfaces. This also places the vehicle

beyond the crosswalk so that passengers leaving the station do not interfere with the vehicle's departure.

The prototype staggered station layout, shown in **Figure 10-5**, will be used at all of the station locations listed at the beginning of this chapter.

Modular shelter design allows for a consistent image to be created through a design that is responsive to the level of passenger usage. The platform area is a consistent size across the system, designed to allow for two BRT

vehicles to be stopped at any given time. The shelter is sized based on anticipated station loads and can be expanded as the system grows.

Fare collection equipment, signage and system maps and information will be presented in a similar manner at each station. This predictability of information and placement will enhance the passenger's experience.

In many newer transit systems art is incorporated in the stations through stand-alone or integrated art. This provides an opportunity to enhance the public's perception of the system and increases the level of safety and security. This art can reflect the current or historical context of the station or community. In many cases the art at several stations is linked into a common theme to provide variation yet allow for a complete story to be told. Integrated art has become the more common method since stand-alone art generally requires more space and is seen as distinct from the station whereas integrated art joins the function of the station.

10.1.8 Park and Ride Facilities

Although integration with YRT local services as feeders is a primary objective, the Region's rapid transit plan includes a commitment to undertake a parking need assessment and management study to perform an operational review on feeder services, to determine the requirements for parking spaces and how these required parking spaces will be provided and implemented. The installation of parking facilities, wherever practical, cost-effective and primarily in the general areas noted earlier in this Chapter, will facilitate access to the system by private cars. During the design phase, local municipalities and, where opportunities exist, private property owners will be consulted to identify potential locations for park-and-ride facilities. The allocation of parking spots may be feasible at regional centres and business locations to allow for the integration of the transit system. Options to be investigated could include vacant land owned by municipalities, shared use of municipal parking lots or garages, sharing of commercial parking lots and joint development in the vicinity of key rapidway stations. Park-and-ride facilities will be implemented in accordance with the study recommendations respecting site planning and EA regulatory requirements. Any new separate facilities may be subject to the requirements of a Class EA as appropriate. The Region will not assume that parking spaces will be available on GO Transit-owned lands at GO Stations.

10.2 SERVICE PLAN FOR SURFACE RAPID TRANSIT

10.2.1 Near-Term Service Design

Initially, the service design for the North Yonge Street Corridor is expected to be generally the same as that for the Viva 1 phase, which began operation in fall of 2005. This is described as follows:

- **Routing** – essentially staying on the corridor, as defined in this report. On Yonge Street at Davis Drive the service will split, with approximately two-thirds of the vehicles turning east on Davis Drive and the remainder continuing north on Yonge Street;
- **Stop Policy** – stopping at all stations, as defined in this report (i.e. no express or semi-express operation or other stop variation);
- **Vehicle Allocation** – 18-metre articulated vehicles of the type currently providing service in the North Yonge corridor to the Eagle bus terminal ;
- **Span of Service** – 7 days per week and approximately 18 hours per day (6:00 am to 12:00 midnight, with slightly later early morning starts Saturdays and Sundays), the same as for the Viva 1 phase, although service could operate later in the evening as ridership builds, say to 1:00 or 2:00 am, the same as the local service now provided by YRT;
- **Service Frequencies (weekday peak periods)** – a minimum 10-minute service during weekday peak periods (6 vehicles per hour in each direction on individual routes), with integrated schedules where routes overlap to provide a combined 5-minute service and 12 vehicles per hour in each direction where routes overlap).
- **Service Frequencies (off-peak times)** – a 15-minute service on all routes with no route overlaps, as noted in the routing descriptions above.

10.3 PROJECT ACTIVITIES

There are three distinct phases to the project which are:

- **Pre-construction Phase:** Includes the completion of preliminary and detailed engineering designs, streetscape designs and preparation of contract drawings and specifications. This phase also involves obtaining all necessary permits, as well as approvals from regulatory agencies.

- **Construction Phase:** Involves all activities related to construction such as removals, grading, excavation, filling, construction and replanting for the entire construction period.
- **Operation Phase:** Begins on the first day of transitioning to operation and covers the general operational activities such as maintenance and monitoring, on an as required basis.

The activities associated with each of these phases are discussed in the following three sections.

10.3.1 Pre-construction Phase

This phase includes completion of preliminary and detailed engineering and streetscape designs and preparation of contract drawings and specifications. Issues to be addressed and resolved during preliminary design include but are not limited to:

- Potential funding sources for construction of the project;
- Property acquisition;
- Phasing requirements for infrastructure design;
- Construction staging of the design;
- Resolution of transit terminal arrangement at Southlake Regional Health Centre and at the Yonge Street/Davis Drive area;
- Landscaping materials;
- Heritage element design;
- Utility relocation strategy and design;
- Street lighting design, frequency and location;
- Street furniture;
- Public art;
- Vehicle types and operational plans;
- Station design and amenities;
- Traffic signal design;
- Coordination with local transit routes and transfer strategies;
- Fare collection strategies;
- Sewer design and watermain design;
- Pavement design for running ways and roadways; and
- Parking mitigation strategy.

Other pre-construction activities include:

- Site surveying as required;
- Obtaining approvals for construction access, working areas and any necessary traffic detectors;
- Obtaining approvals from TRCA for development, interference with wetlands, alterations to shorelines and watercourses;

- Geotechnical investigations including drilling of boreholes to determine existing soil, pavement and groundwater conditions;
- Archaeological and waste contamination investigations;
- Advance utility relocation or burying contracts; and
- Coordination with other projects in the vicinity of the corridor.

10.3.2 Construction Activities Phase

Physical construction activities will include, but are not limited to:

- Installation of traffic accommodation measures as described in the staging plan;
- Clearing and grubbing of trees and vegetation within the grading limits of the project;
- Stripping and topsoil within the grading limits;
- Excavation of road surface including sidewalks and medians;
- Trenching and installing new below-grade infrastructure and burying overhead services where planned;
- Removing existing asphalt and disposing at approved facility;
- Removing redundant structures and disposing of debris;
- Preparing road bed including cutting, filling and lying granular;
- Potentially salvaging existing granular/asphalt for reuse;
- Pouring concrete for curb, barriers, retaining walls, planters and sidewalks;
- Fabricating and erecting station elements including amenities;
- Laying granular and application of hot mix asphalt;
- Installing lighting, heritage lighting and traffic signals;
- Final grading and topsoil application;
- Asphalt line painting; and
- Installing landscaping features such as sod, shrubs, trees, paving stones irrigation systems, station amenities and street furniture.

Throughout the construction stage, various associated activities, which have potentially adverse environmental effects will need to be mitigated, as outlined in **Section 11.4**.

10.3.3 Operation Phase

Once construction is complete, monitoring of the North Yonge Street Corridor rapidway will be initiated. This will include monitoring the following:

- Traffic and transit ridership volumes to determine the potential for future modifications;
- Collisions to analyze safety conditions;
- Traffic signal timing; and
- Overall landscape health.

Routine maintenance activities include:

- Spring sweeping of road, sidewalk and boulevards;
- Snow and ice removal in the winter;
- Landscape maintenance including grass cutting, shrub and tree pruning in the summer; and
- Replacement of any landscaped material.

10.4 PROJECT STAGING

There will be opportunities to stage project activities during the construction phase. Staging the project will be beneficial in maintaining the best possible level of service during construction, including maintaining accesses to all properties as well as maintaining city/town and utility services such as water, sewer and hydro. This will include staging of activities across the corridor (cross-section staging), or sections/portions along the corridor (component staging).

Although specific plans to stage the project will not be determined until the detailed design phase, and until Senior Government funding is committed, it is useful to present staging opportunities in general terms in this ESR so that potential effects can be assessed.

Because of the generous platform width required for the new project, staging of construction should have the ability to maintain pedestrian and road traffic as currently existing during construction except for brief periods where traffic and pedestrian restrictions are necessary. The basic strategy would be:

- Construct the additional widening on one side of the roadway to its required width;
- Shift existing traffic to the side where new widening has been constructed. If necessary a temporary surface over the landscape median/station areas may have to be constructed;
- Operate traffic to one side. Set up temporary signals to align with new traffic lanes at signalized intersections;
- Construct remainder of the roadway while maintaining access to existing properties by staged construction; and
- Finalize construction and open to traffic to its final configuration.

There are three sections of the alignment that will be staged accordingly. The rapidway construction on Yonge Street section between Bloomington Road to Henderson Drive hinges on the GO Barrie bridge replacement timeline as well as traffic congestion levels.

The interim six-lane HOV stage on Yonge Street between Davis Drive and Green Lane will be constructed first to alleviate the traffic delays in this section. Once transit ridership increases and adjacent land is redeveloped to support rapid transit initiatives, the ultimate median dedicated rapidway will be constructed in the already widened right-of-way. Similarly, rapid transit will operate in mixed traffic along Green Lane until such time as development takes place and dedicated rapidway is warranted.

10.5 DESIGN ATTRIBUTES AND BUILT-IN MITIGATION

For this project, “built-in mitigation” is defined as actions and design features incorporated in the pre-construction, construction and operational phases, that have the specific objectives of lessening the magnitude of environmental effects which may be caused by the project.

The North Yonge Street Corridor Rapidway will be designed and implemented with the benefit of planning, road and transit design engineering, landscaping design, and environmental best management practices. Regard shall be given to the legislation, policies, regulations, guidelines, and best management practices of the day. Where possible, mitigation measures will be prescribed in the construction contracts and specifications. Examples of practices that should be employed, based on current standards, are described below. These will be applied and refined during the pre-construction, construction and operational phases of the project.

Construction and Traffic Management Plan

A Construction and Traffic Management Plan will be developed to manage the road’s transportation function for all travel modes including equipment and material deliverables at various times during the construction period. The objective of the plan will be to maintain safe and clear pedestrian routes, maintain existing traffic as close as possible to its current conditions, and outline the road signage program.

Emergency Response Plan

The preparation of an Emergency Response Plan to be used by the contractor will be included to allow full access to emergency services during the construction period, so that at any given time there is a method to access all adjacent land uses. Additionally, the Emergency Response Plan should include provisions for providing temporary services to end users in the event of a construction related service outage or other service disruption. A spills response and reporting plan will be prepared and adhered to by the contractor. Spills or discharges of pollutants or

contaminants will be reported immediately. Clean up shall be initiated quickly to ensure protection of the environment.

Management of Contaminated Materials

Studies will be completed during the design phase to confirm the potential for the project of interaction with contaminated soil or groundwater. Where the potential is confirmed, a plan to remediate the environment to the applicable standards will be prepared. The Ministry of Environment and Construction Manager would be notified immediately upon discovery of any contaminated material encountered within the construction area. If contaminated materials or contaminated groundwater are encountered within the construction limits, these are to be removed and disposed off in accordance with all applicable Acts and regulations. Treatment and discharge of contaminated groundwater are also to be in accordance with applicable legislation and regulations.

Construction Waste Management Plan

During construction there will be some excess materials that must be disposed off the project site. These could include concrete rubble, asphalt, earth and road right-of-way appurtenances such as signs, lighting and utility poles. During the detailed design stage a waste management plan will be developed to ensure that surplus material is recycled wherever practical and to describe the methods to be used by the Contractor for disposal of all other surplus material in accordance with provincial or local municipal practices and guidelines.

Geotechnical Investigations

Geotechnical investigations will be required to confirm groundwater and subsurface conditions and potential impacts that will need to be considered in the detailed design phase of the project. Geotechnical investigations will also be required to undertake the pavement design. Foundation investigation will be required for structural design of new structures and extension of culverts.

Archaeological Assessment and Monitoring

Based on the existing conditions, there were areas identified as having archaeological potential. Accordingly, it is recommended that a Stage 2 Archaeological Assessment be conducted for those areas by a licensed archaeologist prior to construction. During the actual construction, it may be necessary for a licensed archaeologist to monitor deep excavations with the Stage 2 assessment results determining this level of monitoring. If during the course of construction archaeological resources are discovered, the site should be protected from further disturbance until a licensed

archaeologist has completed the assessment and any necessary mitigation has been completed.

Stormwater Management Plan

During the design phase, a Stormwater Management Plan will be prepared in accordance with the MOE's *Storm Water Management Planning and Design Manual (2003)* and *Guidelines for Evaluating Construction Activities Impacting on Water Resources* to identify the rate and volume of anticipated storm water runoff and the means to accommodate it. During the detailed design phase the means of achieving MOE guidelines for water quality of storm water runoff will also be acknowledged including the identification of the overall storm water management system requirements, methods of detention and filtration, and any control mechanisms necessary to achieve runoff quantity and quality targets. This plan, when prepared during the detailed design phase, will take into account the opportunity that exists to use specific locations within the identified right-of-way as retention areas to assist in the objective to improve stormwater runoff quality to further off-site (i.e. outside the right-of-way) treatment. This plan will also outline monitoring and maintenance commitments for storm water management facilities constructed as part of this undertaking.

Erosion and Sediment Control Plan

During the detailed design phase, a comprehensive plan will be prepared by the contractor to manage the flow of sediment into storm sewers. This plan will be based on best management practices including the Guidelines for Erosion and Sediment Control at Urban Construction sites. Provision for inspection of erosion and sedimentation control measures during construction will be identified in permit approvals. Catchbasin filters and straw bales in roadside ditches will be used to control erosion and sedimentation during construction. Sediment fences will be used where construction is adjacent to watercourse crossings.

Landscape Plan

A detailed Landscape Plan will be prepared to guide the species selection, location and planting details for all proposed plantings and other streetscaping elements within the corridor. The plan will be prepared by a professional landscape architect with experience in plantings along arterial roadways. TRCA have indicated that with regard to salt spray, additionally mitigation impacts can be provided with landscaping/planting of salt tolerant species to intercept salt spray adjacent to sensitive features. Salt tolerant species are to be included in the landscape plan at the detailed design stage.

Lighting Treatment Plan

A Lighting Treatment Plan, in accordance with municipal and regional standards, will be prepared during the pre-construction phase. This plan will include lighting fixtures and illumination along the various sections of the corridor. A lighting audit of the preferred lighting design plan will be conducted to ensure clear sight lines and appropriate illumination.

Public Communications Plan

The requirement for a Public Communications Plan stems from the need to keep the public informed about the work in progress and the end result of the construction activity. Residents and other stakeholders must be aware of scheduled road closings and other disruptions to normal service ahead of time in order that their activities can be planned with minimum disruption. The Public Communications Plan should describe in detail how to communicate the information to the public, what information should be disseminated, and at what project stages the communications should take place.

11. ASSESSMENT OF THE PREFERRED DESIGN

11.1 ASSESSMENT METHODOLOGY

An impact analysis was undertaken to identify the potential effects, both positive and negative of the pre-construction, construction and operational activities required for project implementation. In the case of negative effects, mitigation opportunities and methods were also identified. The evaluation criteria and indicators established during the alternatives evaluation process were used as the basis for assessing the effects of the preferred design on the social, physical and natural environments. The effects analysis involved the application of the following steps:

- Step 1:** Identify and analyze activities where the project, as described in **Chapter 10**, may interact with the existing environmental conditions described in **Chapter 7**.
- Step 2:** Acknowledge predetermined project activities that act as built-in positive attributes and/or propose mitigation measures that can be implemented during construction or operation of the project.
- Step 3:** Identify the residual environmental effects, if any.
- Step 4:** Identify opportunities for further mitigation of residual effects, if possible/practical, including monitoring.
- Step 5:** Determine the significance of the residual environmental effects, after further mitigation. The potential effects of project implementation were described based on their level of significance.
- Step 6:** Recommend monitoring activities during the construction or operation of the project.

Professional experience, analysis, simulation and judgement formed the basis for identifying environmental effects and mitigation measures. The analysis was based primarily on comparing the existing environment condition with the anticipated future environment, prior to, during, and after construction. The prediction of effects considered:

- The interaction between a project activity and the valued environmental components;
- The effects of the project activities on the environmental values; and
- The combined effects of multiple activities and/or multiple effects.

Within this context, consideration was given to:

- The magnitude, spatial extent, and duration of effects;
- The proportion of a population or community affected;
- Direct or indirect effects; and
- The degree to which the effect responds to mitigation.

In this assessment, “residual” environmental effects are defined as changes to the environment caused by the project, and vice versa, when compared to existing conditions and taking into account all built-in mitigation measures. Potential residual environmental effects were assessed as to their significance, including spatial and temporal considerations, and were categorized according to the following definitions:

“Positive effect” means an effect that will contribute to the well-being or health of a valued environmental component.

“Negligible” means an effect that may exhibit one or more of the following characteristics:

- Nearly-zero or hardly discernible effect; or
- Affecting a population or a specific group of individuals at a localized area and/or over a short period in such a way that the effect is similar to random small changes but would have no measurable effect on the population as a whole.

“Insignificant” means an effect that may exhibit one or more of the following characteristics:

- Not widespread;
- Temporary or short-term duration (i.e., only during construction phase);
- Recurring effect lasting for short periods of time during or after project implementation;
- Affecting a specific group of individuals in a population or community at a localized area or over a short period, but not affecting the integrity of the population or community; or
- Not permanent, so that after the stimulus (i.e., project activity) is removed, the integrity of the environmental component would be resumed.

“Moderately Significant” means an effect that may exhibit one or more of the following characteristics:

- Not widespread with mostly local effects;
- Requires further consideration of mitigation;
- Permanent reduction in species diversity or population of a species, but not in sufficient magnitude to cause a decline in abundance and/or change in distribution beyond which natural reproduction or migration

- would not return that population, or any species dependent on it, to its former level within several generations; or
- Could be alleviated with additional detailed design.

“Significant” means an effect that may exhibit one or more of the following characteristics:

- Widespread;
- Permanent transgression or contravention of legislation, standards, or environmental guidelines or objectives;
- Permanent reduction in species diversity or population of a species in sufficient magnitude to cause a decline in abundance and/or change in distribution beyond which natural reproduction or migration would not return that population, or any species dependent on it, to its former level within several generations (including the consequences of a short-term construction effect);
- Permanent loss of critical/productive habitat; or
- Permanent alteration to community characteristics or services, established land use patterns, which is severe and undesirable to the community as a whole.

The definitions of significance were adopted for use in this assessment because many of the impacts cannot be quantified in absolute terms, although changes and trends can be predicted. The definitions provide guidance and were intended to minimize personal bias. This is important because the analyses are sometimes based on professional judgement and limited information.

Once the potential effects were predicted, additional mitigation measures were identified. Often these mitigation measures were sufficient to reduce potential negative effects to an insignificant or negligible status.

Monitoring is important to verify the accuracy of predicting effects. Monitoring measures were recommended to determine what effects would actually occur with project implementation, and may result in the modification of mitigation measures to improve their effectiveness. Identified monitoring measures included inspection, surveillance and compliance monitoring.

11.2 ASSESSMENT RESULTS

An environmental effect requires consideration of all project activities and their interaction with the environment. Pre-construction, construction and operational activities were assessed. **Section 11.4** describes these project activities for the surface rapid transit components of the undertaking and their interaction with the environment and location, the potential effects, mitigation measures, residual effects and their significance, and monitoring recommendations. Project stages are coded as follows:

- P – Pre-construction
- C – Construction
- O – Operation

11.3 PROJECT RELATED EFFECTS AND MITIGATION

The evaluation of project-related effects was performed using the primary Rapid Transit Plan objectives and related goals developed for the evaluation of alternatives in selecting the preferred alignment. These objectives are:

- To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service
- To protect and enhance the social environment in the corridor
- To protect and enhance the natural environment in the corridor
- To promote smart growth and economic development in the corridor

Goals defined by professionals on the study team are subsets of these objectives and refer to an environmental value or criterion. The effect of the proposed undertaking in terms of each environmental value was rated using a qualitative scale ranging from a positive or beneficial effect through negligible to a potentially significant negative effect as described in the above methodology.

11.4 ANALYSIS OF ENVIRONMENTAL EFFECTS AND MITIGATION

11.4.1 OBJECTIVE A: To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service

The analysis relative to Objective A is tabulated in **Table 11-1**. Generally, the project has the ability to improve mobility within the Region and provide good connectivity with inter-regional transit services. It features convenient connections to GO Transit's Barrie Line at the Newmarket GO Station and East Gwillimbury GO Station. The project is also capable of connecting to future 400-series highway rapid transit services. From this point of view, the proposed rapidway will have an overall positive effect on transit ridership and accessibility in the Region. The planned alignment characteristics and geometry will provide a fast, convenient and reliable service in most respects. Although grades at some stations exceed LRT standards, the BRT technology proposed for initial implementation will be accommodated in every case. The recommended mitigation, to provide for future LRT technology when needed, will be local modifications to the running way and station platform configuration at the stations where standards are not met. Stations are located in areas with high residential density, high employment numbers or a mixture of the two to capitalize on the effectiveness of implementing the improved public transit system. The strategic locations of stations generally achieve the goal of increasing the attractiveness of the rapid transit service and make a positive contribution towards maximizing ridership. In order for all members of society to have access to the system, all stations, shelters and the transit system itself will be accessible for the mobility impaired by providing ramps, elevators, etc. Attractiveness of the rapid transit service is implicit in the design of the Undertaking, however, achieving the desired transit speed may affect the capacity for general traffic movements at certain intersections. In this respect, the effect on traffic may be moderately significant.

Table 11-1
Effects and Mitigation for Mobility

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE A: To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service												
A1	Increase attractiveness of rapid transit service	Travel time and service reliability	✓		✓	Entire Corridor	Adjustments to signal timing to achieve progression and minimize delay to rapid transit.	Micro-simulation of rapid transit operation and general traffic movements during detailed design will be used to optimize signal timing. Transit speed will be increased to maximum achievable with reasonable intersection operation.	Delay to transit or intersecting traffic may be unacceptable. May affect intersection capacity for general traffic movements.	Modification of inter- section signal timing.	Moderately significant	Pursue an on-going intersection performance monitoring program
						Yonge Street (Davis Drive to Green Lane)	Dedicated median transit lanes are not proposed for this segment initially	Curb-lane High-Occupancy Vehicle (HOV) lanes will improve transit speeds; increased road capacity will minimize congestion.	Some delays may occur due to right turning traffic in HOV lanes	Ensure HOV lanes are enforced	Positive effect	None
A2	Maximize transit connectivity	Connections to inter-regional services and future gateways	✓		✓	Newmarket GO Bus Terminal	Direct rapid transit connection is not provided to Newmarket GO Bus terminal on Davis Drive west of Yonge Street.	Local transit services will continue to be provided along Davis Drive. Inter-regional connections may also be made at East Gwillimbury GO Station	Level of transit service at Newmarket bus terminal may be reduced	None	Positive effect	Adjust local transit routes accordingly
			✓		✓	East Gwillimbury GO Station	Improved transit connections to East Gwillimbury GO Station	North Yonge transit service will provide a direct connection to the GO Rail network at the Green Lane Station.	Increased potential for intensified development around this transfer point.	None	Positive effect	None
			✓		✓	Newmarket GO Rail Station	Improved transit connections to Newmarket GO Station	North Yonge transit service will provide a direct connection to the GO Rail network at the Davis Drive Station.	Increased potential for traffic congestion around this station due to bus and pedestrian activity	Improve signage and intersection geometry	Positive effect	Monitor traffic performance and pedestrian-vehicle safety
			✓		✓	Aurora GO Station	Direct rapid transit connection is not provided to Aurora GO Station	Local transit services will continue to be provided along Wellington Street	None	None	Positive effect	None
		✓		✓	Entire Corridor	Inconvenient transfer between local transit and North Yonge Transit may discourage transit ridership	Stations generally located on local transit routes ensuring convenient transfers between services. Integrated fare system proposed.	Project may change the configuration of local transit.	Local services configured as grid where practical, to provide both community coverage and feeder roles	Positive effect	Regular review of effectiveness of local service plans.	
A3	Alignment geometry that maximizes speed and ride comfort and minimizes safety risks and maintenance costs	Grade at station in excess of standard	✓		✓	Davis Drive and Parkside Drive	Running way grade at platform exceeds max grade (actual is 4.9%)	Platform grade is adequate for BRT operations. Could be modified in future for LRT.	None expected.	None	Insignificant	Review situation if LRT is considered

Table 11-1
Effects and Mitigation for Mobility

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE A: To improve mobility by providing a fast, convenient, reliable and efficient rapid transit service												
A5	Station locations that maximize ridership potential of rapid transit service	Residents/Employees within walking distance of station locations. Accessibility for mobility impaired.	✓		✓	Entire Corridor	Stations at locations without transit-oriented land use and convenient access could discourage rapid transit use.	Station locations selected to serve supportive land use. Facilities designed with weather protection, direct barrier free access and attractive streetscapes within surrounding residential neighbourhoods.	Continued dependence on automobile if land use objectives not achieved	Implement transit-supportive land use and parking policies through Official Plans	Positive effect	Regular review of land use and new or infill development potential during detailed design phases for rapidway and stations.

Notes:

P – Pre construction, C – Construction, O – Operation

11.4.2 OBJECTIVE B: To protect and enhance the social environment in the corridor

Overall, the various goals set to protect and enhance the social environment are largely achieved. The assessment in terms of the related environmental values indicates that most adverse effects are generally mitigated by the built-in attributes of the design and benefits for the communities within the corridor can be maximized. The assessment for Objective B is tabulated in **Table 11-2**.

In particular, the undertaking will very likely improve community cohesion as well as access to municipal and community facilities within the corridor. In general, overall intersection capacity for vehicular traffic in the Study Area will be reduced due to the required operational changes and the effects of traffic using modified access to adjacent properties. Offsetting somewhat is an anticipated reduction in vehicular demand over time. As a result, the intersections in the Study Area can continue to serve a high volume of vehicular traffic, the needs of a broad range of pedestrians and adjacent businesses with the implementation of the rapid transit. While some improvements to road traffic and pedestrian circulation safety are anticipated, the removal of random left turn access inherent in the adoption of a median location for the rapidway requires road users to modify their travel patterns. This rapidway configuration, although preferable to curb-side options, will restrict left turn access to regularly spaced signalized intersections for vehicles and widen the roadway for pedestrians. In both cases, these effects are significantly mitigated by permitting U-turns at the signalized intersections for general traffic and by the introduction of a centre median refuge to allow for a two-stage pedestrian crossing where necessary. Ultimately, the implementation of a median rapidway will increase the person carrying capacity along the corridor.

Preserving and improving public safety and security in the corridor was an important consideration in the development of the design concept. Again, several features of the median rapidway design were able to, not only allow frequent access across the median for Emergency Response Vehicles, but also provide pedestrians with a safer environment.

In addition, noise and vibration studies at representative sensitive receptors have demonstrated that the combined effect of median rapidway operation and general traffic on the widened Corridor roadways will not result in a noticeable increase in noise or vibration levels for residents. Station shelters should be consistent in design throughout all of the Viva corridors. A Stage 1 Archaeological Assessment, conducted during the study, indicated the absence of archaeological sites within the project impact area. As is usually the case, a Stage 2 archaeological study will be conducted during the construction phase for the rapidway.

Finally, the introduction of a rapidway, even in a highly developed urban context, has the potential to worsen the visual aesthetics of the road. In consultation with the municipalities and the public, a concerted effort was made to establish landscaping and streetscaping principles to be followed in rapidway insertion design for the entire corridor, offering the potential for a significantly enhanced street environment.

Table 11-2
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE B: To protect and enhance the social environment in the corridor												
B1	Minimize adverse effects on and maximize benefits for communities in corridor	Potential displacement of community features		✓	✓	Entire Corridor	Potential displacement or loss of unique features.	Avoid known distinct community features to minimize impact; incorporate landscaping and furniture into streetscape to enhance corridor and community environment.	None expected	None expected	Negligible	None
		Effect on community cohesion			✓	Entire corridor	Median rapidway in widened Yonge Street may be perceived as a barrier between east and west communities. Median rapidway in widened Davis Drive and Green Lane may be perceived as a barrier between north and south communities.	Design rapidway to facilitate safe pedestrian road crossings with median refuge. Improved streetscaping in order to create a friendlier pedestrian environment.	During initial operation, vehicle/pedestrian incidents may occur due to the introduction of new traffic facilities and patterns.	Emphasis on education programs, signage, and stricter enforcement.	Negligible	Continue to monitor traffic behaviour and causes of incidents involving pedestrians.
		Effect on adjacent properties		✓	✓	Entire corridor	Potential encroachment on property frontages. Potential loss of parking. Need to acquire property and displace business and/or residents.	Rapidway and widened roadway designed to minimize encroachment of property frontages or need for acquisition of property. Rapidway and widened roadway designed to minimize loss of parking. Where acquisition of entire property is unavoidable negotiation and/or expropriation to establish fair market value and business loss compensation with property owners will be used to mitigate effects.	Implementation of rapidway and widened roadway will require property acquisition.	None	Moderately significant	Work with affected property owners during detailed design to minimize impacts to existing business operations.
		Community facility utilization			✓	Entire corridor	Improved transit access could increase demand on services within the corridor.	Municipality can expand community services as needed	None expected	None Expected	Positive effect	None

Table 11-2
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE B: To protect and enhance the social environment in the corridor												
B2	Maintain or improve road traffic and pedestrian circulation	Reduction in main street intersection capacities due to rapid transit operations			✓	Davis Drive	Implementation of dedicated transit lanes reduces the intersection capacity after future growth.	Dedicated left turn lanes are provided at key intersections where a capacity deficiency has been identified.	Capacity conditions resulting from high projected traffic volumes are projected at several intersections.	None.	Positive effect on traffic operation from implementation of turning lanes at key intersections	Monitor intersection operations.
					✓	Yonge Street (Mulock Drive to Davis Drive)	Yonge Street to be widened for transit only resulting in a potential deficiency in road capacity for general traffic	Left turn lanes are maintained at major signalized intersections. Rapidway implementation significantly increases person carrying capacity in the corridor	Mainline traffic may continue to experience delays during PM peak period	None	Moderately Significant	Monitor intersection operations.
		Right turn lanes			✓	Mulock Drive to Green Lane	Existing right turn lanes at minor intersections will not be replaced after road widening in order to minimize roadway width and to avoid the need for regular YRT buses to transition from right turn lanes into general traffic lanes.	Six lane (HOV) configuration north of Davis Drive reduced need for right turn lanes	Minor delays for right turning vehicles at some locations	None required	Moderately significant	Further review of need for right turn lanes during detailed design phase.
		NB/SB (Yonge Street) and WB/EB (Davis Drive and Green Lane) U-turn movements and the corresponding side street right-turn-on-red (RTOR) movements	✓	✓	✓	Entire Corridor	Median rapidway will eliminate random left turns into developments fronting on the three roadways	U-turns provided at adjacent intersections for safe manoeuvres into side streets and to properties. Random permissive left turns eliminated thus increasing safety. Develop traffic management plans for construction.	Conflict with U-turns and Right Turns on Red from side streets.	None required	Insignificant	Monitor the intersection operations and conflict potential. Develop traffic management plan for construction.
		Pedestrian Crossings			✓	Yonge Street/Davis Drive intersection; various locations	The required pedestrian crossing times at this location cannot be accommodated in a single crossing. A two-stage crossing is required.	A centre median refuge will allow for a two-stage pedestrian crossing decreasing the green time loss for transit and regular vehicles.	Reduction in pedestrian level of service	None necessary	Moderately significant	Monitor pedestrian crossing times and adjust signal timing if required
		Potential conflict at transition points between mixed-traffic operations and median rapidway operations			✓	Davis Dr at Roxborough Rd; Yonge St at Henderson Dr; Yonge St at Orchard Heights Blvd; Yonge St at Davis Dr	Rapid transit may have to wait for opportunity to merge with the general through traffic resulting in service delay. New signal phase will be required to facilitate a safe transit movement among the general traffic.	New signal phase is introduced to accommodate transit movements.	None expected	None Expected	Insignificant	None required
		Access to minor side streets and properties along the North Yonge St Corridor transit routes	✓	✓	✓	Entire Corridor	Median rapidway will eliminate random left turns into minor side streets and properties thereby requiring an alternative access route	In many cases, alternative access can be obtained to a site via another site access or an adjacent roadway with signalized access to North Yonge St Corridor. The travel patterns for the major traffic generators will be changed. U-turns provided at major signalized intersections for safe manoeuvres into side streets and to properties. Random permissive left turns are eliminated thus increasing safety. Develop traffic management plans for construction.	Conflict with U-turns and Right turns may decrease safety	None necessary	Moderately significant	Monitor traffic and prohibit Right Turns On Red movements from the side street at these locations if necessary. Develop traffic management plan for rapidway operation.
B3	Maintain a high level of public safety and security in corridor	Access for emergency vehicles				Entire Corridor	Incorporation of median and construction will have adverse effects on Emergency Response Services (ERS) access and time.	Provided U-Turns at intersections. Meet with emergency representatives. Median breaks to be provided to allow access to Emergency Response Vehicles only.	Some risk may remain as access type will change after implementation of mitigation.	Address during detail design in conjunction with ERS.	Insignificant	Obtain feedback from ERS.

Table 11-2
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE B: To protect and enhance the social environment in the corridor												
B4	Minimize adverse noise and vibration effects	Noise effect for BRT due to widening of Yonge Street			✓	Entire Corridor in proximity of receptors	Combine effect of median rapidway operation and general traffic on the widened Yonge Street roadway may result in increased noise levels at receptors.	Modeling of future traffic activities indicated that expected noise increases will not exceed the 5dB threshold at which mitigation measures are required. BRT sound levels expected to be marginal to none.	None expected	None necessary	Negligible	None
		Noise effect for BRT due to widening of Davis Drive			✓	Entire Corridor in proximity of receptors	Combine effect of median rapidway operation and general traffic on the widened Davis Drive roadway may result in increased noise levels at receptors.	Modeling of future traffic activities indicated that expected noise increases will not exceed the 5dB threshold at which mitigation measures are required. BRT sound levels expected to be marginal to none.	None expected	None necessary	Negligible	None
		Noise effect for BRT due to widening of Green Lane			✓	Entire Corridor in proximity of receptors	Combine effect of median rapidway operation and general traffic on the widened Green Lane roadway may result in increased noise levels at receptors.	Modeling of future traffic activities indicated that expected noise increases will not exceed the 5dB threshold at which mitigation measures are required. BRT sound levels expected to be marginal to none.	None expected	None necessary	Negligible	None
		Noise and vibration to be experienced during construction activities		✓		Entire Corridor	Potential adverse environmental effects from noise and vibration resulting from construction activities.	Construction equipment to comply with MOE NPC-115 noise emission standards. Further, construction activities to comply with local noise by-laws, especially time and place restrictions.	Short-duration noises from safety devices such as back-up beepers.	If practicable, measures such as temporary hoarding may be used to mitigate residual noise under certain limited circumstances.	No significant effect is anticipated after mitigation. However, due to the very nature of the work, certain noise sources are likely to be audible at nearby receptors.	Site review may be undertaken in response to certain specific complaints relating to noise and vibration. However, on-going or continuous monitoring is not recommended. Include requirement in contract documents for Contractor to comply with local noise by-laws.
B5	Improve regional air quality and minimize adverse local effects	Degradation of existing local and regional air quality when compared to MOE standards			✓	York Region	Situation expected to be unchanged or marginally better through implementation of the project	The fleet average emissions will drop significantly due to technological improvements balancing the increase in traffic volumes. The proposed Rapid Transit will divert commuters from individual highly polluting sources (single passenger automobiles).	Anticipated improvement in all gaseous pollutants assessed (NO _x , CO, Various VOCs) and potential small increase in particulate based emissions when comparing 2021 forecasts with and without the proposed Rapid Transit. Subject to verification through modelling.	Increase vegetation along roadways to mitigate particulate based emissions.	Positive Effect	None required
		Increase in emissions of Greenhouse Gases (GhG)			✓	York Region	Fewer GhGs are expected to be emitted	Compared to the status quo (no additional transit) there will be far less GhGs emitted per commuting person	Reduction per capita emissions of GhGs (overall annual reductions to be estimated through modelling)	None required	Positive Effect	None required
		Degradation of air quality during construction		✓		Yonge Street Corridor, Davis Drive and Green Lane	Some dust is expected during the construction period.	The law requires that all possible pollutant emission mitigation steps possible be taken during construction activities	Some PM emissions locally.	None required.	Negligible	None recommended
B5	Minimize adverse effects on cultural heritage resources	Displacement of Built Heritage Resources (BHR)	✓	✓	✓	Aurora Cemetery (includes the Keepers House (1879))	Widened roadway could displace some of the cemetery's graves, unless alignment is modified.	Alignment is shifted up to 3.5 m to the west.	Displacement of cemetery property is completely avoided.	None required	Negligible	None required
			✓	✓	✓	Quaker Cemetery	Widened roadway could displace some of the cemetery's graves, unless alignment is modified.	Alignment is shifted up to 4.6 m to the east.	Displacement of cemetery property is completely avoided.	None required	Negligible	None required
			✓	✓	✓	Hicksite Quaker burial Ground	Widened roadway could displace some of the cemetery's graves, unless alignment is modified.	Alignment is shifted up to 5.0 m to the east.	Displacement of cemetery property is completely avoided.	None required	Negligible	None required

Table 11-2
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE B: To protect and enhance the social environment in the corridor												
B5 (con't)	Minimize adverse effects on cultural heritage resources (continued)	Displacement of Built Heritage Resources (BHR) (continued)	✓	✓	✓	Cultural Heritage Resources in Newmarket <ul style="list-style-type: none"> ▪ 330 Davis Dr. (2a BHR) ▪ 338 Davis Dr. (3a BHR) ▪ 355 Davis Dr. (5a BHR) ▪ 425 Davis Dr. (11a BHR) <i>Listed</i> ▪ 556-558 Davis Dr. (15 a BHR) ▪ 560 Davis Dr. (16a BHR) ▪ 564 Davis Dr. (17a BHR) ▪ 572 Davis Dr. (18a BHR) <i>Listed –Cane House</i> 	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – rapidway will be integrated with existing streetscape and road traffic operations.	Davis Drive- 330; 338; 355; 425 <i>Listed</i> ; 556-558; 560; 564; and, 572 <i>Listed</i> . <i>Permanent loss of cultural heritage resources</i>	Cultural Heritage Resource Documentation Reports for each displaced building including individual site histories and photo documentation recording of the interior and exterior of the buildings. 425 and 572 Davis Drive (11a & 18a BHR) <i>Listed</i> -Union Hotel, Cane House. This building should be relocated and preserved outside of the right-of-way.	Significant	None required
		Displacement of Cultural Landscape Units (CLU)		✓		None expected	None expected	None expected	None expected	None expected	None expected	None expected
		Disruption of Built Heritage Resources (BHR)		✓		Entire corridor	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment around the cultural heritage features.	None required – rapidway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required
		Disruption of Built Heritage Resources (BHR)		✓		Cultural Heritage Resources in Richmond Hill: <ul style="list-style-type: none"> ▪ 11575 Yonge St. (#30 BHR); <i>Listed</i>, ▪ 11666 Yonge St. (#29 BHR); <i>Listed</i> ▪ 11901 Yonge St. (#28 CHL); <i>Listed</i>, ▪ 12001 Yonge St. #27 (BHR) <i>Listed</i>, ▪ 12125 Yonge St. (#26 CHL) <i>Listed</i>, ▪ 12261 Yonge St. (#25 BHR) <i>Listed</i>, ▪ 12761, 12764, 12800, 12850, 12919 Yonge St. (#21 CHL Former Hamlet of Oakridges) <i>Listed</i> 	The potential introduction of rapid transit operation may cause changes in the visual, audible and atmospheric environment around the cultural heritage resources.	None required – rapidway will be integrated with existing streetscape and road traffic operations.	Limited encroachment on property will disrupt the existing cultural heritage context. * At 12125 Yonge St. An Ontario Heritage Trust commemorative plaque exists that may require moving back on the property. Must be confirmed through inspection.	None necessary	Insignificant	None required

Table 11-2
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE B: To protect and enhance the social environment in the corridor												
B5 (con't)	Minimize adverse effects on cultural heritage resources (continued)	Disruption of Built Heritage Resources (BHR) (continued)				Cultural Heritage Resources in Newmarket: <ul style="list-style-type: none"> ▪ 1786? Yonge St. (34 CHL) Plaque on Building. ▪ 309 Davis Dr. (1a BHR) ▪ 341 Davis Dr. (4a BHR) ▪ 359 Davis Dr. (6a BHR) ▪ 371 Davis Dr. (7a BHR) <i>Listed</i> ▪ 385 Davis Dr. (8a BHR) ▪ Bridge Culvert 33+220 Davis Dr. (9a BHR) ▪ 415 Davis Dr. (10a BHR) <i>Listed</i> ▪ Bridge 33+420 Davis Dr. (14a BHR) ▪ 641 Davis Dr. (19a BHR) ▪ 655 Davis Dr. (20a BHR) ▪ 665 Davis Dr. (21a BHR) 	The potential introduction of rapid transit operation may cause changes in the visual, audible and atmospheric environment around the cultural heritage resources.	None required – rapidway will be integrated with existing streetscape and road traffic operations.	Limited encroachment on property will disrupt the existing cultural heritage context.	None necessary	Insignificant	None required
		Disruption of Cultural Landscape Units (CLU)		✓		Entire Corridor	The potential introduction of rapid transit operation may cause changes in visual, audible and atmospheric environment to the cultural heritage features in the Cultural Landscape – former centre of settlement.	None required – rapidway will be integrated with existing streetscape and road traffic operations.	None expected	None necessary	Insignificant	None required

Table 11-2
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE B: To protect and enhance the social environment in the corridor												
B5 (con't)	Minimize adverse effects on cultural heritage resources (continued)	Disruption of Cultural Landscape Units (CLU) (continued)		✓		Cultural Heritage Resources in Richmond Hill: <ul style="list-style-type: none"> ▪ 11901 Yonge St. (#28 CHL); <i>Listed</i>, ▪ 12125 Yonge St. (#26 CHL) <i>Listed</i>, ▪ (#21 CHL Former Hamlet of Oakridges) <i>Listed</i>, Cultural Heritage Resources in East Gwillimbury <ul style="list-style-type: none"> ▪ 574 Green Lane (#1 CHL); Farm Complex Cultural Heritage Resources in Newmarket: <ul style="list-style-type: none"> ▪ Railscape Corridor CHL 1a 33+320 ▪ Waterscape CHL 2a 33+420 	The potential introduction of rapid transit operation may cause changes in the visual, audible and atmospheric environment around the cultural heritage resources.	None required – rapidway will be integrated with existing streetscape and road traffic operations.	Permanent change in the cultural heritage environment.	Some landscape screening or edge of property restoration may be required.	Positive	None required
		Possible impacts to areas with potential for identification of archaeological sites	✓			Entire Corridor	There is potential for identification of archaeological sites within the project impact area.	<ul style="list-style-type: none"> ▪ Stage 1 Archaeological Assessment has been conducted. ▪ Stage 2 Archaeological Assessment will be performed in detailed design: field survey in accordance with Ministry of Culture Stage 1-3 Archaeological Assessment Technical Guidelines to identify any sites that may be present within the proposed impact area. ▪ If areas of further archaeological concern are identified during Stage 2 assessment, such areas must be avoided until any additional work required by the Ministry of Culture has been completed. Mitigation options, including avoidance, protection, or salvage excavation must be determined on a site-by-site basis. ▪ If no potentially significant archaeological sites are identified during Stage 2, it will be recommended to the Ministry of Culture that the areas assessed be considered free of further archaeological concern. 	<ul style="list-style-type: none"> ▪ Archaeological sites may be identified during the course of Stage 2 Archaeological Assessment. ▪ In the event that deeply buried archaeological remains are encountered during construction activities, the office of the Regulatory and Operations Group, Ministry of Culture should be notified immediately. ▪ In the event that human remains are encountered during construction, both the Ministry of Culture and the Registrar or Deputy Registrar of the Cemeteries Regulation Unit, Ministry of Consumer and Commercial Relations should be notified immediately. 	Needs for further mitigation, possibly including Stage 3 Archaeological Assessment (test excavation) and Stage 4 Archaeological Assessment (further mitigative work, including mitigative excavation), must be determined following Stage 2 Archaeological Assessment, if archaeological resources are identified during survey.	Negligible for stage 1 Archaeological Assessment	No requirement for monitoring has been identified as a result of Stage 1 Archaeological Assessment. Monitoring may be required, depending on the result of Stage 2 Archaeological Assessment.

Table 11-2
Effects and Mitigation for Social Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE B: To protect and enhance the social environment in the corridor												
B5 (con't)	Minimize adverse effects on cultural heritage resources (continued)	Possible impacts to areas with potential for identification of archaeological sites (continued)	✓	✓		Quaker cemetery along the west side of Yonge St., north of Mulock Drive	There is potential for identification of archaeological site adjacent to this area.	<ul style="list-style-type: none"> Stage 2 Archaeological Assessment of this site as part of the Yonge St. Watermain EA was conducted. Ministry of Culture approved the assessment and concurred with the recommendation that there are no further concerns for impacts to the site. Prior to any land-disturbing activities in the vicinity of the site, additional investigation is recommended to confirm the presence or absence of unmarked graves within the ROW. This would initially involve archival research of cemetery records to investigate grave locations, followed, if necessary, by monitoring of the ROW for grave shafts by a licensed archaeologist, either during construction, or in advance of construction. The latter involves the removal of the topsoil with a Gradall followed by the shovel shining of the exposed surfaces and inspection for grave shafts. 				
B6	Minimize disruption of community vistas and adverse effects on street and neighbourhood aesthetics	Visual Effects	✓		✓	Entire Corridor	Introduction of rapidways may reduce visual aesthetics of road	Introduction of a comprehensive landscaping and streetscaping plan for the corridor.	Narrow sections of ROW where property cannot be acquired may limit incorporation of streetscaping	None required	Significant	Monitor redevelopment and acquire property through redevelopment applications
		Landscaping	✓		✓	Entire Corridor	Landscaping species may not survive in winter months	Choose appropriate species for both winter and other months to maintain greenery throughout corridor. Place landscaping in planters and incorporate buried irrigation systems.	Species may still not survive	Change species, irrigation patterns, etc	Insignificant	Monitor health of landscaping continuously

Notes: P – Pre construction, C – Construction, O – Operation

11.4.3 OBJECTIVE C: To protect and enhance the natural environment in the corridor

The protection and enhancement of the natural environment, as shown in **Table 11-3**, within the corridor has been entirely achieved. By definition, the project along the North Yonge Street Corridor roadways rights-of-way is set in a highly developed urban environment, where natural features have mostly been disturbed by previous development. Nevertheless, small river tributaries or creeks still cross Yonge Street, Davis Drive and Green Lane, connecting to the much larger Holland, Humber and Don watersheds. Similarly, nearby urban green spaces still exist and must be protected. Of great importance and sensitivity is the Oak Ridges Moraine, which the rapidway travels through on Yonge Street through the south end of the study area in Richmond Hill. The project is considered to have insignificant environment effects on the Oak Ridges Moraine because the impacts have been avoided, minimized or mitigated. In terms of all valued environmental components to be considered, effects on aquatic and terrestrial ecosystems are either negligible or insignificant when built-in mitigation measures are implemented or sensitive construction and operation methods are respected.

Future air quality, except for PM, is expected to be better than current air quality mainly due to improvements in engine technology and fuels. The forecast increase in PM10 from 2005 to 2021 can be attributed to the increase in fugitive emissions from traffic due to population and employment growth built into the model. As noted in **Appendix L**, future 2021 air quality was forecasted both with and without the proposed rapid transit alternative. When future (2021) air quality without transit improvements are compared with future (2021) air quality with transit improvements, the results show a small net decrease for all gaseous pollutant concentrations including greenhouse gases and a small net decrease in particulate based pollutant concentrations.

**Table 11-3
Effects and Mitigation for Natural Environment**

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE C: To protect and enhance the natural environment in the corridor												
C1	Minimize adverse effects on Aquatic Ecology	Fuel spills, due to accidents during construction refuelling and accidents during operation, entering the watercourses		✓	✓	Entire Corridor	Fish kills due to chemical spills resulting in short term population decline.	No refuelling within 10 m of a watercourse. Emergency Response Plan.	Short term population decline. Some contaminants within storm-water system.	None practical	Insignificant	None required
		Sediment laden stormwater entering watercourses during construction		✓		Entire Corridor	Fish kills and loss of aquatic habitat resulting in short term population decline.	Construction fencing at work areas near watercourses limiting area of disturbance. Erosion and Sedimentation Control Plan.	Short term population decline.	None practical	Insignificant	None required
		Sediment laden stormwater entering watercourses during operation			✓	Entire Corridor	Loss of aquatic habitat resulting in population decline.	Stormwater management facilities such as grassed swales, oil and grit separators, stormwater ponds. Detailed Storm Water Management Plan will be prepared during the detailed design stage.	Short term population decline.	Clean-out facilities as required.	Insignificant	Monitor sediment accumulation in stormwater management facilities. York Region will work with TRCA during the design phase to provide enhanced treatment, particularly in sensitive areas, where feasible.
		Loss of site-specific habitat		✓		All watercourses within entire corridor.	Potential loss of fish habitat as a result of culvert extensions, replacements or repairs, and bridge replacement at one location, YDD2.	Design rapidway cross-sections to reduce footprint area. Use headwalls, wingwalls and guiderail to reduce length of culvert extension. Avoid in-water work to the extent possible. Minimize the area of in-water alteration to the extent possible. Follow in-water construction timing restriction. Perform all in-water work in the dry using a temporary flow bypass system. Establish new bridge footings out of watercourse to span channel. Provide erosion and sedimentation control.	A harmful alteration of fish habitat will likely result from culvert extensions and from bridge replacement on Davis Drive	Negotiations with regulatory agencies during detail design. Compensate for the harmful alteration of fish habitat. TRCA has indicated where culverts/structures will be removed in their entirety and replaced, there is a requirements to provide a 100 year meander belt analysis. These details will be confirmed at the detail design phase.	Negligible if mitigation measures are implemented	On-site environmental inspection during in-water work. Post-construction monitoring of fish habitat compensation measures.

Table 11-3
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE C: To protect and enhance the natural environment in the corridor												
C1 (con't)	Minimize adverse effects on Aquatic Ecology (continued)	Baseflow alterations		✓	✓	All watercourses within entire corridor.	New impervious surfaces can lead to changes in the frequency, magnitude and duration of flows.	Reduce the area of impervious surfaces to the extent possible. Use stormwater management practices that encourage infiltration and recharge of groundwater.	None expected.	None	Negligible	<ul style="list-style-type: none"> Post-construction inspection of stormwater management facilities to evaluate their effectiveness. On-going maintenance as required.
		Fish mortality		✓		All watercourses within entire corridor.	Fish may be injured or killed by dewatering or physical harm..	Design rapidway cross-sections to avoid modifications at culverts/bridges. Avoid in-water work to the extent possible. Perform all in-water work in the dry using a temporary flow bypass system. Capture fish trapped during dewatering of the work zone and safely release upstream. Prohibit the entry of heavy equipment into the watercourse.	None expected.	None	Negligible	On-site environmental inspection during in-water work.
		Barriers to fish movement.		✓	✓	All watercourses within entire corridor.	Culvert extension, repair or replacement may create a barrier to fish movement.	Install the culvert extension to match the inverts of the existing culvert and stream bed; if possible, the culvert should be open bottom or countersunk a minimum of 20 % of the culvert height and then backfilled with native substrate; The culvert extension will be designed to maintain fish passage.	None expected	Negotiations with regulatory agencies during detail design.	Negligible	On-site environmental inspection during in-water work.
		Increased temperature		✓	✓	All watercourses within entire corridor	Clearing of riparian vegetation and stormwater management practices can impact temperature regimes.	Minimize the area of stream bank alteration to the extent possible. Use stormwater management practices that encourage infiltration and recharge of groundwater.	Shading lost through removal of riparian vegetation.	Restore riparian areas disturbed during construction with native vegetation.	Negligible	<ul style="list-style-type: none"> Post-construction inspection of stormwater management facilities to evaluate their effectiveness. On-going maintenance as required. Post-construction inspection of riparian plantings to confirm survival.
		Disturbance to rare, threatened or endangered species		✓	✓	Not identified within any watercourse.	None	No species-specific mitigation required.	None expected.	None required.	No net impacts	None required.

Table 11-3
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE C: To protect and enhance the natural environment in the corridor												
C2	Minimize adverse effects on Terrestrial Ecology	Destruction/ Disturbance of wildlife habitat		✓	✓	Entire corridor.	Construction of the rapidway and associated facilities may result in the removal of vegetation and ecological functions it supports. Activities such as site grubbing, staging & stockpiling during construction could result in destruction or disturbance of migratory birds	Minimize the area of vegetation removals to the extent possible. Minimize grade changes to the extent possible. Use close cut clearing and trimming to minimize the number of trees to be removed. Delineate work zones using construction fencing/tree protection barrier. Protect trees within the clear zone using guiderail, curbs, etc. to prevent removal. TRCA comments dated November 27, 2008 (item 11) identified a concern with additional row requirements in the vicinity of the Phillips-Bond-Thompson wetland complex. A commitment to further work has been added in the monitoring and recommendations column.	Displacement of resident wildlife species.	Restore natural areas disturbed using construction with native vegetation, where feasible. Replace ornamental vegetation as part of landscaping.	Negligible	Post-construction inspection of vegetation plantings to confirm survival. The lateral alignment within the existing ROW, and any additional ROW requirements in the vicinity of the Phillips-Bond-Thompson wetland complex will be determined through the detailed design phase to minimize encroachments into, and impacts to this key natural heritage feature. York Region commits to work with TRCA during design to minimize the footprint of the project within Regulated Areas and in the vicinity of Key Natural Heritage Features.
		Wildlife mortality		✓		Entire corridor.	Removal of wildlife habitat may result in wildlife mortality.	Perform vegetation removals outside of wildlife breeding seasons (typically April 1 to July 31). Perform culvert/bridge extension, repair and replacement outside of wildlife breeding season.	None expected.	None required.	Negligible	None required.
		Wildlife/vehicle conflicts			✓	Entire corridor.	Increase in the width of Yonge Street to accommodate rapidway and associated facilities may increase the potential for wildlife/vehicle conflicts.	Use oversized culverts to promote wildlife passage under the road. Stagger culvert inverts to create wet and dry culverts.	Rapidway represents an incremental increase in road width compared to existing hazard to wildlife created by Yonge Street.	None required.	Insignificant.	None required.
		Barriers to wildlife movement		✓	✓	Entire corridor	Increase in width of Yonge Street to accommodate rapidway and associated facilities may create an additional impediment to wildlife movement	Enhance wildlife passage under rapidway, where feasible through culvert/bridge modifications. The TRCA noted in a letter dated November 27, 2008 (item #6) that the design of the Corridor will incorporate improvements to provide for wildlife passage across the segment of Yonge Street that bisects the Ridges Moraine through areas identified as Natural Core and Natural Linkage in the Oak Ridges Moraine Conservation Plan (ORMCP), in the vicinity of Bond Lake in particular, and other areas as appropriate.	Rapidway represents an incremental increase in road width compared to existing barrier created by Yonge Street.	Use of existing culverts/bridges maintains wildlife passage under rapidway and does not offer opportunities to enhance wildlife passage. Commitment to review during detail design phase opportunities to provide wildlife passage in the Oak Ridges Moraine area.	Moderately significant.	York Region commitment to work with TRCA during design to provide improvements to wildlife passage within areas of concern.
		Disturbance to rare, threatened, or endangered wildlife		✓	✓	Entire corridor.	No rare, threatened or endangered wildlife identified within study area.	No species-specific mitigation required	None expected.	None required.	No impacts expected.	None required.

Table 11-3
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE C: To protect and enhance the natural environment in the corridor												
C2 (con't)	Minimize adverse effects on Terrestrial Ecology (continued)	Disturbance to vegetation through edge effects, drainage modifications and road salt		✓	✓	Entire corridor.	New forest edges may result in sunscald, windthrow, and invasion of exotic species. Ditching, grading and other drainage modifications may alter local soil moisture regimes. Road salt may result in vegetation mortality and die back.	Minimize the area of vegetation removals to the extent possible. Minimize the grade changes and cut/fill requirements to the extent possible. Use close cut clearing and trimming to minimize encroachment on remaining vegetation. Delineate work zones using construction fencing/ tree protection barrier. Manage the application of road salt to the extent possible.	Vegetation communities within the study area are primarily cultural in origin and have been impacted by Yonge Street. Rapidway represents an incremental encroachment into these already disturbed communities.	Landscape treatments.	Insignificant.	York Region will work with TRCA during detail design phase to develop an edge management plan/vegetation compensation where forest edges are removed.
		Rare, threatened or endangered flora		✓		Entire Corridor.	Twenty-two regionally rare plant species are located within the study limits. Individual occurrences of these species are beyond the zone of influence of this project. One threatened species, Kentucky coffee-tree, was identified within the zone of influence of this project. Since this species was planted and not naturally occurring the significance of its removal is diminished. One endangered species, butternut, was identified south of Bond Lake. The individual occurrence of this species is well beyond the zone of influence of this project and will therefore not be removed or disturbed.	Provide fencing/ tree protection barrier for Kentucky coffee-tree	None expected.	None required.	Insignificant.	None required.
C3	Minimize adverse effects on corridor hydro-geological, geological, and hydrological conditions	Water quality in shallow groundwater that can affect quality in surface watercourses			✓	Areas located hydraulically down gradient of transit alignment, where receiving surface watercourses are present.	Rapidways will require de-icing salt and will accumulate various chemical substances that can impact water quality of runoff. Impacted runoff that infiltrates can increase concentrations in shallow groundwater. Potential to affect shallow groundwater that discharges to surface watercourses.	Dilution and other natural processes will attenuate elevated parameters in groundwater.	Potential effects to water quality of surface watercourses. Groundwater quality effects are anticipated to be detectable.	Reduce application of road salt, where possible. Use of curbs and gutters to convey impacted runoff away from permeable soil areas.	Moderately significant.	None required. Water quality effects are anticipated to remain acceptable within Ontario Drinking Water Standards.
		Water quality in shallow groundwater that can affect quality in water supply wells			✓	Areas located hydraulically down gradient of transit alignment, where shallow water supply wells in active use are present.	Rapidways will require de-icing salt and also will accumulate various chemical substances that can impact water quality of runoff. Impacted runoff that infiltrates can increase concentrations in shallow groundwater. Potential to affect shallow groundwater that is extracted by down-gradient supply wells.	Dilution and other natural processes will attenuate elevated parameters in groundwater.	Potential effects to groundwater quality used as drinking water. Groundwater quality effects in water wells may be detectable.	Reduce application of road salt, where possible. Use of curbs and gutters to convey impacted runoff away from permeable soil areas.	Moderately significant	None required. Water quality effects are anticipated to remain acceptable within Ontario Drinking Water Standards. Well inspection will be performed during the detailed design phase to confirm the relationship of the widened roadway to existing active water well will not have an adverse affect on water quality. If it does, use of domestic well is confirmed, a contingency plan will be developed.
		Baseflow in surface water courses		✓	✓	Recharge areas within proposed alignment, particularly in areas of Newmarket Till and sand textured glacial lake deposits.	Increase of pavement area decreases the pervious area that existed prior to construction, resulting in proportionally decreased recharge to shallow groundwater.	N/A	Decreases in recharge can decrease baseflow in surface watercourse(s). Reduced baseflow in surface watercourses.	Construction of pervious surfaces where practical, including grassed areas and permeable pavements.	Negligible	None required. The degree of impact is anticipated to be undetectable.

Table 11-3
Effects and Mitigation for Natural Environment

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE C: To protect and enhance the natural environment in the corridor												
C3 (con't)	Minimize adverse effects on corridor hydro-geological, geological, and hydrological conditions (continued)	Increased pavement; decreased infiltration			✓	Entire corridor	Minor increase in quantity of surface runoff and minor decrease in quantity of groundwater.	Storm water management facilities such as grassed swales and storm water ponds.	Minor increase in peak stream flows. Minor decrease in groundwater.	None practical	Negligible	None required
		Changes in flood levels from the widening of existing bridges and culverts			✓	East Branch – Humber River crossing at Sta 19+131	It is anticipated that this culvert will likely have minimal impact on the overall flooding regime due to a dam control downstream to Lake Wilcox.	No increase in Regional storm or return period flood levels upstream of the crossing. See Appendix G for results of the analysis.	N/A	N/A	Negligible	None required.
					✓	Main Branch – Tannery Creek crossings at Sta 26+332 & 26+534	HEC-RAS model provided by LSRCA was used to assess changes in flood level due to widening the existing culvert by 15 m.	See Appendix G for results of the analysis.	Minor increase in Regional storm flood level. Widening will not adversely impact upstream water levels.	N/A	Negligible	None required.
					✓	Main Branch – Tannery Creek crossing at Sta 27+900	HEC-RAS model provided by LSRCA was used to assess changes in flood level due to widening the existing culvert by 15 m.	See Appendix G for results of the analysis.	Minor increase in return period flood levels. Widening will not adversely impact upstream water levels.	N/A	Negligible	None required.
					✓	Western Creek Crossing at Sta. 33+050	HEC-RAS model provided by LSRCA was used to assess changes in flood level due to widening the existing culvert by 20 m.	See Appendix G for results of the analysis.				
		Changes in flood levels due to construction of new bridge			✓	Proposed New East Holland River crossing at Sta. 33-425	HEC-RAS model provided by LSRCA was used to assess changes in flood level due to a proposed bridge width of 34 m and a span of 31 m.	See Appendix G for results of the analysis.				

Notes: P – Pre construction, C – Construction, O – Operation

11.4.4 OBJECTIVE D: To promote smart growth and economic development in the corridor

One of the main purposes of the rapid transit system is to support the smart growth policies of the Provincial and Regional Governments and simultaneously encourage economic development. From this perspective, the North Yonge Street Corridor strongly supports Regional and Municipal planning policies, such as the Centres and Corridors urban form. In many respects, the project will contribute to the intensification of under-utilized sites within the corridor and encourage transit-oriented development at infill locations and vacant land along the route. At the same time, several built-in design characteristics are aimed at reducing the potential for adverse effects on business or access to residential neighbourhoods and community facilities.

The transit system will support the overall objective of the Region's Planning Policies to ensure that form follows function. The transit system must contribute to a sustainable environment by improving access to new and existing development leading to increased business and economic activity along the corridor. Through this increase in business activity, infill locations and vacant land is more likely to be developed, maximizing the desired concentration of development within municipal zoning controls and leading to a more viable alternative of rapid transit in York Region. The assessment in terms of Objective D is tabulated in **Table 11-4**.

Table 11-4
Effects and Mitigation for Smart Growth and Economic Development

GOAL	Environmental Value/ Criterion	Environmental Issues/Concerns	Project Phase ¹			Location	Potential Environment Effects	Proposed Mitigation Measures			Level of Significance after Mitigation	Monitoring and Recommendation
			P	C	O			Built-In Positive Attributes and/or Mitigations	Potential Residual Effects	Further Mitigation		
OBJECTIVE D: To promote smart growth and economic development in the corridor												
D1	Support Regional and Municipal Planning Policies and approved urban structure	Need for pedestrian-friendly streets and walkways for access to stations		✓	✓	Entire corridor	Streetscape will create a more pedestrian-friendly atmosphere.	Signalized pedestrian crosswalks will be provided at all station locations at an appropriate number of intersections; Pedestrian safety will be considered in the design of station precincts and road signage will be highly visible to both pedestrians and vehicles.	Potential for jaywalking in vicinity of stations, which could lead to increase in number of vehicle/pedestrian incidents.	Platform edge treatment will discourage illegal access	Negligible	Monitor traffic accidents involving pedestrians to establish whether cause is transit related.
D2	Provide convenient access to social and community facilities in corridor	Potential barrier effects during construction and operation		✓	✓	Entire corridor	Rapidway could be perceived as a barrier in access to future community centres, hospital(s), malls, parks, etc.	Construction Traffic and Pedestrian Management Plan will avoid wherever possible, barriers to entrances/exits to large attractors along Yonge Street, Davis Drive and Green Lane. Rapidway median design will recognize pedestrian access requirements, particularly in proximity to community facilities.	Alternative access routes to facilities may affect adjacent properties	Mark detours and alternative access points clearly	Insignificant	Monitor congestion levels during construction and traffic patterns during operations.
D3	Minimize adverse effects on business activities in corridor	The potential for an increase in business activity.	✓	✓	✓	Entire corridor	Increased pedestrian traffic via the implementation of a rapid transit system will increase the potential for business activity.	A higher density of development on underutilized sites, infill locations and on vacant land should increase the market for some business activity.	Increase in vehicular traffic; increase in workforce/ population.	Encourage intensification meeting urban form objectives.	Insignificant and positive	None
		The potential for a decrease in business activity.		✓	✓	Entire corridor	Modification of road access could lead to displacement and/or business loss.	Implement procedures to address requests of affected businesses; incorporate design solutions and construction methods to minimize number of businesses affected.	Decrease in traffic; decrease in workforce/population	Encourage alternative compatible development	Moderately significant	Cooperative response to business loss concerns addressed to municipalities.
D4	Protect provisions for goods movement in corridor	Ease of Truck Movement		✓		Entire Corridor	Construction may limit access for trucks	Traffic Management Plan to ensure truck access at all times	May not be possible in some areas	Designate alternative truck routes	Negligible	None required
					✓	Entire Corridor	Median rapidway will restrict truck movement in corridor	Provided U-turns at major intersections to allow for truck access to side streets and properties. Traffic analysis at intersections indicated sufficient capacity for trucks using U-turns.	In areas of 4-lane cross-section, intersections with no station or landscaping in median do not allow sufficient turning width for WB 17 (articulated trucks).	Traffic signs prohibit large truck at these intersections (see next entries). Designate truck routes.	Insignificant	None
D5	Promote transit-oriented development	Locating higher density and transit-oriented development where it can be served by rapidway			✓	New and redevelopment/infill locations	Current landowners could object to implementation of existing land use pattern changes along transit corridor.	Regional/Municipal land use controls and approval processes to encourage transit-oriented development or re-development in support of OP objectives.	Redevelopment pressure on surrounding areas	Apply Municipal Site Plan approval process	Insignificant	None

12. PUBLIC AND AGENCY INVOLVEMENT

There are five features that are key to the successful planning under the Environmental Assessment Act. The five features that are described in the “Interim Guidelines on Environmental Assessment Planning and Approval, Ministry of Environment, 1989” are:

- Consultation with affected parties;
- Consideration of reasonable alternatives;
- Consideration of all aspects of the environment (i.e., natural, social, economic, cultural and technical);
- Systematic evaluation of net environmental effects; and
- Clear and complete documentation of the planning process.

The consultation process developed for this study contributes to the achievement of each of these key features. As such, an extensive public involvement program was followed during the EA. The study was organized so that interested parties were:

- Informed throughout the study by the use of various communication channels and techniques;
- Involved throughout the study period and as well notified of appropriate milestones;
- Provided access to current information in an efficient manner;
- Provided sufficient time to respond to question and data request; and
- Encouraged to participate in an issue identification and resolution process.

The program ensured that concerns and issues were brought forward early and addressed appropriately in the course of the study. In addition, **Public Consultation Centres** were organized on several occasions for the general public to review and comment on the findings and progress of the study. These were advertised in local newspapers and mail-drop notices. A project mailing list was maintained and updated during the course of the study.

When appropriate, meetings with specific interest groups were held to deal with localized issues and many formal meetings and presentations were organized with various stakeholders within the study area. As well, information regarding the status of the EA Study was available on the Region (www.york.ca) and Viva (www.vivayork.ca) websites throughout the study duration.

Participating technical agencies have continued to be involved during the EA Study and were actively involved in scoping the issues, developing and assessing alternative alignments, and developing mitigating measures for

unavoidable impacts. Consultation with agencies was held through formal Technical Advisory Committee meetings, site visits, workshops and correspondence.

The public, including the general public, communities, interest groups and property owners (residential/business/other) were offered several opportunities to review the study findings and provide input. These opportunities were as follows

- PCC#1
- TOR submission
- PCC #2
- PCC #3
- Study Integration with Davis Drive Improvements and Transition from IEA to Class EA
- PCC #4
- Draft ESR available for public review
- Final ESR submission for 30 day public review

There were also two business owner consultation open houses held in Newmarket. In addition, representatives of key interest groups, community associations, business areas and heritage groups have been consulted through workshops, meetings and correspondence.

12.1 TECHNICAL ADVISORY COMMITTEE AND TECHNICAL AGENCIES

A Technical Advisory Committee (TAC) was organized to facilitate the line of communication between the Project Team and relevant agencies, thereby ensuring a seamless integration of Rapid Transit into the Region. TAC representatives were given the opportunity at all critical milestones to express any concerns their agencies may have with regards to the project. In addition, member’s input was sought at various stages throughout the study and their suggestions and comments integrated into the scope of work. Given the nature of the study, the location of the Study Area, the range of issues and the potential for a high level of community interest and concern, the TAC was comprised of senior staff from the following agencies:

- York Region
- York Region Transit
- Town of Richmond Hill
- Town of Aurora
- Town of Newmarket
- Town of East Gwillimbury

- GO Transit
- Toronto Regional Conservation Authority (TRCA)
- Lake Simcoe Region Conservation Authority (LSRCA)
- Ministry of Transportation (MTO)
- Ministry of Natural Resources (MNR)
- Ministry of Culture

Meetings with MOE were held to obtain input on noise and air quality protocols and methodologies.

Also, contact was initially established with CEAA to present the overall York Region Transit study on a program wide basis and to describe the three corridors through which implementation of the transit strategy was going to be undertaken. At this meeting a review of the application of the Federal Environmental Assessment procedures, and requirements and procedures for the screening procedures of “Triggers” under the Canadian Environmental Assessment Act was conducted. Finally CEAA was contacted at the final stages of the preparation of the EA to plan for the review of the Report.

During the EA phase, the TAC met on five occasions. Four of these meetings were held immediately prior to Public Consultation Centres to present to TAC members the material for the upcoming PCCs and obtain their feedback. The remaining meeting was held to inform the TAC of the evaluation methodology of the alternatives and seek input from them; and to present the recommended alignment. Copies of the minutes of the TAC meetings can be found in **Appendix M**.

Key technical agencies were asked to provide input through participation on the TAC. In addition, those technical agencies with a potential interest in the study, including municipal, provincial, and federal agencies, were all provided notices at various stages of the project. Any comments these agencies provided were taken into consideration. **Appendix M** includes a record of consultation.

12.2 PUBLIC INVOLVEMENT PROGRAM

For the purpose of the North Yonge Street Corridor EA, the public included the general public, community groups, interest groups and property owners. Input from the public was obtained in a variety of ways including:

Public Notices – Several public notices were published to introduce the study to the public, to invite interested members of the public to be placed on the mailing list and to provide any preliminary comments. Notices were placed in local newspapers including the *Richmond Hill Liberal* and *Era*

Banner, before each *Public Consultation Centre* (the local newspapers cover all households in the study area and are a standard avenue for the Region to publish notices and information about these types of project). In addition, for the third and fourth PCCs, notices were mailed to all property owners along Yonge Street, Davis Drive and Green Lane within the study area. Copies of all notices that were published are provided in **Appendix M**.

Public Consultation Centres (PCCs) – PCCs were held at four key stages during the study. At each point, PCCs were held in locations that provided geographic coverage along the North Yonge Street Corridor.

Project Website – The dedicated Viva website, www.vivayork.ca, provided ongoing opportunity for the public to acquire information about the project, contact the Region and the Consortium team, and provide comments.

Region's Website – During the length of the study, current and updated information about the project was available on the Region's website (<http://www.region.york.on.ca/Services/Transit/default+Public+Transit.htm>) including detailed information presented at each PCC. The website also included information on the three approved rapid transit EAs in the Region, as well as information pertaining to other related rapid transit initiatives. The Region's website will also be used to provide the public and agencies with a convenient means of accessing the final ESR once a Notice of Completion is filed.

12.2.1 Public Consultation Centres (PCC)

Public Consultation Centres were an important feedback instrument throughout the study duration. Using the format of an Open House, they allowed the public to keep up-to-date on the proposed design alternatives and recommendations for each main phase of the project. During each PCC, the public was invited to review a detailed series of display boards, ask questions to team members and provide written and verbal comments. A "Comment Sheet" box was available at all venues for participants to submit their comments on the project and on the presentation material. The record of the Public Consultation Centres described above is included in **Appendix L** and contains copies of comments received from the general public. The highlights of each round of PCC's are as follows.

❖ Public Consultation Centre #1

The purpose of the first PCC was to familiarize the public with the project and provide the public with an opportunity to review and provide input regarding the terms of reference (ToR) for the study. (Just as a reminder, this EA was initiated as an individual EA and included a formal Terms of Reference phase. Following approval of the MEA Class EA in the fall of

2007, to include for the first time Municipal Transit projects, the EA as transitioned to a Class EA). The PCC display material is presented in **Appendix L1** and included information on:

- The EA Process;
- Background of the Need and Justification for the Project;
- Study Area;
- Purpose of the Undertaking;
- Potential Routing Alternatives; and
- Potential Environmental Factors

The first round of Public Consultation Centres was held in three locations:

Where	When?
Upper Canada Mall, Town of Newmarket	Saturday, June 12, 2004 (9:30 am to 6:00 pm)
Oak Ridges Moraine Library, Town of Richmond Hill	Tuesday, June 15, 2004 (6:00 pm to 8:00 pm)

The material on display consisted of presentation boards and project-specific fact sheets. Upon arrival, attendees were asked to sign a visitor "sign-in" sheet and given the opportunity to provide comments via a comment sheet. The material for the first PCC is included in **Appendix L1**.

A total of 44 people signed the sign-in sheet at the June 12 PCC at Upper Canada Mall and eight people signed in at the Oak Ridges Library location on June 15. In addition to numerous verbal comments, four written comment sheets were completed and submitted to the Project Team.

❖ Public Consultation Centre #2

The purpose of the second PCC was to:

- Present the project study area and existing conditions;
- Describe the transportation alternative to the undertaking;
- Present evaluation of the transportation alternative and selection of the preferred alternative;
- Identify the alternative transit technologies; and
- Present the preliminary screening results of the alternative routes.

The second round of Public Consultation Centres was held at:

Where	When?
Oak Ridges Community Centre, Town of Richmond Hill	Wednesday, September 13, 2006 (4:00 pm to 8:30 pm)
Upper Canada Mall, Town of Newmarket	Thursday, September 14, 2006 (9:30 am to 8:30 pm)

The material on display consisted of presentation boards, a project information sheet and various Viva/YRT materials such as the Viva zip card and system route map. Upon arrival, attendees were asked to sign a visitor "sign-in" sheet. Examples of the material presented are included in **Appendix L2**.

A total of seven people signed in at the Oak Ridges location on September 13 and there were 37 who signed in on September 14 at Upper Canada Mall. Given the mall environment it was difficult to insure that all visitors signed in. It is estimated that an additional 30-40 persons viewed the display material during the period at the mall.

In addition to verbal comments, eight written comment sheets were completed and submitted to the project team during the two days (included in Appendix L2). The overall response to the material presented at the PCC appeared to be very positive regarding the existing Viva service as well as what the preferred routing will be through the Newmarket segment.



❖ Public Consultation Centre #3

The purpose of this third PCC was to present to the public the evaluation of rapid transit route alternatives for the entire corridor, and road capacity improvements alternatives along Yonge Street from Mulock Drive to Green Lane. The alternatives along Davis Drive were introduced showing various lengths of dedicated rapidway. The third round of Public Consultation Centres was held at:

Where	When?
Municipal Town Hall Lobby, Town of Aurora	Wednesday, June 20, 2007 (4:00 pm to 8:00 pm)
Oak Ridges Community Centre, Town of Richmond Hill	Thursday, June 21, 2007 (6:00 pm to 9:00 pm)
Upper Canada Mall, Town of Newmarket	Saturday, June 23, 2007 (9:30 am to 6:00 pm)

The material on display consisted of presentation boards and a project-specific fact sheet. **Appendix L3** contains the record of the material presented.

A total of five people signed in at the Wednesday session at Oak Ridges Recreation Centre, 12 people signed in at the Town of Aurora Offices location on the Thursday, and 15 people signed in at the Upper Canada Mall location on the Saturday. Given the “mall” type of environment, it was difficult to insure that all visitors would sign in. It is estimated that a further 30-40 persons viewed the display during the period in the mall.

In addition to verbal comments, twenty-seven (27) written comment sheets were completed and submitted. The questionnaire, asked four questions to the public. The most frequent comment/concern expressed by the participants at this third round of Public Consultation Centres was the safe crossing of pedestrians given the much wider right-of-way than currently exists. The public comment sheets are presented in Appendix L3.

❖ Public Consultation Centre #4

A final series of PCCs was convened in June and August 2008 at the following locations:

Where	When?
Regional Municipality of York Offices	Wednesday, June 11, 2008 (4:00 pm to 8:00 pm)
Oak Ridges Community Centre, Town of Richmond Hill	Thursday, June 19, 2008 (5:00 pm to 8:00 pm)
Town of Newmarket Offices	Monday, August 11, 2008 (7:00 pm to 9:00 pm)

The purpose of this final PCC was to present the project recommendations and obtain feedback from the public prior to finalizing the Environmental Study Report. Refer to **Appendix L4** for the details of this fourth and final PCC.

A total of 28 people signed in at the June 11 session, 33 people at the June 19 session, and 82 people at the August 11 session. The August 11 venue was added at the request of Town of Newmarket staff. It was felt that additional consultation with the Newmarket community was appropriate given the significant evolution proposed for the Davis Drive corridor.

There were a variety of presentation boards on display highlighting the project recommendations for the entire corridor. In addition, there was also a presentation that was repeated throughout the PCC showing various illustrations of what the road network with Viva will look like in the future. This included a traffic simulation at a signalized intersection which highlighted the various signal phases including pedestrian and Viva vehicle movements across the intersection.

Generally, the introduction of the rapid transit network within the study area was received positively. There were several inquiries as to the extent of specific property effects along Davis Drive, including access to and from the roadway, of which the York Region property staff addressed on an individual basis. Other comments included; increase the amount of green space and inquiries of the cost of the project to the taxpayer.

12.2.2 Facts Sheets

A number of Facts Sheets have been prepared over the years as part of Viva’s larger communications program and were made available at the PCC’s as background information for the public. The Facts Sheets presented information on a wide range of topics including specific information about the Consortium, the proposed technologies, as well as more general information relating to the environmental, transportation and economic benefits of the rapid transit plan. The facts sheets produced during the project covered topics such as:

- What is Rapid Transit?;
- What is York Region’s Rapid Transit Plan?;
- Bring Rapid Transit to York Region: A Three-Phase Approach;
- Sustainability and Smart Growth;
- Mobility and Connectivity;
- Industry and Economy;
- Technology and Innovation;
- Integrated Family of Services Increases Convenience of Public Transit;
- Rapid Transit Corridors will Link Four Urban Centres within York Region;
- The Environmental Assessment Process;
- York Region’s Rapid Transit Plan Technical Advisory Committee;
- York Region and York Consortium;
- Rapid Transit is Key to Smart Growth;
- Transportation Benefits of York Region’s Rapid Transit Plan;
- Environmental Benefits of York Region’s Rapid Transit Plan;
- Financial and Economic Benefits of York Region’s Rapid Transit Plan;
- Innovation and Technology Benefits of York Region’s Rapid Transit Plan;
- York Region is the Fastest Growing Municipality in the Greater Toronto Area;

- Transportation Gridlock Threatens Quality of Life;
- York Region’s Rapid Transit Plan Improves Inter-Regional Connections; and
- Measuring the Effectiveness of York Region’s Rapid Transit Plan.

Other specific Facts Sheets, tailored to each of the Public Consultation Centres, were also produced during the length of the study.

12.2.3 Viva Website

A comprehensive website was created for the purpose of informing the public on the Viva network. This Website, www.vivayork.com, contains a variety of information on Viva such as the existing system and the phases that are still to come. There is also a section on Public Consultation which posted the notices for the PCC’s prior to each of the dates as well as the material that was presented at each PCC. Visitor’s to the site also have the opportunity to leave a comment if they so choose. This information was also placed on the Region’s Corporate website www.york.ca.

12.3 FIRST NATIONS CONSULTATION

At the commencement of the project, the Ontario Secretariat of Aboriginal Affairs (OSAA) was contacted and they recommended that contact be made with organizations that represent a number of First Nations to inquire whether there are any First Nations who may be interested in the project and wish to provide comments. The two organizations identified by OSAA were the Association of Iroquois and Allied Indians, and the Anishinabek Region/Union of Ontario Indians. The Association of Iroquois Indians recommended contacting the Six Nations of the Grand River. The First Nations that encompass the southeast region within the Anishinabek Region/Union of Ontario Indians were contacted to see if they have a potential interest in the study. These First Nations include Alderville First Nation, Beausoleil First Nation, Algonquins of Pikwakanagan First Nation, Chippewas of Georgina Island First Nation, Curve Lake First Nation, Mississauga’s of Scugog Island First Nation and Moose Deer Point First Nation.

OSAA also suggested that Indian and Northern Affairs Canada (INAC) be contacted since the Government of Canada sometimes receives claims that Ontario does not. Three different branches of INAC were contacted, namely the Comprehensive Claims, Specific Claims and Litigation Management and Resolution Branches. Study Area maps were provided for review and information on any First Nations that may have an interest in the EA was requested.

The Comprehensive Claims Branch of INAC noted that there are currently no comprehensive claims within the Study Area.

The Specific Claims Branch of INAC noted that the study area is located within the area delineated by the Toronto Purchase specific claim which involves the Mississaugas of the New Credit First Nation.

The Litigation Management and Resolution Branch of INAC noted a case involving the 1923 Williams Treaties which is currently in litigation. The First Nations involved as part of these Treaties and that may have an interest in the EA are the following: Alderville First Nation, Beausoleil First Nation, Chippewas of Georgina Island First Nations, Mississaugas of Scugog Island First Nation, Chippewas of Mnjikaning First Nation, Hiawatha First Nation and Curve Lake First Nation. Some of the First Nations that fall within the 1923 William Treaties are part of the Anishinabek Region/Union of Ontario Indians organization. The First Nations were contacted at each key milestone of the project, as noted at the beginning of this chapter.

The detailed consultation record is provided in **Appendix M**, including a summary of any comments received and responses provided.

12.4 OTHER STAKEHOLDER CONSULTATIONS

During the EA, the project team met independently with a number of affected landowners upon their request. In most cases, these meetings were requested by landowners as a follow-up to information presented at the PCC's so that site specific details could be better understood. In many cases, individual meetings were requested by landowners who could not attend the PCC but wished to be involved.

Two business owner meetings took place in Newmarket to discuss the impacts along Yonge Street and Davis Drive. During these two meetings small groups were formed with project representatives present in each of the groups. The plans were presented to the business owners and they were given the opportunity to review them and provide any comments or ask questions.

A Record of Consultation is included in **Appendix M**.

12.5 MUNICIPAL APPROVALS

At important decision points in the study, formal presentations were made to the York Region Rapid Transit Steering Committee and Regional Council to summarize the assessment of alternatives, the recommended designs

and major recommendations of the study, including the final submission of this report. These presentations were also made to various councils and committees of the Towns of Richmond Hill, Aurora, Newmarket, and East Gwillimbury throughout the duration of the study. Committee reports and Council resolutions are presented in **Appendix M**.

12.6 RECORD OF CONSULTATION

Throughout the EA process comments have been received and documented from various sources. In summary during Phase 2 of the Class EA process, alternative solutions, the input received was considered and the preferred solution "Rapid Transit Corridor Initiatives, Including Current Commitments" was confirmed. Both Regional and Local Councils have been supportive of the process and minutes/resolutions from the Councils are included in **Appendix M**.

Detailed responses to various comments are included in the record of consultation table (refer to **Appendix M**). Comments that were received that resulted in a significant change to the alignment have been noted in the table.

13. IMPLEMENTATION PROCESS

13.1 CONTEXT

Chapter 1 of this report has described the Regional Municipality of York's commitment to put in place a comprehensive network of rapid transit services linking the four designated regional centres. The Plan has as its focus, the early provision of a viable alternative to increasing automobile dependence for mobility in the Region.

The North Yonge Street Corridor Public Transit and Associated Road Improvements project description, described in **Chapter 9**, is the northern primary north-south corridor in York Region's proposed four-corridor Rapid Transit Plan. This ESR constitutes the first step in the implementation process which will include all the traditional phases of preliminary and detailed design, construction, testing and commissioning of systems and installations and finally operation of rapid transit service.

13.2 PROJECT IMPLEMENTATION PLAN

In support of the EA studies, the preferred rapidway design has been developed to a Functional Planning level of detail including both horizontal and vertical alignment of the preferred rapidway alternative. Also, preferred locations for the at-grade stations have been identified and conceptual layouts for insertion of prototypical station facilities developed at each station site.

13.2.1 The Design Phase

The infrastructure planning undertaken during the EA study is considered adequate to identify the effects of implementation and operation of the undertaking and establish whether any mitigation is needed and what form it should take. Following approval of the ESR, further preliminary design and subsequently, detailed design will constitute the first stage of the Region's implementation plan.

Selection of bus rapid transit (BRT) as the preferred initial technology allows the facilities to be constructed and the service to be operated in stages along the length of the corridor. The timing and extent of each stage implemented and operated will depend on the availability of funding, monitoring of transit ridership demand, expected travel time savings and the period required for construction of each stage.

Once these factors have been determined, a work plan to carry out the detailed design will be developed. This plan must recognize that the

Region has decided to implement rapid transit featured services with new buses in mixed traffic in the corridors prior to and during construction of the dedicated lanes. (Viva 1 Services)

It is likely that the design phase for rapidway infrastructure will be completed sequentially in segments along the route, each timed to allow sufficient time for post-EA approvals prior to the scheduled start of construction in each segment. Besides Provincial and Federal EA Act approvals, examples of these approvals are:

- TRCA permits;
- LSRCA permits;
- Federal DFO authorization;
- Permits under the Lakes and Rivers Improvement Act for alternations to the watercourses and/or stream crossings;
- Any Ontario MNR approvals; and
- Navigable waters approval

13.2.2 The Construction Phase

Implementation of the rapidway by segment was introduced in the discussion on design approach above. As a first stage, it is anticipated that the HOV lanes along Yonge Street from Davis Drive to Green Lane will be implemented as budgeted in the Region's 10 year Roads Construction Program (currently identified as a 2011 project). The priority segment of median rapidway identified for early implementation, subject to availability of funding from Metrolinx, is the segment along Yonge Street from Mulock Drive to Davis Drive and on Davis Drive from Yonge Street to the Southlake Regional Health Centre. The remaining segments of the median rapidway will be implemented as funding becomes available and based on specific needs within each segment (transit ridership, expected transit travel time savings and adjacent transit oriented development opportunities). The detailed implementation phasing will be refined during detailed design. In all cases, the limits of each phase of implementation will be selected in consideration of technical issues (such as appropriate location to transition transit vehicles to and from the median rapidway) and in consideration of minimizing environmental effects (as an example, it would be desirable to complete the project implementation through a community or business area as a single phase to avoid negative effects on the community that may result from multiple stage construction). Should funding securement for rapidway implementation along Davis Drive be delayed, it would be desirable to implement selected intersection improvements along Davis Drive to alleviate traffic congestion at several operationally constrained areas and to provide reduced transit travel time for Viva 1 services along this corridor. The required intersection improvements have been identified as a component of the overall project and their staged implementation, as needed, will be determined during detailed design. The other rapidway

segments will fall into place depending on timing of funding and requirements of the rapidway.

Prior to commencing construction in the North Yonge Street Corridor right-of-way, a comprehensive, detailed Traffic Management Plan will be prepared in consultation with regional and local municipal traffic operations staff, emergency services personnel and owners of businesses generating major traffic movements. The plan will include

- traffic signal modifications to control left and U-turns;
- distribution of available roadway width for traffic lane diversions;
- sequencing of shifts of construction and traffic between sides of Yonge Street, Davis Drive and Green Lane;
- measures to preserve vehicle and pedestrian access to adjacent properties;
- measures to maintain access for emergency vehicles;
- locations and details of signage and barriers; and
- methods to permit transit operations during construction.

Within each of the segments discussed above, road-widening works, to develop the median right-of-way for transit, will be staged to minimize the temporary disruption due to traffic lane diversions and narrowing.

13.3 ENVIRONMENTAL COMMITMENTS

The purpose of this section is to outline commitments made by York Region to undertake environmental mitigation measures to ensure compliance with the requirements of the government agencies responsible for the review of this Environmental Assessment. Refer to **Table 13-1**.

Table 13-1
Summary of Environmental Concerns and Commitments

Environmental Issue/ Concern/ Effect			Environmental Commitments		
I.D. #	Details	Potentially Interested Group/ Agency	I.D.#	Details	Comments
1	Fisheries and Aquatic Habitat	EC, MNR, DFO, MOE, TRCA, LSRCA	1.1	All culverts/ bridge modifications regarding potential Harmful Alterations, Disruption or Destruction of fish habitat, compensation under the Fisheries Act and identification of additional watercourses during the detailed design phase will be reviewed and approved by TRCA and LSRCA to ensure the compliance to their requirements.	Appendix C (NSR)
			1.2	For the proposed replacement and widened Keith Bridge at the East Holland River on Davis Drive east of Main Street, a meander belt analysis will be carried out and a 100-year erosion limit will be determined during the preliminary & detailed design phases to meet LSRCA's approval in determining the sizing of the bridge span.	Appendix C
			1.3	Discussion with LSRCA will be carried out during the detail design phase to determine if a HADD will occur at widened replacement water crossing of the East Holland River; and if so, to secure a Fisheries Act authorization.	Appendix C
			1.4	Any proposed in-stream work and site-specific mitigation measures will be carried out as outlined in Table 8 of the Natural Science Report (Appendix C).	Appendix C
2	Wildlife Habitat	MNR, TRCA, DOE, EC	2.1	Edge Management Plan and Tree Preservation Plans will be prepared during the detailed design to mitigate impacts to adjacent natural features, as well as the preparation of detailed compensation and restoration plans to strive to provide for a net improvement to existing condition. TRCA guidelines for Forest Edge Management Plans and Post-Construction Restoration will be followed.	Appendix C
3	Vegetation and Wetlands	MNR, MOE, TRCA, DOE, EC	3.1	Edge Management Plan and Tree Preservation Plans will be prepared during the detailed design to mitigate impacts to	Appendix C (NSR)

Table 13-1
Summary of Environmental Concerns and Commitments

Environmental Issue/ Concern/ Effect			Environmental Commitments		
I.D. #	Details	Potentially Interested Group/ Agency	I.D.#	Details	Comments
				adjacent natural features, as well as the preparation of detailed compensation and restoration plans to strive to provide for a net improvement to existing condition. TRCA guidelines for Forest Edge Management Plans and Post-Construction Restoration will be followed.	
4	Groundwater Resources	MOE, TRCA, LSRCA	4.1	For wells that remain in use, a well inspection will be conducted prior to construction to establish baseline conditions and to confirm the relationship of the widened roadway to existing active water well will not have an adverse affect on water quality. If it does, a contingency plan will be developed. In the event that wells are required to be closed, closure will proceed in accordance with O.Reg.903 of the Ontario Water Resource Act. If the widened roadway has adverse effects on the active well on water quality, a contingency plan will be developed.	Appendix C
5	Surface Water Resources	MOE, MNR, DOE, TRCA, LSRCA	5.1	A detailed Storm Water Management Plan (SWMP) will be developed in accordance with the MOE's <i>Stormwater Management Planning and Design Manual (2003)</i> and <i>Guidelines for Evaluating Construction Activities Impacting on Water Resources</i> . This SWMP will outline monitoring & maintenance commitments for SWM facilities constructed as part of this undertaking.	Section 10.5, Appendices C & F
			5.2	Water quality controls up to the MOE water quality guideline of Enhanced Level (80% total suspended solids removal) will be required for areas where an increase in impervious surface is observed.	Appendices C & F
			5.3	An Erosion and Sediment Control Plan will be developed to manage the flow of sediment into storm sewers and watercourses and to monitor erosion and sedimentation control measures during construction.	Section 10.5
6	Air Quality & Energy	MOE, EC	6.1	During construction measures will be taken to control dust.	Appendix J
7	Contaminated Soil	MOE	7.1	In the event contaminated sites are identified after construction activities begin, a contingency plan will be prepared to outline the steps that will be taken to ensure that contaminant release will be minimized and appropriate clean-up will	Appendix E

Table 13-1
Summary of Environmental Concerns and Commitments

Environmental Issue/ Concern/ Effect			Environmental Commitments		
I.D. #	Details	Potentially Interested Group/ Agency	I.D.#	Details	Comments
		Health Canada	7.2	Health Canada's Federal Contaminated Site Risk Assessment in Canada will be obtained.	
8	Noise and Vibration	MOE	N/A	Contract documents to include provisions for compliance with local noise by-laws during construction	N/A
9	Effects on Businesses and Other Land Uses	Municipal agencies	9.1	A parking need assessment and management study to be performed.	Section 10.1.8
10	Archaeological Resources	MTCR, Municipal Agencies, Municipal Heritage Planners, LACAC, TRCA, Ministry of Aboriginal Affairs	10.1	Findings of future archaeological assessment will be forwarded to the Ministry of Culture.	Appendix H
11	Agriculture	MAF	12.1	A policy to protect agricultural lands during construction will be developed during the detailed design phase.	
12	Other	Public	13.3	Public concerns/ complaints will be address through public consultation centres during detailed design phase. As well, public relation staff will address complaints regarding construction and operations of the rapidway. The received concerns/ complaints will be circulated to appropriate department for action.	
13	Cycling and Pedestrian treatments	York Region	13.4	During the preliminary and detailed design phases, the York Region Cycling Master Plan will be consulted regarding the cyclist and pedestrian treatments.	

13.4 MONITORING

The purpose of this section is to outline commitments made by York Region to monitor the project activities to ensure compliance with the requirements of the government agencies responsible for the review of this EA.

13.4.1 Construction Monitoring

During the construction of the rapidway, the Region will carry out monitoring activities in accordance with a comprehensive **Monitoring Program** to be finalized during the detailed design phase. The plan will set out the purpose, method and frequency of all monitoring activities and provide the framework for recording and documenting their results.

The outline of the plan, shown in **Table 13-2**, documents York Region's commitment to measure the effects of rapidway construction activities on the elements of the environment listed.

Table 13-2
Construction Monitoring

Environment Element	Purpose of Monitoring	Monitoring Method	Monitoring Frequency
Noise generated by construction activities	To ensure noise levels comply with Municipal by-laws	Regular inspection of site to ensure contractor is complying with allowable hours of work and qualitative assessment of nuisance effect from noise on adjacent sensitive receptors	At time of introduction of equipment/activities producing significant noise level with potential to disturb sensitive areas
Effect of construction activities on air quality (dust, odour)	To confirm that local air quality is not being adversely affected by construction activity	Regular inspections of site dust control measures and of construction vehicle exhaust emissions	Monthly during construction seasons
Condition of heritage homes adjacent to rapidway alignment	To determine if any damage/deterioration is caused by construction activity	Pre-construction inspection to obtain baseline condition and monitoring during nearby construction	As required by construction schedule for work adjacent to heritage features
Effect of construction on water quality and quantity in watercourses	To confirm that water quality is not being adversely affected by construction activity	Monitor sediment accumulation after rain events during construction to ensure that the proposed mitigation measures in the Erosion and Sediment Control Plan have been satisfied	After first significant rain event
Effect of construction on boulevard trees	To ensure the survival of boulevard trees	Inspection of protective measures and monitoring of work methods near trees	Prior to commencement of work and bi-weekly during work activities

Environmental protection measures will be stipulated in all appropriate construction specifications that will form the contractual basis for carrying out the works. The **Monitoring Program** will include procedures for implementation of mitigation of any adverse effects identified as well as contingency measures to respond to unexpected adverse impacts. In addition, the plan will set out the responsibilities of inspection staff assigned to carry out the monitoring program described above.

13.4.2 Operations Monitoring

The **Monitoring Program**, described above, will also include a methodology and associated procedures to continue the necessary monitoring during revenue operations to confirm compliance with the commitments documented in the ESR. The Program will include regular monitoring activities as well as the procedure to be adopted in the event that adverse effects are identified between regular inspections. Monitoring activities during rapid transit operations are shown in **Table 13-3**.

Table 13-3
Monitoring Activities During Rapid Transit Operations

Environment Element	Purpose of Monitoring	Monitoring Method	Monitoring Frequency
Condition of heritage homes adjacent to rapidway alignment	To determine if any damage/deterioration is caused by vibrations produced by transit vehicles	Post-construction inspection to obtain baseline condition and monitoring during pass-by operations	Initially after revenue service is introduced and in response to concerns or after any major increase in service frequency
Traffic Operation	To confirm that the traffic operation is not adversely affected	Post-construction traffic assessment	Initially after revenue service is introduced and at a regular interval afterward
Effect of operations and maintenance on boulevard trees	To ensure the survival of boulevard trees	Inspection of protective measures and monitoring of work methods near trees	Annually

example, a design change in streetscape treatment or changes to median width, vehicle lane widths, local alignment refinements, changes to transit stops and station configuration, design speed of roadway curbs and underground infrastructure to be renewed, etc. Such changes could likely be dealt with during the design phase and would remain the responsibility of York Region to ensure that all relevant issues are addressed.

Due to unforeseen circumstances, it may not be feasible to implement the project as described in this ESR. Accordingly, any significant modification to the project or change in the environmental setting for the project which occurs after the filing of this ESR shall be reviewed by York Region and an addendum to the EA may be required. In the event of any uncertainty as to whether a change to the undertaking is a major or minor amendment, the Region will consult MOE before proceeding.

13.5 MODIFYING THE PREFERRED DESIGN

In discussing the process to change the preferred design, it is important to distinguish between minor and major changes. A major design change would require completion of an amendment to this ESR, while a minor change would not. For either kind of change, it is the responsibility of York Region, as Proponent, to ensure that all possible concerns of the public and affected agencies are addressed.

Minor design changes may be defined as those which do not appreciably change the expected net adverse effects associated with the project. For