IBI GROUP

MARKHAM

Langstaff
Land Use and Built Form Master Plan

Draft Transportation Report

August 2009

TABLE OF CONTENTS

TABLE OF CONTENTS (CONT'D)

TABLE OF CONTENTS (CONT'D)

TABLE OF CONTENTS (CONT'D)

LIST OF EXHIBITS

TABLE OF CONTENTS (CONT'D)

EXECUTIVE SUMMARY

Project Overview

The Langstaff Gateway Site is one of the most significant transportation nodes in the Greater Toronto Area and is part of the Richmond Hill/Langstaff Gateway Urban Growth Centre. It has been identified in all local, regional and provincial plans as a major growth area and an opportunity to develop a truly transit-oriented development. This opportunity exists because the site is located at the intersection of five existing/planned rapid transit lines including the Yonge Subway, North Yonge VIVA service, Highway 7 VIVA service, Richmond Hill GO Rail and the Highway 407 Transitway.

IBI Group was retained by the Town of Markham to provide an independent assessment of the transportation impacts and needs for the Langstaff site, including an analysis of the impacts of alternative land use scenarios, required infrastructure and supporting policies. This study was completed in parallel with the Land Use and Built Form Master Plan exercise lead by Calthorpe Associates.

Approach

Building on the efforts of the overall Land Use Master Plan, this study adopted the approach of planning and designing for non-motorized transportation modes as a first priority. As result, the "development capacity" of the Langstaff site was not assumed to be constrained by the capacity of the surrounding road network but rather the total person capacity of all modes serving the site. This approach is appropriate given the fact that capacity of the future transit network serving the site will be several times that of the auto network. It is also reflective of the fact that any available road capacity will be used up by vehicles from new development outside of the study area if not by local development traffic. Placing more development in Langstaff will mean that there is a greater proportion of people in close proximity to transit, thereby maximizing the benefits of public investment in rapid transit.

Not-withstanding the pedestrians and transit first approach, the approach also recognizes that the transit system is not yet fully developed, and in particular, the start of construction of the Yonge Subway is several years away. Therefore, the timing of development in Langstaff needs to be phased with infrastructure improvements. In addition, there is also a need to ensure that the early stages of development are planned and designed to support the ultimate targets for transit use. This includes adopting strong policies for parking supply and transportation demand management (TDM). Several innovative measures to reduce demand for both personal vehicle travel and goods movement are identified in this report.

Finally, it is noted that while all efforts were made to take into account development proposals surrounding the Langstaff area, including plans for the Richmond Hill Gateway and Yonge Street in Vaughan, the various studies underway remain somewhat independent. One of the early conclusions made during this study is that additional work is required at the Regional level to consider the cumulative impacts of all development and transportation proposals for the Langstaff/Richmond Hill Urban Growth Centre, and this work is now taking place. One of the goals of this higher level study is to look at how to maximize access between future development and the multitude of transit modes.

Key Findings

Several interim development scenarios were examined as part of this study; however, this report focuses on a "full-build-out" scenario which could consist of up to 15,000 residential units and approximately 266,000 m^2 of non-residential floor space. Based on these development levels, it is estimated that there will be up to 8,400 person trips exiting the area in the morning peak hour of which 64% (approximately 5,400) will be made by sustainable modes (walking, cycling, transit and auto passenger) while the remaining 36% (approximately 3,000 trips) will be made by auto drivers. This does not take into account the potential that in the future, people choose to take advantage of spare capacity outside of the peak hours more than they do today, a phenomenon referred to as "peak spreading."

Essentially, the analysis concludes that all access points from the Langstaff area to the adjacent arterial and freeway network will be at capacity. Although it was assumed that one new connection to the external road network would be provided (i.e. at Cedar Avenue), further attempts to provide additional connections were not pursued as the adjacent road would not have sufficient capacity to handle the resulting demand. One of the key benefits of the Langstaff site is that the road network is essential "self-limiting" in that if the capacity of the site access roads is exceeded, there will be a greater incentive for people to use transit or other sustainable modes.

Internal Network Considerations

The internal transportation network for Langstaff has been designed to maximize connectivity by adopting a grid pattern. All streets have been designed to accommodate multiple modes of travel, with the exception of the streets adjacent to the central park system which will not be accessible to cars (See Section 7.2 of this report for a description and illustration of the street system). In general, the internal road network has been designed so that cars are directed to the North and South boulevards on the perimeter of the development leading to the main access points at Bayview, Yonge Street and Highway 7 via Cedar Avenue.

A key feature of the Langstaff development will be an internal transit circulator system. This transit circulator, initially consisting of small buses, is essential in order to maximize the attractiveness and use of the regional transit systems including the Yonge Subway. Based on the ultimate development scenario and small-mid size buses, it is estimated that the internal circulator bus system would need to operate at 1-2 minute frequencies to accommodate the projected demand. The internal road network has also been designed to provide dedicated lanes for the internal circulator, as well as YRT buses. The use of new technologies will be maximized to ensure people living and working in Langstaff will have real time information on all transit modes. In addition, consistent with the sustainable development objectives for the site, it is recommended that the internal circulator system be operated with electric buses. Ultimately, this bus-based system could be replaced by a rail based transit or a people mover-type system as such technology matures.

As with transit, a high degree of emphasis has been placed on providing dedicated facilities for cyclists throughout the development. This includes a continuous east-west multi-use path along the south side of the development as well as dedicated lanes on most streets. Recommendations have also been provided on bicycle parking supply and potential connections to adjacent communities, including the Thornhill Neighbourhood to the south.

External Network Considerations

Planned transit improvements including the Yonge Subway, VIVAnext, enhanced GO Rail and the Highway 407 Transitway will go a long way to off-setting the impacts of development on area traffic volumes. However, there still remains the challenge of getting remaining cars to and from the

highway system. Given the planned growth in Richmond Hill Centre and along Yonge Street in Vaughan, combined with the planned Langstaff development, it is essential that network improvements be implemented to benefit the entire area.

Key network considerations for Langstaff include:

- Opening the Cedar Avenue connection under Highway 407 and providing a direct connection to Highway 7, and potentially Highway 407;
- Improving the capacity of the Yonge Street/Langstaff Road intersection, while ensuring safe operations and minimizing impacts on the Highway 407 ramps;
- Investigating the possibility of a second connection under Highway 407 to increase connectivity between Langstaff and Richmond Hill, for all modes
- Improvements to enhance the person carrying capacity of north-south Regional Roads, with an emphasis on transit and high-occupancy vehicles.

Phasing Approach

The Land Use and Built Form Master has identified a preliminary phasing plan that allows development to be constructed in step with major transportation infrastructure improvements, both within Langstaff and external to the site. Development triggers will be based on the following:

- Transit infrastructure (VIVAnext, Yonge Subway, GO Rail, 407 Transitway)
- External road connections, including Cedar Avenue
- Internal road connections, including rail crossings
- Soft infrastructure including car-sharing and bike-sharing

Transportation performance will also be tracked in conjunction with development using a number of measures:

- Ratio of jobs to residents
- Number of zero-car households
- Non-residential parking supply
- Non-automobile modal shares
- Transit capacity and service levels
- Number of auto trips entering and leaving site during the peak hour; off-peak and weekends.

The successful implementation of Langstaff as a sustainable community starts from day-one, by marketing the development as a place where people can live and work without cars.

1. INTRODUCTION

1.1 Project Overview

In May 2008, the Town of Markham commenced a year long process to develop a Land Use and Built Form Master Plan for the Langstaff area. For the purpose of this report, the Langstaff Area generally comprises the lands bounded by Highway 407 to the north, Yonge Street to the West, Bayview Avenue to the east and Holy Cross Cemetery to the south. Together with the Richmond Hill Centre, these lands are a major focal point for development within York Region, and have been designated as an Urban Growth Centre under the Provincial Growth Plan.

Given the significance of the Langstaff Area as a major growth node and transit hub, the land Use and Built Form Master Plan was designed from the outset to explore the full potential of this site from a development and sustainability perspective. Calthorpe Associates, one of the world's leading urban design firms, together with Ferris and Associates, were selected to lead the development of the Master Plan. This includes the preparation of the overall development master plan as well as the creation of urban design principles, implementation documents and a phasing plan. Under a separate process, IBI Group was retained by the Town of Markham to provide technical analyses, advice and recommendations on the transportation systems for Langstaff, and to prepare a supporting transportation report.

The development of the Land Use and Built Form Master has involved a large number of individuals including the Calthorpe Team, Members of Markham Council, Town of Markham staff, and the landowners and their representatives. A large number of meetings were held throughout the process including Visioning workshops, design charettes, workshops and public open houses. Transportation issues and interests were well represented in these consultation activities, if not central to many of the discussions.

The completion of the Land Use Master Plan and supporting documents represents the first step in an ongoing process. Following the completion of these documents and the review process, the Town of Markham will complete necessary Official Plan and Secondary Plan Amendments, which may include further refinements to the concept plan. Separate processes, including Environmental Assessments for major infrastructure, may also be required. In all of these follow-up activities, public and stakeholder input will be critical.

Major Consultation Activities Undertaken for Land Use Master Plan

Kick-Off Meeting (June 23, 2008)

Vision Workshop (July 15, 2008)

Transportation Summit (July 15, 2008)

Internal Design Charrette (August 21-22, 2008)

Places to Grow Conference (November 5, 2008)

Design Workshop 1 (November 6, 2008)

Transportation Workshop (January 9, 2009)

1.2 Purpose of Report and General Approach

The purpose of this report is to summarize the results of the transportation assessments undertaken in conjunction with the development of the land use and built form master plan, as well as the recommended infrastructure improvements and strategies to support the preferred development plan. This includes a review of existing site and area transportation conditions, projections of future

transportation demand for the site and the resulting network performance, proposed strategies for each transportation mode, and a recommended phasing plan.

The approach taken for the transportation analysis is very forward looking and consistent with the long period over which the Langstaff site will be developed – likely more than two decades. It reflects the reality that transit will be the dominant mode of transportation for residents and employees living and working in Langstaff, given the major investments in rapid transit that are planned for the area. In fact, it is estimated that the Langstaff area will have about five to ten times more transit capacity than auto capacity once all the rapid transit systems are in place, which includes the Yonge Subway, all-day GO Rail service, Highway 7 and Yonge Street transitways, and Highway 407 transitway. This differs from a traditional traffic impact study, where existing or planned road capacity is often the limiting factor to development densities.

Consistent with Langstaff's role as a transit hub and live-work community, a significant emphasis was placed on creating environments that facilitate walking and cycling. Similarly, throughout the study a number of innovative measures for reducing the need to travel (or at least avoid peak period travel) were identified and are included in the recommendations of this report.

During the next 20 years, there is a high probability that we will experience significant increases in the cost of fuel, major changes in transportation and information technologies and limitations on movement by private automobiles as a result of growing congestion. It is therefore essential that the Langstaff site is planned and designed to ensure transportation accessibility for its residents and employees without relying solely on private automobiles.

1.3 Report Structure

Following this introduction, this report includes the following chapters:

- Chapter 2 provides a description of the Langstaff area and surrounding land uses, the existing transportation systems, and relevant policies.
- Chapter 3 presents information on travel patterns, traffic volumes and roadway safety for the existing condition and the future background condition.
- Chapter 4 describes the approach to estimating background conditions for the transit and road networks.
- Chapter 5 describes the development of site generated traffic volumes and the modal split assumptions that were used to estimate future auto and transit trips. Case studies for other areas in the GTA are also referenced.
- Chapter 6 focuses primarily on future road network performance and recommended improvements to support the development of the Langstaff area. Various sensitivity tests involving adjacent developments are also presented.
- Chapter 7 presents a detailed strategy for the development of transportation systems in the area, including recommendations for all modes and supporting policies.
- A phasing plan for the development and necessary transportation improvements is developed in Chapter 8.

2. SITE CONTEXT

2.1 Existing Land Use

The Langstaff area has a total area of approximately 46.8 hectares (115.6 acres). The western portion, between Yonge Street and the CN railway tracks, is approximately 17.2 hectares (42.5 acres) and the eastern portion, between the railway tracks and Bayview Avenue, is approximately 29.6 hectares (73.1 acres). The eastern portion of Langstaff includes a strip of land between Langstaff Road East and Highway 407, with an area of approximately 1.9 hectares (4.7 acres), that is located in Richmond Hill, and an Environmentally Significant Public Open Space area (a wood lot), with an area of approximately 1.8 hectares (4.4 acres). An aerial view of the Langstaff site is shown in Exhibit 2.1.

Current land uses are primarily commercial or industrial oriented, although some single family residential dwelling are also present. Most of the existing land uses are types that generate fairly low trip volumes; examples include the Beaver Valley Landscaping company, a trailer sales store, various construction company activities and an automobile storage yard.

One distinct land use on the Langstaff site is the Langstaff GO Rail Station parking lot. At present, the Langstaff GO Station platform extends under Highway 407 and pedestrian access is possible from either the north side or south side of Highway 407. The lot currently contains parking space for approximately 1,041 cars, and is heavily used.

Another important land use adjacent to the Langstaff area is the Holy Cross Cemetery. This land use is significant in that it limits the options for vehicular connections to the south, but also because the trip characteristics for funerals and other functions are unique. In developing the land use and transportation plan, care was taken to account for cemetery needs and to respect privacy issues.

Exhibit 2.1: Aerial View of Langstaff Area

2.2 Existing Transportation Networks

2.2.1 REGIONAL TRANSIT

Langstaff has been designated a Mobility Hub in the Metrolinx Regional Transportation Plan and an Urban Growth Centre in the Ontario Places to Grow Plan largely because of its unparalleled access to high quality rapid transit. The high levels of employment and residential density being proposed for the area can only be justified under the assumption that a high percentage of people will use transit to enter and exit the site, and use transit and active forms of transportation to move around within the site.

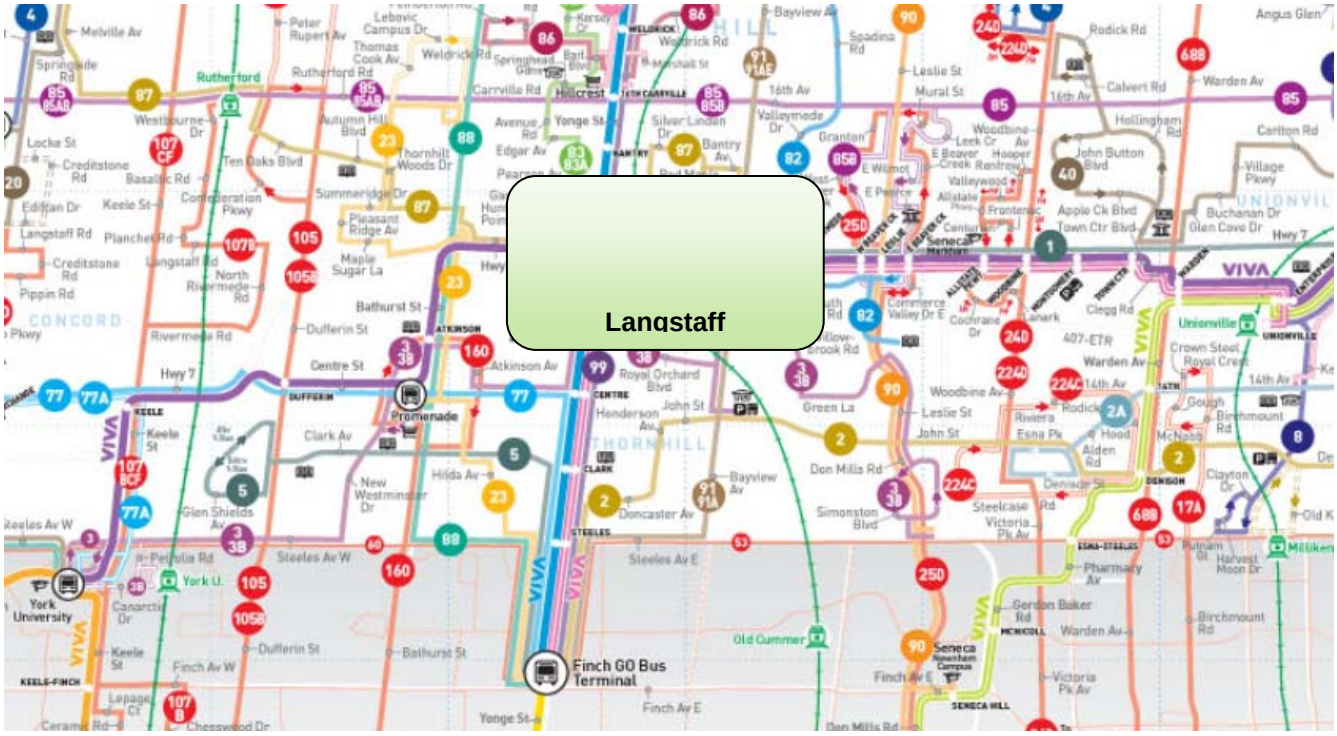
Currently, Langstaff is served by York Regional Transit on Highway 7 and Yonge St.; by VIVA Rapid Transit with services along Highway 7; by GO rail, with service from Langstaff GO station to Toronto Union Station; and by GO bus, with express service along Highway 407 and direct connections to Oshawa and York University. All transit services connect directly with the Langstaff / Richmond Hill Centre transit terminal. A transit map of the area is shown in Exhibit 2.2, and a table summarising the existing transit routes serving Langstaff and their current service frequencies is shown in Exhibit 2.3.

Exhibit 2.2: Existing transit routes serving Langstaff

Route	Connections	AM Peak Period Service	Mid-day Service	AM Peak Period Capacity
YRT Yonge local bus	Finch subway station to Bernard terminal via Yonge St. and Richmond Hill Centre	Every 12 minutes	Every 20 minutes	275 passengers / hour[1]
YRT Highway 7 local bus	Richmond Hill Centre to Markham Stouffville Hospital	Every 20 minutes	Every 30 minutes	165 passengers / hour[1]
VIVA Purple rapid transit bus	York University to Markham Stouffville Hospital via Hwy. 7, Unionville GO station and Richmond Hill Centre	Every 15 minutes	Every 15 minutes	288 passengers / hour[2]
VIVA Pink rapid transit bus	Unionville GO station to Finch subway station via Highway 7 and Richmond Hill Centre	Every 8 – 15 minutes	-	288 - 540 passengers / hour[2]
VIVA Blue rapid transit bus	Finch subway station to Newmarket GO terminal via Yonge St. and Richmond Hill Centre	Every 5 minutes	Every 12 minutes	864 passengers / hour[2]
Highway 407 GO bus	Oshawa to York University via Langstaff GO station	Every 30 minutes	Every 60 minutes	156 passengers / hour[3]
	Mount Joy GO station to York University via Langstaff GO station	Every 30 minutes	Every 60 minutes	156 passengers / hour[3]
	Pickering to York University via Langstaff GO station	Every 30 minutes	Every 30 minutes	156 passengers / hour[3]
Richmond Hill GO Train	Langstaff GO station to Toronto Union Station	4 Trains every 30 minutes	-	4,000 passengers / hour[4]
GO express bus to Union Station	Langstaff GO station to Toronto Union Station	Busses at 8:55 am and 9:00 am	Every 60 minutes until 2:30 pm (southbound)	114 passengers[5]

[1] assuming 55 passengers / bus (YRT loading standards, 40 foot bus)
[2] assuming 72 passengers / bus (VIVA loading standards, 60 foot bus)
[3] assuming 78 passengers / bus (double decker, seated)
[4] assuming 2,000 passengers / train
[5] assuming 57 passengers / bus (seated)

Exhibit 2.3: Transit map of Langstaff and surrounding area.



2.2.2 ROADS

Langstaff Road is the only continuous east-west roadway within the Markham portion of the Langstaff study area, connecting Yonge St. to the west with Bayview Avenue to the east. Signalized intersections are located at Yonge Street and Bayview Avenue. Langstaff Rd. currently has two traffic lanes (one in each direction) and provides access to the southern GO rail commuter parking lot.

Cedar Avenue is a north-south collector roadway that bisects the study area. Its northern terminus is currently at Langstaff Rd., however it is planned to be extended north of Hwy. 407 into Richmond Hill centre, providing access to Hwy 7. The grade separation to allow this connection was built into the construction of Highway 407. The measured opening width of the tunnel appears to be 26 m, which is sufficient for four traffic or transit lanes.

Yonge St. is a major north-south arterial roadway and serves as the western border of the study area, with major access to the Langstaff site provided via Langstaff Rd. Yonge St. has four travel lanes south of Langstaff Rd., and six travel lanes north of Langstaff Rd., providing access to Hwy. 407, Hwy. 7 and Richmond Hill centre. VIVA rapid transit service also operates along Yonge St., connecting Richmond Hill to the north with the Yonge subway to the south.

Aerial view looking west, showing Cedar Ave. (lower left) ending at Langstaff Rd. and the right-of-way for future extension underneath Hwy. 407 to highway 7 (far right). Also shown are the GO transit parking lot (centre) and access to the GO rail platform (top left).

Aerial view looking east, showing Langstaff Rd. (centre) meeting Yonge St. (bottom), and Yonge St. crossing under Hwy. 407 (bottom left).

Bayview Avenue is a major north-south arterial roadway and serves as the eastern border of the study area, with major access to the Langstaff site provided via Langstaff Rd. Bayview Ave. has four travel lanes south of Langstaff Rd., and six travel lanes north of Langstaff Rd, providing access to Hwy. 407 and Hwy. 7.

Highway 7 is a major east-west, six lane arterial roadway that runs north of the study area. Through the Richmond Hill area, from west of Yonge St. to east of Bayview Ave., Highway 7 operates partially like a limited access highway. Yonge St. and Bayview Ave. crossings are grade separated, with access only provided indirectly by secondary roads. Langstaff will be directly connected to Highway 7 in the future via Cedar Ave.

Highway 407 is a limited access toll highway that runs north of the study area, parallel to and directly to the south of highway 7. Access is provided via Yonge St. and Bayview Ave. The Highway 407 corridor will provide rapid transit service in the future, with a direct connection to the Richmond Hill Transit Centre and GO rail station.

Aerial view looking west, showing Langstaff Rd. meeting Bayview Ave. (bottom left) and Bayview Ave. crossing under Hwy. 407 (bottom right).

According to the draft York Region Transportation Master Plan (2009), Yonge St., Bayview Ave., Highway 7 and Highway 407 have been identified as requiring "Road Improvements to Support Transit". The specifics of these improvements have not been defined on a localized basis, but could include road widening to provide HOV lanes.

2.2.3 ACTIVE TRANSPORTATION

The Langstaff study area is currently not conducive to cycling or walking due to its low density and largely industrial land use. There is no cycling infrastructure in place at present, although Langstaff Rd. is a signed bicycle route. In addition to the development of the Langstaff area itself, the York Region Pedestrian and Cycling Master Plan proposes bike lanes on Bayview Ave. and Yonge St., and the Town of Markham Cycling Master Plan proposes a bike lane on Bayview Ave., both of which will connect the area to a larger network of proposed bicycle lanes.

2.2.4 SITE CONSTRAINTS AND OPPORTUNITIES

The Holy Cross Cemetery to the south and the Highway 407 to the north are significant physical barriers that will limit access to the Langstaff site. The potential extension of Cedar Ave. to the north underneath Hwy. 407 will help to connect Langstaff with Richmond Hill centre and mitigate the physical and psychological effects of the barrier to some extent.

Since major vehicular access to the site will be limited to either Bayview Ave. or Yonge St., transit will have to play a significant role in transporting people into and out of the Langstaff site. The proximity of the GO rail station, the planned 407 transit way, and the Richmond Hill transit hub provides an excellent opportunity to encourage transit use through transit oriented development and significantly increase the transit mode share beyond levels typically seen in Markham.

In addition to significant increases in transit use, complementary policies that limit peak hour automobile use, such as Travel Demand Management, may also have to be implemented to help alleviate the pressure on key automobile access points.

The CN rail line (used by GO transit) also presents a significant barrier to internal connectivity and circulation. It is important to provide multiple connections and route options in order to encourage walking and cycling, and to promote healthy, vibrant and safe neighbourhoods. The creation of a transit concourse partially covering the tracks will help to address this problem while strengthening the connection to the GO rail station and transit hub.

2.3 Relevant Transportation Policies

2.3.1 PROVINCIAL PLANS

The Government of Ontario's Growth Plan for the Greater Golden Horseshoe (GGH) designates the Langstaff area as one of 25 Urban Growth Centres (Places to Grow Growth Plan, 2006). The Growth Plan identifies Urban Growth Centres as areas that are to be planned:

- as focal areas for investment in institutional and region-wide public services, as well as commercial, recreational, cultural and entertainment uses;
- to accommodate and support major transit infrastructure; to serve as high density major employment centres that will attract provincially, nationally or internationally significant employment uses; and
- to accommodate a significant share of population and employment growth.

This Growth Plan also includes the following principles to guide how land development decisions are made:

- build compact, vibrant and complete communities;
- plan and manage growth to support a strong and competitive economy;
- protect, conserve, enhance and wisely use the valuable natural resources of land, air and water for current and future generations;
- optimize the use of existing and new infrastructure to support growth in a compact efficient form;
- provide for different approaches to managing growth that recognize the diversity of communities in the GGH;
- promote collaboration among all sectors – government, private and non-profit – and residents to achieve the vision.

The Growth Plan sets minimum density targets of 200 residents and jobs (combined) per hectare by the year 2031 for Urban Growth Centres.

In addition, Langstaff is part of the Richmond Hill/Langstaff Gateway Mobility Hub, identified by Metrolinx in its Regional Transportation Plan for the GGH (Regional Transportation Plan: The Big Move) for its strategic importance as a regional multimodal transportation hub. The Richmond Hill/Langstaff site is situated at the intersection of major north-south and east-west transportation corridors, serving as a key connection point between Toronto, Vaughan to the West, Markham to the East, and the rest of York Region along the Yonge North corridor. Langstaff is already served by GO rail as well as VIVA rapid transit service on Yonge St. and Highway 7, and planned transit improvements, including the 407 Transitway and the Yonge subway extension, will only solidify Langstaff's importance as a mobility hub.

Mobility Hubs are envisioned to be places that:

- provide a range of higher order transportation options
- have a high urban density and use intensity
- have spaces and connections designed with high levels of pedestrian priority
- use embedded technology to access real time information and provide seamless transfers
- are economically competitive, with significant development potential
- are vibrant and have a strong sense of place to support the transportation experience

To support the vision for Langstaff as an Urban Growth Centre and Mobility Hub, it will be redeveloped into high density, mixed use community that is transit oriented and supports walking, cycling for most short trips.

Developing Langstaff as a transit-oriented development will help contribute to meeting the Province's overall green house gas emissions targets. These targets, as outlined in Go Green - Ontario's Action Plan on Climate Change Plan are 15 per cent below 1990 levels by 2020 and 80 per cent below 1990 levels by 2050. These targets imply that current transportation behaviours will need to change radically over the coming decades.

2.3.2 REGION OF YORK

In 2002, York Region put into place a Transportation Master Plan (TMP) in place that served to establish a vision for how the transportation system will accommodate new growth in the region over the next 30 years. The stated goals of the TMP at that time were to create a transportation system that will accommodate growth by doubling transit use, provide more travel choice in order to better cope with traffic congestion, and slow the degradation of the environment caused by excessive automobile use. The plan also emphasised ensuring a high quality of life for future generations through reduced dependence on private automobiles, universal access to public transit and ensuring that public facilities are serviced by transit, better transit integration with the rest of the GTA, and ensuring that the transportation system is adequately funded and kept in a state of good repair.

The original TMP emphasised transit improvements that include the development of dedicated rapid transit services along the Yonge St., Jane St., Highway 7, and Warden Ave. corridors; significant expansion of GO rail service, including expansion of commuter parking lots; providing traffic signal priority and reserved lanes for transit; establishing a grid of supporting bus services; and providing rural bus routes. Significant highway extensions, extensive road widening, and construction of new bypass and major arterial roads are also emphasised in the TMP. The priorities established in the TMP update include:

- Transit improvements to enhance transit operations along arterial roadways, including queue jump lanes and transit signal priority
- Building and expanding BRT or LRT service on Steeles Ave., Hwy. 7, Major Mackenzie Dr., Bathust St., Warden Ave., Jane St., Yonge St. and Davis Dr.
- Improve rural transit links
- Implementing fare integration and pay-by-distance fare structure
- Developing mobility hubs
- Constructing HOV lanes on all 6-lane roads and limiting road widenings to 6 or 7 lanes

- Working with other local area municipalities to improve transit and promote transit oriented development along transit corridors
- Implement the regional pedestrian and cycling master plan

The recently released Draft Transportation Master Plan update builds on the recommendations identified in the 2002 TMP and adds a number of important policies related to Transportation Demand Management, land use planning and design, parking and infrastructure design. The plan also recognizes the need to partner with municipalities to implement the overall plan and supporting measures.

2.3.3 TOWN OF MARKHAM

The Town of Markham produced the Markham Transportation Planning Study (MTPS) in 2002 to address the problem of traffic congestion and the significant forecasted population and employment growth in Markham. The MTPS details a four-point plan to address and resolve key transportation issues, with the goal of achieving an overall 19% transit modal split by the year 2021 and a 30% transit modal split for higher density areas such as Markham Centre and Highway 7. The plan combines rapid transit, road network, and policy and education initiatives, with an emphasis on the following:

- Yonge St., Highway 7 and Warden Ave. rapid transit corridors, with a public-private partnership funding strategy in place
- Additional roads and road widening where required to support the transit network or improve connectivity while improving the efficiency of existing roadways and addressing environmental, heritage and new development issues
- Policy initiatives will support urban development that is balanced between employment and residential uses, improves transit and pedestrian accessibility to office and retail developments, and optimises land development potential through the establishment of a parking authority
- Information sessions and marketing initiatives will raise public awareness, which travel demand management strategies will be employed to reduce peak period congestion

As with York Region, the Town of Markham is also undertaking to develop a new Transportation Plan, referred to as the Markham Transportation Strategic Plan (MTSP). One of the key objectives of this plan will be to identify policies, programs and actions to ensure that decisions at the local level are supportive of region initiatives, such ensuring people can easily walk to regional rapid transit.

2.4 Other Studies

2.4.1 TOWN OF RICHMOND HILL

The Town of Richmond Hill completed a Transportation Master Plan in 2006 that will guide the Town through the next 20 years of development of its transportation system. The strategies it proposes are designed to manage growth and reduce traffic impacts by balancing forecasted population and employment growth with the mobility needs of the town's residents. Richmond Hill is centrally located and thus faces additional north-south and east-west pressures from both cross-regional commuter traffic and from development within the town itself. The goals and objectives are similar to other York Region Transportation Master Plans, with Richmond Hill placing particular emphasis on extension of the Richmond Hill GO rail line north to Bloomington Rd., construction of the highway 407 Transitway, a Yonge St. rapid transit line (BRT or LRT) from the subway north to Newmarket, extensive road widening with some provision for HOV lanes. The Richmond Hill TMP

also emphasises the importance of maintaining the character of the Richmond Hill downtown area along Yonge St. between Major Mackenzie Dr. and Elgin Mills Rd.

2.4.2 CITY OF VAUGHAN

A study of the area west of Yonge St. north of Steeles Ave. is currently being prepared for the City of Vaughan. The study lays out a vision for Vaughan that would see these areas develop into compact, transit and pedestrian oriented, complete neighbourhoods. The plan emphasises the importance of land use, and proposes to create lively main streets along Yonge St. and Steeles Ave. through intensification, transit supportive design and development, by encouraging a mixture of land use types, and creating appropriately scaled buildings. Cycling and walking would be encouraged by providing a safe network of streets and paths, creating excellent pedestrian amenities, and enhancing connections within and between neighbourhoods by extending the street grid network. Finally, a coherent streetscape character is promoted, while supporting interest and variety for pedestrians and protecting the area's existing assets such as the Thornhill heritage area.

A Transportation Master Plan for the City of Vaughan is also currently under development.

3. EXISTING TRANSPORTATION CONDITIONS

The Langstaff site is very well located from a transportation point of view. It is directly adjacent to Highways 407 and 7, which together form the major east-west travel corridor in York Region, and is also directly adjacent to Yonge St. and Bayview Ave., providing direct connections to Toronto and Vaughan to the south, and Richmond Hill, Aurora and Newmarket to the north. Furthermore, by virtue of its central location within York Region, Langstaff serves as transportation hub, connecting points east and west, and acting as a gateway to other destinations throughout the GTA.

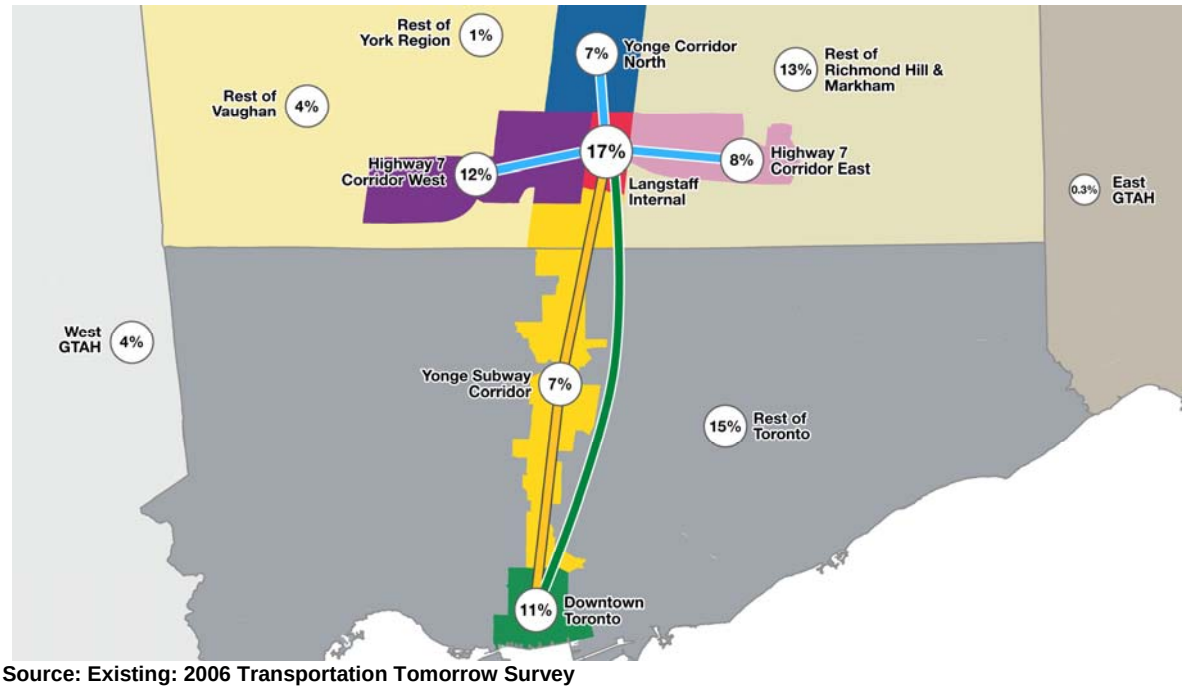
Although at present most travel to and from Langstaff is by automobile, there is enormous potential to exploit the region's location and excellent transit connections to significantly increase the transit mode share. Similarly, walking and cycling currently play only a very small role in transportation in the region, however non-motorised modes can potentially play a significant role in high density, mixed-use, transit oriented developments.

3.1 Current Travel Patterns and Modal Shares

Currently, about 55% of all trips originating from Langstaff and the surrounding area period are destined to York Region, and about 84% of all trips destined to Langstaff and the surrounding area originate in York Region. Of these trips, 47% and 56% of trips originate from or are destined to Richmond Hill, 31% and 20% originate from or are destined to Markham, and 18% originate from or are destined to Vaughan, respectively. The close proximity of most trips highlights the potential to increase the walk, bicycle and local transit mode shares. Approximately 10% of all trips originating from Langstaff are destined to PD1 of Toronto, and 30% of trips are destined to the rest of Toronto.

Morning peak period travel patterns are only slightly different. The distribution of current and projected trip destinations originating from Langstaff and surrounding area is shown in Exhibit 3.1. At present, 63% of trips are destined to the Yonge St. or Highway 7 transit corridors. As these corridors are already well served by transit and will be increasingly so in the future, there is tremendous potential to significantly increase the transit mode share in the future for trips originating from and destined to Langstaff.

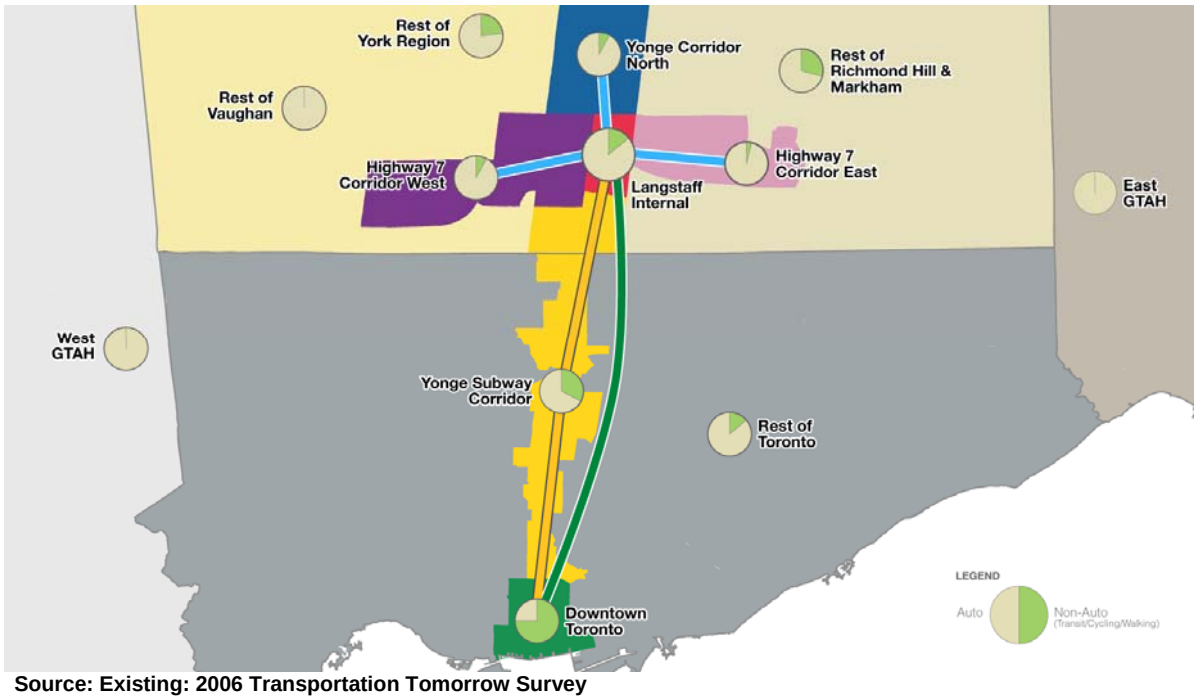
Exhibit 3.1: Current Trip Destinations Originating from Langstaff and Surrounding Area (AM Peak)



Source: Existing: 2006 Transportation Tomorrow Survey

At present, transit (YRT/VIVA + GO) handles approximately 12% of the morning Peak Period trips from the study area (Langstaff Gateway and immediate vicinity) while walk/cycle currently accounts for approximately 5% of all peak hour trips (GTA average is 8%). This is largely a reflection of the current land uses around Langstaff and the Richmond Hill Gateway which are fairly dispersed and low density. Mode shares by destination are shown for trips originating in Langstaff in Exhibit 3.2.

Exhibit 3.2: Current Mode Shares for Trips Originating from Langstaff and Surrounding Area (AM Peak)



Source: Existing: 2006 Transportation Tomorrow Survey

3.2 Existing Transit Volumes

The area surrounding Langstaff is currently well served by transit, and residual capacity remains even at present service levels. Morning peak period volumes on VIVA peak at approximately 660 passengers per hour in the southbound direction and approximately 271 passengers per hour in the eastbound direction. Based on current service levels and VIVA's loading standards of 72 passengers per 60 foot bus, VIVA is operating at about 57% capacity in the southbound direction and at about 47% capacity in the eastbound direction, in the morning peak hour. Approximately 9% of trips originating from the Langstaff and surrounding area in the morning peak period are made using local transit.

The Langstaff GO rail station is located directly adjacent to the Langstaff study area. The existing (2007) morning peak period volume on the Richmond Hill GO line is 4,159 people in the southbound direction, which corresponds to a 52% capacity utilisation based on GO operating 4 trains in the morning period at a capacity of 2,000 persons per train. Approximately 3% of trips originating from the Langstaff and surrounding area in the morning peak period are made using GO rail.

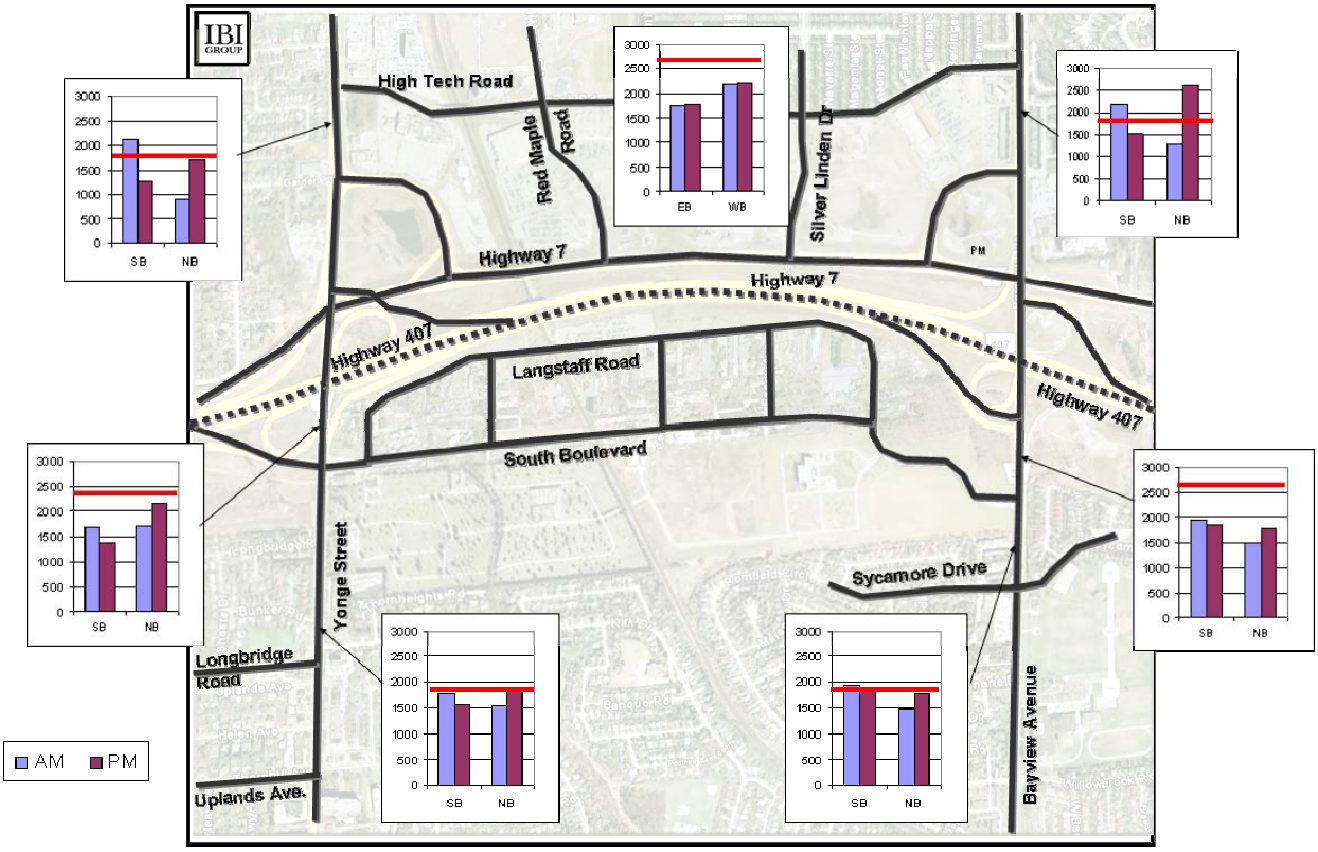
3.3 Existing Traffic Volumes

Many of the roads around the Langstaff area are already operating at or near their theoretical capacity. A map showing existing traffic volumes on selected road segments is presented in Exhibit 3.3. A map of existing turning movement volumes is provided in Appendix A.

Yonge St. and Bayview Ave. north and south of Langstaff are operating at their full theoretical capacity in the peak hour. However, Highway 7 can still accommodate more vehicles, suggesting that a strategy for the future road network would be to increase connections to Highway 7 so that it can act as a distributor to other north-south arterial routes. The segments of Yonge St. and Bayview Ave. between Highway 7 and the Langstaff site show slightly reduced traffic volumes compared with the segments to the north and south, possibly because many travelling southbound take Highway 407 rather than continuing south. It is also noted that there are three travel lanes per direction on these segments, whereas there are two travel lanes per direction to the north and south.

The observation that most roads in the Langstaff area are already near capacity supports improving transit service and trying to encourage most new trips generated by the Langstaff development to use transit or non-motorised modes, as well as implementing effective travel demand management policies for both site generated and non-site generated trips.

Exhibit 3.3: Existing Peak Hour Traffic Volumes in Relation to Capacity



Note: Each graph above shows the peak hour traffic volume heading northbound and southbound, or eastbound and westbound, in the AM and PM peak hours. The horizontal red line on each plot gives the theoretical capacity of the roadway based on the number of traffic lanes and the estimated capacity per lane.

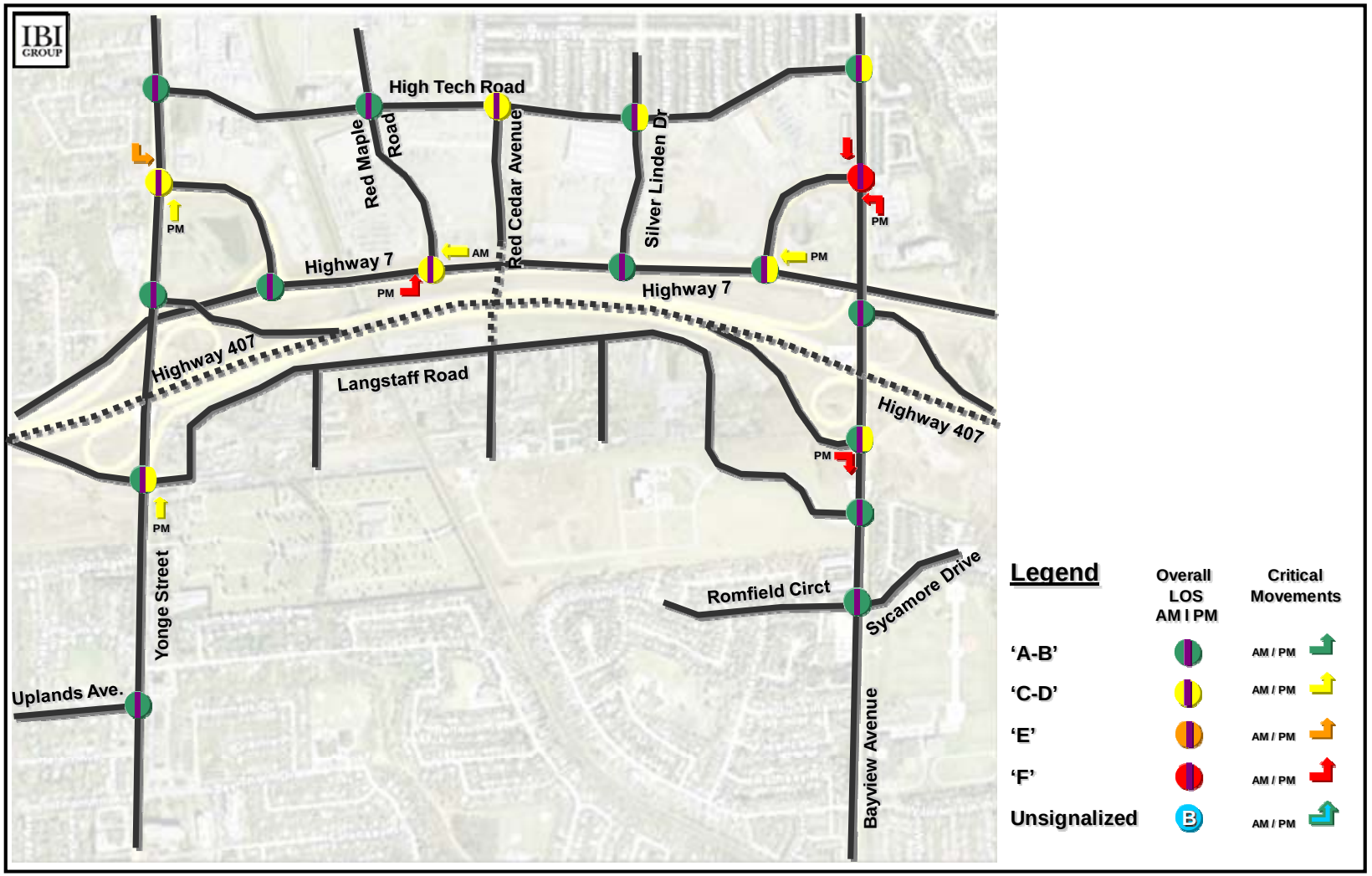
3.4 Existing Roadway Levels of Service

Capacity analyses of the signalized intersections were performed using the Highway Capacity Manual (2000) and Synchro software. A summary of the results is presented on Exhibit 3.4.

An analysis of the existing signalized intersection capacity confirms that most intersections within the study area are operating at acceptable levels of service ("D" or better), except at the Highway 7 Ramp Terminal intersection at Bayview Avenue. Overall volume to capacity (v/c) ratios range from 0.45 to 0.99 during the weekday a.m. peak hour, and from 0.46 to being at full capacity during the weekday p.m. peak hour.

At the Highway 7 Ramp Terminal at Bayview Avenue, the northbound left-turn and southbound through movements are subject to increasing delays, and are operating at or over capacity during the weekday a.m. and p.m. peak hours. Two eastbound left-turn movements at Highway 7 corridor also experience minor delays during design peak hours due to heavy westbound through traffic movements. Adjustments to signal timings may address some of these deficiencies in the short term.

Exhibit 3.4: Existing Level of Service at Study Area Intersections



4. FUTURE BACKGROUND TRANSPORTATION CONDITIONS

This section documents the planned road and transit improvements and resultant transportation performance for the background condition, regardless of the Langstaff development. It is noted; however, that the future conditions in this area will be dominated by what happens in Langstaff and Richmond Hill and the "background" conditions will change as a result.

4.1 Future Transit Service

Very high density levels are being proposed on the Langstaff site because of its unparalleled access to rapid transit and, as a designated Urban Growth Centre and Gateway Mobility Hub, Langstaff will see significant improvements to transit service over the next 15 - 25 years. As shown in Exhibit 4.1, there will be no less than five rapid transit lines serving the Langstaff Gateway in the longer term. An extension of the Yonge subway is planned to Richmond Hill Centre that will connect with the Langstaff GO rail station, providing rapid transit service south to Toronto. Planned Yonge St., Hwy. 7, and Hwy. 407 Bus Rapid Transit services are will improve transit connections west, east and north. In addition, full day, two way GO rail service will improve rapid transit service to downtown Toronto. The characteristics of these services and their approximate implementation schedule are shown in Exhibit 4.2.

If all of the rapid transit systems are developed as planned, the theoretical total transit carrying capacity will be on the order of 60,000 passengers per hour in the outbound, or "peak", direction. Even though this capacity would be difficult to achieve given downstream and upstream constraints, it is quite clear that the future carrying capacity of transit at Langstaff is at least several times (if not an order of magnitude) greater than the carrying capacity of single occupant vehicles. Given that a typical arterial traffic lane with traffic signal control has a capacity of approximately 900 vehicles per hour (1,000 persons at typical auto occupancies), 50 vehicle lanes of traffic exiting the Langstaff site[1] would need to be built to provide the equivalent automobile capacity that could be provided by rapid transit.

As noted previously, transit volumes along the Yonge St. and Highway 7 corridors are no where near their theoretical limits and it is reasonable to assume that the existing and proposed transit services will have sufficient capacity to handle the development levels proposed for the Langstaff and Richmond Hill Mobility Hub. The major challenge, as discussed later in this report, will be in providing enough circulation capacity for feeder transit services around the hub, as well as high quality pedestrian access. In addition, improved pedestrian access to the rapid transit services along Highway 7 is potentially an important issue due to the physical barrier that highway 407 represents. This will have to be accomplished though a combination of pedestrian bridges or tunnels and local transit feeder services via an extended Cedar Ave.

Exhibit 4.3 provides an estimate of future transit volumes and capacities in the absence of significant development on the Langstaff lands. These figures were estimated using the York Region Travel Demand Model, adjusted to take out the development in Langstaff. As shown, there is surplus capacity on most transit modes. The Viva Blue line will be approaching capacity as it enters and exits the Richmond Hill terminal, but this capacity can be expanded by reducing bus headways as demand warrants.

It should be noted that this analysis does not account for potential capacity limitations of the Yonge Subway south of Langstaff, though it is also conservative in terms of the southbound GO Rail frequency and capacity.

[1] Note that the development levels proposed do not require 50 lanes, nor will the full capacity of transit be required. The point of this statement is to simply illustrate the need to design the Langstaff site around transit.

Exhibit 4.1: Existing and Planned Regional Rapid Transit Systems

Exhibit 4.2: Characteristics of Planned Rapid Transit

					
MODE:	**VIVA Rapid Transit**	**Yonge Subway**	**GO Rail**	**York Region Transit**	**407 Transitway**
Existing Network Characteristics	Rapid Transit vehicles operating on Yonge Street and Highway 7	Subway terminates at Finch Station	4 trains southbound in AM, northbound in PM	Service on Yonge St and Bayview only; no service on Langstaff Rd.	Highway 407 GO Bus
Future Network Characteristics	Dedicated rapidways on Yonge Street North and Highway 7	Subway extended to Richmond Hill Centre	Frequent All-day service; potentially electrified	Continued service increases	Limited stop bus or rail service in dedicated right-of-way
Approximate Timing of Planned Improvements	2-5 years	5-10 years	On-going	On-going	Beyond 15 years
Approximate Capacity for Trips Exiting Site (Ultimate) - persons/hr	3,000 Northbound 3,000 Eastbound 3,000 Westbound	24,000+ Southbound	20,000 Southbound	variable	3,000 Eastbound 3,000 Westbound
Service Required for Ultimate Capacity	In each direction: 30 busses / hour 100 persons / bus[1]	20 trains / hour 1,200 persons / train	10 trains / hour 2,000 persons / train	-	In each direction: 30 busses / hour 100 persons / bus[1]

[1] **Maximum possible capacity, greater than current VIVA loading standards**

Exhibit 4.3: York Region Model 2031 Background Transit Boardings without Trips Destined to or Originating from Langstaff

Transit Service	Direction	Vehicle Capacity		Frequency / Hour	Total Capacity		Forecast Peak Load	V/C (Peak)
		Seating	Total		Seating	Total		
Viva - Blue	Inbound (Yonge St. South)	60	110	40	2,400	4,400	4,360	99%
	Outbound (Yonge St. North)	60	110	40	2,400	4,400	770	17%
Viva - Purple + Pink	Inbound (Highway 7 Westbound)	60	110	40	2,400	4,400	3,230	74%
	Outbound (Highway 7 Eastbound)	60	110	40	2,400	4,400	3,549	81%
Viva - Total	Inbound	60	110	80	7,200	13,200	7,600	58%
	Outbound	60	110	80	7,200	13,200	4,300	33%
Yonge Subway	Inbound (Northbound)	480	1,200	30	14,400	36,000	14,500	40%
	Outbound (Southbound)	480	1,200	30	14,400	36,000	1,800	5%
GO Rail	Outbound (Southbound)	1,600	2,000	3	4,800	6,000	2,300	38%
407 Transitway	Inbound (Westbound)	60	110	24	1,440	2,640	1,830	69%
	Outbound (Westbound)	60	110	24	1,440	2,640	1,900	71%
Local Transit	Inbound (Yonge St. South)	40	60	53	2,120	3,180	2,350	74%
	Outbound (Yonge St. North)	40	60	53	2,120	3,180	450	14%

Notes:
Only the peak direction is shown for transit services with multiple routes.
Total inbound or outbound transit trips generated by Langstaff were proportionally assigned a direction based on the 2031 fraction of boardings in each direction predicted by the York Region Model, by mode.
Rapid Transit / Subway trips generated by Langstaff were split into Rapid Transit (VIVA) and Subway based on the 2031 fraction of VIVA and Subway boardings predicted by the York Region Model.

4.2 Future Background Traffic Volumes

There are many variables that will affect the growth in demand for roadways in the study area over the longer term, including:

- Impact of transit improvements in changing modal shares;
- Development activity within the wider study area;
- Improvements made to increase traffic capacity on Yonge Street, Bayview or other parallel roadways;
- Impact of proposed travel demand management measures identified by York Region;
- Changes in fuel prices or other travel costs.

In addition to the proposed Langstaff Development, there are several planned changes near the study area that will generate additional traffic volumes:

- Development of the lands in the Richmond Hill portion of the Urban Growth Centre north of Highway 407, which is currently under study. Preliminary plans suggest a longer term growth of approximately 15,000 persons and 16,000 employees. The achievement of this growth is contingent on some of the existing large format uses and parking lots being redeveloped. It is also contingent on being able to develop on top of the transit hub and associated terminal facilities.
- A proposed park and ride lot west of Yonge Street and south of Highway 407 is currently being planned to accommodate approximately 2,000 parking spaces. This lot is being planned in conjunction with the Yonge Subway extension, and would replace the lot at the current Finch terminus. Many of the trips to/from this lot would be trips

that already use the Finch park and ride, and therefore the net impact on traffic volumes would be less than if they were entirely new trips.

- Development intensification along Yonge Street in the City of Vaughan

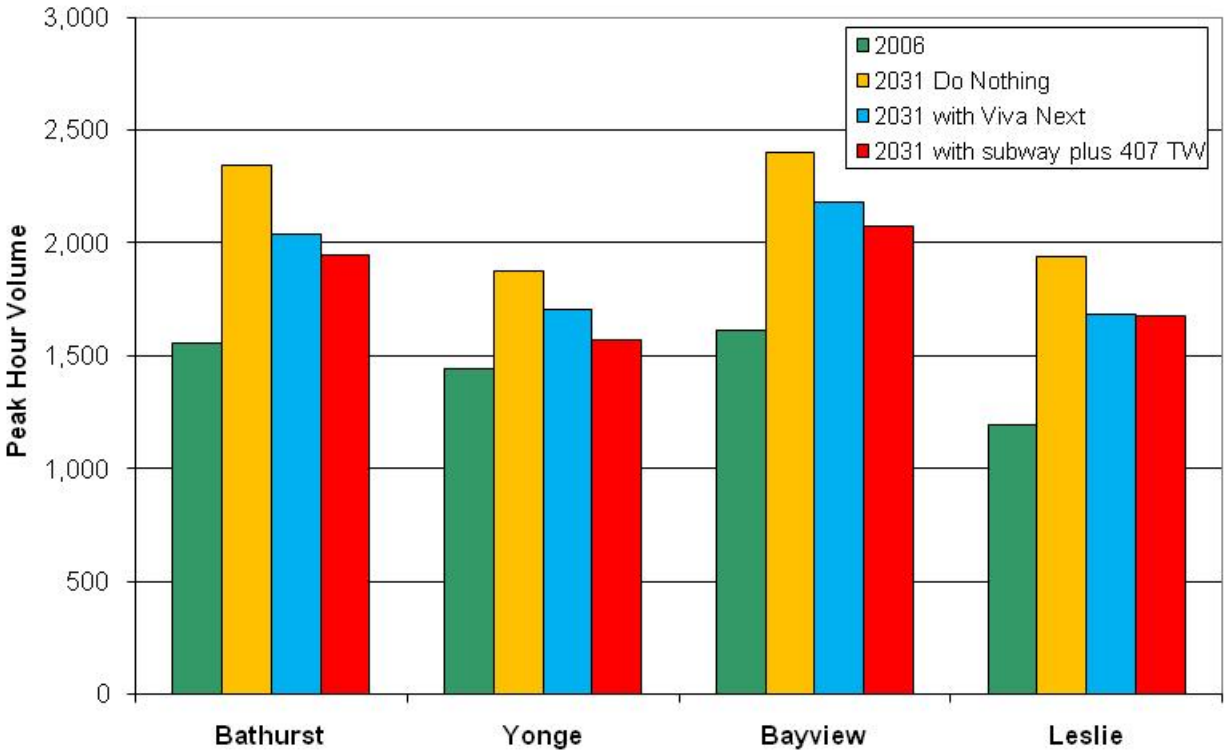
Given the above considerations, it was necessary to adopt a strategic approach to developing background traffic growth estimates. The York Region EMME/2 model was used to gain insights into traffic growth rates for Yonge Street and Bayview Avenue. Projected future year traffic volumes for the four major north-south roads within a larger study area around Langstaff are shown on Exhibit 4.4. These traffic volumes were estimated using the York Region EMME/2 Model and reflect several different scenarios. As shown, with the planned Yonge Subway and Highway 407 transitway in place, volumes on Yonge Street in 2031 are projected to be approximately the same as current volumes, while volumes on Bayview may increase slightly. This is a significant achievement given the projected growth in York Region, and recognizing the fact that any reductions in traffic on Yonge Street due to mode shifts to transit are likely to be off-set by traffic from other roads filling up this capacity.

For Yonge Street, for example, the model projects that shifts to transit will effectively off-set traffic growth. Note that the marginal difference between the VIVANext improvements vs. Yonge Subway improvements should not be taken as the projected subway impacts, as the EMME/2 model is not constrained to transit capacity. In addition, as noted previously, the model tends to re-assign traffic back to Yonge Street from other parallel roads as more people shift to the Yonge Subway.

For the purpose of estimating background traffic volumes, the following assumptions were made:

- Traffic on Yonge Street and Bayview Avenue will not increase except due to local trips from the Richmond Hill Gateway and the proposed park and ride.
- Traffic on Hightech Road will increase by an average of 1% per year (note: that this growth was also distributed to Yonge Street and Bayview in proportion to existing volumes). It is recognized that traffic volumes may be greater from the Richmond Hill Gateway depending on the pace of development/redevelopment. However, it is also recognized that some of this growth was included in the York Model and will be off-set by mode shifts to transit.
- Volumes from the proposed park and ride west of Yonge Street are not included in the base scenario, but are examined as a sensitivity test.

Exhibit 4.4: Southbound Traffic Volumes in the AM peak hour on Selected Arterial Roadways (South of Highway 407)



Note: The notional capacity for a four lane roadway (two lanes in each direction) is approximately 2,000 vehicles per hour in one direction (1,000 vehicles per lane).

5. LANGSTAFF DEVELOPMENT TRIP GENERATION

5.1 Development Program

Langstaff is being planned as a high density mixed use community and will be developed over many years. Exhibit 5.1 provides a breakdown of the planned development by land use type and phase. These development targets were arrived at using an iterative process which took into account the available transportation capacity and achievable mode shares by time period, municipal servicing capacity and the most logical staging of land development by block. The planned phasing strategy is discussed in more detail in Section 7. A detailed breakdown of land use by block and phase is provided in Appendix B.

Ultimately, the Langstaff site is being planned to accommodate approximately 15,000 residential units, mostly in the form of high-rise development, approximately 220,000 sq. m of office development and 36,000 sq. m of retail development. A small number of civic uses are also planned, which would include schools, libraries, community centres, etc.

To put these numbers in perspective, the Scotia Plaza Tower in Downtown Toronto has approximately 185,000 sq. m of office space, and 8,000 employees. Markville Mall in Markham has approximately 90,000 sq. m of retail space (or about three times what is planned for Langstaff). A typical 30 storey high-rise condominium has about 400 units.

Exhibit 5.1: Development Program and Phasing

Phase	Residential Units	Office GFA (m^2)	Retail GFA (m^2)	Civic GFA (m^2)
Phase One	4,973	33,600	7,285	6,145
Phase Two	3,653	132,710	8,135	5,355
Phase Three	6,514	51,544	20,252	1,775
Total	**15,140**	**217,854**	**35,672**	**13,275**

5.2 Forecasting Approach

The approach used to forecast travel demand to and from the Langstaff site follows the same general approach used for a typical traffic impact study, consisting of four major steps:

- Trip generation
- Trip distribution
- Modal split
- Trip assignment

The forecasting procedures are based on first principles due to the fact that the site will be developed over a long horizon period, and that the transit infrastructure serving the site will evolve along with travel behaviors. As a result, different modal split assumptions are adopted for different stages of development. In addition, the forecasting approach differs somewhat from a typical traffic study in that the modal split and trip distribution assumptions were specific to each major trip linkage and land use type, as opposed to the typical approach of adopting one set of mode splits for the entire site. This approach mimics a travel demand model approach (similar to the York region

Model), but allows greater flexibility in adjusting the assumptions to local site and land use characteristics, as well as policy directions such as trip self-containment and transit-oriented development.

The following sections describe the forecasting approach and major assumptions.

5.3 Trip Generation

Given the need to incorporate different assumptions on modal shares, it was necessary to estimate site trip generation on a person/employee basis first, prior to applying modal splits for auto, transit and non-motorized modes. This approach is supported by recent research conducted in the United States on transit-oriented development which found that[2]:

- TOD projects averaged 44% fewer vehicle trips than estimated by "Industry-standard" trip rates.
- Transit use for TODs is up to 5 times greater
- 3.5 times more walking than in comparable urban developments
- Parking requirements are significantly less for TOD developments, further reducing vehicle trip rates. TOD households are almost twice as likely not to own a car and own almost half the number of cars as other households

Many of these results are based on the fact that transit oriented developments tend to generate more internal, or short distance, trips, which are more conducive to walking, cycling and transit. Thus rather than applying assumed, uniform modal splits up front, in the trip generation stage, they are applied after the fact. This allows the mode splits to be adjusted depending on the destination of the trip. Trips destined to a transit corridor, such as a subway line or downtown Toronto, for example, will have a higher transit mode share, and internal trips will have a higher non-motorised mode share. Both cases are expected to dominate trip distribution from Langstaff, especially internal trips due to numerous live / work opportunities.

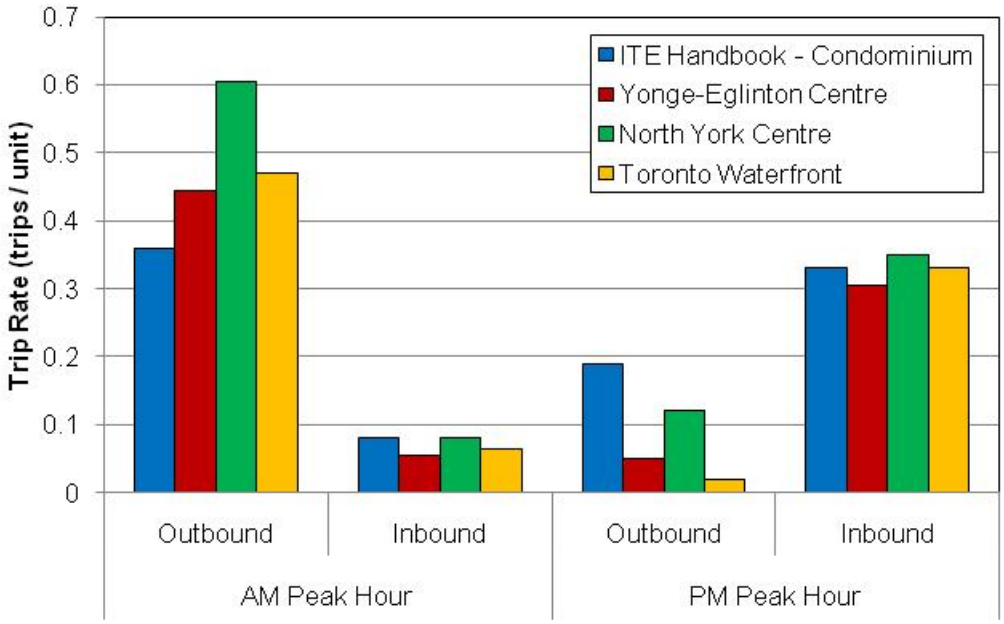
5.3.1 RESIDENTIAL USES

A number of sources were reviewed in order to predict the likely person trip generation for residential uses including the ITE Trip Generation Handbook and data from the Toronto Transportation Tomorrow Survey. One of the considerations in developing an appropriate trip rate is the type of residential development. In general, higher density developments tend to attract more single family dwellers, so trips per unit tend to be lower than for a single detached family dwelling.

Based on the data shown on Exhibit 5.2, it can be concluded that an morning peak hour outbound trip rate, or the trip rate for people leaving the Langstaff site, of 0.5 person trips per unit would appropriately represent the type of development considered for Langstaff. In combination with the mode split assumptions, this rate was then used to calculate a vehicle trip rate for the purpose of estimating site traffic volumes.

[2] Vehicle Trip Reduction Impacts of Transit-Oriented Housing, Robert Cervero, G.B. Arrington, Journal of Public Transportation, Vol. 11, No. 3, 2008

Exhibit 5.2: Comparison of Residential Trip Generation Rates



Note: ITE rates are vehicle trip rates whereas the case study rates are person trip rates. Source for Yonge-Eglinton, North York and Toronto Waterfront is the Transportation Tomorrow Survey.

5.3.2 NON-RESIDENTIAL USES

Unlike residential uses, it is more difficult to extract a true trip rate for office and other uses from the TTS survey as GFA by traffic zone is not available. Trip rates for retail are also known to be under-reported in the TTS as many trips may be due to people living outside of the survey area. As a result, the ITE Trip Generation Handbook rates were used as a starting point for estimating person trip rates for non-residential uses.

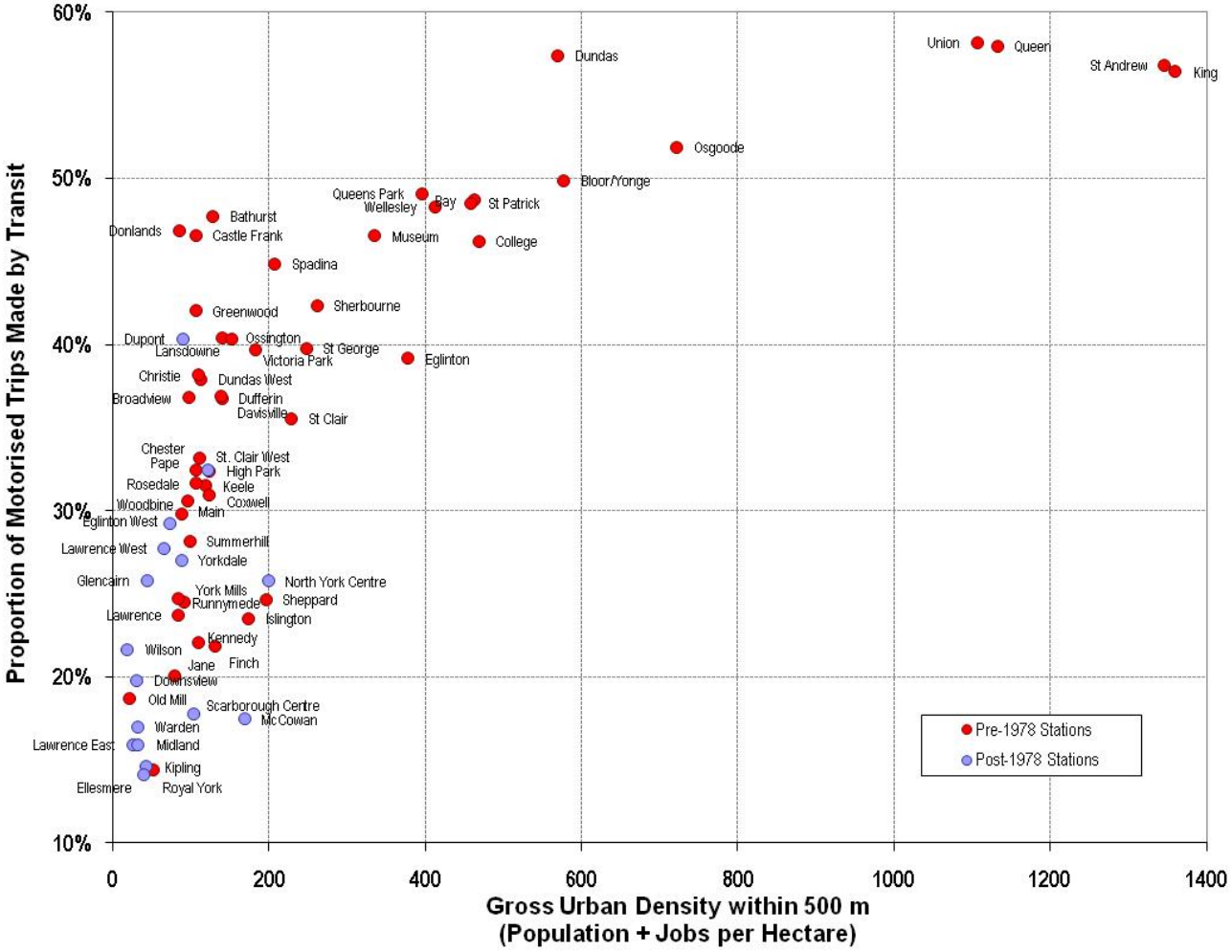
As stated in the user guide accompanying the ITE Trip Generation Manual, "Data were primarily collected at suburban locations having little or no transit service, nearby pedestrian amenities, or travel demand management programs." Therefore, it can be assumed that the vehicle trip rates for office and retail developments are similar to the person trip rate. While this may result in slightly lower trip generation rates for commercial developments, it should be noted that most of the retail on the site will be supported by local residents having the option of walking.

5.4 Modal Split Analysis

Transportation infrastructure and associated travel choices will change considerably over the next decade in the Langstaff area and it is important to carefully consider the impacts of these changes on travel demand patterns. As part of this study, a considerable amount of research was undertaken to determine how improvements in transit infrastructure as well as the promotion of transit-oriented development will impact the use of different modes.

As shown on Exhibit 5.3, there is a well established correlation between transit infrastructure, density and propensity for transit use. Several of the existing subway stations in Toronto are approaching a 60% transit modal share in the morning peak hour when measured as a percentage of total motorized trips.

Exhibit 5.3: Transit Mode Share as a Function of Gross Urban Density for the area within a 500 m radius of TTC Subway Stations.



Of course, other factors affect transit mode share, such as automobile ownership. Such factors also, however, tend to be correlated with density as well. A comparison of the non-auto mode share for a few GTA neighbourhoods is shown in Exhibit 5.4 to illustrate the potential for Langstaff. Very high transit mode splits have been achieved in neighbourhoods of comparable or lower density. North York Centre offers an excellent example of what can be achieved with a relatively high density area on a subway line in an otherwise suburban setting. Even Glencarin Station area, which is fairly low density and comprised of suburban type development, achieves a non-auto mode share of 30%.

Exhibit 5.4: Non-auto Mode Share and Characteristics of GTA Neighbourhoods

Neighbourhood	Existing Gross Density (persons+jobs/ hh)	Non-automobile mode share (excludes auto passenger)	Auto ownership (automobiles / household)
Langstaff and surrounding area (Existing)	25	21%	1.7
Glencarin Station	25	30%	1.2
North York Centre	190	43%	1.2
Toronto Waterfront	350	49%	0.9
Cityplace	400+	52%	0.8
Yonge & Eglinton	300	56%	1.0

Source: Based on 2006 Transportation Tomorrow Survey data

As noted previously, the approach adopted for this study was to apply different modal shares to different trip linkages and land uses. For example, it can be assumed that from trips from Langstaff to downtown Toronto would have a higher GO Transit mode share and rapid transit mode share than a trip to Durham Region. In addition, the mode split potential for each trip linkage is effectively weighted by the relative proportion of trips for that linkage (e.g. Downtown Toronto will account for about 11% of all work trip destinations for people living in Langstaff in the future, based on model projections).

This approach was executed within a large spreadsheet. Different assumptions were adopted for each land use and project phase. For the initial phase of development, modal shares were assumed to be similar to existing trends. Transit and non-motorized mode shares were increased progressively for each development phase, consistent with the evolution of transit infrastructure and service levels. In addition to adjusting modal shares, the regional trip distribution was also adjusted. Specifically, the percentage of trips remaining on in the Langstaff area was increased with each phase of development, reflecting the potential for live-work opportunities. Trip distribution was otherwise based on existing travel patterns, which were not significantly altered from current conditions as shown in Exhibit 3.1 except to account for the increase in internal trip capture.

Exhibit 5.5 summarizes the results of the mode split assignments for each phase and general land use type. It is noted that the modal shares for Phase 3 were applied to the Phase 1 and Phase 2 development totals in a cumulative fashion. This assumes that the initial development phases will be designed to take advantage of transit opportunities (or discourage auto ownership and use) as the site builds out.

In order to validate the mode split assumptions, the aggregate results for residential based trips are compared to other neighbourhoods in the GTA, as shown on Exhibit 5.6. For all modes, there is a reasonable comparable example in the GTA where the projected mode share for Langstaff has been achieved or exceeded. As shown in Exhibit 5.6, it is projected that in Phase 3, 66% of all residential based trips from Langstaff will be made using modes other than single occupant vehicles. This can be considered to be realistically achievable provided:

- The Yonge Subway extension to Richmond Hill Centre is in place
- There are high levels of internal transit provided to get people to and from subway and other rapid transit stations
- Parking supply is provided at levels that are consistent with the mode split assumptions

Exhibit 5.5a: Outbound Trip Mode Shares During Weekday AM Peak Hour (Residential Land Use)

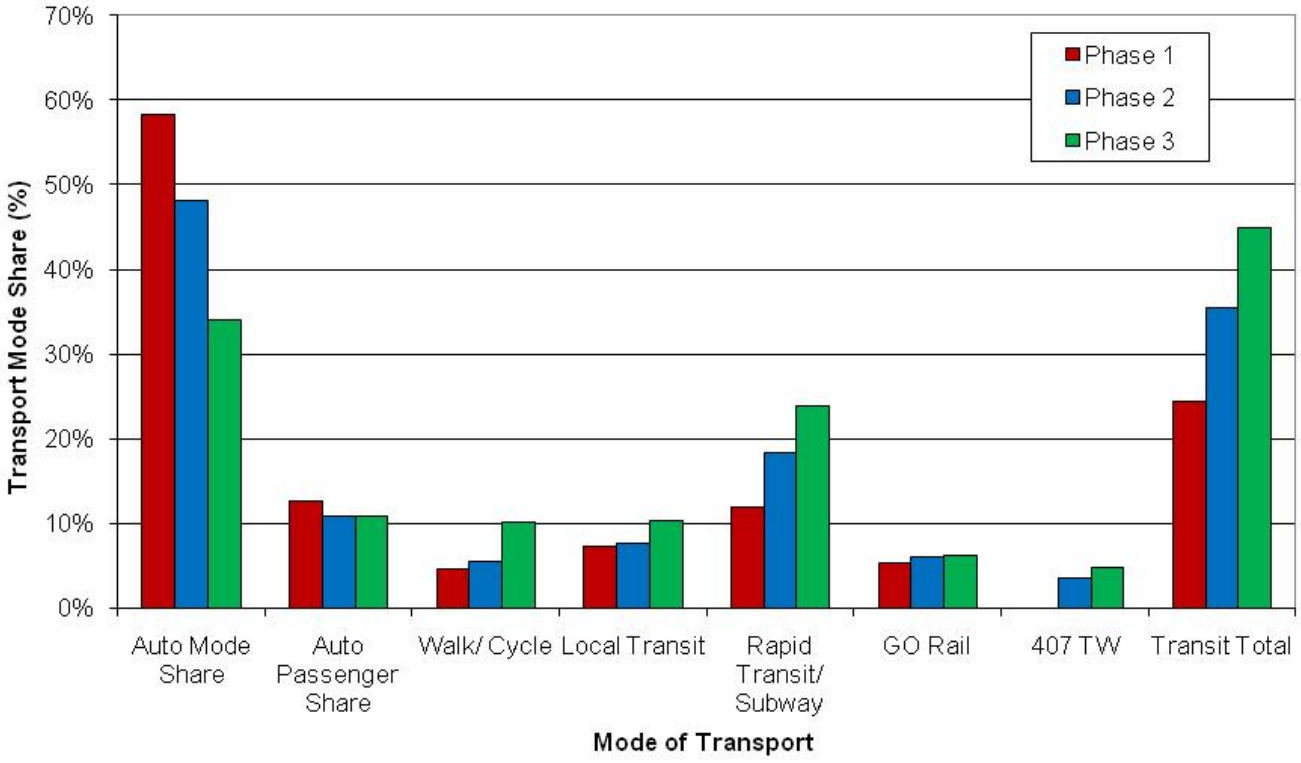


Exhibit 5.5b: Inbound Trip Mode Shares During Weekday AM Peak Hour (Commercial/Retail Land Use)

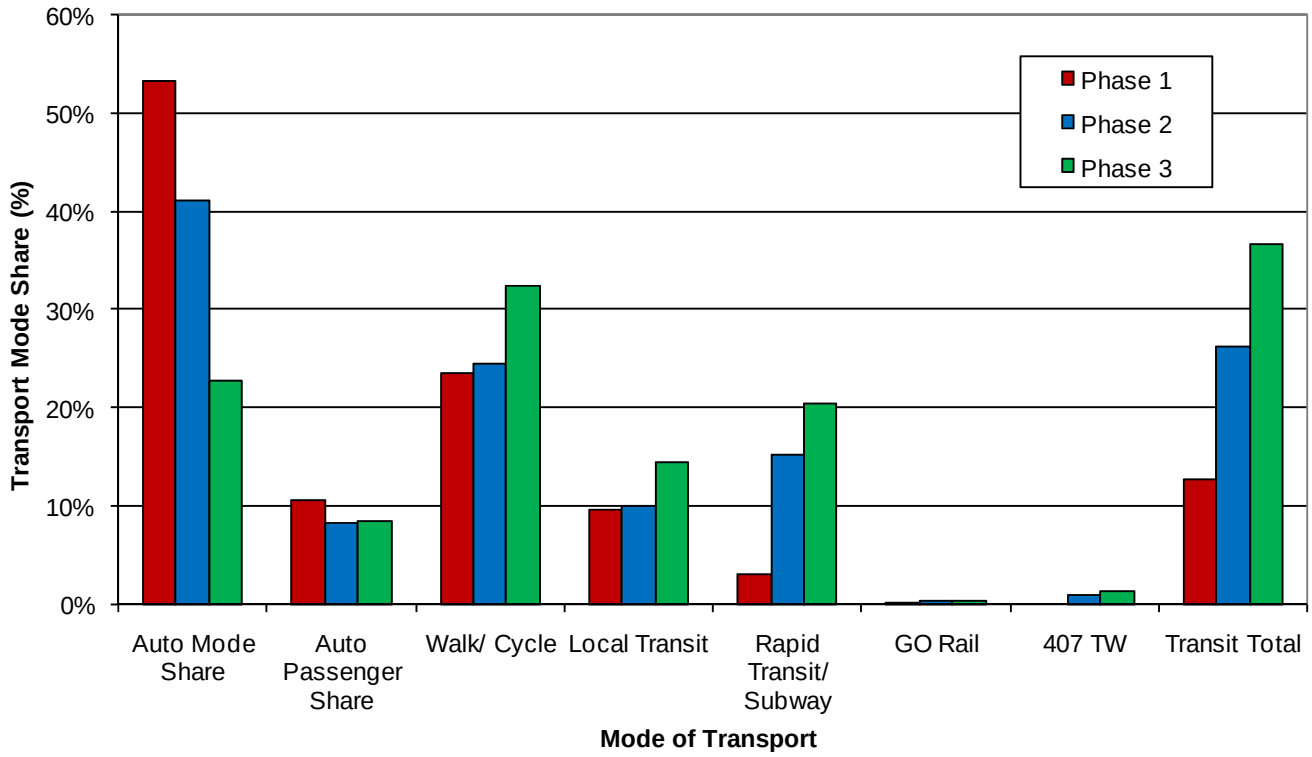


Exhibit 5.5c: Inbound Trip Mode Shares During Weekday AM Peak Hour (General Office Land Use)

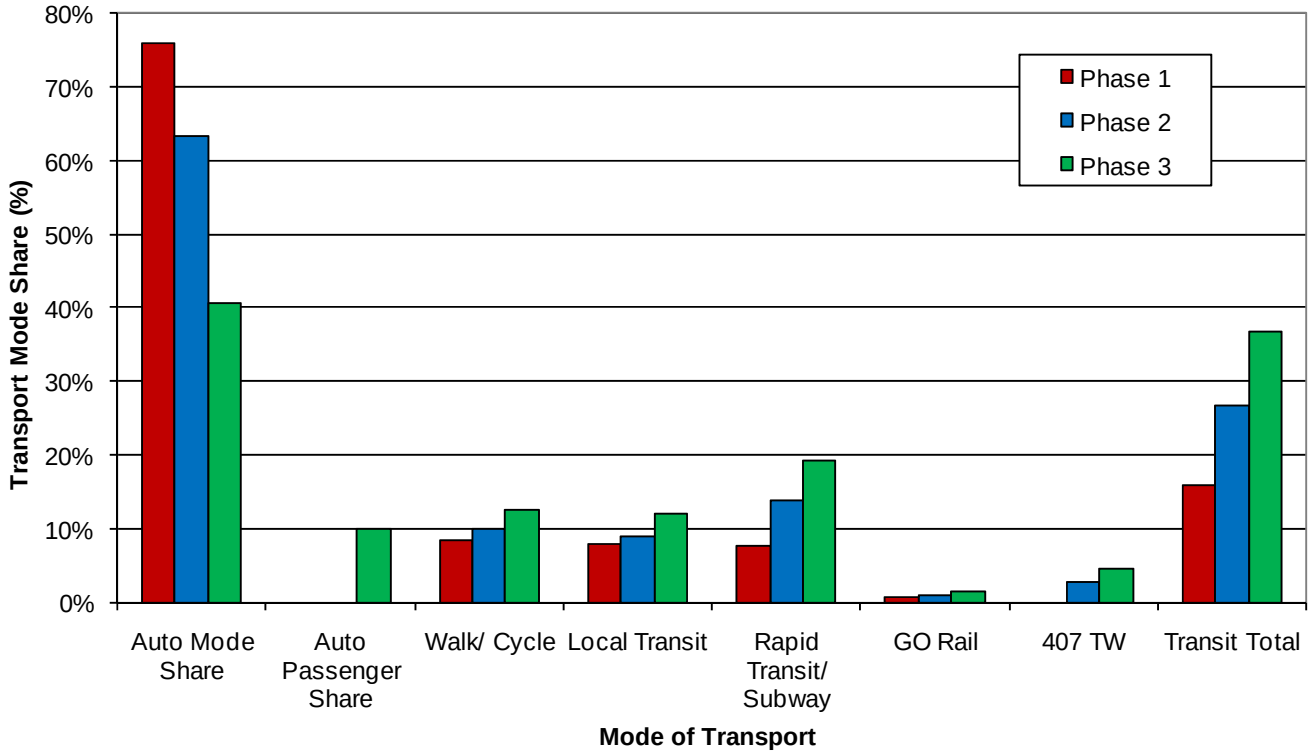


Exhibit 5.6: Comparison of Mode Shares to Examples from the GTA

Mode	Mode Share for Residential Trips (Phase 3)	Examples from GTA (AM peak hour travel)
Walk/Cycle	10%	15% of people in St. Lawrence neighbourhood walk or bike
Subway/Rapid Transit	24%	25% of residents in North York Centre use the subway in the morning peak hour
Auto passenger (car share)	11%	18% of people living in Langstaff and the surrounding area presently share a ride to work
GO Rail/Hwy 407	6% GO Rail + 5% 407 TW	12% of all work trips by Oakville residents are made using GO rail
Local Transit	10%	13% of people in Markham currently use local transit to get to work
Total Sustainable Modes (including auto passengers)	66% (1)	
Total Auto Driver	34%	30% of trips made by residents in the central area of Toronto are made by auto drivers

(1) Mode shares vary by land use and direction. The figures above are for residential uses only.

5.5 Summary of Site Generated Trips

Exhibit 5.7 provides a summary of the combined results of the trip generation and modal split analysis, and the resultant trips by development phase. Modal shares represent the average of the individual mode shares by trip linkage and are shown for the future 2031 horizon. That is, the Phase One results are for the full-build out scenario. More detailed results are provided in Appendix B.

Under the full build-out scenario, it is estimated that there will be approximately 8,400 person trips exiting the area in the morning peak hour of which 64% (approximately 5,400) will be made by sustainable modes (walking, cycling, transit and auto passenger) while the remaining 36% (approximately 3,000 trips) will be made by auto drivers.

Exhibit 5.7: Trip Generation Summary

Phase #	Land Use	Development Size (sq. m.)	No. of Units	Average Auto Driver Mode Split (%)[1]	Sustainable Mode Split (%)[1]	Auto Vehicle Trip Ends						Other Trips (Auto Passenger, Transit, Walking, Cycling)					
						Weekday AM Peak Hour			Weekday PM Peak Hour			Weekday AM Peak Hour			Weekday PM Peak Hour		
						In	Out	2-way	In	Out	2-way	In	Out	2-way	In	Out	2-way
Phase One	Residential Parcel	-	4,973	36%	64%	108	899	1,007	648	216	863	190	1,587	1,777	1,143	381	1,524
	Commercial/ Retail	7,285	-	25%	75%	19	13	33	69	65	133	62	39	101	196	211	407
	Office	33,600	-	44%	56%	195	32	227	42	170	212	265	33	298	38	230	268
	Other (Civic Uses)	6,145	-	26%	74%	15	13	28	23	29	52	50	29	79	50	95	145
	Total (Phase 1)	**47,030**	**4,973**	**36%**	**64%**	**338**	**958**	**1,295**	**780**	**479**	**1,260**	**567**	**1,688**	**2,255**	**1,427**	**917**	**2,344**
Phase Two	Residential Parcel	-	3,653	36%	64%	83	661	744	476	167	642	136	1,166	1,302	839	272	1,111
	Commercial/ Retail	8,135	-	26%	74%	28	17	45	86	91	176	78	50	128	245	254	499
	Office	132,710	-	44%	56%	733	118	851	158	654	812	972	112	1,084	157	871	1,028
	Other (Civic Uses)	5,355	-	29%	71%	27	25	52	24	28	52	76	54	130	44	77	121
	Total (Phase 2)	**146,200**	**3,653**	**38%**	**62%**	**871**	**821**	**1,692**	**743**	**939**	**1,682**	**1,262**	**1,382**	**2,644**	**1,285**	**1,474**	**2,759**
Phase Three	Residential Parcel	-	6,514	34%	66%	134	1,108	1,242	798	269	1,067	256	2,149	2,405	1,547	513	2,060
	Commercial/ Retail	20,252	-	21%	79%	44	32	76	167	149	316	149	91	240	613	596	1,209
	Office	51544	-	42%	58%	300	51	351	67	263	330	440	49	489	68	387	455
	Other (Civic Uses)	1,775	-	25%	75%	4	4	8	8	9	17	15	13	27	17	32	49
	Total (Phase 3)	**73,571**	**6,514**	**33%**	**67%**	**483**	**1,195**	**1,677**	**1,040**	**690**	**1,729**	**860**	**2,302**	**3,161**	**2,246**	**1,529**	**3,774**
All Phase	Residential Parcel	-	15,140	35%	64%	326	2,668	2,994	1,921	651	2,572	583	4,902	5,485	3,529	1,166	4,695
	Commercial/ Retail	35,672	-	23%	76%	91	63	154	321	304	625	289	180	469	1,055	1,061	2,115
	Office	217,854	-	43%	57%	1,228	201	1,429	267	1,086	1,353	1,677	194	1,871	263	1,489	1,752
	Other (Civic Uses)	13,275	-	27%	73%	47	41	88	54	66	120	141	96	236	111	205	316
	Total (All Phase)	**266,801**	**15,140**	**36%**	**64%**	**1,691**	**2,973**	**4,664**	**2,563**	**2,108**	**4,671**	**2,689**	**5,372**	**8,061**	**4,958**	**3,919**	**8,878**

5.6 Trip Distribution

As discussed above, the distribution of site generated vehicle trips to regional origins and destinations is based on observed travel data (TTS data) and the Region of York model projections. These trip distributions have been refined and extended to capture distinct characteristics of travel patterns for different types of land use. The developed distributions also assume exclusive nature weekday peak hour trip patterns as well as discrete characteristics of travelling directions.

Exhibit 5.8 shows the total distribution of trips generated by residential land uses to or from various regional destinations or origins for the three phases of development, while Exhibit 5.9 shows the distribution for Residential, Commercial/Retail, and General Office land uses for phase 3 only. Note that the distribution of trips to the Langstaff, Richmond Hill and Yonge subway areas are increased under Phase 2 and 3, consistent with the introduction of the Yonge Subway and the likelihood of increased trip self-containment.

Exhibit 5.8: Total Trip Distribution for Residential Land Uses

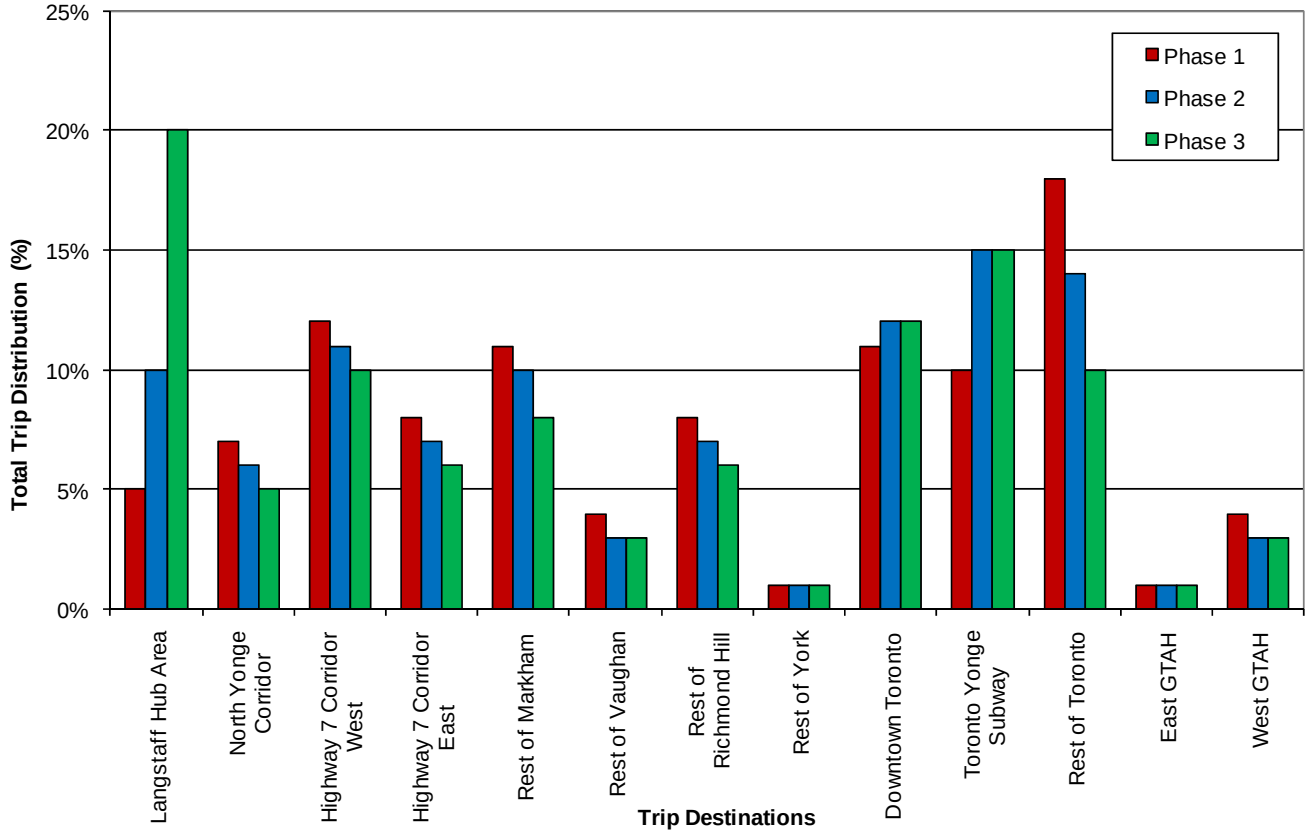
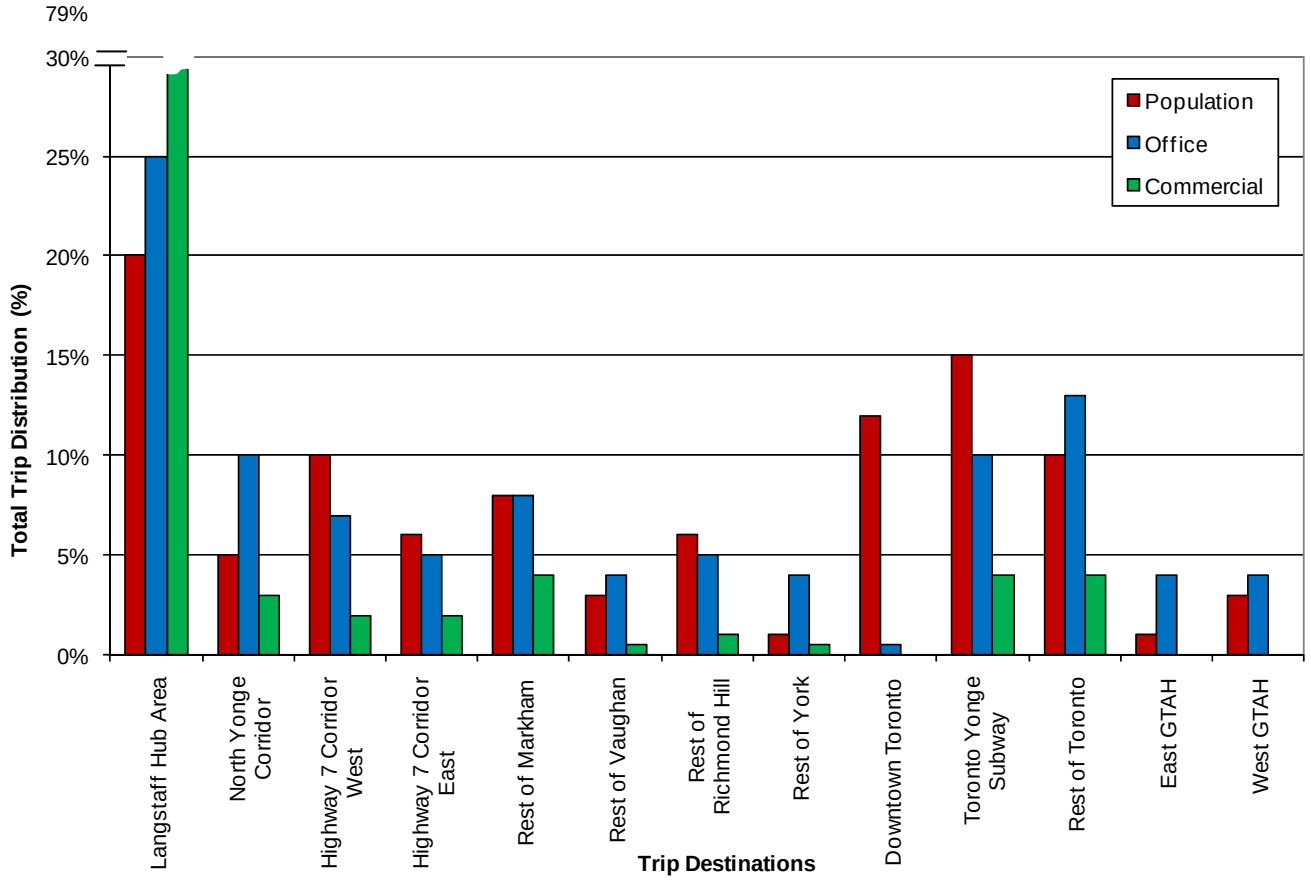


Exhibit 5.9: Phase 3 Total Trip Distribution for Residential, Commercial and Office Land Uses



In order to be able to realistically determine the overall mode splits for Langstaff, different mode splits were assumed depending on the destination or origin of the trip. These, in combination with the total trip distribution to and from each origin or destination, then determine the overall mode split. Mode split assumptions by destination were based on existing mode splits by destination obtained from TTS data, and modified to match expected results of policy initiatives to promote walking and cycling for internal trips, and transit use for trips destined to and from transit corridors in parallel with improved transit infrastructure, service and accessibility to and from the site. Mode splits by trip origin or destination are shown for residential trip generation, commercial/retail land use, and general office land use in Exhibits 5.10, 5.11 and 5.12, respectively, in the peak direction of travel.

Exhibit 5.10: Phase 3 Outbound Mode Split for Residential Trip Generation

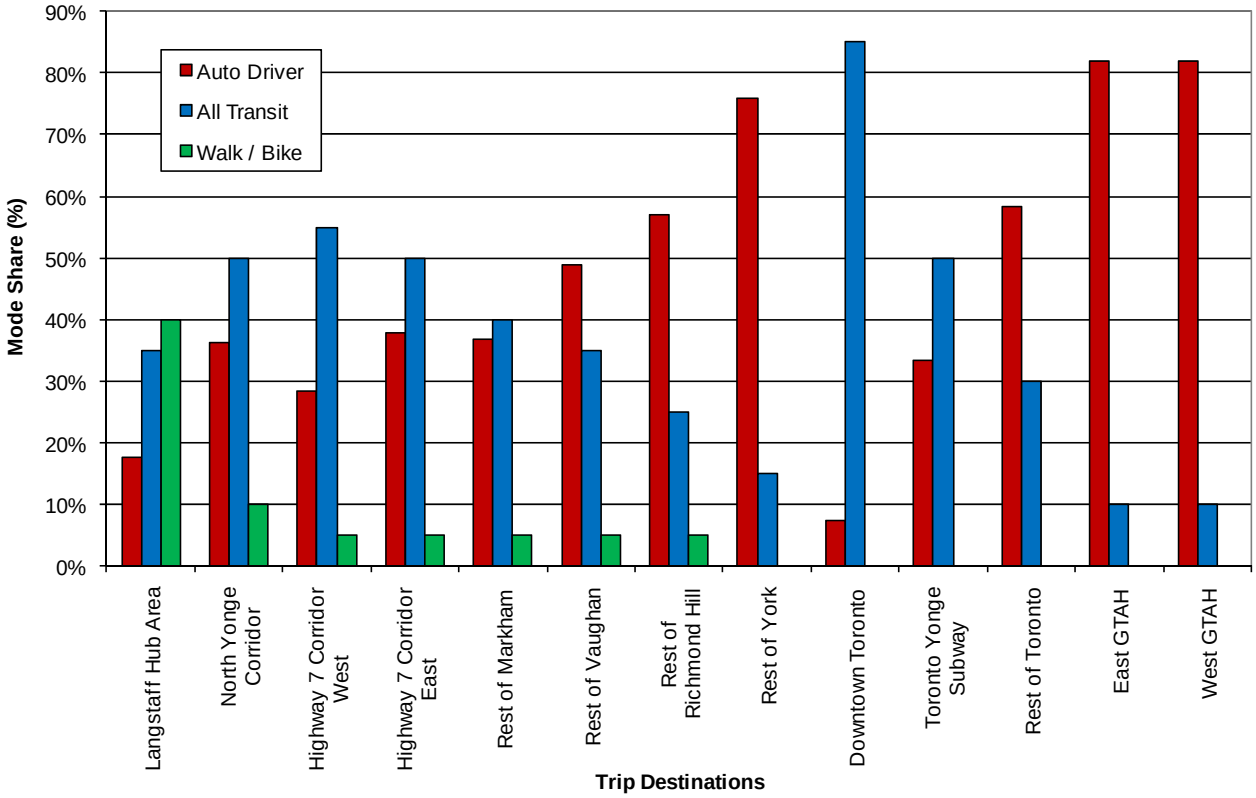


Exhibit 5.11: Phase 3 Inbound Mode Split for Commercial/Retail Trip Generation

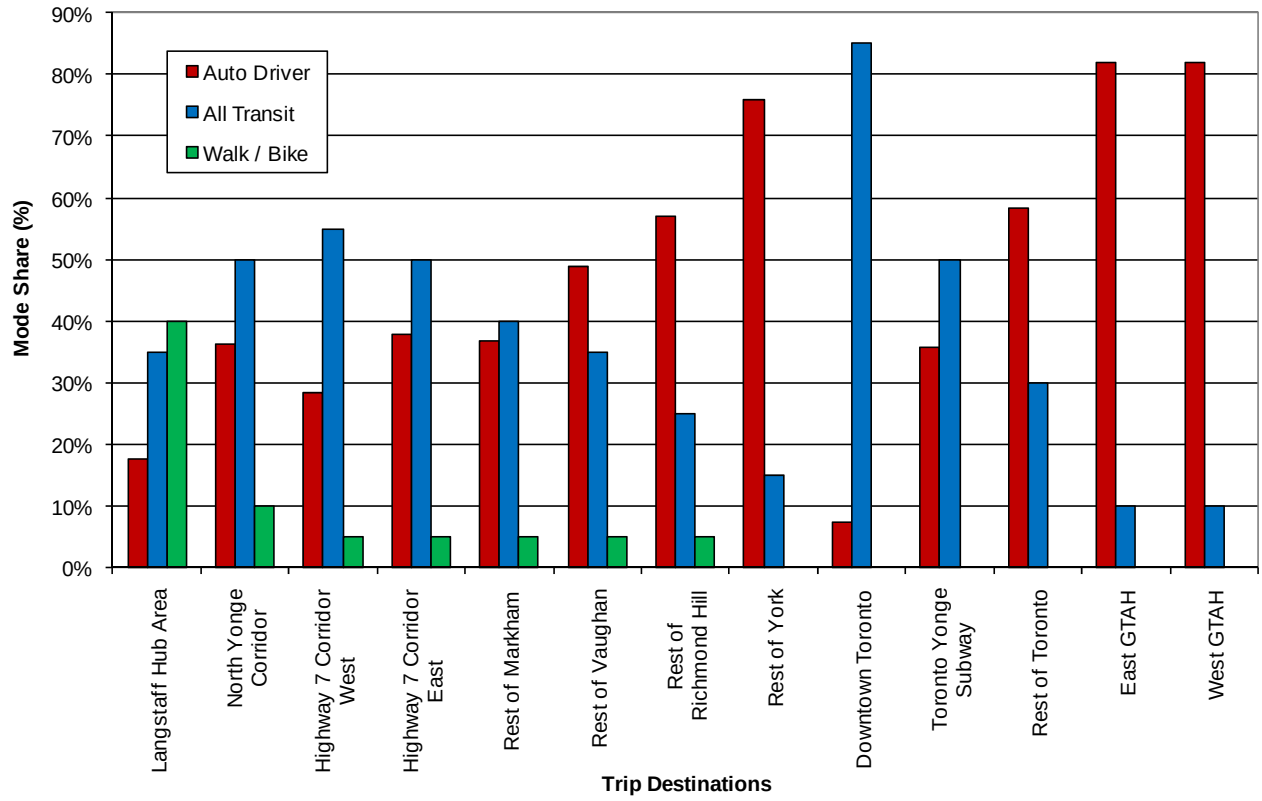
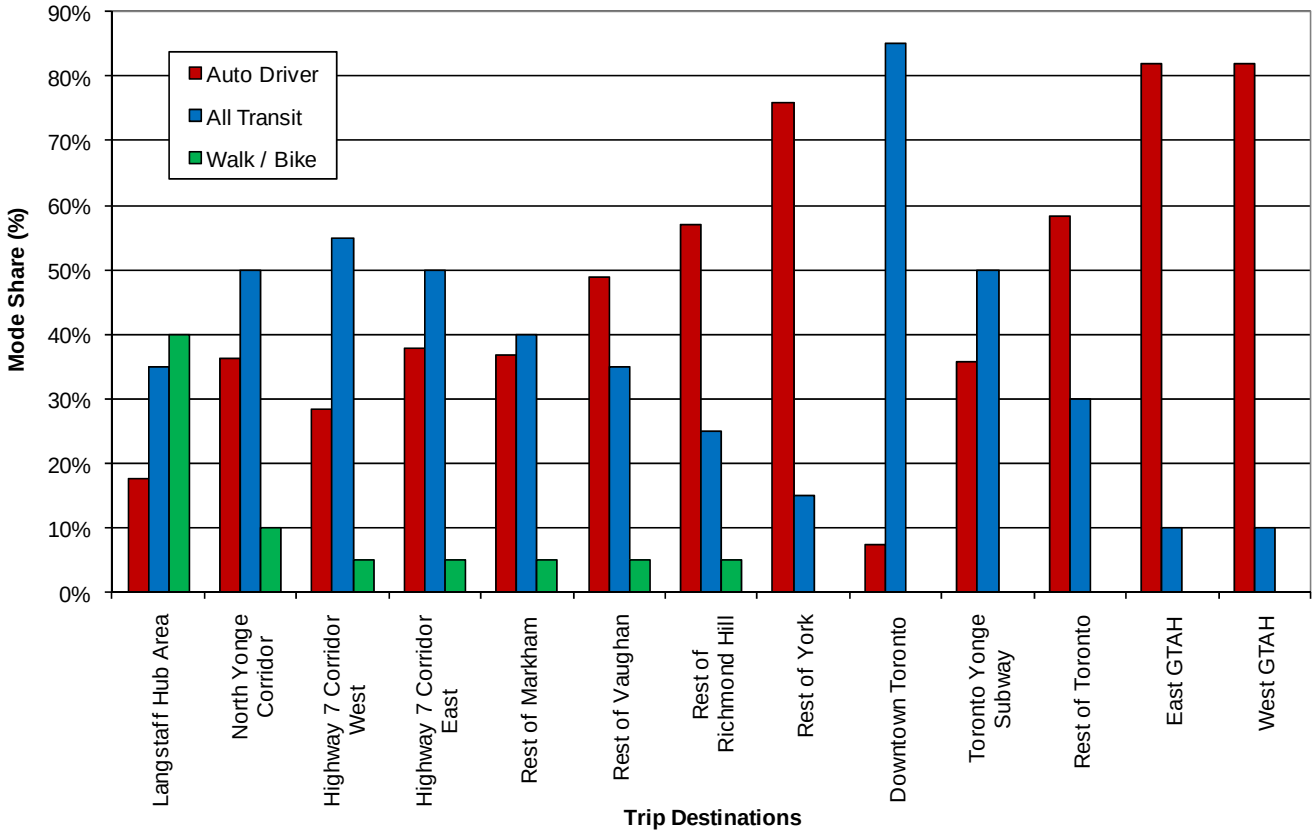


Exhibit 5.12: Phase 3 Outbound Mode Split for General Office Trip Generation



5.7 Auto Assignment

The total auto driver trip distributions resulting from the assumed mode splits and overall trip distribution patterns, for all land uses together, are shown in Exhibits 5.13 and 5.14. Exhibit 5.13 shows the distribution of outbound morning peak hour trips to various regional destinations for the three phases of development, while Exhibit 5.14 shows the distribution by time period and direction for phase 3 only.

Exhibit 5.13: Outbound Auto Trip Distribution for Weekday AM Peak Hour

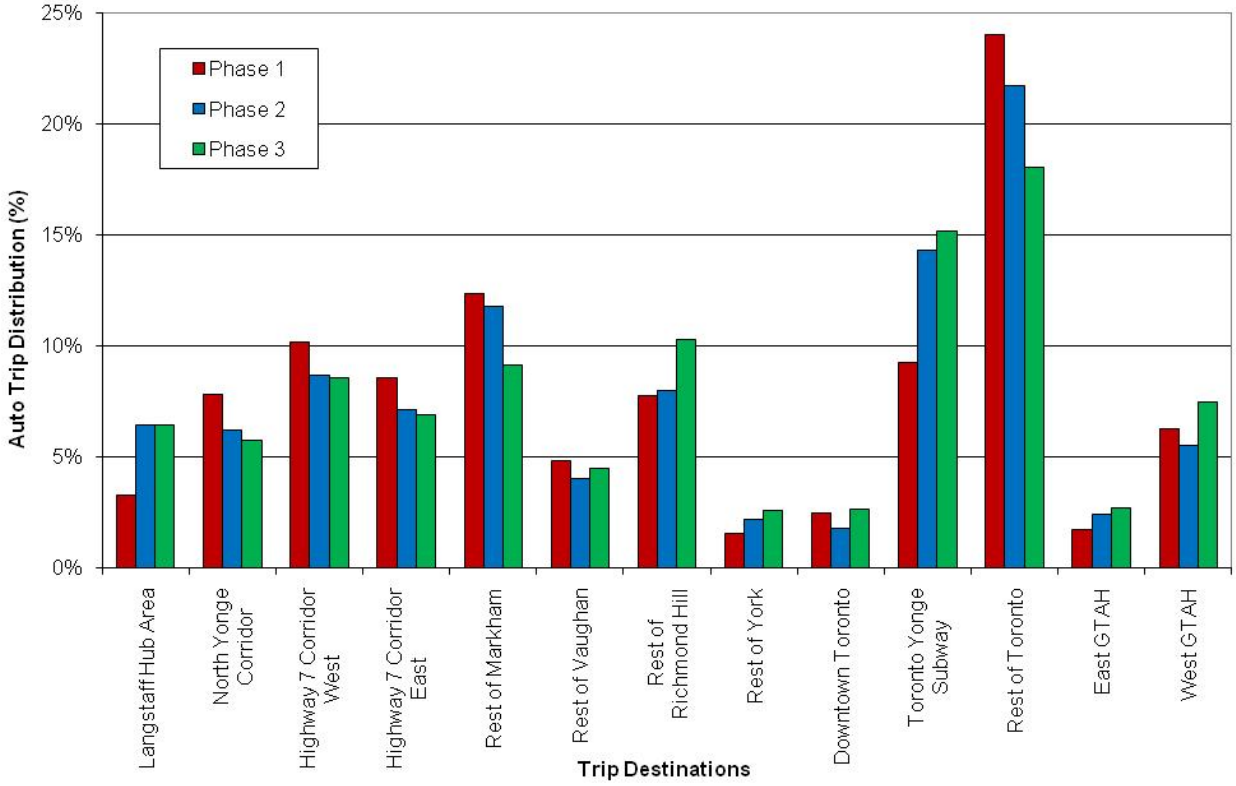
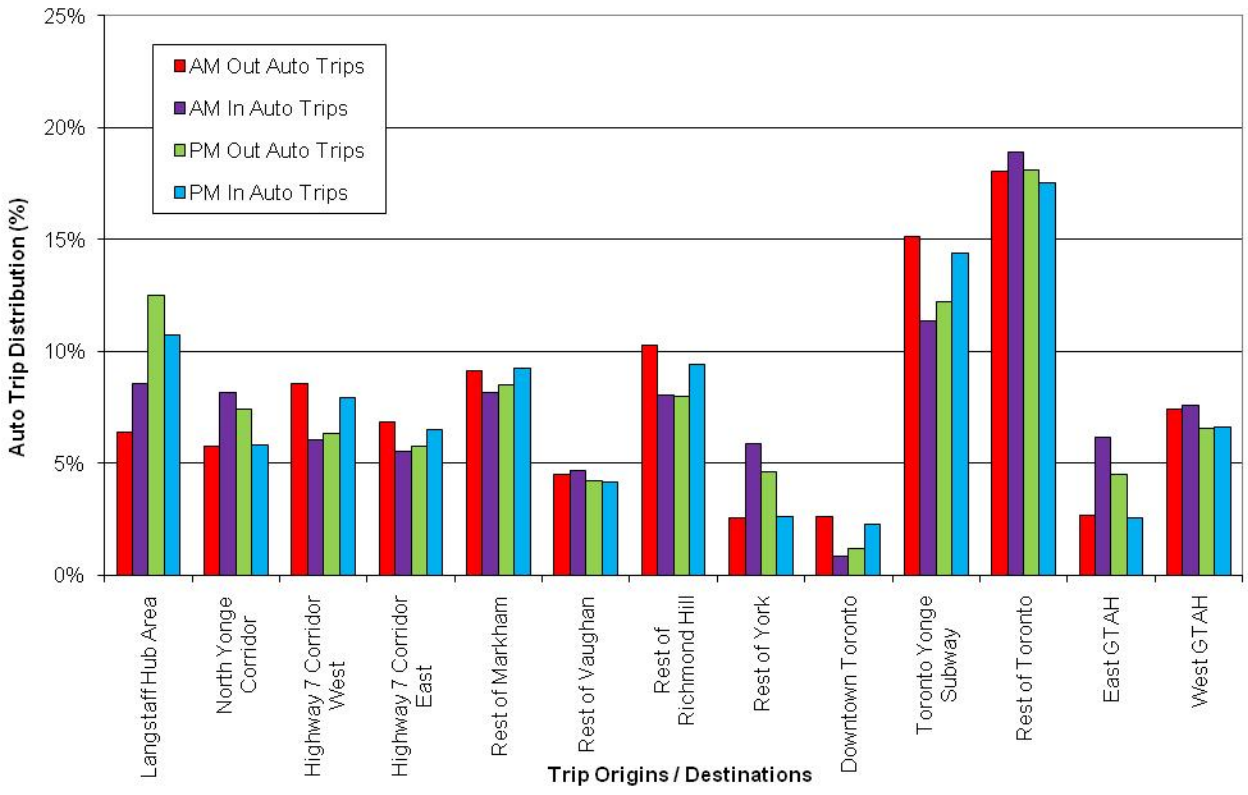


Exhibit 5.14: Phase 3 Inbound and Outbound Auto Distribution for AM and PM Peak Hour



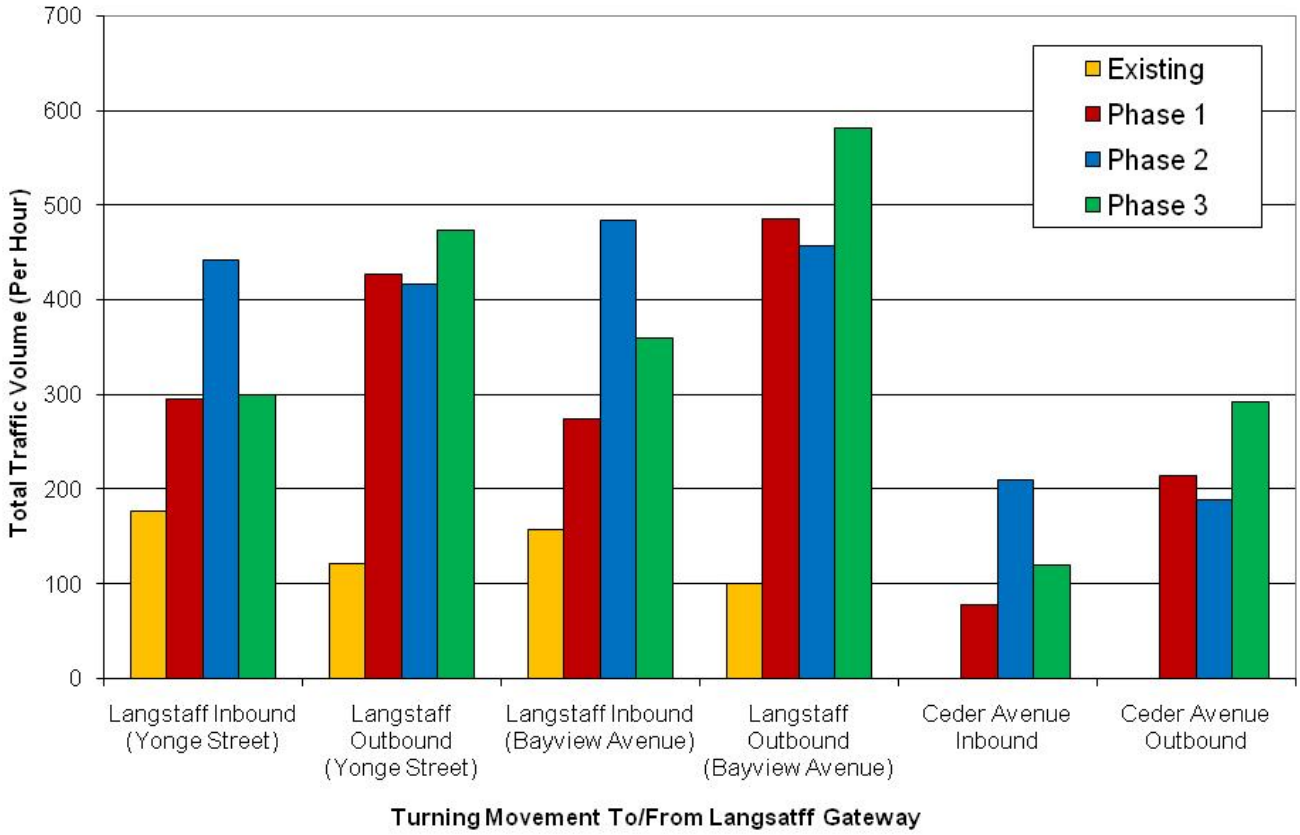
5.7.1 LOCAL TRIP DISTRIBUTION

Within the local study area, vehicle trips were distributed to the network generally by assigning trips to the shortest path. In order to increase the accuracy of these assignments, separate trip assignments were prepared for the east and west sections of the site.

In the full build-out scenario with 15,000 residential units and the full amount of office and retail development, it is estimated that there will be approximately 3,000 vehicle trips exiting the Langstaff site in the morning peak hour and 2,600 vehicle trips entering the site in the PM peak hour. The distribution of these trips to the three access points is shown in Exhibit 5.15 and Exhibit 5.16 for the a.m. and p.m. peaks, respectively.

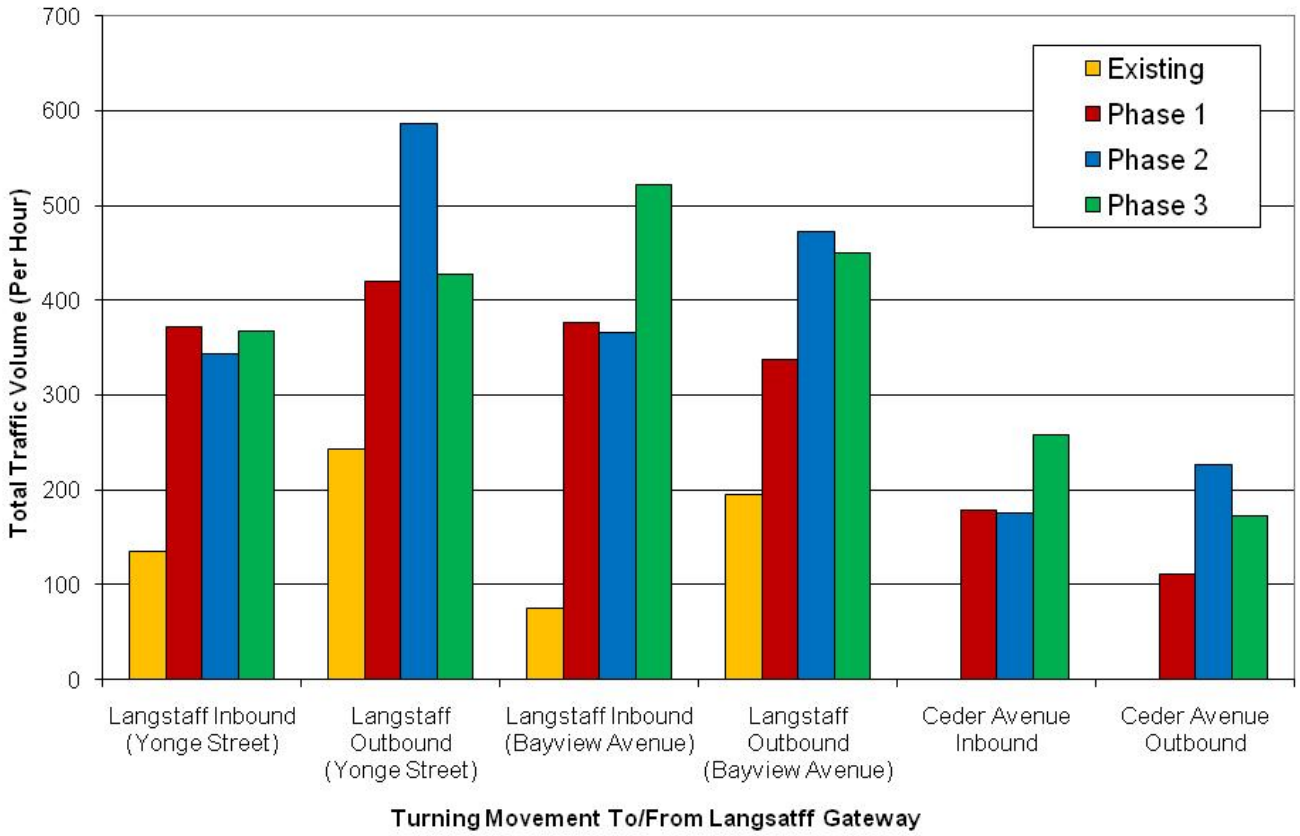
Detailed plots of site generated traffic assignments for each phase of development are provided in Appendix C.

Exhibit 5.15: Total Auto Trips To/From From Langstaff Site During the Weekday AM Peak Hour



Note: Phase 1 and Phase 2 development trips shown above are based on ultimate, rather than intermediate, mode split values

Exhibit 5.16: Total Auto Trips To/From From Langstaff Site During the Weekday PM Peak Hour



Note: Phase 1 and Phase 2 development trips shown above are based on ultimate, rather than intermediate, mode split values

5.8 Trip Distribution and Transit Assignment

In the full build-out scenario with 15,000 residential units and the full amount of office and retail development, it is estimated that there will be approximately 3,700 transit trips exiting the Langstaff site in the morning peak hour and 1,700 transit trips entering the site in the morning peak hour. A summary of the total transit trips entering and exiting the site by time of day is shown in Exhibit 5.17, and a summary of the total transit trips exiting the site in the morning peak hour at each phase of development is shown in Exhibit 5.18. Walk and bike trips are also included for comparison and for their importance as a sustainable mode.

Exhibit 5.17: Total Transit Trips To/From From the Langstaff Site in the AM and PM Peak Hours

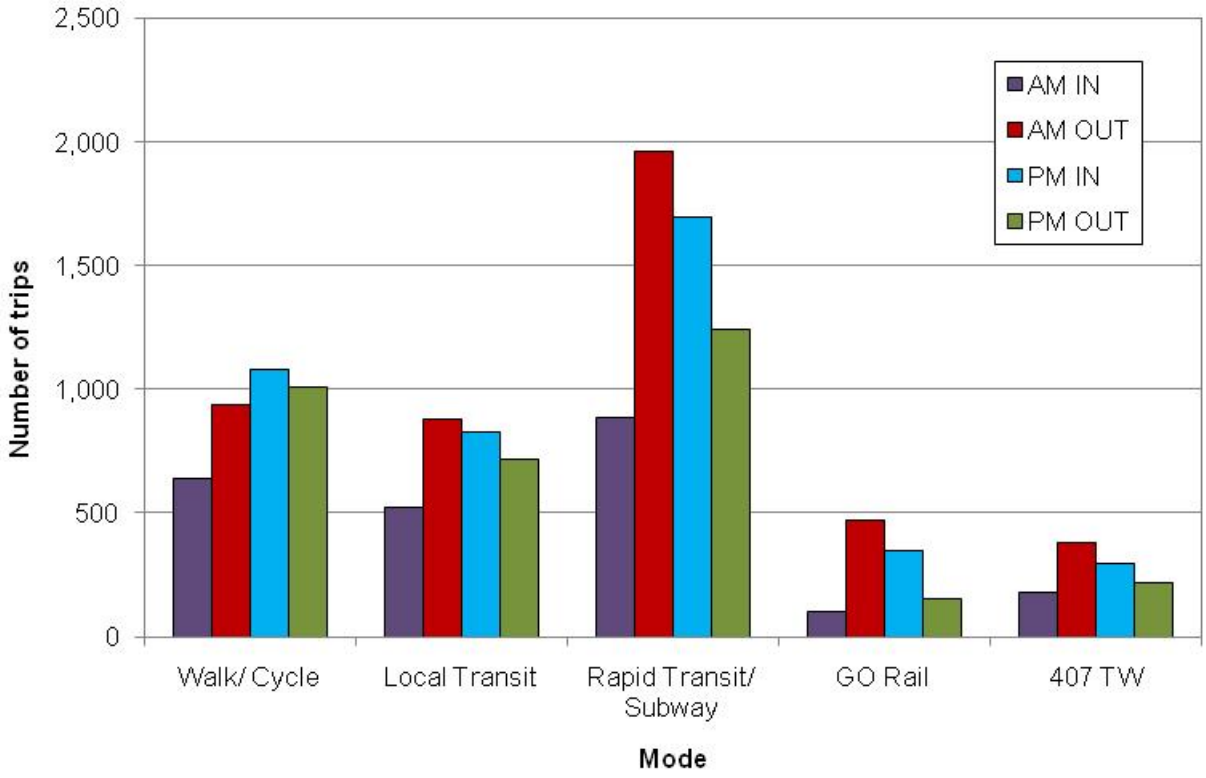
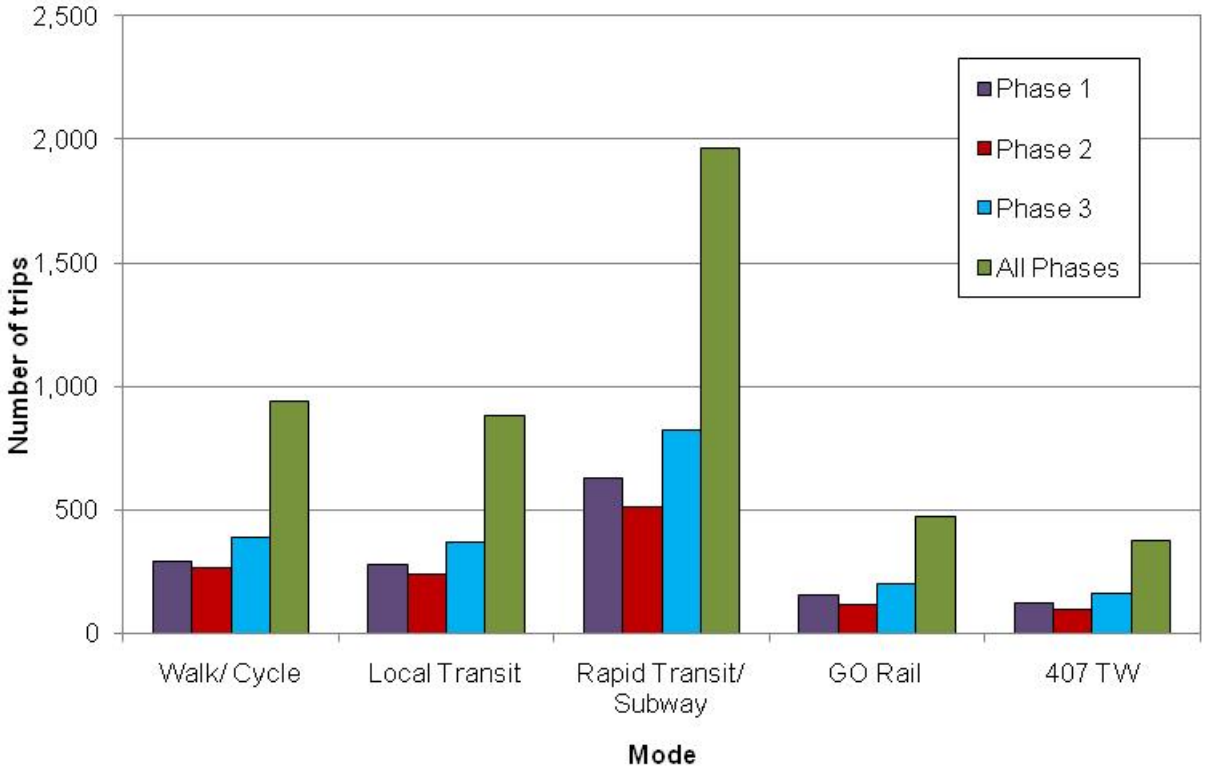


Exhibit 5.18: Total Transit Trips Exiting the Langstaff Site During the Weekday AM Peak Hour for each Development Phase



Background 2031 transit network volumes were calculated using the York Region Model, and the transit trips that the model assumes to originate from or be destined to Langstaff were subtracted from the network volumes to get background transit volumes excluding Langstaff. The total transit trips generated by Langstaff based on the assumptions in this study were then added to the background volumes, based on the specific transit sub-mode and trip distribution, to get the total predicted 2031 transit volumes including the full Langstaff build-out and mode split assumptions. Results for the morning peak period are shown in Exhibit 5.19 for each transit sub-mode. Transit service levels for 2031 assumed in the York Region Model are also shown and the resulting volume to capacity ratio.

Exhibit 5.19: Total Transit Volumes for Langstaff in the Weekday AM Peak Hour

Transit Trips Originating from or Destined to Langstaff

Transit Service	Direction	Vehicle Capacity		Frequency / Hour	Total Capacity		Peak Load
		Seating	Total		Seating	Total	
Viva - Blue	Inbound (Yonge St. South)	60	110	40	2,400	4,400	17
	Outbound (Yonge St. North)	60	110	40	2,400	4,400	59
Viva - Purple + Pink	Inbound (Highway 7 Westbound)	60	110	40	2,400	4,400	716
	Outbound (Highway 7 Eastbound)	60	110	40	2,400	4,400	161
Viva - Total	Inbound	60	110	80	7,200	13,200	733
	Outbound	60	110	80	7,200	13,200	220
Yonge Subway	Inbound (Northbound)	480	1,200	30	14,400	36,000	139
	Outbound (Southbound)	480	1,200	30	14,400	36,000	1,645
GO Rail	Outbound (Southbound)	1,600	2,000	3	4,800	6,000	472
407 Transitway	Inbound (Westbound)	60	110	24	1,440	2,640	96
	Outbound (Westbound)	60	110	24	1,440	2,640	224
Local Transit	Inbound (Yonge St. South)	40	60	53	2,120	3,180	236
	Outbound (Yonge St. North)	40	60	53	2,120	3,180	504

Total Transit Volume Entering or Leaving the Langstaff Site / Richmond Hill Transit Centre

Transit Service	Direction	Vehicle Capacity		Frequency / Hour	Total Capacity		Peak Load	V/C (Peak)
		Seating	Total		Seating	Total		
Viva - Blue	Inbound (Yonge St. South)	60	110	40	2,400	4,400	4,376	99%
	Outbound (Yonge St. North)	60	110	40	2,400	4,400	827	19%
Viva - Purple + Pink	Inbound (Highway 7 Westbound)	60	110	40	2,400	4,400	3,951	90%
	Outbound (Highway 7 Eastbound)	60	110	40	2,400	4,400	3,710	84%
Viva - Total	Inbound	60	110	80	7,200	13,200	8,328	63%
	Outbound	60	110	80	7,200	13,200	4,537	34%
Yonge Subway	Inbound (Northbound)	480	1,200	30	14,400	36,000	14,618	41%
	Outbound (Southbound)	480	1,200	30	14,400	36,000	3,412	9%
GO Rail	Outbound (Southbound)	1,600	2,000	3	4,800	6,000	2,774	46%
407 Transitway	Inbound (Westbound)	60	110	24	1,440	2,640	1,929	73%
	Outbound (Westbound)	60	110	24	1,440	2,640	2,103	80%
Local Transit	Inbound (Yonge St. South)	40	60	53	2,120	3,180	2,577	81%
	Outbound (Yonge St. North)	40	60	53	2,120	3,180	960	30%

Notes:
Only the peak direction is shown for transit services with multiple routes.
Total inbound or outbound transit trips generated by Langstaff were proportionally assigned a direction based on the 2031 fraction of boardings in each direction predicted by the York Region Model, by mode.
Rapid Transit / Subway trips generated by Langstaff were split into Rapid Transit (VIVA) and Subway based on the 2031 fraction of VIVA and Subway boardings predicted by the York Region Model.

Under the current service levels assumed, the VIVA Blue southbound service is projected to be at almost at capacity. However, this service is already predicted to be at capacity before the addition of the Langstaff generated trips (i.e. background conditions), which do not add significantly to the total passenger volume.

6. ROADWAY NETWORK ASSESSMENT

6.1 Future Roadway Level of Service

At present, there are very few traffic generators in the Langstaff area aside from the GO Station. As a result, the addition of development at the levels proposed will significantly affect future operations at signalized intersections in the study area. Changes to the overall volume to capacity ratio are in the range of 1% to 40% during the weekday a.m. peak hour and 2% to 45% during the weekday p.m. peak hour. Overall level of service at all signalized intersections will remain at an acceptable LOS 'D' (or better), based on implementation of the road network improvements discussed in Section 5.3. One exception is the intersection of Langstaff Road and Yonge Street, which will operate at or above capacity under almost any scenario. Potential options to mitigate this problem are discussed later in this section.

Exhibit 6.1 provides a graphical summary of the projected level of service for each study area intersection under the ultimate build-out scenario, while Exhibit 6.2 shows the estimated queue lengths at major intersections. Numerical summaries are provided in Appendix E. As shown, in addition to providing the Cedar Avenue connection, several physical road network enhancements are warranted. Recommended improvements are discussed in the following sections.

6.1.1 OPERATIONAL IMPROVEMENTS

Cumulative operational changes and improvements were implemented sequentially to the Yonge Street, Bayview Avenue and Highway 7 corridor signalized intersections to address identified deficiencies. To obtain the maximum optimisation, all key intersection cycle lengths were kept at 120 seconds in all future scenarios except at the Highway 407 ramp terminal / Langstaff Road at Yonge Street intersection. Signal offsets were also adjusted to improve the progression on Yonge and Bayview and a left turn phase was added at Yonge Street and the Highway 7 ramps. For future conditions, a peak hour factor of 1.0 was used for modelling purposes, which reflects heavy traffic conditions.

6.1.2 PHYSICAL ROAD IMPROVEMENTS

Exhibit 6.1 also illustrates the implementation of physical improvements corresponding to the Phase 3 scenario.

To achieve satisfactory levels of service at the Langstaff Road at Yonge Street and Bayview Avenue intersections, it is recommended that dual westbound and an eastbound exclusive right turn lanes be provided. In addition, consideration should be given to providing a direct channelized right-turn lane to the Highway 407 eastbound on-ramp, as discussed further below.

Based on the foregoing assessments, it is clear that the Langstaff area development will require an additional access to Highway 7. Therefore, the extension of the Cedar Avenue to Highway 7 should be an early priority. This connection should be designed to accommodate two travel lanes in each direction (one of which may be dedicated to transit or HOVs), as the projected volumes are on the order of 700 vehicles per hour.

Exhibit 6.1: Projected Future Intersection Level of Service (Ultimate Build-out)

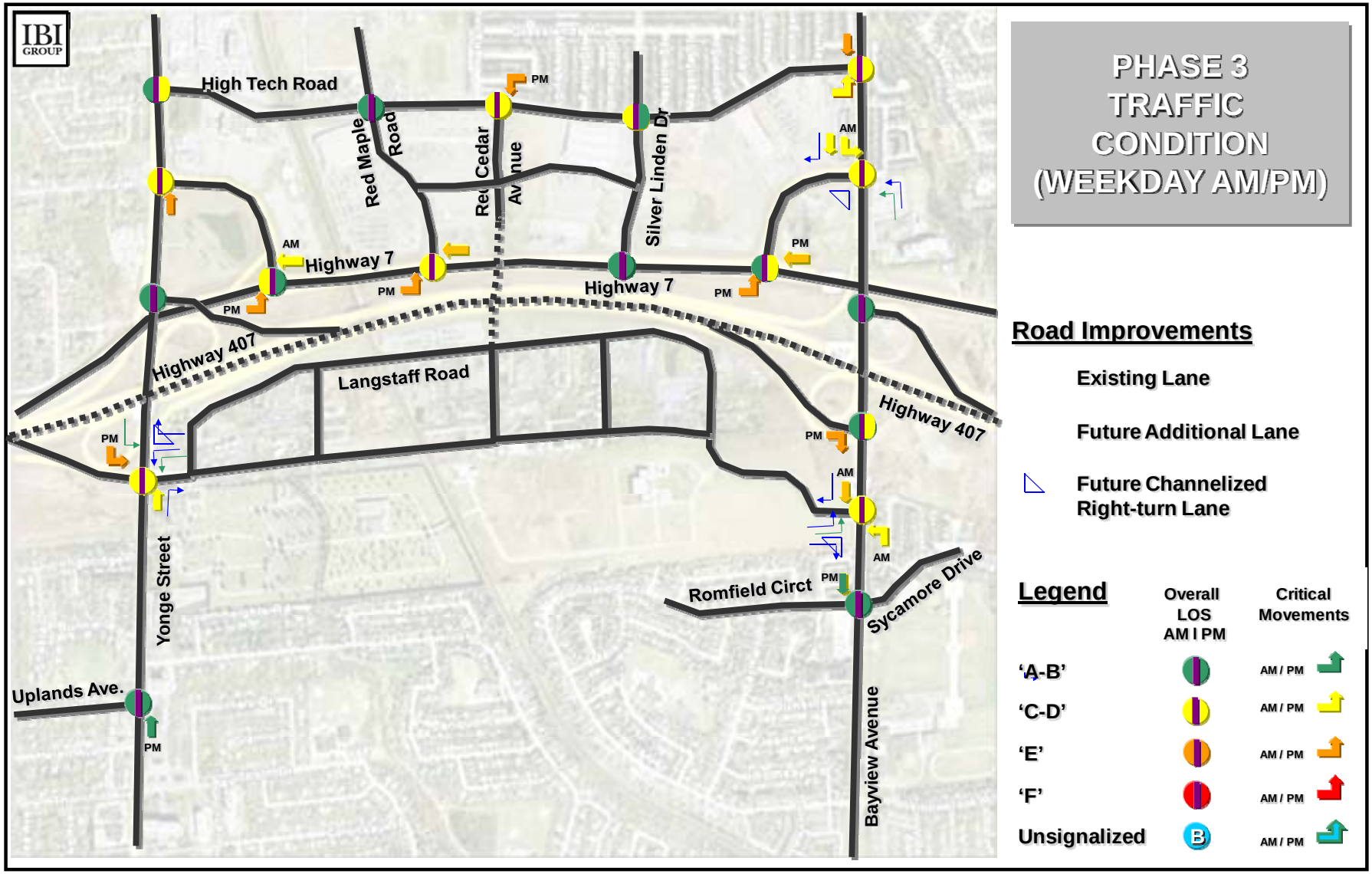
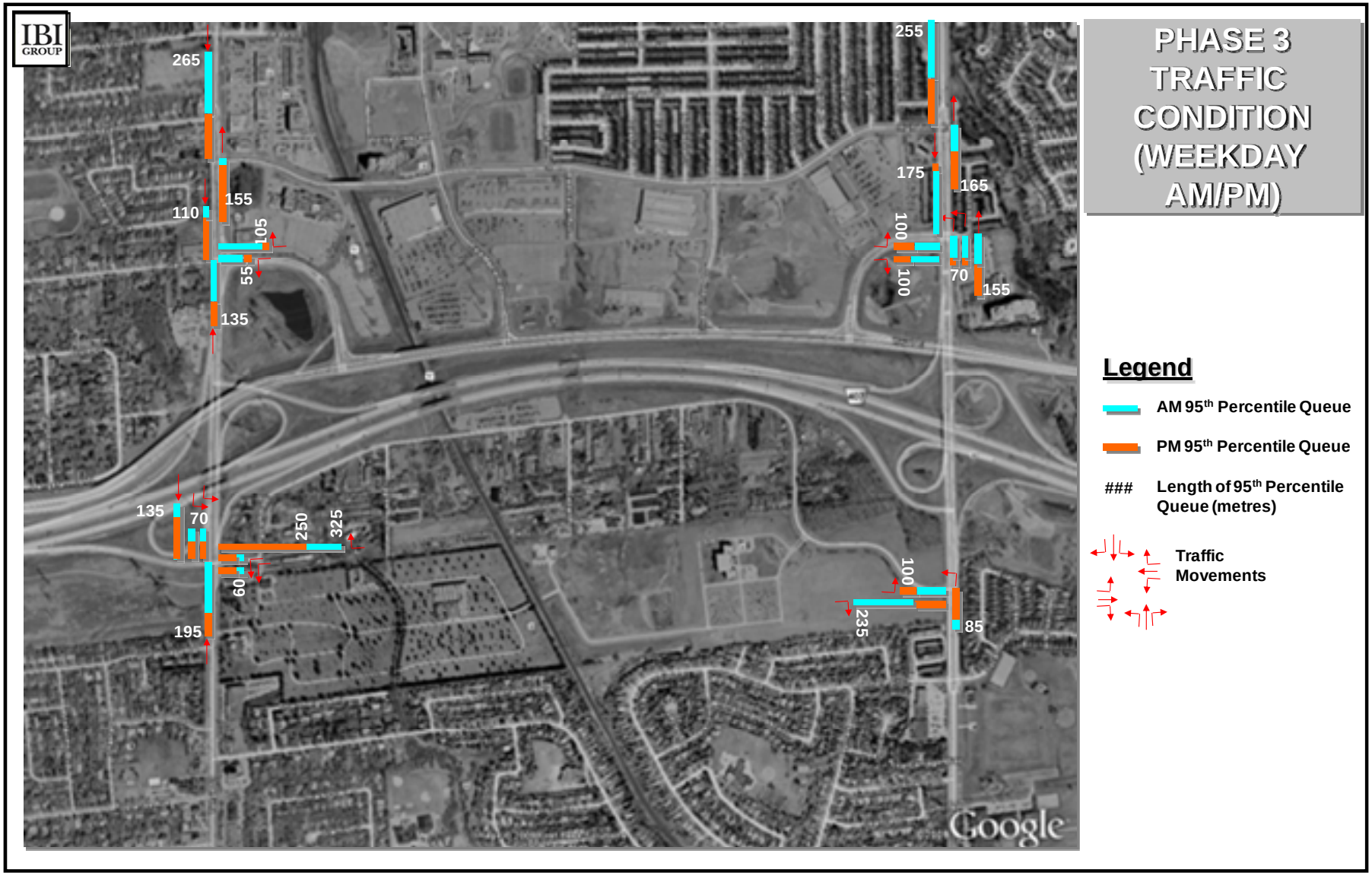


Exhibit 6.2: Projected Future Queue Lengths (Ultimate Build-out)



An analysis of current traffic conditions indicates that the ramp terminal access to Highway 7 at Bayview Avenue experiences significant delays due to heavy turning movements from the northbound approach. This problem is largely a result of traffic destined to Richmond Hill Centre, and will undoubtedly be greatly exacerbated by additional traffic from Langstaff. Several physical road improvements are recommended to achieve satisfactory level-of-service under both current and future traffic operations at this intersection:

- Install dual left-turn lanes at the northbound approach to accommodate more than 900 vehicles during the weekday p.m. peak hour;
- Introduce a southbound exclusive right-turn lane to accommodate the heavy right-turn traffic from southbound through traffic; and
- Convert the existing eastbound right-turn lane to high capacity channelized right-turn lane to absorb both current and future traffic turning onto Bayview Avenue.

It should be noted that all recommended road improvements are necessary to maintain basic acceptable levels of service and avoid system failure in the face of very high development densities in an area with limited accessibility. They do not preclude the need for appropriate transit, cycling and pedestrian infrastructure, nor are the recommended improvements intended to eliminate congestion. Transit will remain the primary mode of transport for Langstaff.

6.2 Sensitivity Tests

In order to support the Yonge Subway Extension, the TTC and York Region are planning to develop a park and ride lot on the west side of Yonge Street, south of Highway 407. A new entrance to Yonge Street south of Langstaff Road will provide access to the lot. Options to provide direct access from Highway 7 are being explored, but do not appear to be feasible at this point. Therefore, the majority of traffic destined to this park and ride will need to travel through the Yonge/Langstaff/407 ramp intersection.

In the above analysis, traffic from the proposed Longbridge park and ride was not included so as to ensure that the traffic impacts of the Langstaff development could be clearly distinguished. The purpose of this section is to show the combined impacts of both the Langstaff development and the park and ride.

Results of the analyses of the combined scenario are provided in Appendix E. Key findings are as follows:

- Overall, the introduction of subway parking traffic will increase Yonge Street southbound though traffic during the morning peak hour and northbound traffic in the afternoon peak hour. This increase in through traffic will eventually create significant impacts on several key left-turn movements along the Yonge Street corridor.
- The Yonge St. and Langstaff Rd. intersection will operate well above its theoretical capacity. During the weekday p.m. peak hour, the intersection will operate from 12% to 22% above the capacity of the proposed configurations recommended for the Langstaff area development due to competing movements such as northbound through traffic and southbound left-turn movements.
- The contribution of Langstaff site traffic movements to overall V/C ratios will be 1% to 15% during the morning peak hour and 0% to 13% during afternoon peak hour.

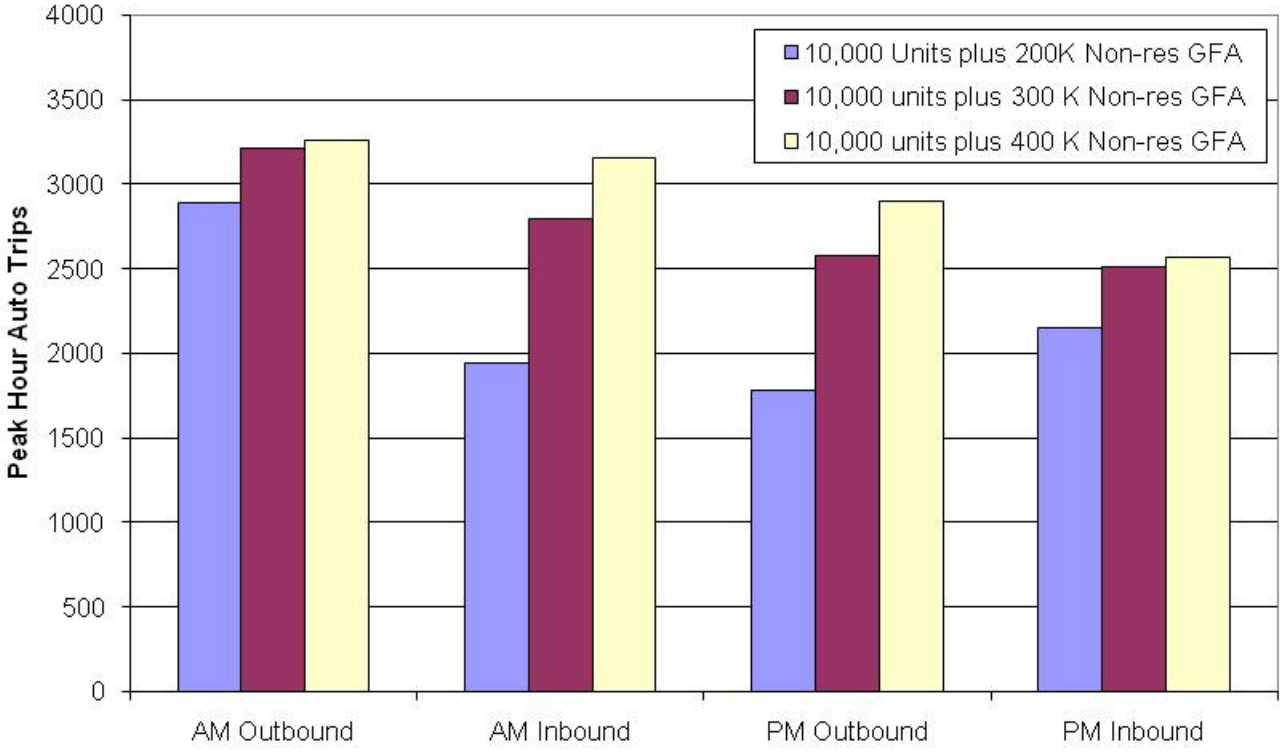
Based on the above, it is clear that a solution will need to be developed to ensure that the subway park and ride lot can be developed without impacting the development potential for Langstaff and the remainder of the Urban Growth Centre. Solutions may include direct access to the park and ride, parking pricing options to shift the peak entry and exit times, or a complete redesign of the Yonge-Langstaff intersection.

It is also recognized that the development of the park and ride lot is an early measure required to supplement or replace the existing parking at Finch Station and to generate ridership, whereas the time to reach the full development potential of the Langstaff site is longer term.

6.2.1 INCREASED EMPLOYMENT

In the early stages of developing the Land Use Master Plan, an analysis was undertaken to determine the most appropriate mix of land uses. One of the tests performed was to determine the impacts of additional employment. As shown in Exhibit 6.3, the nature of trip generation and directional splits for employment is such that additional employment can be accommodated without seriously impacting the "peak" travel demand. On a base of 10,000 units (an interim scenario), the amount of office space can be effectively doubled without seriously impacting the a.m. peak hour outbound traffic movement, which is the critical movement for the Langstaff site.

Exhibit 6.3: Sensitivity Test: Effects of Increased Employment on AM and PM peak hour Inbound and Outbound Auto Trips



6.3 Recommended Improvements

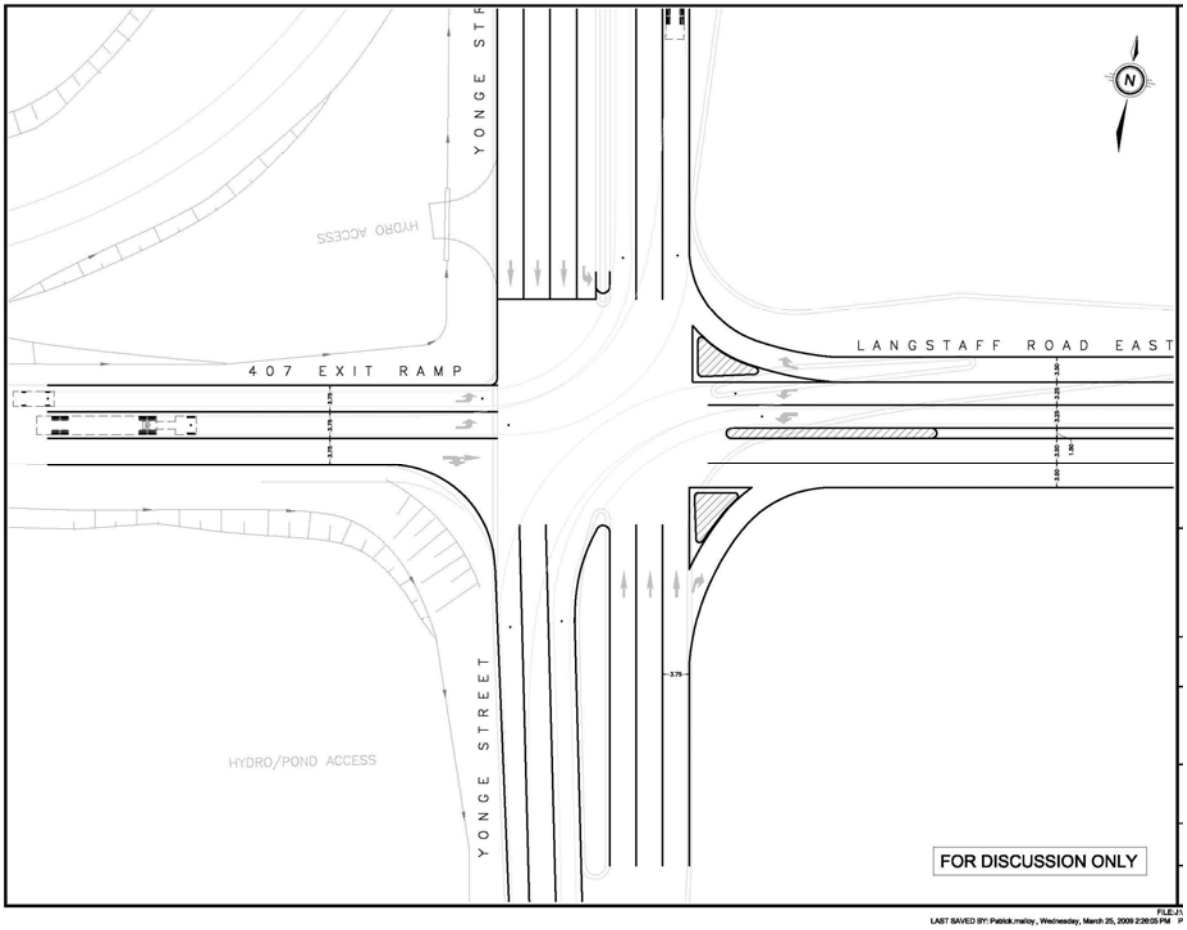
6.3.1 IMPROVEMENTS TO THE YONGE STREET AND LANGSTAFF ROAD INTERSECTION

In its present configuration, the intersection of Langstaff Road and Yonge Street is not designed to handle the additional traffic that would be generated by even modest development of the Langstaff lands. In particular, the taper of the 407 on ramp overlaps with the Langstaff intersection, which

would cause safety concerns if volumes increased. Restricting right turns on red for the outbound movement and providing a direct ramp to the Highway 407 on-ramp will help alleviate some of these concerns, but additional improvements will be required.

Exhibit 6.4 illustrates a concept plan for the Langstaff intersection assuming minimum geometric improvements.

Exhibit 6.4: Minimum Required Geometric Improvements to Yonge-Langstaff Intersection



6.3.2 ROUNDABOUT ANALYSIS FOR LANGSTAFF RD. AND YONGE ST. INTERSECTION

The vehicle operation characteristics for a potential round-about at the Yonge Street and Langstaff Road intersection were explored utilizing the application of RODEL software. RODEL software is an interactive program that facilitates the design and analysis of various roundabout configurations. Roundabouts can be analyzed for capacity, delay and queuing using different confidence limits.

RODEL calculations provided the initial lane geometry and capacity requirements for the roundabout design alignment based on the design peak hours under existing and 2031 traffic conditions with or without GO transit parking traffic projections. The RODEL output calculates the required geometry for a roundabout to function within the desired capacity, or alternatively to determine if the planned geometry will be adequate under pre-determined capacity and delay criteria.

The RODEL analyses (available on request) indicates that an urban roundabout under existing conditions would provide a level of service (LOS) 'D' or better for weekday peak hours both overall and for the heaviest approach leg.

Under the full build out conditions, the roundabout would operate at a LOS 'C' during the weekday a.m. peak hour and LOS 'F' during the weekday p.m. peak hour. This would increase to LOS 'F' for both the a.m. and p.m. peak hours with the addition of the subway park and ride traffic.

Essentially, the analysis concluded that a two lane round about would not provide sufficient capacity for future traffic and although a three lane roundabout would function adequately, the land required to construct such a round about would be significant.

7. DEVELOPING A TRANSPORTATION STRATEGY FOR LANGSTAFF

7.1 Guiding Principles

It is clear from the analysis of future roadway level of service in the previous chapter that the development of the transportation system for Langstaff will require a somewhat different approach than is typical for developments in suburban locations. In the early stages of the study, a set of simple guiding principles were identified to provide direction to the development of a transportation strategy for Langstaff.

Guiding Principle #1 – Plan for Transit and Pedestrians First

The combined investment in rapid transit lines intersecting at the Langstaff hub is in the order of several billion dollars. The realization of a return on these investments is contingent on high numbers of people living and working in close proximity to these transit lines. Langstaff is one of the few locations within the GTA where living without a car will be entirely possible – and many people will choose to do so. However, efforts to create a transit-oriented development will not likely be successful if unlimited access is available for automobiles.

Guiding Principle #2 – Density Can be Accommodated by Transit and Non-motorized Transportation

The capacity of the road network around Langstaff will be exceeded under almost any development scenario of modest densities, and if not by people in Langstaff, then by people living and working in nearby developing areas. However, the capacity of transit is virtually unlimited, and with almost two thirds of the trips from Langstaff in the future being destined to existing or future rapid transit corridors, it is logical that as densities are increased over time, transit will accommodate the majority of trips generated. If transit cannot serve these trips, or if people are unwilling to use transit, there will come a point where development will be constrained. In other words, the Langstaff site is almost self-limiting in terms of what densities can be supported by the transportation network.

Guiding Principle #3 - Achieving the ultimate development program requires many innovative measures

Notwithstanding the future capacity of transit, achieving the levels of development proposed in the Land Use Master Plan will require many innovative strategies over and above current travel demand approaches. The Langstaff development presents a unique opportunity to force site developers to implement and support innovative strategies to reduce automobile trips in order to achieve the planned densities. These include planning for a significant portion of households to not require cars, planning for and facilitating innovative live-work arrangements, considering options to manage trips associated with shopping and parcel delivery, and promoting extensive use of car-share and bike share programs. Many of these innovative measures are only possible if development is highly compact and a mix of land uses is provided.

Guiding Principle #4 - Development phasing needs to be tied to transportation performance

There are undeniably risks associated with planning for a transit-depend development. At the time of this report, the timing of the construction of the Yonge-subway was not known and the Highway 407 transitway was identified as a 20+ year project. Therefore, it is only appropriate that the development of the Langstaff site be tied to transportation infrastructure and transportation system performance. However, it is also important that development is planned from the beginning to be transit dependent, as it will be impossible to achieve the long term targets if this is not the case.

Perhaps more importantly, individuals and families moving into Langstaff need to be made aware of the longer term auto capacity limitations.

Guiding Principle #5 – Some Congestion is Essential to Achieving Transit Mode Share Targets

It is important to recognise that in order to achieve aggressive mode split targets, a certain amount of congestion is necessary. Congestion increases the "cost" of driving by increasing the travel time, and in the absence of such factors that make driving unattractive it will be extremely difficult to achieve significant transit modal splits. No matter how attractive transit is made to be, driving will always be more attractive if there is ample parking and little congestion, and hence it is imperative that in the development of Langstaff, parking and road expansions are constrained. Certainly parking and road capacity must be provided, but not to the point where driving is so attractive that it draws people away from transit.

Guiding Principle #6 – The plan must be compatible with and supported by Regional Initiatives

The Region of York has recently released its draft Transportation Master Plan and Official Plan outlining strategies to move towards more sustainable development patterns and transportation futures. The proposed transportation strategy for Langstaff needs to be compatible with the Regional Transportation Plan, and is also dependent on the initiatives set out in the Region's plans for transit, walking, cycling, parking and goods movement. It is also important that the local transportation network serving Langstaff, the Richmond Hill hub and the proposed Yonge Street park and ride be connected, integrated and operational.

7.2 Internal Street Network

The internal street network for Langstaff will consist of a variety of street types, all designed to accommodate multiple modes of travel. The primary circulation routes for motorized vehicles will be the North Boulevard (which generally follows the current Langstaff Road) and the South Boulevard. Cedar Avenue is also an important circulation route providing a connection to the Richmond Hill Gateway.

Traffic will also be permitted on Main Street East and West, and the Pomona Creek Park Couplet, although traffic movement on these streets will be balanced with on-street parking, pedestrian space, transit and bicycles. Local streets will generally serve the function of providing access to and from underground parking and for local deliveries. Local streets will be designed for low speed operation with a significant emphasis on the pedestrian environment.

Exhibit 7.1 illustrates the proposed internal street network while Exhibit 7.2 provides a summary of the general characteristics of each street. Detailed cross-sections are provided in the Land Use and Built Form Master Plan Report (Calthorpe/Ferris Report). A phasing plan for the construction of each street is provided in the following Chapter of this report.

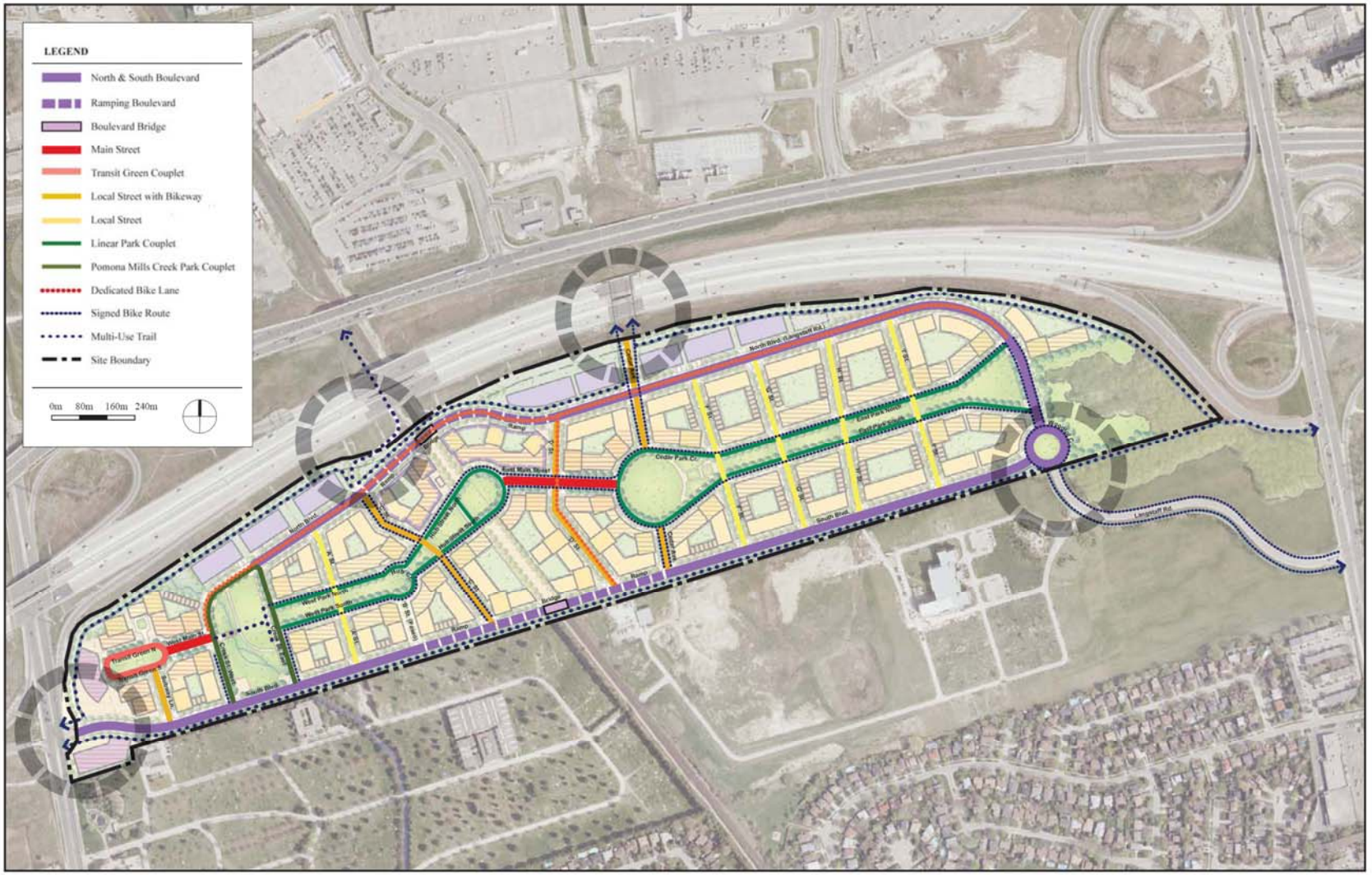
The geometric design characteristics of each street will be refined through the secondary planning stage and as the development proceeds; respecting current Town-wide standards for lane widths, curb-radii, maximum grades, etc. Additional work will also be required to confirm the need for additional turning lanes within the site. At a minimum, it is expected that dedicated left turn lanes will be required at the following locations:

- South Boulevard at Subway Lane
- South Boulevard at Creek Street East

- South Boulevard at Street C and Street D
- North Boulevard at Cedar Avenue

Left turn lanes can be provided at each of these locations within the proposed R.O.W. as long as on-street parking is eliminated at the intersection approaches.

Exhibit 7.1: Street Hierarchy



Source: Cathorpe Associates

Exhibit 7.2: Function and Characteristics of Internal Streets

Street Name/Type	Transit Provisions	Pedestrian Provisions	Bicycle Provisions	Traffic Provisions	Parking	R.O.W. Width
North Boulevard	Dedicated lanes	2.5 m sidewalk on both sides	Share with transit lane, signed route	Two lanes, 3.25 m & 4.25 m travel lanes	Both sides of street	30.0 m
South Boulevard	Dedicated lanes	2.5 m sidewalk on north side & multi-use path on south side	3.0 m multi-use, bi-directional path on south side	Two lanes, 3.25 m & 3.5 m travel lanes	North side of street	30.0 m
Boulevard Bridge	Dedicated lanes	3.0 m sidewalk on north side & multi-use path on south side	3.0 m multi-use, bi-directional path on south side	Two lanes, 3.25 m & 3.5 m travel lanes	None	30.0 m
Local Street (3 and 6 storey buildings)	None	2.0 m sidewalk on both sides	None	4.25 m single lane	Both sides of street	22.5 m
Local Street with Bike Lanes	None	2.0 m sidewalk on both sides	1.8 m bike lane on both sides	3.0 m single lane	Both sides of street	23.0 m
Main Street	Dedicated lanes	4.5 m sidewalk on both sides	1.8 m bike lane on both sides	3.0 m & 3.5 m travel lanes	Both sides of street	33.0 m
Transit Green Couplet	Dedicated lanes	3.5 m sidewalk on both sides	1.8 m bike lane or direct route to subway	3.25 m & 3.5 m travel lanes	Both sides of street	51.0 m
Linear Pak Couplet	Dedicated lanes	2.5 m sidewalk on both sides	1.5 m bike lane on both sides	3.5 m single transit lane	None	52.0 m
Pomona Mills Creek Park Couplet (one way street)	Dedicated lanes	2.5 m sidewalk on one side	1.8 m bike lane	3.0 m & 3.5 m travel lanes	Both sides of street	18.0 m

7.3 Pedestrians

From the outset, the entire Master Plan for Langstaff was designed to create and environment that encourages walking. Streets are generally laid out in a grid pattern with short block lengths, streets are lined with commercial uses and all streets include generous sidewalks and space for plantings. Additionally, the Calthorpe Plan has taken into account visual, sun and wind impacts in the design and massing of buildings.

Sidewalks on the major streets are planned to be 2.5 m wide, which is greater than the Town-wide standard of 1.5 m for major collector streets. Combined with the planned 2.5 m tree-lawn and 4.0 m building setback, this provides for considerable space for pedestrian movement. All streets will include on-street parking providing a further buffer from traffic. An example of a typical local street cross-section is shown in Exhibit 7.3.

Local streets will include 2.0 m sidewalks on both sides with 2.5 m tree-lawns and 3.0 m setbacks. Local streets will be designed to minimize traffic speeds by:

- Providing narrow lane widths for cars (3.0 m compared with the typical Town standard of 4.5 m)
- Providing on-street parking
- Including traffic calming features such as raised intersections, curb-extensions and textured pavement.

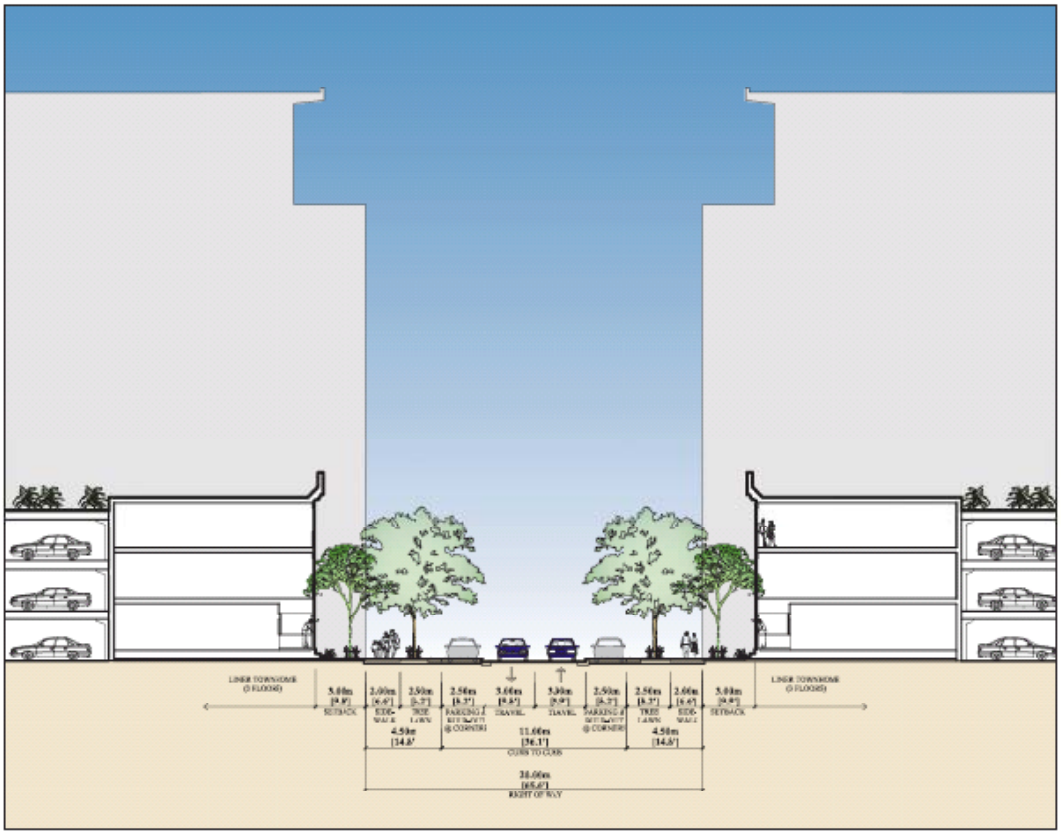
Embracing modern technology such as Segways is one way of extending access by foot.

A key measure of the success of Langstaff will be the degree to which various origins and destinations are accessible by foot. Ideally, the majority of residents and employees should be a 5-10 minute walk or less from a rapid transit node. Exhibit 7.4 illustrates representative walking routes and distances through the Langstaff area. As shown, the entire west side of the development is within a 10 minute walk or less of the Yonge Subway. Residents on the east side will obviously have a longer walk, re-enforcing the need to provide other transportation options such as cycling and transit as discussed below. All residents and employees will be within a 10 minute walk of the Main Street retail area.

Notwithstanding the walkability of the ultimate design, major challenges with respect to the pedestrian environment and movement will need to be overcome in the early stages of development. For example, much of the site will be under construction for several years and it will be important to pre-build pedestrian connections from the east to west side of the site. In addition, there are many attractions in the Richmond Hill centre (e.g. movie-theatre, grocery store, recreation centre) that people living in Langstaff will want to access. Providing pedestrian connections through Cedar Avenue and the GO Rail concourse will help in this regard.

As discussed below under cycling, all attempts should be made to provide pedestrian connections through Holy Cross Cemetery so that people living in the Thornhill Neighbourhood can access jobs and social activities in Langstaff and visa versa.

Exhibit 7.3: Local Street Cross-Section



LOCAL STREET (3-STOREY BUILDINGS) - 20 meter R.O.W. (Section Scale 1 : 3)

Source: Calthorpe Associates

Exhibit 7.4: Representative Walking Distances

7.4 Bicycles

Increasingly, people in the Greater Toronto Area are recognizing the virtues of cycling for utilitarian purposes. Communities that have provided proper dedicated cycling facilities have seen their use grow immensely. Some routes in Toronto such as Bloor Street and the Waterfront Trail along Lakeshore experience "bicycle congestion" on a daily basis. The Langstaff area has the opportunity to become one of those communities where cycling is the dominant mode for short distance trips.

Key features of the Langstaff Master Plan to facilitate accessibility for cyclists are shown in Exhibit 7.5 and include:

- A continuous off-street bikeway along the south side of the South Boulevard
- Dedicated bicycle lanes throughout the central greenway corridor, along 'C' Street, Cedar Avenue, the Pomona Street Park Couplet, the Transit Green Couplet and Langstaff Road East to Bayview Avenue.
- Signed routes and associated amenities on all other streets
- A possible dedicated pathway through the Holy Cross Cemetery
- A possible pathway to Bayview Avenue adjacent to the Woodlot
- Connections to Richmond Hill via the GO Concourse, Cedar Avenue underpass and a possible future overpass across Highway 407

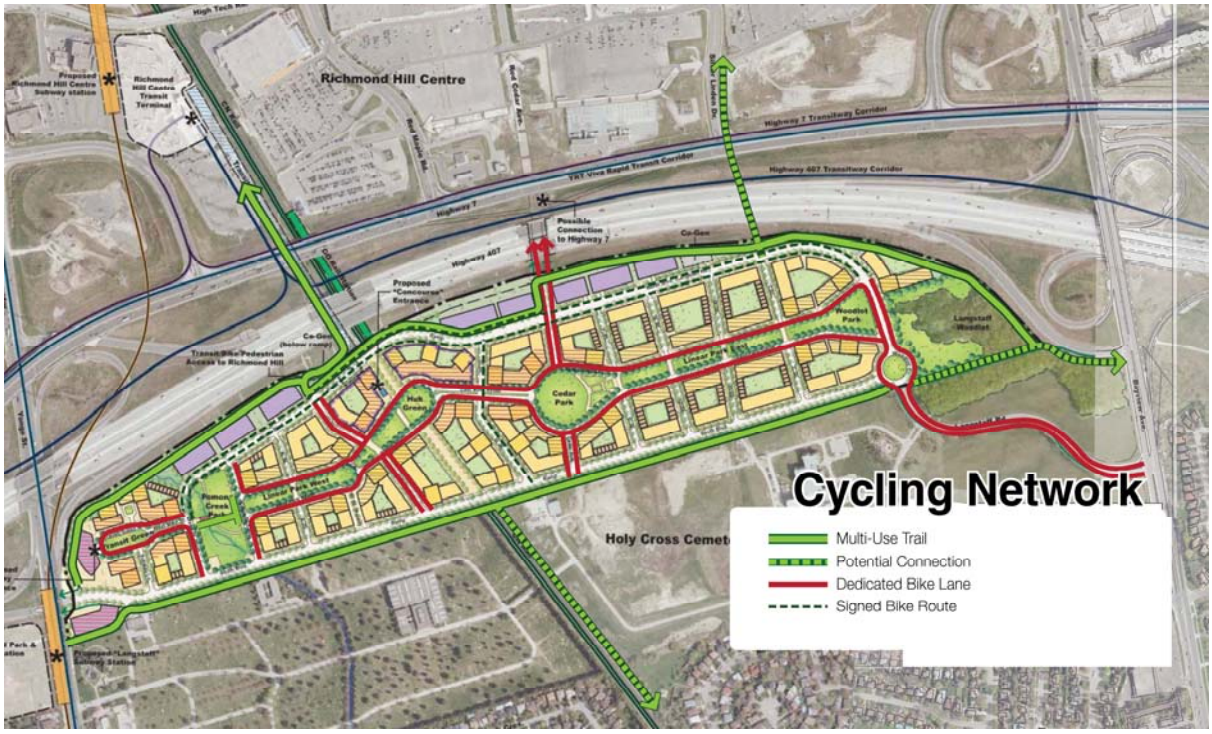
In addition to local cycling facilities, it will be important to provide connections to the surrounding area and the existing and proposed Regional bicycle network. Access for cyclists will be designed into the connections to Richmond Hill via the GO Concourse and Cedar Avenue, and it is recommended that consideration be given to constructing a bike bridge over Highway 407 in the east end in the longer term.

A public bicycle system with stations at the subway and the office buildings along Highway 407 would be ideal in that residents could ride the bikes to the subway in the morning to be ready for pick-up by employees travelling to the office buildings, with the reverse flow occurring in the evening.

Perhaps more important is the need to provide at least one bicycle path through the cemetery to the south. An ideal location for this would be along the CN Rail line, although it is recognized that there are safety and property issues that would need to be over come. It is also understood that cemetery plots directly abut the rail R.O.W. Another option would be to utilize a portion of the internal roadway for the Cemetery, or to dedicate a path through the undeveloped portion of the cemetery closer to Bayview Avenue. All of these options would require cooperation from the Holy Cross cemetery and would need to be designed in a manner that respects the nature of its activities. Mount Pleasant Cemetery in Toronto provides a good example of how a cemetery can be used for recreation. Many people cycle, walk and rollerblade in the cemetery, a heavily used bicycle route passes through the cemetery, and it is directly connected to two major walking trails as part of Toronto's ravine park system.

Additional features to further promote cycling include the implementation of a bike share program, provision of extensive bicycle parking throughout the site and within each building and providing a bike station with secure bike parking at the subway and GO station entrances. Local and regional transit buses would also be equipped with bike racks.

Exhibit 7.5: Proposed Cycling Provisions



7.5 Transit

By virtue of its location alone, the Langstaff development will be a place where people can choose to live and work without a car and instead rely on transit. However, the extent to which people will use the available transit modes is heavily dependent on how easy it is to access them – often referred to as the "Last Mile Problem". The Langstaff site is not without challenges in this regard, as the current regional plans place most of the transit access at the planned mobility hub in Richmond Hill, and the only subway station is at the very southwest corner of the site.

The challenge of moving people to and from the regional transportation has been considered in planning of the Langstaff Master Plan. At the broad level, the land use plan places a large concentration of development at the subway node, and at the portal to the GO Concourse. Streets are also being planned so people can walk and bike to transit.

The major feature of the transit system, however, is a proposed internal transit circulator designed to carry people to and from the regional transit stations. This transit circulator would be developed along the central spine and include connections to the north as they become available (See Exhibit 7.6). Initially, the service would be provided using buses, but could evolve into a higher order mode such as streetcar or Personal Rapid Transit in the longer term. The

Quebec City recently completed a pilot test of electric buses which are smaller than a regular bus and would be ideal for use as the circulator buses for Langstaff. Buses are power by batteries that last throughout the day and cost only a few dollars to recharge.

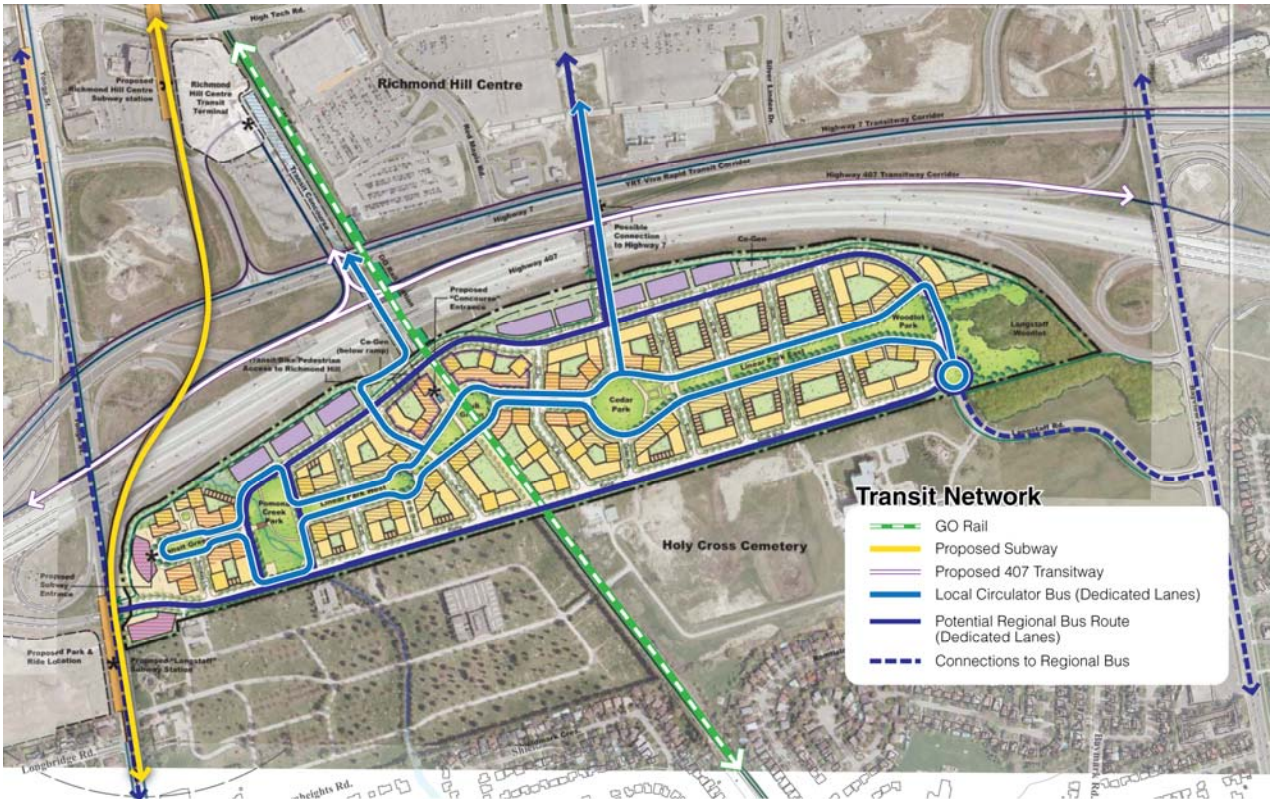
system could be operated by YRT or it could be a community owned system funded by modest development levies. The latter would permit the option of allowing free access to encourage transit use.

Initial estimates of the demand for the internal circulator bus are substantial, and suggest the design of this system cannot be under-estimated. Assuming 0.5 trips per unit are generated in the peak hour and 25% of these trips utilize local transit for some portion (e.g. to access the subway), this would translate into a peak hour demand of about 1,875 person trips per hour, not including employee related trips. At a capacity of 30 persons per bus (i.e. smaller buses), buses would need to be operating at one minute headways to meet the projected demand.

Indoor pathways can significantly reduce the perceived walking distance from rapid transit stations.

In addition to providing local transit services, one of the ways of extending the "reach" of rapid transit would be to design climate controlled walkways into the building fabric, similar to the path system in Downtown Toronto, or the concourse system in North York Centre. For example, there could be an underground or enclosed pathway from the subway directly to the office towers west of the railway tracks and south of Highway 407.

Exhibit 7.6: Proposed Transit Provisions

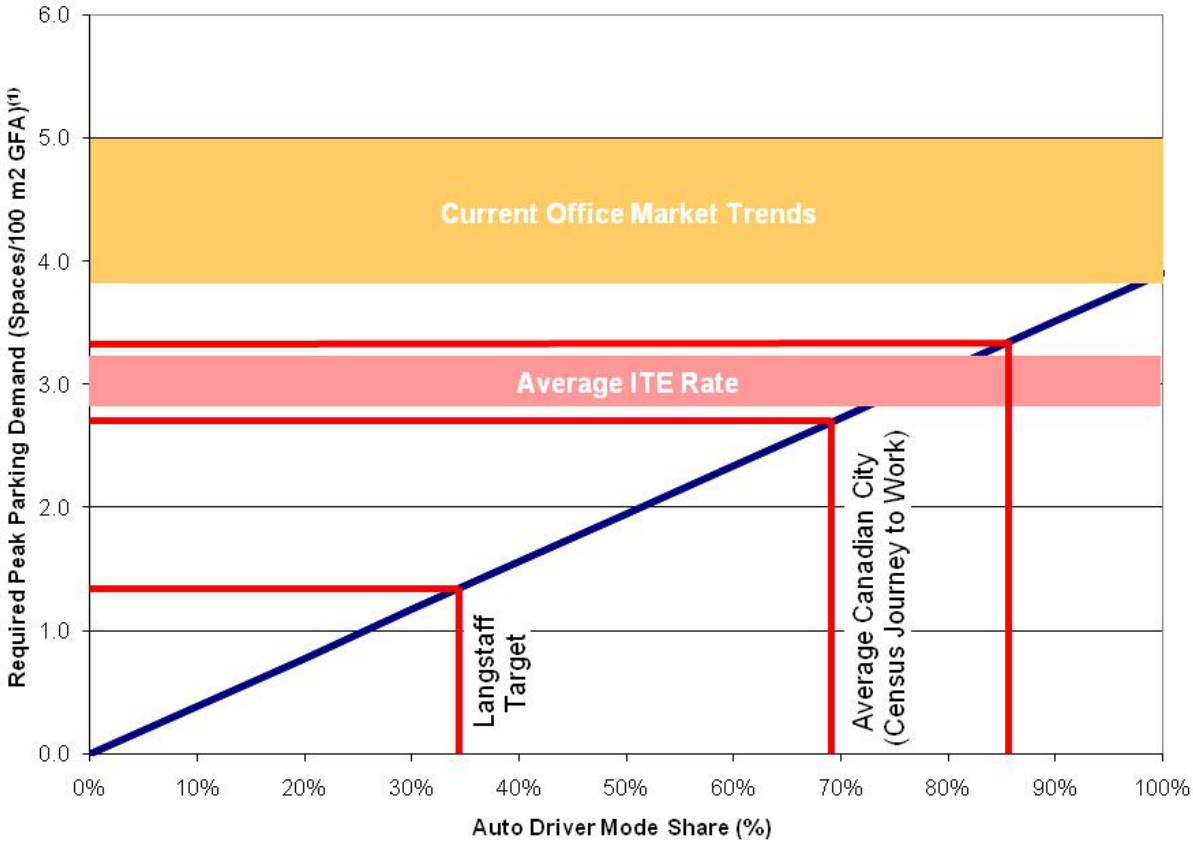


7.6 Parking

In addition to other factors such as density and auto ownership, mode choice is significantly affected by the availability and price of parking. Even if an area is well served by frequent and convenient transit, transit mode shares will remain very low if plentiful and inexpensive parking is available. Thus, an effective strategy to encourage greater use of sustainable transportation modes will also include a parking strategy. Generally, parking requirements need to reflect the level of transit service and transit mode split targets. An example of how the demand for parking spaces in an office building changes with auto mode split is shown in Exhibit 7.7. As the auto mode split decreases, the need for parking also decreases. Looking at it the other way around, the maximum auto mode split is limited by, or to some extent can be controlled by, the availability of parking. By design, Langstaff needs to adopt parking requirements that are well below current standards and observed trends in order to meet the required mode split targets.

Rather than setting minimum parking standards, the zoning by-law for Langstaff will need to set maximum parking standards. In addition, provisions will need to be put in place to ensure that any parking that is constructed is available for multi-purpose uses (e.g. shared parking). Exhibit 7.8 sets out the suggested parking spaces required for each development in Langstaff by the land use type and its proximity to transit. It should be noted that the proposed office standards assume that a portion of this supply will be available for general public uses.

Exhibit 7.7: Relationship Between Office Parking Supply and Auto Mode Shares



Note (1): Graph shows the number of parking spaces required per 100 m^2 Gross Floor Area as a function of auto driver mode share to work (assuming 3.9 employees per 100 m^2 GFA).

Another way to reduce parking needs, particularly for residents, is to provide car share vehicles. Car sharing programs already exist in many cities such as Seattle, Vancouver and Toronto. Demand for parking is reduced because one vehicle is shared among many users, i.e. each vehicle sits idle for a much smaller fraction of the time compared with a private vehicle.

With reduced car ownership, many short or discretionary trips that otherwise would have been made with a car, but do not need to be made with a car, are more likely to be made on foot or by transit. Membership in an auto sharing group makes it convenient to make a trip by automobile when needed, but not so convenient that trips are made by automobile when not necessary.

Car-sharing opportunities need to be put in place in conjunction with the initial development in Langstaff to provide for occasional car trips for those households who will not have parking.

7.6.1 BICYCLE PARKING

Bicycle parking will also be considered as part of Langstaff's overall parking strategy. The provision of adequate bicycle parking and associated shower and change facilities

is an important element in the promotion of bicycle use. Consistent with current best practices, minimum bicycle parking standards will be specified for each type of use and will not be tied to auto parking standards. Preliminary ratios are set out in Exhibit 7.8. These standards are consistent with the proposed standards for the City of Toronto, as well as existing standards for Ottawa, Vancouver, and Calgary. In addition, the zoning by-law will include requirements for the amount, location and design of supporting amenities such as showers, lockers and bicycle storage facilities by type of use.

The minimum bicycle parking standards are broken down into two categories of parking, and are defined as follows:

- **Type 1**: Long term secure parking that is provided in a locked separate bicycle room located within a building or automobile parking facility. These can be lockers, bicycle rooms, or bicycle cages. Not more than 50% of spaces shall be provided in a manner that requires the bicycle to be locked in a vertical position.

- **Type 2**: Short term parking provided in racks. The racks should be in a convenient and if possible sheltered location and should be of a suitable design that allows the frame and a wheel to be locked to the rack using a conventional U-lock.

Assuming a typical office employment density of 3.9 employees per 100 m^2 or office space, the proposed bicycle parking standards would allow for a 5% bicycle mode share. This is consistent with the forecasted Phase 3 bike/walk mode share of 10% for Langstaff. The values presented in Exhibit 7.8 are minimum standards, however, and increased bicycle parking will certainly be necessary to increase the bike mode share to more substantial levels.

In addition to type 1 bicycle parking , shower and other supportive facilities such as clothing lockers should be provided in all workplaces. The recommended number of shower stalls for a given number of required Type 1 parking spaces is given in Exhibit 7.9.

Further, in addition to Type 2 off-street bicycle parking spaces, which are required in all buildings, on street bicycle parking should be provided liberally throughout Langstaff, especially in retail areas, near community uses and parks, and in high employment areas. At least one on street bicycle parking space should be provided for each on-street car parking space in commercial areas, consistent with what is typically seen on most downtown Toronto commercial streets.

Exhibit 7.8: Proposed Car and Bicycle Parking Standards for Langstaff

Use	Proximity to Transit	Car Parking Space Requirement	Minimum number of Type 1 Bicycle Parking Spaces	Minimum number of Type 2 Bicycle Parking Spaces
Residential	< 200 m radius	0.5 spaces / unit	0.75 spaces / unit	0.15 spaces / unit
	200 - 400 m radius	0.7 spaces / unit		
	Other	1.0 spaces / unit		
Office	< 200 m radius	1.75 spaces / 100 m^2	0.2 spaces / 100 m^2	Greater of: 0.2 spaces / 100 m^2 or 6 spaces for sites with GFA < 100 m^2
	200 - 400 m radius	2.0 spaces / 100 m^2		
	Other	4.0 spaces / 100 m^2		
Retail	< 200 m radius	0.7 spaces / unit	0.2 spaces / 100 m^2	Greater of: 0.3 spaces / 100 m^2 or 6 spaces for sites with GFA < 100 m^2
	200 - 400 m radius	1.0 spaces / unit		
	Other	3.0 spaces / unit		
Civic / Community	< 200 m radius	0.5 spaces / unit	-	-
	200 - 400 m radius	0.7spaces / unit		
	Other	1.5 spaces / unit		

Exhibit 7.9: Proposed Minimum Shower Facilities Required for Each Gender

Required Number of Type 1 Bicycle Spaces	Number of Shower Stalls
0 – 4	0
5 – 29	1
30 – 59	2
60 – 89	3
90 – 119	4
120 – 149	5
150 – 179	6
Over 179	7 plus 1 for each additional 30 spaces

7.7 Travel Demand Management

Travel Demand Management (TDM) is now an accepted strategy for mitigating local and regional traffic congestion, and can be seen as part of a broader comprehensive approach to reduce peak period drive alone trips. TDM is a key element of the recently released York Region Transportation Master Plan. Strategies include implementing policies to encourage companies to allow flexible working hours or employees to work from home a certain fraction of the time. Targeted marketing strategies can be used to encourage carpooling, car sharing or combining trips, which can be

particularly effective when used in combination with infrastructure incentives such as High Occupancy Vehicle Lanes. Travel Demand Management strategies often result in a shift in when trips are made or the type of trip made, but not an overall reduction in the number of trips. Thus, it is important to combine TDM incentives with high density, walk and bike friendly, transit oriented design in order to keep the overall auto mode split to a minimum.

The Langstaff development represents perhaps the greatest opportunity in the GTA to explore and implement innovative TDM measures, and have them be successful. The fact that the site is constrained in terms of automobile capacity means that the promotion and financial support of TDM measures by the development community will be a necessity, as opposed to a matter of choice. Some of the applicable TDM measures for Langstaff are outlined below.

Mock-up of an in-home traveller information system recently implemented in a residential development in Richmond Hill.

An important early action will be to establish a Transportation Management Association (TMA) with representation from the Town, Region and development community, as well as major employers and residents associations.

7.7.1 PROMOTION OF CAR FREE LIVING

In order to achieve a target sustainable mode share of over 60%, it will be necessary that some households choose to live without a car. This is implied in the residential parking standards, which are less than 1.0. Car-free living is quite common in Downtown Toronto, but has yet to become widespread in York Region where the average car ownership is over 2 cars per household.

In addition to simply reducing parking supply for residential units, it is recommended that Langstaff be marketed as a car-constrained development from the outset. This is important so that people do not move into the community in anticipation of having un-restricted car ownership, which is not possible in the longer term.

In the United Kingdom, and London in particular, the concept of formalized 'car-free' development is becoming increasingly common (See carfreehousing.co.uk). Some developments actually require residents to sign a legal covenant that they will not own a car when they purchase a unit.

7.7.2 PROMOTION OF TRANSIT

In addition to having access to local and regional transit, additional measures could be considered to further enhance the attractiveness of transit for residents and employees. For example, many developments in the GTA now include a transit pass for a year with the purchase of a unit. Several employers also provide discounted transit passes for employees, matched by the local transit agency.

Use of information technology would be another way to make transit use more attractive. For example, each residential unit could be provided with a devise that would monitor the location of the

transit circulator buses in real time. This same information would be provided at kiosks throughout the entire development, including office buildings.

7.7.3 LIVE-WORK OPPORTUNITIES

As congestion and gas prices rise, it is inevitable that communities that provide the option of both living and working will be in high demand. Between 1996 and 2006, the number of people reporting that they did not leave the home for work increased from 4.3% to 8.7%[3].

The Langstaff Master Plan includes a mix of residential and employment uses, which will increase the probability that someone living in the area will also have the opportunity to work in the area. However, even if there are 30,000 jobs in the Langstaff and Richmond Hill area in the future, this represents a small percentage of the millions of jobs in the GTA. Therefore, other strategies will be necessary to facilitate live-work arrangements.

Virtual offices and social networking spaces offer an option to those who do not want to commute to work every day.

One potential strategy is to build facilities for shared office space into developments. These so called virtual offices are becoming more common in the GTA and elsewhere. The concept is based on the notion that employees do not have to go to a formal office every day if they have the access to the same office amenities locally (e.g. video conference facilities, photocopiers, office assistance, boardrooms, etc.). The concept of shared office space also recognizes that people also need some level of social interaction, and spaces are designed to facilitate this.

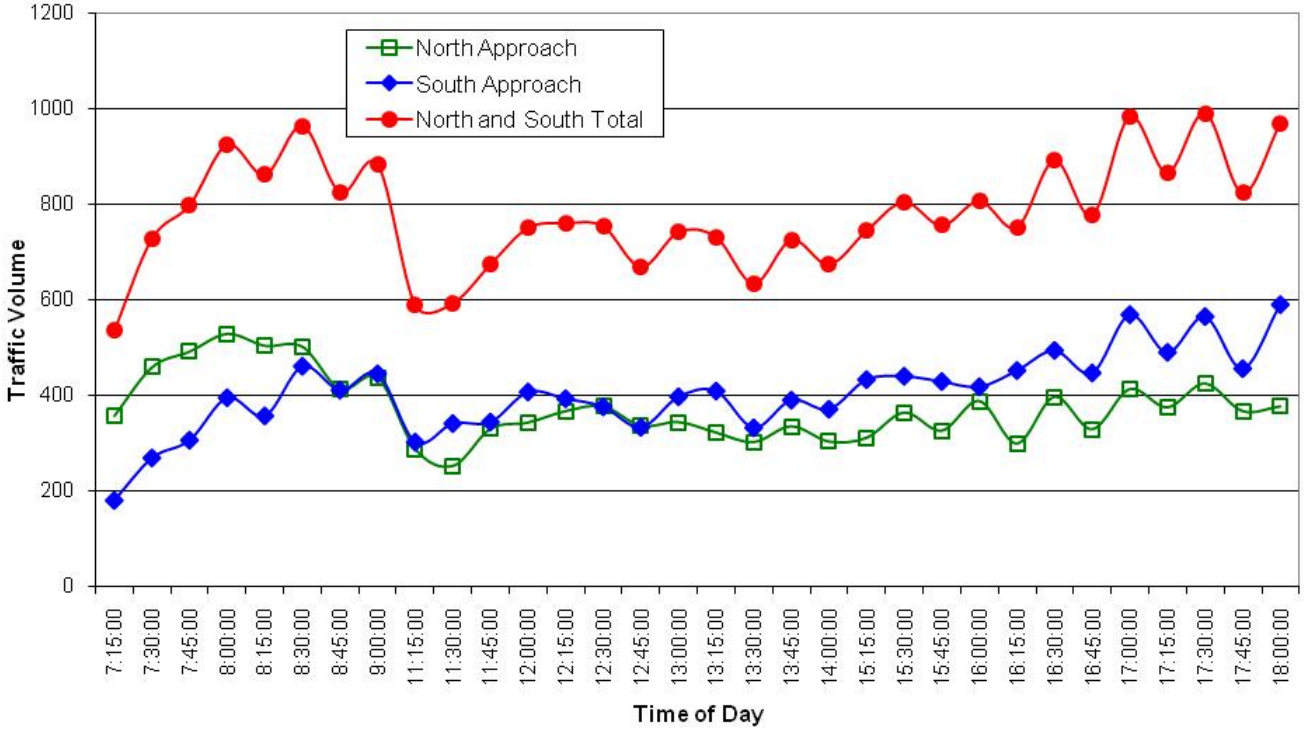
7.7.4 PEAK SPREADING

A final and obvious TDM strategy for Langstaff will be to simply recognize that not all trips need to be made in the peak hours. As shown in Exhibit 7.10, the shoulders of the peak hours (e.g. before 8 a.m., after 9 a.m., before 4:30 p.m. and after 6 p.m.) have at least 15-20% less traffic than the peak hours. As is typical throughout the GTA, many people tend to plan their trips to avoid these peak hours, and this will no doubt need to occur for people travelling to and from the Langstaff area.

Pricing is one way to encourage peak spreading, a strategy that has already been adopted for Highway 407 and one that will likely become more widespread over the planning horizon for Langstaff. In addition to road pricing, parking pricing can also be designed to shift travel to non-peak hours (e.g. early bird rates).

[3] Transportation Tomorrow Survey, 1996, 2001 and 2006.

Exhibit 7.10: Existing Daily Traffic Profile for Yonge Street at Langstaff Road



7.8 Goods Movement / Commercial Vehicle Movements

The movement of commercial goods and delivery vehicles can be challenging in areas with high population and employment densities. From an urban design perspective, loading bays and areas located beyond the view of the general public should be provided in order to avoid the right-of-way being used for general loading and unloading, and these features are included in the Master Plan.

From a broader perspective, there is also a need to simply reduce the number of trips made to and from Langstaff for the purpose of moving goods or other commodities such as garbage and construction materials. This is required from an environmental perspective, but also makes sense given the limited roadway capacity.

Centralized package pick-up can significantly reduce the number of trips made by residents, as well as shift the delivery of goods to off-peak times.

Some solutions for minimising the impact of delivery vehicles in Langstaff include central locations for dropping goods, which can then serve as a focal point for delivery and circulation by small scale, local delivery vehicles or from where local merchants and residents will be able to pick up goods directly; timed access regulations that would allow delivery vehicles to access the site or certain high traffic, pedestrian or transit areas only during certain times of the day; and regulations that limit the size of delivery vehicles allowed to access the Langstaff site.

During the construction phases of the Langstaff site, strategies such as local concrete production should be considered. Concrete is produced locally on the Toronto waterfront, for example, to supply the high level of condominium development that is occurring there. Other strategies include automated waste collection through underground network of pipes to reduce the need for servicing by trucks. Such systems are available on the market from companies such as ***Envac*** and are being explored for Langstaff by the developers.

8. PHASING STRATEGY

8.1 Overall Phasing Approach

The Langstaff Gateway project is an ambitious and complex undertaking, especially so because of the site's unique physical constraints (such as CNR's active freight rail corridor) and planned transit infrastructure. In recognition of these challenges, a detailed and thorough phasing plan has been established. Development will be staged in sequence that respects site issues such as site ownership patterns, traffic & circulation infrastructure, existing and proposed site access and egress, site servicing and utility infrastructure. In addition to these logistical considerations, project implementation has been designed so that core sustainability goals are achieved at every stage instead of final project buildout.

As outlined in the Master Plan document, benchmarks, targets, and thresholds has been established to guide development. This system of benchmarks will be an objective and quantifiable way to measure the progress of the development and confirm that it is adhering to the shared vision that is articulated in this Master Plan document. If key targets are not met (minimum amounts of community space provided, for instance) advancement to the next stage of development will be blocked.

8.2 Transportation Targets and Performance Measures

Exhibit 8.1 presents a set of proposed transportation phasing targets/criteria corresponding to each phase of development. A preliminary phasing plan for the road network is identified in Exhibit 8.2.

Performance categories such as travel behaviour should be measured based on traffic and transit counts taken at key access points. If the mode split targets as are not being met, then adjustments should be made to subsequent phases of development in an effort to get mode splits back on target. Measures that could be taken might include ceasing to expand or reducing the amount of parking on site, ceasing to expand or reducing the road capacity, or increasing transit levels of service and accessibility to transit stations. Transportation pricing strategies could also be considered, including adjusting the marginal differences between auto and transit travel.

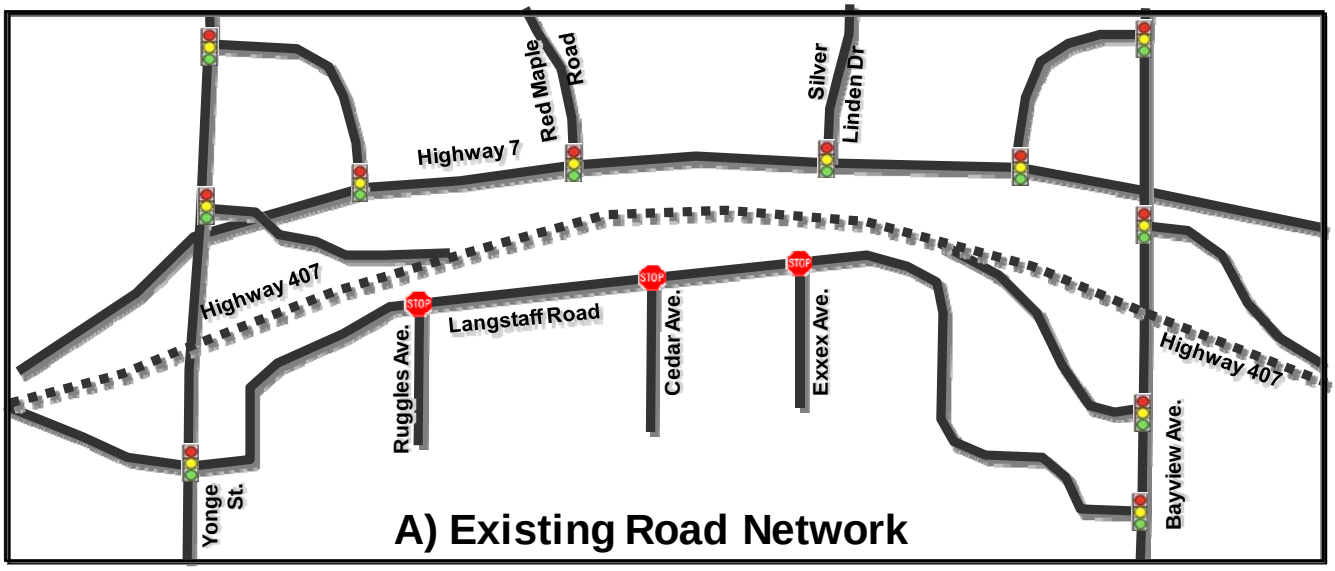
Exhibit 8.1: Preliminary Phasing Considerations and Suggested Performance Targets

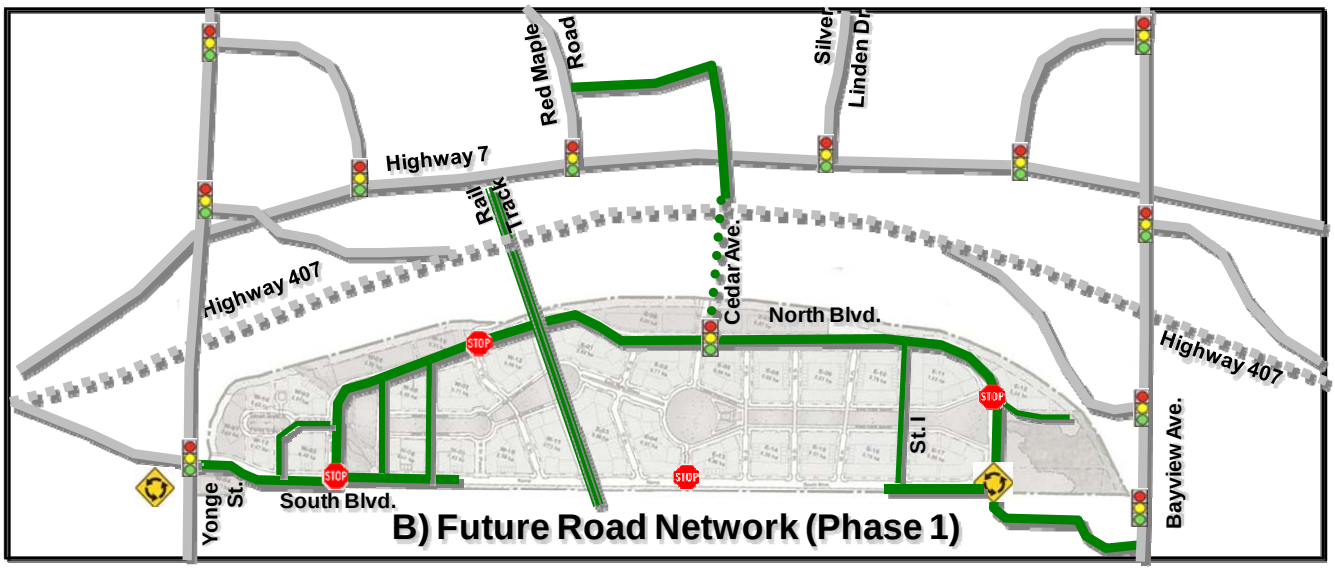
Category	Phase 1	Phase 2	Phase 3
Land Use	0.5 jobs per resident in Urban Growth Centre	0.75 jobs per resident in Urban Growth Centre	1 job per resident in Urban Growth Centre
Parking	Parking ratios do not exceed ultimate maximums by more than 10% 10% zero car households	Parking ratios do not exceed ultimate maximums 50% of non-residential parking is publically accessible/shared 20% zero car households	Parking ratios do not exceed ultimate maximums 75% of non-residential parking is publically accessible/shared 30% zero car households
Major Infrastructure/ Transit Service (1)	Transit shuttle operating with connection to Richmond Hill Terminal Cedar Avenue underpass Temporary transit access via CNR underpass	Transit shuttle operating with connection to Yonge Subway, Richmond Hill Terminal Yonge Subway operational All day service on Richmond Hill GO Line Highway 7 Rapidway	Transit shuttle or PRT operating with connection to Yonge Subway, Richmond Hill Terminal Mobility hub concourse connecting to Richmond Hill Ped/Bike overpass across Highway 407 to Silver Linden
Travel behaviour	35% of peak hour trips made by sustainable modes by end of Phase (2)	50% of peak hour trips made by sustainable modes by end of Phase (2)	65% of peak hour trips made by sustainable modes by end of Phase (2)
Traffic Performance	Queue lengths for inbound movements on regional roads do not exceed available/planned storage capacity for more than 2 hrs per day Off-peak and weekend traffic does not exceed peak period traffic	Queue lengths for inbound movements on regional roads do not exceed available/planned storage capacity for more than 2 hrs per day Off-peak and weekend traffic does not exceed peak period traffic	None
Supporting Measures	Minimum of one carshare operation in place Langstaff Transportation Management Association (TMA) established	Public bike share in place Concept of virtual offices well established	Centralized parcel pick-up available

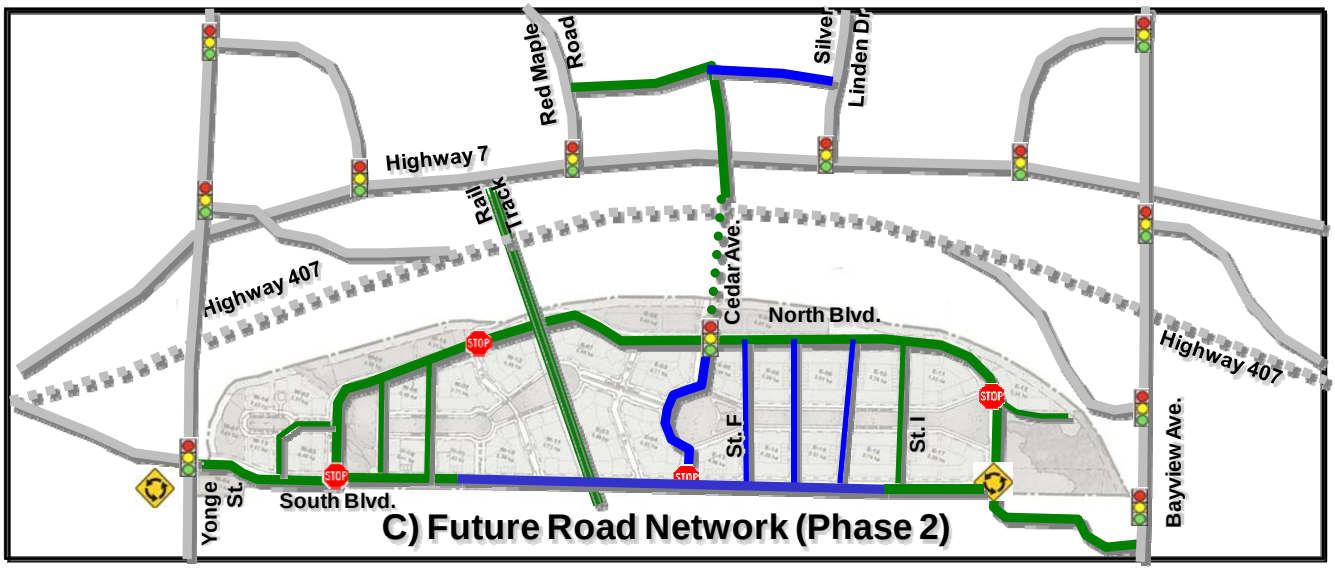
(1) See Exhibit 7.2 for phasing of internal street network

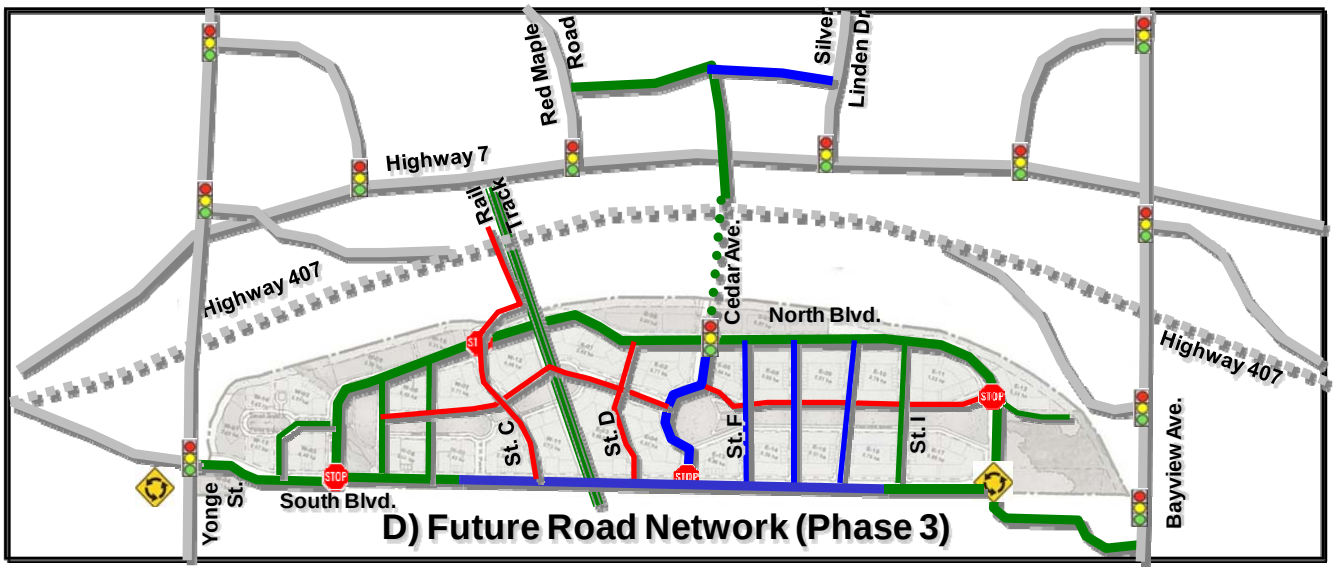
(2) Sustainable modes include walk, cycle, transit or car passenger.

Exhibit 8.2: Preliminary Phasing Considerations and Suggested Performance Targets






Red Maple Road
Silver
Linden Dr.
Highway 7
Rail Track
Cedar Ave.
Highway 407
North Blvd.
Highway 407
STOP
St. F
St. I
Bayview Ave.
Yonge St.
South Blvd.
C) Future Road Network (Phase 2)


Red Maple Road
Silver
Linden Dr.
Highway 7
Rail Track
Cedar Ave.
Highway 407
North Blvd.
Highway 407
STOP
St. C
St. D
St. F
St. I
Bayview Ave.
Yonge St.
South Blvd.
D) Future Road Network (Phase 3)