

Chapter 2 – Transportation Needs



407 TRANSITWAY – WEST OF BRANT STREET TO WEST OF HURONTARIO STREET
MINISTRY OF TRANSPORTATION - CENTRAL REGION

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2. TRANSPORTATION NEEDS

2.1. Introduction

The 407 Transitway project from west of Brant Street to west of Hurontario Street encompasses the Design of an exclusive all grade-separated 43 km runningway and eight station facilities adjacent to the 407 ETR Corridor. The 407 Transitway will provide transit service across the GTA and will link a variety of major urban centres and transit intermodal hubs. The 407 Transitway will be implemented as a busway (BRT); however, the design and footprint of the BRT will allow opportunity to convert to light rail transit (LRT) in the future, if needed.

The purpose of this Systems Planning report is to confirm the need and justification of the Transitway, develop ridership forecasts, assess the need for stations and size of stations, and to provide input to preliminary design and support other EA disciplines including traffic, noise, air quality, and costing.

2.1.1. Background

In the 1990s, the Ministry of Transportation of Ontario (MTO) began protecting property along the 407 ETR corridor through a series of Property Protection Studies. The studies developed a runningway alignment and station locations for the purposes of acquiring property and restricting development.

In the mid-2000s, MTO began formalizing plans for the transitway through EA study of the ‘central’ segment between Highway 400 and Kennedy Road in Markham. Two subsequent EAs, for Kennedy Road to Brock Street (‘east’ segment) and Hurontario Street to Highway 400 (‘west’ segment), followed and were also filed. The current EA, west of Brant Street to west of Hurontario Street, is the fourth separate EA for the 407 Transitway.

Land adjacent to 407 ETR in Peel Region have extensively developed as industrial / employment uses, and new developments currently underway or proposed along the corridor include the Ninth Line lanes in Mississauga and North Oakville in Halton Region. As these developments are encroaching on the land protected for the Transitway, and the corridor protection study is aging at approximately 20 years old, an update to the transitway plan is needed.

2.1.2. Scope of Systems Planning

The purpose and scope of this systems planning report is:

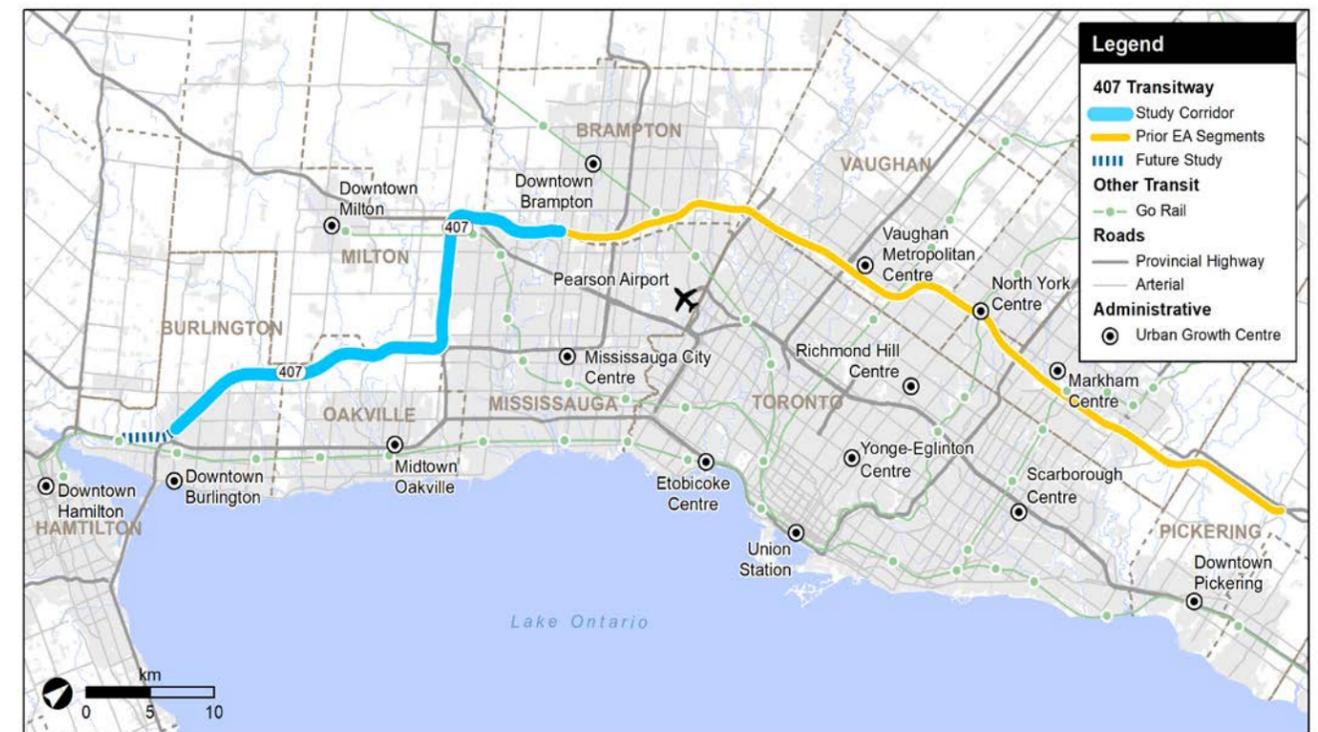
- Confirm the need and justification of the Transitway in the current context with significant growth since prior studies and updated plans including the Metrolinx Regional Transportation Plan and updated Provincial Growth Plan;
- Update the system impacts of the Transitway across the Greater Toronto and Hamilton Area, including transit impacts and benefits and effects on the road network;

- Update ridership forecasts to the 2041 horizon;
- Determine station and facility needs, feeding into conceptual design to determine station footprint.

2.1.3. Study Corridor

A map of the study corridor and its location along the overall 407 Transitway is provided in **Figure 2.1**. The current study limits are from Brant Street in Burlington to west of Hurontario Street in Brampton. West of Brant Street the Transitway is subject to a future environmental assessment, to be carried out under a separate study. In the east limit of the study area, the Transitway connects to a proposed station at Hurontario Street, which was included in the 2018 approved EA (Hurontario Street to Highway 400).

FIGURE 2.1: STUDY CORRIDOR MAP



The study corridor length is approximately 42 km. Stations were proposed in the property protection study at major arterial crossings in Halton Region and Peel Region, which also correspond to interchange locations along the Highway. The alignment also crosses Highway 403 and Highway 401, with potential connections discussed later in this report.

The study corridor is adjacent to developed land in parts of Burlington, Brampton and north Mississauga, but otherwise is largely rural undeveloped. While currently undeveloped, a significant portion of the adjacent lands in north Oakville and west Mississauga are in late stages of development planning and

approvals and will develop within the 2041 planning horizon of this study. A detailed discussion of land use and development plans is provided in **Sections 2.2** and **2.3** of this report.

2.1.4. Approach

The Systems Planning approach included the following broad tasks and methodology:

- A review of existing and future land-use was undertaken with land-use plans drawn from the Provincial Growth Plan.
- Existing travel patterns, behaviour, and current trends were drawn from the 2016 Transportation Tomorrow Survey (TTS).
- MTO's Greater Golden Horseshoe travel demand model was updated and used to develop ridership and traffic forecasts for various station and transitway alignment alternatives.

Travel trends analysis was based on the Transportation Tomorrow Survey (TTS), a survey of travellers in the GTHA undertaken every five years that provides a detailed database of travel behaviour in terms of trip origin/destination, trip purpose (e.g. work, shopping), travel mode (e.g. auto, bus, bicycle), and other details (e.g. time of trip).

Modelling activities were performed using the Greater Golden Horseshoe Model (GGHM) V4. The GGHM is an advanced four-stage travel demand model used to analyze travel conditions within and through the GGH. The model is under the jurisdiction of MTO's Systems Analysis and Forecasting Office, and is an advanced state-of-practice tool that is sensitive to a wide range of network performance sustainable transportation policies. The model can be used to predict traffic and ridership considering changes to cost of travel, congestion, travel time, land-use, and many other variables. The model incorporates latest population and employment forecasts from the Provincial Growth Plan. Future background network assumptions include the Metrolinx Regional Transportation Plan and other planned and committed projects from municipal plans.

Findings from the analysis were used to undertake a planning-level evaluation of the proposed stations along the Transitway, which is provided in **Section 2.6**. Forecasts were also used as input to traffic studies, noise,

2.1.5. Overview of the Chapter

This chapter is organized as follows:

- **Section 2.2:** Existing Conditions and Past Trends provides an overview of the corridor area and adjacent land uses, describes existing travel demands, and outlines how travel patterns have evolved in the past 20 years.
- **Section 2.3:** Future Conditions provides estimates of future growth and land use changes, as well as resulting travel demands, to identify emerging travel markets and possible network

deficiencies.

- **Section 2.4:** Service Concept provides a conceptual operating and service concept for the 407 Transitway, including the proposed service strategy, vehicle technology, and the route structure.
- **Section 2.5:** Vehicle Maintenance and Storage support
- **Section 2.6:** Ridership Forecasts summarizes ridership forecasts for the selected service concept, and evaluates potential station locations based on station demands, transit connections, and nearby trip generators.
- **Section 2.7:** Summary of Findings

2.2. Existing Conditions and Past Trends

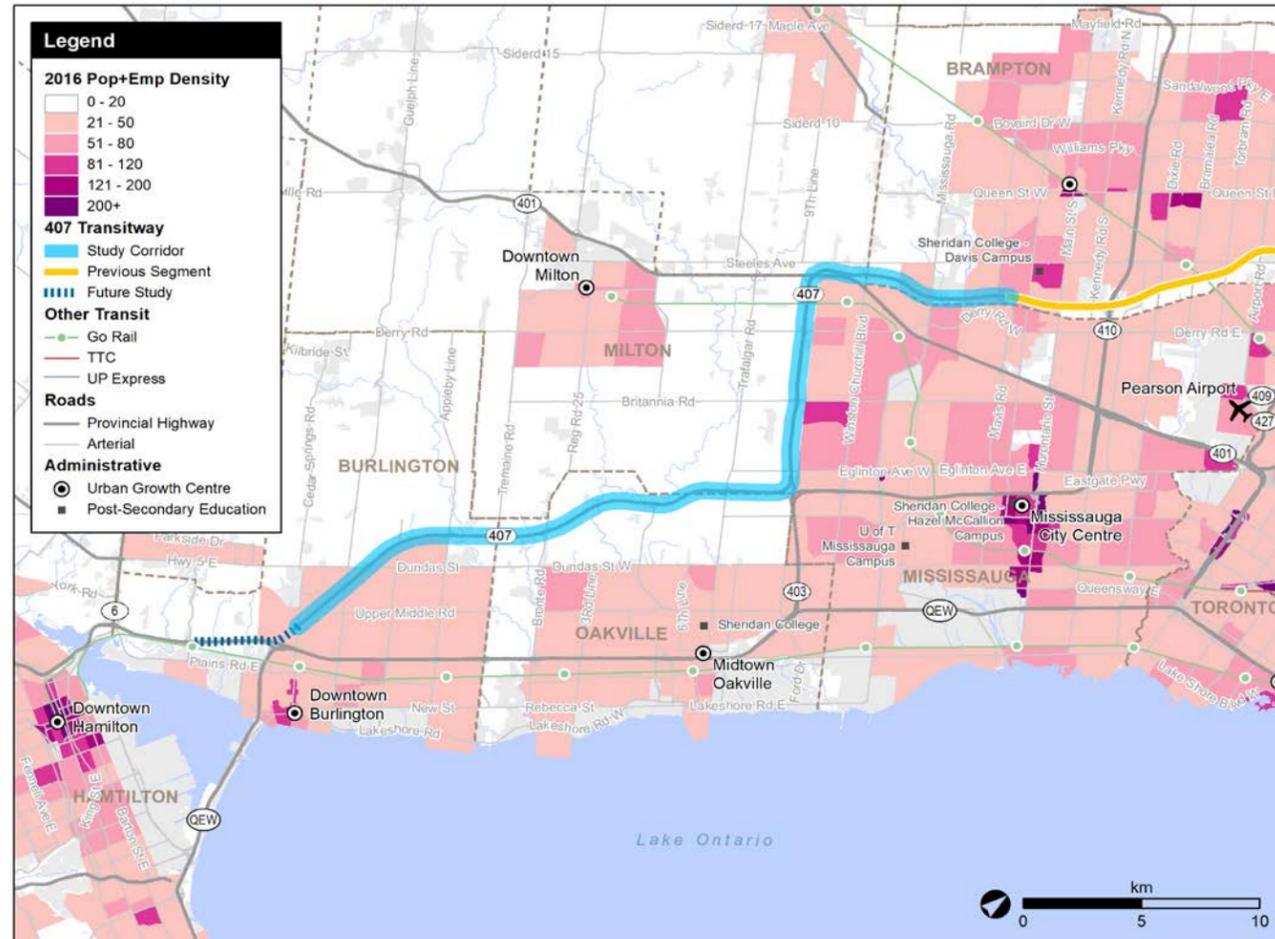
This section describes the current transportation network and provides an overview of major trip generators and attractors that exist within the study area. Historical trends are analyzed using travel survey data to inform how the corridor is growing and to determine markets that could be served by the 407 Transitway.

2.2.1. Current Land Use

The majority of 407 ETR lies along urban area boundaries, and adjacent land uses include a mix of rural agricultural, low-density residential, and some pockets of commercial/industrial. A significant portion of the adjacent lands through Burlington and Oakville are designated as part of the Natural Heritage System in the Greenbelt Plan. **Figure 2.2** shows land use densities in areas nearby the transitway for year 2016.

While there are some high-activity areas near the corridor, including near Oakville Trafalgar Memorial Hospital and the Toronto Premium Outlet Collection, the current density adjacent most of the corridor is quite low. However, several urban growth centres located nearby the study corridor – including Downtown Hamilton, Downtown Burlington, Midtown Oakville, Downtown Milton, Mississauga City Centre, and Pearson Airport – represent potential higher density markets that could be targeted. **Section 2.2** explores opportunities for connecting to these markets using interlined transit service.

FIGURE 2.2: 2016 DENSITY (POPULATION AND EMPLOYMENT PER HECTARE)



Niagara Peninsula and the Gardiner Expressway in Toronto. Within the study area, the QEW primarily has an eight-lane cross section, with an additional two High-Occupancy Vehicle (HOV) lanes provided between Guelph Line and Trafalgar Road. QEW is often congested increasing travel times for east-west travel, potentially diverting traffic to 407 ETR a portion of which may be attracted to use the Transitway.

- **Highway 403** – Highway 403 is an east-west 400-series highway that spans between Brantford and Highway 401, merging with the QEW through Burlington and Oakville. Beyond where Highway 403 Branches off from the QEW, the highway ranges from two to six lanes for general traffic, and also includes an additional two HOV lanes through Mississauga between 407 ETR and Highway 401. Highway 403 through Mississauga includes an existing Transitway between Winston Churchill Boulevard and Pearson Airport, providing a potential linkage to the future 407 Transitway.
- **Highway 401** – The largest expressway in Ontario, Highway 401 has a large influence on east-west travel within the GTHA and to/from many other cities throughout Ontario and beyond. Highway 401 currently has a six-lane cross-section adjacent to the study area, however is currently under design-build for widening between Hurontario Street and Regional Road 25.

Many four-lane and six-lane arterial roads also intersect or run parallel to the study corridor. Availability of park-and-ride facilities is expected to be an important source of ridership for the 407 Transitway, to attract demand from locations outside of the immediate corridor area. Major roads nearby or intersecting the study corridor include:

- **North-south arterials** (from west to east) – Brant Street, Guelph Line, Walkers Line, Appleby Line, Tremaine Road, Bronte Road, Neyagawa Boulevard, Sixth line, Trafalgar Road, Ninth Line, Winston Churchill Boulevard, Heritage Road, Mississauga Road, Financial Drive, Mavis Road.
- **East-west arterials** (from north to south) – Steeles Avenue, Derry Road, Britannia Road, E Lower Base Line, Dundas Street, Plains Road, Fairview Street.

2.2.2. Transportation System

2.2.2.1. Road and Highway System

The following are primary roads and highways within the study area:

- **407 ETR Express Toll Route (ETR)** – 407 ETR is a privately operated and tolled 400-series highway that spans 100 km in the GTHA, from Burlington to Oshawa. Given the high tolls charged, the high traffic flows still carried during peak travel periods are indicative of the strong demand for east-west travel. Within the study corridor, 407 ETR has a six-lane cross-section between QEW and Highway 401, and an eight-lane cross-section beyond Highway 401. As a parallel highway, 407 ETR may act as a feeder access route for some travel to the Transitway and it may serve an interim role serving buses along the highway.
- **Queen Elizabeth Way (QEW)** – The QEW is a 400-series highway that spans 139 km between the

2.2.2.2. Existing Transit Services

This section describes other bus and passenger rail services within and nearby the study corridor. These transit services are included in the current-year GGHM scenario, updated according to recent agency service plans.

VIA RAIL CANADA

VIA Rail Canada is Canada’s national passenger rail service that provides inter-city, long-distance, and regional transportation with connections to over 400 communities across Canada. The majority of its ridership comes from inter-city travel in the Quebec-Windsor corridor. Aldershot Station and Oakville Station are VIA Rail stations within or nearby the study corridor.

GO TRANSIT

Several GO Rail stations are located within the study area, including Aldershot GO and Burlington GO on the Lakeshore West line, as well as Lisgar GO on the Milton Line. These GO Rail stations provide service to Union Station in downtown Toronto, and therefore serve a different market than the proposed 407 Transitway. However, transfer opportunities may be possible at several future transitway stations.

GO Bus also operates several routes on 407 ETR, with stations located at nearly all of the highway interchanges in Burlington and Oakville. It is noted that when constructed, the 407 Transitway will effectively replace these existing GO Bus services operating on 407 ETR.

LOCAL TRANSIT SERVICES

There are numerous local transit operators within and nearby the study corridor, including Burlington Transit, Oakville Transit, MiWay, and Brampton Transit / Züm. Transitway stations will need to be planned and coordinated with local transit services to ensure the 407 Transitway serves distinct trip markets that are not redundant with other agencies, but instead work cohesively efficient transfers and first-and-last mile connections. The 407 Transitway is intended to serve more long-distance and cross-boundary travellers, and therefore will not be competing with local transit services.

2.2.3. Historic Travel Trends

Transportation Tomorrow Survey (TTS) results were used to conduct a historical analysis of travel demand in the study area. **Table 2.1** provides a comparison of a.m. peak period trip data from the 1996 and 2016 surveys. Trips are summarized according to location of origin/destination, classified as either occurring within the primary corridor area adjacent to 407 ETR, to/from the nearby urban growth centres, or to/from other nearby areas to the south, west, north or east.

Findings show transit modal share is strongest for trips to/from the east (Toronto) where transit made up 24% of motorized trips in 2016, up from its 16% value in 1996. This strong modal share likely reflects limited road expansion and alternatively, strong GO Service expansion between Halton Region and downtown Toronto.

Within the primary corridor area transit made up 5% of motorized trips in 2016, unchanged from 1996. While relatively low, the modal share reflects existing land-use and an under-served transit market, and the challenge of providing a transit service that serves dispersed travel origins and destinations.

In terms of all modes of travel, the majority of demand in the primary corridor area was either local (internal trips), to/from the south, or to/from the east. Some of this demand likely represents trips made between the residential areas near 407 ETR and the various employment areas along the QEW, a potential market for new transit users.

Between 1996 and 2016, the area with the highest percentage-increase in total trips to/from the study corridor was that to the north (other parts of Halton and Peel Regions). Significant employment growth

in the area surrounding 407 ETR likely contributed to this increased demand, as this area would have attracted additional trips cities like Brampton and Milton.

Transit trips showed strong growth overall at 183% increase between 1996 and 2016. While much of the growth was to and from Toronto, the strong increase shows that with attractive higher-order transit service the population will take advantage. Overall trends point to a potential role of the 407 Transitway in connecting Regional areas not along the Lakeshore that are nonetheless growing.

TABLE 2.1: HISTORICAL ANALYSIS OF AM PEAK PERIOD MOTORIZED TRAVEL, 1996 – 2016

A. 1996

TRIP INTERCHANGE	TRANSIT	AUTO	MOTORIZED	MODE SPLIT
Within Study Corridor	2,100	42,300	44,400	5%
To/From Nearby Urban Growth Centres	800	19,500	20,300	4%
To/From South	1,700	41,900	43,600	4%
To/From West	100	14,000	14,100	1%
To/From North	400	13,700	14,100	3%
To/From East	8,100	44,100	52,200	16%
Through Eastbound	0	700	700	0%
Through Westbound	0	200	200	0%
Total	13,200	176,400	189,600	7%

B. 2016

TRIP INTERCHANGE	TRANSIT	AUTO	MOTORIZED	MODE SPLIT
Within Study Corridor	5,300	107,300	112,600	5%
To/From Nearby Urban Growth Centres	2,400	32,400	34,800	7%
To/From South	5,600	84,800	90,400	6%
To/From West	1,600	29,100	30,700	5%
To/From North	2,300	39,400	41,700	6%
To/From East	19,900	62,200	82,100	24%
Through Eastbound	200	1,400	1,600	13%
Through Westbound	100	700	800	13%
Total	37,400	357,300	394,700	9%

C. 1996 to 2016 Growth

TRIP INTERCHANGE	TRANSIT	AUTO	MOTORIZED	MODE SPLIT
Within Study Corridor	3,200 (152%)	65,000 (153%)	68,200 (153%)	0%
To/From Nearby Urban Growth Centres	1,600 (184%)	12,900 (67%)	14,500 (71%)	3%
To/From South	3,900 (226%)	42,900 (102%)	46,800 (107%)	2%
To/From West	1,500 (2213%)	15,100 (107%)	16,600 (118%)	4%
To/From North	1,900 (472%)	25,700 (188%)	27,600 (196%)	3%

TRIP INTERCHANGE	TRANSIT	AUTO	MOTORIZED	MODE SPLIT
To/From East	11,800 (146%)	18,100 (41%)	29,900 (57%)	8%
Through Eastbound	200 (-)	700 (121%)	900 (158%)	13%
Through Westbound	100 (-)	500 (190%)	600 (232%)	13%
Total	24,200 (183%)	180,900 (103%)	205,100 (108%)	2%

Note: In Table 'C', numbers in brackets indicate percentage growth.
Source: 1996 TTS and 2016 TTS.

2.2.4. Current Demands and System Performance

Using 2016 land use data, an existing conditions model was developed in the GGHM to analyze travel patterns in greater detail. **Table 2.2** depicts a trip origin and destination matrix and corresponding mode shares as output from this existing conditions model.

A slight directional variance is observed, with more trips originating from the study corridor in the a.m. peak period than destined to it. Nearly half of the trips made from the study corridor are local (remain within study corridor), however a low transit share is observed for these trips as development in study corridor is low-density and dispersed.

Aside local trips, demand is highest between the study corridor and nearby urban growth centres, as well as to/from other areas within Halton and Peel Regions. The highest transit mode share is observed for travel destined to downtown Toronto, several GO Stations located within the study area operating to Union Station.

A higher transit mode share is also observed trips made to other areas to the east that will be served by a future transitway, and while demand to these areas is currently somewhat limited, this high mode share may be due to capture of students (e.g. York University) and reflect the high cost of tolls.

Figure 2.3 shows the current a.m. peak hour performance of nearby 400-series highways, per the results of the existing (2016) conditions model. Model outputs were converted from peak-period to peak-hour data using a conversion factor (0.56) derived from TTS data. The map shows significant eastbound congestion on all non-tolled highways, including Highway 401, 403, and the QEW. In comparison, the travel-time benefits provided by the 407 ETR also appear evident, as the high fees charged to use the highway result in lesser demand and congestion.

FIGURE 2.3: 2016 AM PEAK HOUR HIGHWAY NETWORK PERFORMANCE



TABLE 2.2: 2016 AM PEAK PERIOD TRAVEL FLOWS BY MODE

ORIGIN	DESTINATION									
	STUDY CORRIDOR	STUDY CORRIDOR W/ UGC'S	OTHER TW SECTIONS	TOTAL 407-TW	WESTERN GTHA	OTHER HALTON	OTHER PEEL	DOWNTOWN TORONTO	EASTERN GTHA	TOTAL
ALL TRIPS										
STUDY CORRIDOR	71,300	86,400	15,100	101,500	7,400	15,500	32,500	700	600	158,100
STUDY CORRIDOR W/ UGC'S	80,200	117,300	16,900	134,300	20,800	23,200	42,200	900	700	222,100
OTHER 407-TW SECTIONS	5,400	6,300	115,200	121,500	400	600	17,800	3,300	20,300	163,900
TOTAL 407 TRANSITWAY	85,500	123,600	132,100	255,700	21,200	23,900	59,900	4,300	21,000	386,000
WESTERN GTHA	7,800	30,700	2,700	33,400	450,000	6,300	4,800	1,800	1,000	497,300
OTHER HALTON	12,700	23,600	2,400	25,900	4,500	25,800	6,800	200	200	63,400
OTHER PEEL	28,000	38,700	38,600	77,300	2,900	4,900	112,700	2,800	3,400	204,000
DOWNTOWN TORONTO	600	1,000	4,100	5,100	100	300	2,900	68,900	800	78,100
EASTERN GTHA	1,100	1,500	50,800	52,300	1,100	300	6,300	2,400	225,300	287,700
TOTAL	135,800	219,100	230,600	449,700	479,800	61,600	193,400	80,300	251,700	1,516,400
TRANSIT TRIPS										
STUDY CORRIDOR	5,800	7,500	2,000	9,500	900	1,100	3,300	0	0	14,900
STUDY CORRIDOR W/ UGC'S	6,700	10,200	2,300	12,400	3,000	1,600	4,500	100	0	21,600
OTHER 407-TW SECTIONS	600	700	14,000	14,600	0	0	1,600	200	2,200	18,600
TOTAL 407 TRANSITWAY	7,300	10,800	16,200	27,100	3,100	1,600	6,000	200	2,200	40,200
WESTERN GTHA	200	3,700	0	3,700	42,600	200	100	100	0	46,600
OTHER HALTON	800	1,700	100	1,800	400	800	200	0	0	3,200
OTHER PEEL	4,200	5,400	5,700	11,000	200	200	9,700	200	200	21,400
DOWNTOWN TORONTO	0	0	0	100	0	0	100	10,500	0	10,600
EASTERN GTHA	0	0	5,600	5,700	0	0	300	100	19,400	25,500
TOTAL	12,600	21,700	27,600	49,300	46,200	2,700	16,400	11,100	21,900	147,700
PERCENTAGE TRANSIT TRIPS										
STUDY CORRIDOR	8%	9%	13%	9%	12%	7%	10%	4%	5%	9%
STUDY CORRIDOR W/ UGC'S	8%	9%	13%	9%	15%	7%	11%	5%	5%	10%
OTHER 407-TW SECTIONS	11%	10%	12%	12%	2%	2%	9%	5%	11%	11%
TOTAL 407 TRANSITWAY	9%	9%	12%	11%	14%	7%	10%	5%	11%	10%
WESTERN GTHA	3%	12%	1%	11%	9%	3%	1%	3%	1%	9%
OTHER HALTON	6%	7%	2%	7%	8%	3%	4%	2%	0%	5%
OTHER PEEL	15%	14%	15%	14%	6%	4%	9%	7%	6%	11%
DOWNTOWN TORONTO	1%	1%	1%	1%	2%	2%	2%	15%	1%	14%
EASTERN GTHA	3%	2%	11%	11%	0%	0%	4%	6%	9%	9%
TOTAL	9%	10%	12%	11%	10%	4%	8%	14%	9%	10%

SOURCE: 2016 'EXISTING' GGHM-4

2.3. Future Conditions

This section explores how land use trends and policy will impact transportation needs in the area. It also describes methodologies used to forecast 2041 travel demands, accounting for other committed transportation projects throughout the GTHA.

2.3.1. Land Use Changes

The Greater Golden Horseshoe is one of the fastest growing regions in North America. In 2006, recognizing the rapid speed of development, the Provincial Growth Plan was enacted to create a policy environment that directs growth to built-up urban centres. This type of infill and intensification creates complete communities having transit-supportive densities, as evidenced by the numerous new rapid transit services being planned and built across the GTHA. While this type of growth will not be directed towards the immediate study corridor, which predominantly lies along urban area boundaries, it will affect nearby urban growth centres.

Figure 2.4 shows changes in population and employment from 2016 to 2041 in broad areas surrounding the study corridor. Of the areas through which the study corridor passes, west Mississauga is easily the most populated today. Significant growth is expected in west Mississauga and north Oakville, while modest growth is expected in north Burlington. There is also notable growth in several other surrounding areas.

However a closer look is needed to determine whether this growth will affect areas immediately served by the proposed transitway, and so **Figure 2.5** shows anticipated 2041 land use densities at a more detailed level. Densities along this segment of 407 ETR fall below typical assumed thresholds for supporting higher-order transit service, as an urban density of above 120 people plus jobs per hectare would generally consider more conducive to bus rapid transit (BRT).

Despite these low densities, a high east-west commuting demand persistent throughout the western GTHA suggests there is still a potential market for rapid transit. Pockets of medium density at Brant Street, Britannia Road, and Derry Road represent strong options for transitway stations to be located. Additionally, higher densities are clearly visible at various urban growth centres located near the corridor, including in Hamilton, Burlington, Oakville, Milton, and Mississauga. It may be possible connect the 407 Transitway to these high-density urban growth centres using interlined transit routing, as is explored in **Section 2**.

In summary, given the low densities through most of the study corridor, the viability of this transitway section may be dependent on providing a service plan that provides access to the identified growth areas, even though they are away from the immediate corridor. These connections could allow for the transitway to serve as regional link, providing an alternative to heavy highway congestion or high tolls.

FIGURE 2.4: CHANGE IN POPULATION AND EMPLOYMENT, 2016 – 2041

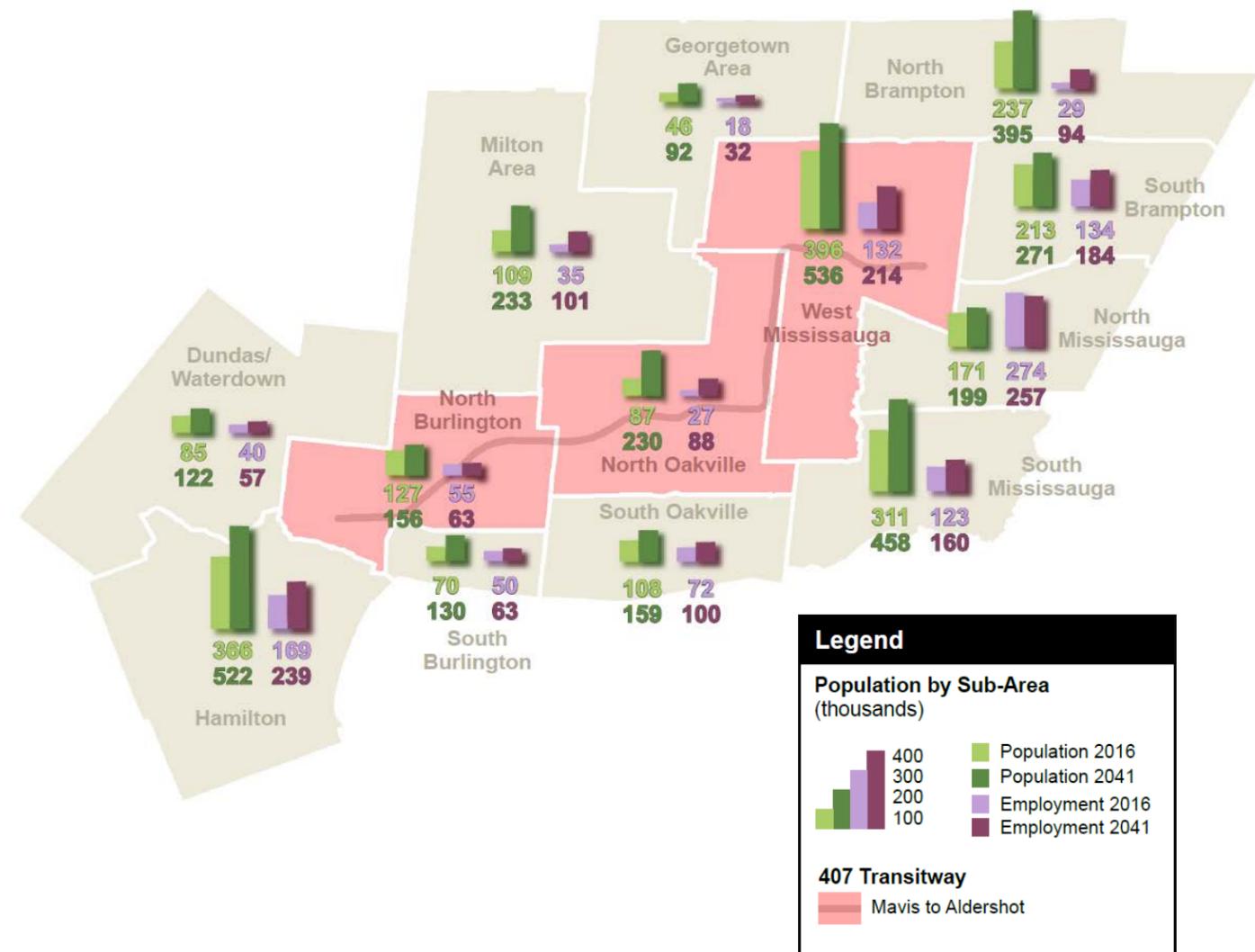
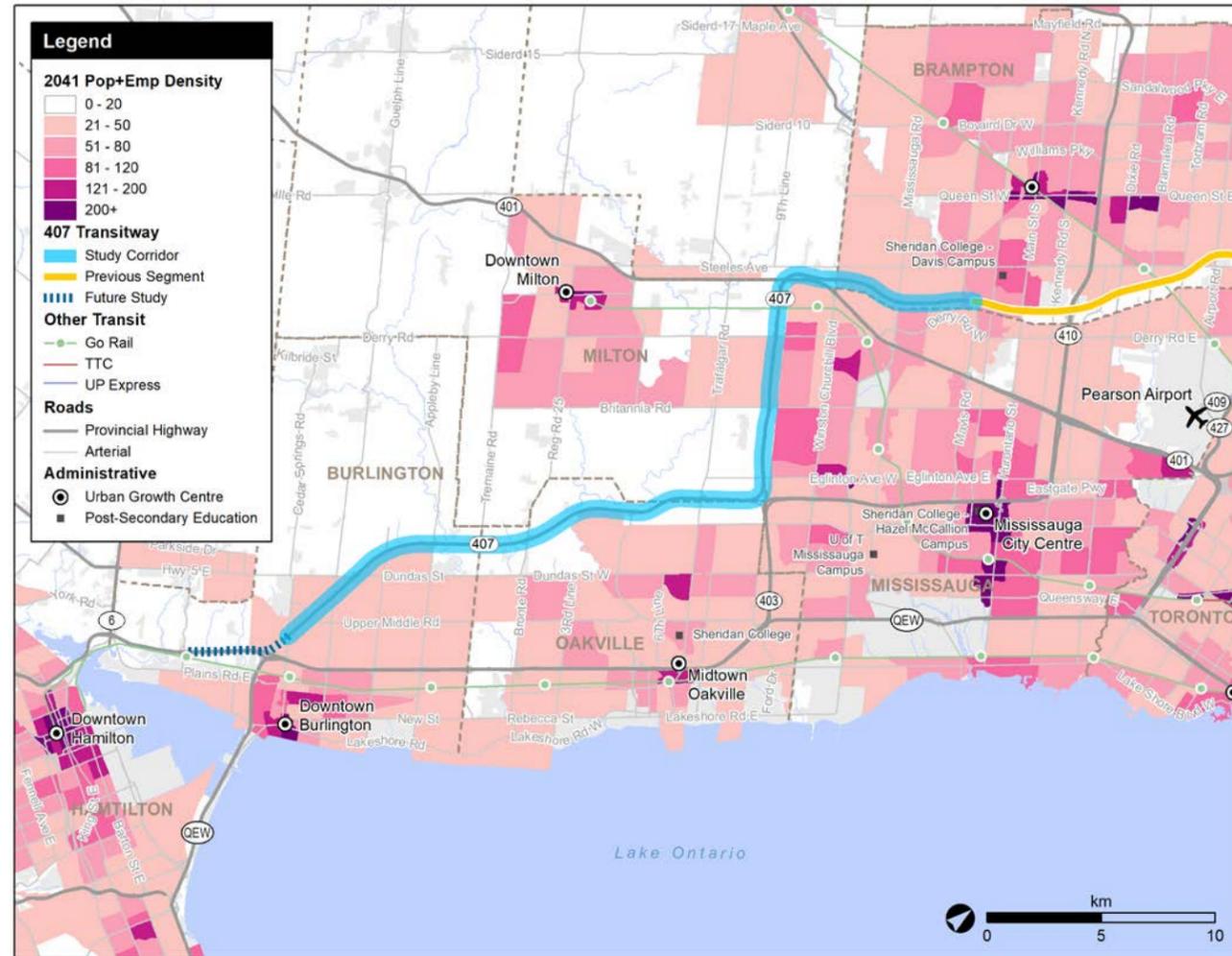


FIGURE 2.5: 2041 DENSITY (POPULATION AND EMPLOYMENT PER HECTARE)



2.3.2. Transportation Network Changes

This section describes the anticipated new transit infrastructure and road upgrades anticipated by 2041. These network changes were coded in GGHM to develop a 2041 ‘status quo’ model scenario, which does not include the present 407 Transitway study corridor. Instead the study corridor will be added in separate future model scenarios (detailed in **Section 2.6**) so to measure the overall network impact resulting from its inclusion.

2.3.2.1. Transit Service Changes

Future-year GGHM scenarios account for planned transit service changes and new rapid transit infrastructure detailed in the Metrolinx Regional Transportation Plan (RTP). New transit infrastructure is mapped in **Figure 2.6**.

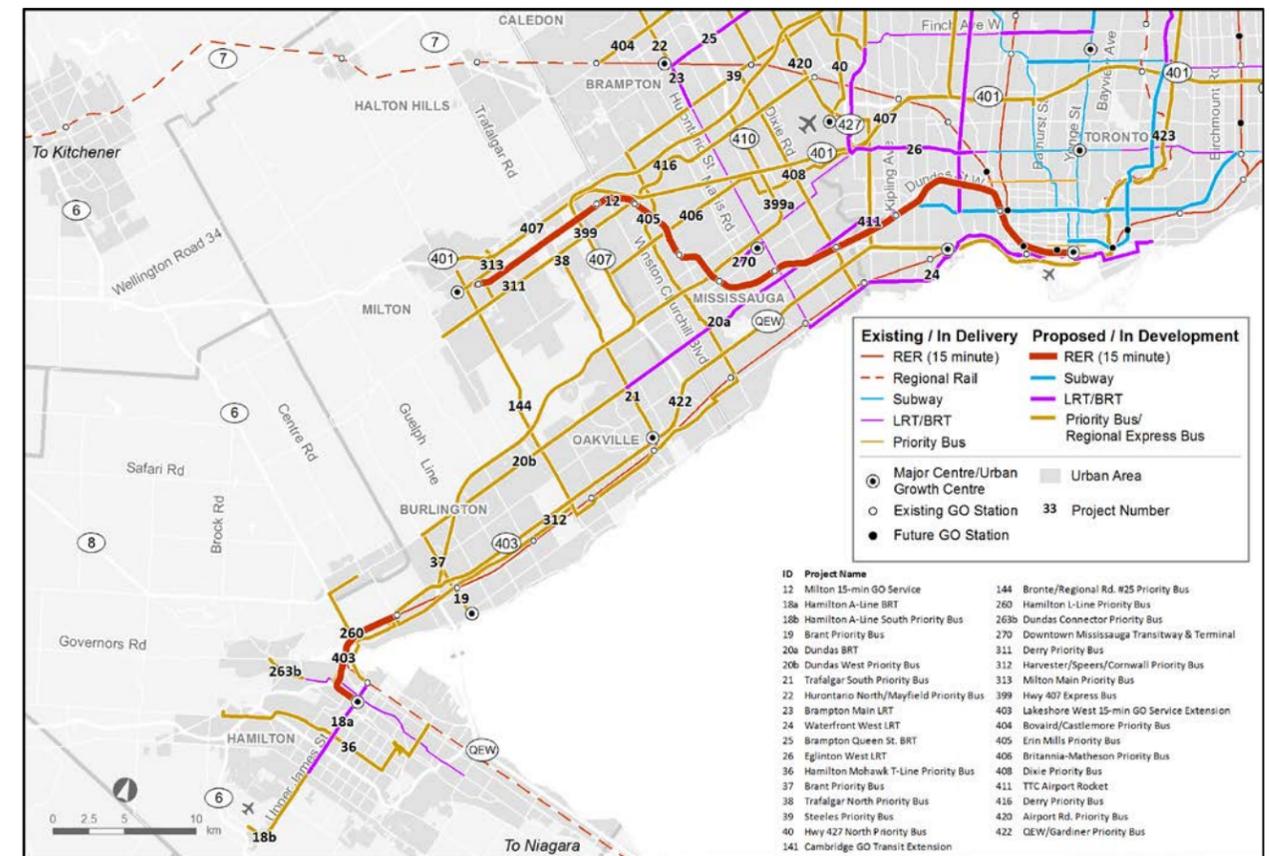
While the other 407 Transitway sections (already planned in prior separate EA studies) are included in all future-year model scenarios, the current study corridor (Brant Street to west of Hurontario Street) is not included in the future ‘status quo’ scenario.

Plans for two-way all-day GO Trail service (Regional Express Rail) are included in all future-year scenarios. These plans may impact the study corridor, as connections may be possible at several GO stations to serve commuter demand on the way to/from downtown Toronto.

The Hurontario LRT has a direct connection to the 407 Transitway just beyond the east limit of the current study corridor (transitway station planned at Hurontario Street). Transfers between the 407 Transitway and the Hurontario LRT will allow users from the study corridor to travel to downtown Mississauga with minimal connections.

Dundas Street BRT represents other east-west rapid transit facility planned within Mississauga. These facilities will provide more of a local function within Mississauga, as compared to the inter-regional function provided by the 407 Transitway. A direct connection between the 407 Transitway and the 403 Transitway may be possible if a station is located near the Highway 403 and 407 ETR interchange.

FIGURE 2.6: PLANNED NEW RAPID TRANSIT INFRASTRUCTURE, 2016 – 2041



2.3.2.2. Road and Highway Updates

Future-year GGHM scenarios account for planned arterial road projects drawn from municipal plans, as well as MTO highway expansion projects as listed in **Table 2.3**.

TABLE 2.3: PLANNED ROAD NETWORK UPGRADES, 2016 – 2041

CORRIDOR	REGION	LIMITS	DESCRIPTION
HIGHWAY 400	York	Major Mackenzie Drive to 9 th Line	Widening (6 to 8 lanes)
HIGHWAY 401	Peel	407 ETR to Highway 403	Widening (6 to 8/12 lanes)
HIGHWAY 401	Toronto	Avenue Road to Leslie Street	EB collector widening (+1 lane)
HIGHWAY 401	Halton/Peel	Martin Street to Highway 403	HOV lanes (+1 in each direction)
HIGHWAY 401	Durham	Brock Road to Harmony Road	HOV lanes (+1 in each direction)
HIGHWAY 403	Halton	QEW to 407 ETR	Widening (4 to 6 lanes)
HIGHWAY 403	Peel	407 ETR To Eglinton Ave W	Widening (6 to 8 lanes)
HIGHWAY 403	GTHA	Entire length	HOV lanes (+1 in each direction)
HIGHWAY 404	Toronto/York	Highway 401 to 407 ETR	Widening (8 to 10 lanes)
HIGHWAY 404	York	407 ETR to Major Mackenzie	Widening (6 to 10 lanes)
HIGHWAY 404	York	Major Mackenzie to Green Lane	Widening (4 to 6 lanes)
HIGHWAY 404	Toronto/York	Highway 401 to Green Lane	HOV lanes (+1 in each direction)
407 ETR	Peel/York	Highway 401 to Highway 404	Widening (8 to 10 lanes)
407 ETR	York	Highway 404 to York-Durham Line	Widening (6 to 8 lanes)
407 ETR	Durham	York-Durham Line to Brock Road	Widening (4 to 6 lanes)
HIGHWAY 410	Peel	Highway 401 to Queen Street	Widening (6 to 10 lanes)
QEW	Halton	Guelph Line to Trafalgar Road	Widening (6 to 8 lanes)
QEW	GTHA	Entire length	HOV lanes (+1 in each direction)

2.3.3. Changes in Travel Patterns

Travel patterns were extracted from the 2041 ‘status quo’ model scenario, which does not include the study corridor but accounts for all other planned transportation network changes as detailed in **Section 2.3.2**. These results were compared with those from the 2016 existing conditions model introduced in **Section 2.2**. Results reflect a.m. peak period conditions, and are summarized in **Table 2.4**.

Findings indicate an expected 60% increase in total motorized trips made to, from or through the study area. There is significant growth in trips made to/from the north, which includes quickly-growing areas within Halton and Peel Regions (such as Brampton Milton). There is also notable growth in trips made to/from south (Burlington and Oakville) and to the east (Mississauga and Toronto). Transit mode share for these trips shows some growth, aided by planned local transit service enhancements and increased GO Rail service frequency.

There is also growth in transit mode share for trips made to and from nearby urban growth centres, which include Downtown Hamilton, Downtown Burlington, Midtown Oakville, Downtown Milton, Mississauga City Centre, and Pearson Airport. These locations are defined by Metrolinx¹ as anchor ‘mobility hubs’, and serve as convergence and transfer points for multiple Regional and local transit routes.

Focusing on local trips beginning and ending within the study corridor, there is an expected 59% growth in motorized trips from 2016 to 2041. However, without the present 407 Transitway study corridor (west of Brant Street to west of Hurontario Street), transit growth only paces auto growth over this time and transit is still expected to make up only 8% of motorized travel.

Overall, the areas surrounding 407 ETR continue to under-perform in terms of transit mode share, with car use dominating motorized travel. This reflects both a lack transit accessibility for residents living within these areas, as well as a lack of transit connectivity between municipalities and urban growth centres.

TABLE 2.4: FUTURE CHANGES IN AM PEAK PERIOD MOTORIZED TRAVEL, 2016 – 2041

A. 2016

TRIP INTERCHANGE	TRANSIT	AUTO	MOTORIZED	MODE SPLIT
Within Study Corridor	5,800	65,500	71,300	8%
To/From Nearby Urban Growth Centres	1,700	20,300	22,100	8%
To/From South	6,400	53,900	60,200	11%
To/From West	1,100	13,300	14,400	8%
To/From North	3,100	25,700	28,700	11%
To/From East	3,700	33,100	36,800	10%
Through Eastbound	0	600	600	0%
Through Westbound	0	200	200	0%
Total	21,800	212,500	234,300	9%

¹ Metrolinx, Mobility Hubs in the GTHA

B. 2041

TRIP INTERCHANGE	TRANSIT	AUTO	MOTORIZED	MODE SPLIT
Within Study Corridor	9,300	103,800	113,100	8%
To/From Nearby Urban Growth Centres	3,700	32,900	36,600	10%
To/From South	8,900	73,400	82,300	11%
To/From West	1,100	20,000	21,100	5%
To/From North	8,100	62,000	70,100	12%
To/From East	5,600	45,400	51,000	11%
Through Eastbound	0	700	700	0%
Through Westbound	0	400	400	0%
Total	36,800	338,600	375,400	10%

C. 2016 to 2041 Growth

TRIP INTERCHANGE	TRANSIT	AUTO	MOTORIZED	MODE SPLIT
Within Study Corridor	3,500 (61%)	38,300 (58%)	41,800 (59%)	0%
To/From Nearby Urban Growth Centres	2,000 (109%)	12,600 (62%)	14,500 (66%)	2%
To/From South	2,500 (40%)	19,500 (36%)	22,100 (37%)	0%
To/From West	0 (0%)	6,700 (50%)	6,700 (47%)	-3%
To/From North	5,000 (165%)	36,300 (141%)	41,400 (144%)	1%
To/From East	1,900 (51%)	12,300 (37%)	14,200 (39%)	1%
Through Eastbound	0 (0%)	100 (13%)	100 (12%)	0%
Through Westbound	0 (0%)	200 (95%)	200 (93%)	0%
Total	15,000 (69%)	126,100 (59%)	141,100 (60%)	1%

Note: In Table 'C', numbers in brackets indicate percentage growth.

Source: 2016 'Existing' GGHM-4 and 2041 'Status Quo' GGHM-4.

2.3.4. Future Demand and System Performance

A detailed breakdown of trip data (origin and destinations) and mode shares from the 2041 'status quo' model is provided in **Table 2.5**.

With future development being largely low-density and dispersed, a low transit share is still observed within the study corridor. Transit mode share is also currently low for travel to and from nearby urban growth centres, some of which are not directly served by existing transit routes from the study area (for

example, local transit routes do not cross municipal boundaries to Hamilton or Milton). These growth centres represent a significant potential market for the transitway, as interlined routes branching off the spine transitway can connect directly to these outside markets.

There is moderate demand to/from other areas in Halton and Peel Regions. However, this is a difficult market for the transitway to serve as reaching these areas often at minimum requires transfer onto one or more local transit routes. For this reason, these areas (apart from urban growth centres) are not a significant target market for the 407 Transitway.

The highest transit mode share is observed for travel destined to downtown Toronto. While Toronto is not served by the 407 Transitway, potential links can be provided at Aldershot GO, Burlington GO, and/or Lisgar GO stations. A higher transit mode share is also observed trips made to other transitway sections, and while demand is somewhat limited, this high mode share may be due to capture of students (e.g. York University) and also reflect the high cost of tolls on the 407 ETR.

Serving primarily as an inter-regional service, the 407 Transitway will need to compete with major highways and other major cross-border arterials. The high population and employment growth forecasted to continue throughout the GTHA will lead to increased road congestion on most highways near the study corridor, as evident in **Figure 2.7** showing modelled highway congestion during the a.m. peak hour.

Congestion on 400-series highways will be significant and will lead to slow travel times throughout the GTHA. In the a.m. peak hour, heavy congestion (volume-to-capacity ratio above 0.8) is anticipated for eastbound traffic on all non-tolled highways. The 407 ETR also shows some increased congestion in the model, however demand can be managed by increased tolls. These travel time constraints, in addition to the high tolls required to travel on the 407 ETR, will result in a lack of accessibility for longer distance trips within the GTHA.

Costs of traffic congestion in the Greater Toronto and Hamilton Area, particularly lost productivity due to delays in travelling to and from workplaces and potential loss of markets due to impairment of goods movement, is substantial. The role of higher-order public transit infrastructure investments can play in mitigating congestion and its attendant economic costs.

These observations point to a potential target market of east-west inter-regional travellers/commuters. Attracting riders will depend on providing a service competitive (or better) than the automobile in terms of total travel times, including transfers and first/last mile connections. Park-and-ride will likely be an important tool for attracting this demand, as it can often reduce end-to-end travel times and allow users to avoid transfers between different transit services and routes.

TABLE 2.5: 2041 AM PEAK PERIOD TRAVEL FLOWS BY MODE, STATUS QUO MODEL

ORIGIN	DESTINATION									
	STUDY CORRIDOR	STUDY CORRIDOR W/ UGC'S	OTHER TW SECTIONS	TOTAL 407-TW	WESTERN GTHA	OTHER HALTON	OTHER PEEL	DOWNTOWN TORONTO	EASTERN GTHA	TOTAL
All Trips										
Study Corridor	113,100	134,100	22,400	156,500	10,700	28,900	49,400	800	1,700	248,000
Study Corridor w/ UGC's	128,700	179,200	25,100	204,300	30,800	42,900	64,200	1,100	1,900	345,300
Other 407-TW Sections	7,800	9,100	172,700	181,800	600	1,200	25,400	3,800	42,500	255,200
Total 407 Transitway	136,600	188,300	197,800	386,100	31,400	44,200	89,600	4,900	44,400	600,500
Western GTHA	11,900	37,600	3,600	41,200	656,300	10,500	6,600	1,300	1,900	717,800
Other Halton	32,200	49,600	4,200	53,800	7,600	49,600	13,600	200	500	125,400
Other Peel	39,700	53,500	55,500	109,000	3,600	8,800	164,400	2,500	10,600	298,800
Downtown Toronto	1,000	1,600	6,000	7,600	200	400	3,800	89,100	1,800	102,900
Eastern GTHA	1,700	2,200	90,100	92,400	1,500	600	11,900	2,100	409,500	517,900
Total	222,900	332,800	357,200	690,000	700,500	113,900	289,900	100,200	468,800	2,363,200
Transit Trips										
Study Corridor	9,300	11,300	3,100	14,400	700	1,700	6,500	100	0	23,400
Study Corridor w/ UGC's	11,100	14,900	3,400	18,300	3,200	2,700	8,200	100	0	32,500
Other 407-TW Sections	600	700	18,400	19,100	0	0	1,700	500	3,900	25,300
Total 407 Transitway	11,700	15,600	21,800	37,400	3,200	2,700	10,000	600	3,900	57,800
Western GTHA	400	3,100	100	3,200	50,200	200	100	0	0	53,800
Other Halton	4,200	5,800	200	5,900	600	2,000	1,900	0	0	10,500
Other Peel	4,700	5,800	7,600	13,400	200	200	14,500	300	300	28,900
Downtown Toronto	0	0	100	100	0	0	100	15,600	0	15,800
Eastern GTHA	0	0	10,400	10,400	0	0	500	200	35,400	46,600
Total	21,100	30,300	40,100	70,500	54,300	5,100	27,100	16,700	39,700	213,400
Percentage Transit Trips										
Study Corridor	8%	8%	14%	9%	7%	6%	13%	7%	2%	9%
Study Corridor w/ UGC's	9%	8%	13%	9%	10%	6%	13%	10%	2%	9%
Other 407-TW Sections	8%	7%	11%	11%	1%	1%	7%	14%	9%	10%
Total 407 Transitway	9%	8%	11%	10%	10%	6%	11%	13%	9%	10%

ORIGIN	DESTINATION									
	STUDY CORRIDOR	STUDY CORRIDOR W/ UGC'S	OTHER TW SECTIONS	TOTAL 407-TW	WESTERN GTHA	OTHER HALTON	OTHER PEEL	DOWNTOWN TORONTO	EASTERN GTHA	TOTAL
Western GTHA	3%	8%	2%	8%	8%	2%	2%	2%	1%	7%
Other Halton	13%	12%	4%	11%	9%	4%	14%	3%	0%	8%
Other Peel	12%	11%	14%	12%	6%	2%	9%	10%	3%	10%
Downtown Toronto	1%	1%	1%	1%	2%	1%	2%	17%	1%	15%
Eastern GTHA	2%	1%	12%	11%	0%	0%	4%	11%	9%	9%
Total	9%	9%	11%	10%	8%	4%	9%	17%	8%	9%

Source: 2041 'Status Quo' GGHM-4

FIGURE 2.7: 2041 AM PEAK HOUR HIGHWAY NETWORK DEFICIENCIES



2.4. Service Concept

This section provides a description of the service concept for the 407 Transitway, indicating how buses will use the facility, the service plan in terms of routing and station access, and a planning-level commentary on design vehicle and recommended design standards.

2.4.1. Operating Characteristics

Transitways are grade-separated facilities that provide a dedicated/exclusive route for use by buses. This complete separation from general traffic allows transit vehicles to maintain a high level of service as a result of high average speeds (short travel times) and good schedule reliability.

One unique aspect of 407 Transitway is that it would be located adjacent to the 407 ETR Express Toll Route (407 ETR). This privately operated tolled highway charges high fees in order to manage traffic demands and maintain adequate travel times. As a result, the 407 ETR is rarely if ever congested during normal conditions when there are no incidents, construction, or inclement weather.

Due to the limited congestion and high operating speeds observed on the 407 ETR, there is potential for transit to operate on the highway in mixed traffic (as an interim scenario) and still achieve a fairly high level of service. Prior EA studies have identified that a phased implementation approach is possible for the 407 Transitway, where the transitway is constructed in parts – driven by demand. With this approach, buses would travel on constructed portions of the transitway to avoid the more congested portions of the highway, and travel in mixed traffic along the remaining portions. This phased implementation approach may be valid for the study corridor under review, from Brant Street to west of Hurontario Street.

It is important to note however that while operation in mixed traffic is possible in the interim, implementation of an exclusive runningway is still recommended in the longer-term. In the interim mixed-traffic scenario, stopping at a station requires transitway buses to exit the highway, enter an arterial road and travel through several busy intersections, load/unload passengers, enter a turnaround facility, and eventually return to and re-enter the highway – all of which adds delay. Instead, construction of an exclusive runningway will provide buses with direct routing between stations, providing significant travel time savings. The transitway also reduces risk of schedule delays that might otherwise occur in mixed traffic as a result of incident, construction, or inclement weather. These travel time benefits are likely essential for attracting ‘choice’ riders, meaning those that have alternative travel modes such as private cars available to them.

The transitway facility would provide a highly flexible piece of infrastructure, as buses can enter and exit the facility at multiple locations, and the same buses used on the facility would be compatible with other bus facilities and public roads. This interlining capability is essential to the operating plan for the subject segment. Additionally, at the transitway stations, bypass lanes will be provided to allow for operation of ‘express’ bus routes that do not serve every station, thereby providing further travel time benefits.

Broadly the operating characteristics proposed for the transitway are:

- A dedicated facility providing uninterrupted service between stations, thus enabling fast travel times and high reliability;
- Full separation from surface traffic, and no pedestrian, cycling, or public traffic access to the facility;
- Compatibility with municipal and GO buses of various sizes and shapes as in use in the GTHA today and likely in the future;
- Interlining opportunity (e.g. access to transitway) should be provided at stations wherever possible, to enable flexible transit service planning.
- A shared facility open to multiple operators – it is known that this would be unusual in the GTHA context and would require further coordination and consultation between operators of the transitway and service operators.
- Bypass lanes at stations to provide for express buses that do not stop at every station.

2.4.2. Conceptual Operating and Service Strategy

Two service strategies were developed for the study corridor. First, a ‘base’ service strategy was developed which focuses on providing spine services along the transitway. Second, an ‘enhanced’ service strategy was also developed, which builds on the ‘base’ spine service while providing interlined service to nearby urban growth centres.

2.4.2.1. Base Service Concept

The transitway is linear transit infrastructure connecting stations within the subject area and providing connection to the transitway already planned from Hurontario Street to Brock Road. As the transitway would likely be built and operated primarily by Metrolinx, an initial service plan was developed under the single operator model with spine services assumed to be travelling between stations and connecting to the east at Hurontario Street.

Under this ‘base’ service concept, buses would travel between Aldershot and Hurontario stations, and continue eastbound on the transitway past Hurontario Street to Brock Road. Connections to background municipal transit services are provided wherever background services exist (e.g. along Dundas Street in Burlington, and Ninth Line in Mississauga), however require passengers to transfer as there are no direct connections provided outside of the spine corridor.

Figure 2.8 illustrates the stations and routing of the transit services.

FIGURE 2.8: CONCEPTUAL SERVICE STRATEGY, BASE SERVICE CONCEPT



2.4.2.2. Enhanced Service Concept

An ‘enhanced’ service concept was also developed as a means to capture additional ridership outside the immediate 407 ETR corridor, which was noted earlier as having limited land use density and development potential. Observed travel patterns illustrated that many of travellers along the 407 corridor are to and from low-density to medium-density developments in the west GTHA and north GTHA and are a difficult target market for transit services.

The structure of the enhanced service concept is to extended bus service from the transitway to provide transfer-free service to urban growth centres, which Downtown Hamilton, Downtown Burlington, Midtown Oakville, Downtown Milton, Mississauga City Centre, and Pearson Airport. The enhanced service concept is aggressive in that it is a major increase in total service length compared to Base Service Concept, intended to capture the accessibility and market potential of the transitway.

The transfer-free service would leverage the ability of the transitway to accept interlining buses at various locations, assuming buses are selected as the preferred vehicle technology as opposed to other rapid transit such as LRT. The connections to Mississauga and Pearson Airport would be via the Mississauga Transitway, implying a connection between services near the interchange of 407 ETR and Highway 403.

A map illustrating the service connections is provided in Figure 2.9.

FIGURE 2.9: CONCEPTUAL SERVICE STRATEGY, ENHANCED SERVICE CONCEPT



2.5. Vehicle Maintenance and Storage support

2.5.1. Facility Need

There will be a major facility located at Jane Street and 407 ETR. This facility will consist of the operational headquarters for the complete 407 Transitway, the main maintenance yard also for the complete 407 Transitway, the storage facility to garage the vehicle fleet serving central section, an administrative building, and a surface parking area. The Preliminary Design, and Environmental Assessment of the Jane Street yard was approved by MECP in February 2012.

To support the Jane Street main yard, two additional secondary yards were proposed. The East Yard to be located east of Lake Ridge Road in Whitby and the West Yard to be located in the Brant Street to Hurontario Street section. These support yards will consist of a minor maintenance facility (washing/cleaning), a storage facility to garage the vehicle fleet serving the east and west sections of the 407 Transitway respectively, administrative buildings, and surface parking areas.

2.5.2. West Yard – Capacity Assessment

Prior to implementation, the operating agency will define the service concept and storage strategy and functionality of the 407 Transitway. At this time, it is being assumed that the West Yard will store buses operating between Burlington and Jane Street Station, the Jane Street Yard will store buses operating between Jane Street and The Lake Ridge Yard in Whitby, and the Lake Ridge Yard will store buses operating between Lake Ridge and Highway 115/35. An assessment of the approximate vehicle capacity required in the West Yard was conducted based on the assumptions listed below:

- Approximate distance between the potential Burlington Terminus and the Jane Street Yard – 64 km.
- Average operating speed of 85 km/h;
- 2-minute average dwelling time at 14 stations;
- 20-minute (0.33h) layover at terminus
- Drive time = 0.75h
- Overall dwell time = 0.47h
- Total travel time: 0.75h + 0.47h = 1.22h
- Round trip time: 1.22h x 2 = 2.44 h
- Cycle time: 2.44h + 0.33h = 2.77h
- Headways: 5 minutes (conservative)
- Vehicles required: 2.77h/(1h/12 veh) = 33 vehicles
- Adding 20% for spares = 40 vehicles.

2.5.3. West Yard – Location

The screening of possible maintenance and storage facility locations for the West Yard is addressed in **Chapter 4 Section 4.5** of the EPR.

2.6. Transitway Ridership Forecasts

This section outlines forecasts for the base service and enhanced service concepts, as output when modelling all of the preliminary station locations identified in the Corridor Protection Studies. It also describes an initial evaluation of these stations based on station demand forecasts, network connections, spacing to adjacent stations, and nearby trip generators.

Based on this initial evaluation and following input from other engineering and environmental disciplines,

a revised list of recommended stations was developed and recommended in the Environmental Project Report (EPR). This section provides revised ridership forecasts for this EPR recommended station structure under the enhanced service concept.

Finally, a sensitivity analysis is also provided to test several other scenarios that have since been identified through the EA study, including addition of a station at Lisgar GO, and inclusion of park-and-ride at Appleby Line Station.

2.6.1. Strategic Forecasts

As described previously, the GGHM-4 was used to model future travel demands and test different service concepts for the 407 Transitway. Future land use data is based on population and employment forecasts from the Provincial Growth Plan, while the future background network accounts for the Metrolinx Regional Transportation Plan and other planned and committed projects from municipal plans.

The following sections describe station demand forecasts for the base service and enhanced service concepts. The initial station locations identified for each of these servicing strategies were previously illustrated in **Figure 2.8** and **Figure 2.9**, and are listed as follows:

- Aldershot GO
- Dundas
- Appleby
- Bronte
- Neyagawa
- Trafalgar
- Britannia
- Derry
- Winston Churchill
- Mississauga Road
- Mavis

The enhanced service concept also provides connection to several urban growth centres including Downtown Hamilton, Downtown Burlington, Midtown Oakville, Downtown Milton, Mississauga City Centre, and Pearson Airport.

Forecasts were developed for the 2041 a.m. peak period (2-hour period) and then converted to a.m. peak hour using a conversion factor developed from 2016 TTS, which showed that within the study area the a.m. peak hour represents 56% of a.m. peak period trips.

2.6.1.1. Base Service

Under the ‘base’ service concept, transitway buses would operate and stop at stations along the main spine of the transitway only. **Table 2.6** shows ridership forecasts for the initial stations when operating

under the base service concept.

TABLE 2.6: 2041 AM PEAK HOUR BOARDINGS AND ALIGHTINGS, INTITAL STATIONS WITH BASE SERVICE

STATION	EASTBOUND					WESTBOUND				
	BRANC H ON	VOLUM E IN	STATION BOARD	STATION ALIGHT	BRANC H OFF	BRANC H ON	VOLUM E IN	STATION BOARD	STATION ALIGHT	BRANC H OFF
Aldershot GO	-	-	300	-	-	-	-	-	-	-
Dundas	-	300	180	30	-	-	80	-	80	-
Appleby	-	450	140	-	-	-	130	-	50	-
Bronte	-	590	50	30	-	-	130	50	60	-
Neyagawa	-	600	50	-	-	-	100	40	-	-
Trafalgar	-	650	40	60	-	-	230	-	130	-
Britannia	-	630	40	40	-	-	320	20	110	-
Derry	-	620	110	40	-	-	200	170	50	-
Winston Churchill	-	690	30	40	-	-	210	20	30	-
Mississauga Road	-	680	10	50	-	-	340	10	140	-
Mavis	-	630	-	20	-	-	350	10	20	-
<i>(continuing east)</i>	-	610	-	-	-	-	-	-	-	-

Source: 2041 GGHM-4, initial stations with base service

Given the limited population and employment density near the corridor, and with the base service strategy providing no direct service to other major centres, weak ridership levels are observed. The number of on-board eastbound passengers does not exceed 700 at any station during the a.m. peak hour.

Even considering that the study corridor fits into a larger network (i.e. connects to other 407 Transitway sections further east), this section of transitway from Brant Street to west of Hurontario Street would likely not be warranted nor cost-effective if limited to operation under the base service concept.

2.6.1.2. Enhanced Service

The enhanced service concept includes interlining bus routes to divert from the spine transitway to provide direct connection nearby urban growth centres. Ridership forecasts for the initial stations increase when operating under this enhanced service concept, as is shown in **Table 2.7**.

TABLE 2.7: 2041 AM PEAK HOUR BOARDINGS AND ALIGHTINGS, INTIAL STATIONS WITH ENHANCED SERVICE

STATION	EASTBOUND					WESTBOUND				
	BRANCH ON	VOLUME IN	STATION BOARD	STATION ALIGHT	BRANCH OFF	BRANCH ON	VOLUME IN	STATION BOARD	STATION ALIGHT	BRANCH OFF

Aldershot GO	390	390	340	30	-	-	310	140	50	400
Dundas	430	1,120	160	130	-	-	780	360	70	760
Appleby	-	1,150	100	-	-	-	760	30	10	-
Bronte	30	1,280	130	60	-	-	790	40	70	-
Neyagawa	-	1,350	180	10	-	-	770	30	10	-
Trafalgar	380	1,900	940	720	980	300	1,250	790	690	590
Britannia	60	1,200	250	110	-	-	1,250	50	110	250
Derry	-	1,340	290	50	-	-	1,080	220	40	-
Winston Churchill	40	1,620	640	50	270	580	1,530	110	530	30
Mississauga Road	30	1,980	530	100	-	-	1,380	20	500	70
Mavis	-	2,410	30	10	-	-	1,370	20	10	-
<i>(continuing east)</i>	-	2,430	-	-	-	-	-	-	-	-

Source: 2041 GGHM-4, initial stations with enhanced service

The nearby urban growth centres represent significant trip generators and attractors, as is evident in the ridership forecast. New riders originating from the growth centres are evident in the “branch on” volumes. Additionally, station board demands at the transitway stations are also higher than those observed under the base service scenario, as additional residents living nearby the transitway corridor can use the service to reach these urban growth centres.

Total eastbound passengers now exceed 1,000 riders across the entire length of the study corridor, while approaching 2,000 riders at several stations. This represents a significant increase when compared to the base service forecasts. While these ridership levels are still slightly below the levels of demand typically considered suitable for introducing BRT services, the study corridor would not exist on its own but as an outer segment of a larger network.

Eastbound passengers are shown to exceed 2,000 riders east of Mavis, where the study corridor connects to the rest of the 407 Transitway. When considering the entire 407 Transitway, inclusion of the study corridor from Brant Street to west of Hurontario Street improves benefits ridership across the entire system. Interim operation of transit services in mixed traffic along the 407 ETR may also be considered for this corridor section before and during its construction.

In summary, the enhanced service concept with direct connection provided to nearby urban growth centres greatly benefits ridership forecasts. The study corridor is an end segment feeding the core portions of the Transitway. As such, the study corridor is recommended to be carried forward as it supports the central sections of the Transitway while also supporting other objectives set out by the Province, including provision of a high-quality transit service to an underserved market, and FA supporting intensification of growth centres per the Provincial Growth Plan.

2.6.2. Station Evaluation

The model was an important tool for screening preliminary station locations, and testing responses to changes in station spacing and parking availability. Determining the appropriate number of stations involves a balancing of network coverage (more stations yields greater network coverage) and transitway travel times (fewer stations allows for shorter travel times). Station demands and ridership forecasts become a function of both these factors.

The corridor protection study identified ten potential stations (not including the west terminus station beyond Brant Street), spaced on average 4.1 km apart. As part of Systems Planning, removal or consolidation of low-demand stations is considered where resulting in a net increase to ridership (due to travel time savings). Otherwise, stations are carried forward for further study by other disciplines.

The following criteria were used in the initial station evaluation:

- **Station Demands** – Forecasted a.m. peak hour demands under the enhanced service concept;
- **Network Connections** – Transit routes near the station that present transfer opportunities;
- **Major Trip Generators** – Land use density, residential developments, and employment areas located near the station.

Results of this initial station evaluation are summarized in **Table 2.8**.

This evaluation is intended to rate stations on a relative basis, and shows that certain stations perform better than others according to several criteria. Neyagawa and Mavis were identified as the lowest performing stations relative to the others, both having low ridership demand and limited network connections available. For this reason, these two stations were screened at this Systems Planning stage.

All other stations were carried forward for further evaluation in the EA by other engineering and environmental disciplines.

TABLE 2.8: SUMMARY OF STATION EVALUATION RESULTS

EVALUATION CRITERIA	DUNDAS STREET	APPLEBY LINE	BRONTE ROAD	NEYAGAWA BLVD	TRAFALGAR ROAD	BRITANNIA ROAD	DERRY ROAD	WINSTON CHURCHILL BLVD	MISSISSAUGA ROAD	MAVIS ROAD
STATION DEMANDS	●	◐	◐	◐	●	◐	●	●	●	○
AM PEAK HOUR STATION BOARD (COMBINED EB & WB)	520	130	170	210	1,730	300	510	750	550	50
AM PEAK HOUR BRANCH ON (COMBINED EB & WB)	1,210		30		680	60		620	30	
NETWORK CONNECTIONS	●	◐	●	◐	●	◐	●	●	●	◐
RAPID TRANSIT (BRT / LRT)	- Dundas West Priority Bus	-	- Bronte Priority Bus	-	- Trafalgar Rapid Transit - Trafalgar N Priority Bus	- Britannia / Matheson Priority Bus	- Derry Priority Bus	- Steeles West Priority Bus - Züm: 511 Steeles	- Mississauga / Erin Mills Priority Bus	-
LOCAL BUS OPERATORS	- Burlington Transit - Oakville Transit	-	-	-	-	-	-	- MiWay Brampton Transit	Brampton Transit	Brampton Transit
GO TRANSIT	- GO Bus - Existing park-and-ride lot	- GO Bus - Existing park-and-ride lot	- GO Bus - Existing park-and-ride lot	- GO Bus	- GO Bus - Existing park-and-ride lot	- GO Bus	- Lisgar GO Station - GO Bus	- Lisgar GO Station - GO Bus	- Meadowvale GO Station - GO Bus	- GO Bus
MAJOR TRIP GENERATORS	◐	◐	◐	◐	◐	●	●	●	◐	●
LAND USE DENSITY	Current: Medium Future: Medium	Current: Low Future: Medium	Current: Low Future: Low	Current: Low Future: Low	Current: Low Future: Medium	Current: Medium Future: High	Current: Medium Future: High	Current: Low Future: Medium	Current: Low Future: Medium	Current: Medium Future: Medium
RESIDENTIAL DEVELOPMENTS	- Brant Hills	-	-	-	- Trafalgar Corridor Area	- Ninth Line Corridor Area - Trafalgar Corridor Area - Erin Mills	- Ninth Line Corridor Area - Trafalgar corridor area - Meadowvale West	- Meadowvale West	-	- Churchville
EMPLOYMENT CENTRES	-	- SmartCentres	-	-	-	- Erin Mills Town Centre	- Agerton Employment Area - SmartCentres	- Mississauga Industrial Area	- Mississauga Industrial Area	- Sheridan College
STATION SPACING	5.7 km to Burlington GO 3.9 km to Appleby	3.9 km to Dundas 4.2 km to Bronte	4.2 km to Appleby 4.9 km to Neyagawa	4.9 km to Bronte 3.1 km to Trafalgar	3.1 km to Neyagawa 6.5 km to Britannia	6.5 km to Trafalgar 3.1 km to Derry	3.1 km to Britannia 4.9 km to Winston Churchill	4.9 km to Derry 2.9 km to Mississauga Rd	2.9 km to Winston Churchill 3.3 km to Mavis	3.3 km to Mississauga Rd 2.2 km to Hurontario

EVALUATION CRITERIA	DUNDAS STREET	APPLEBY LINE	BRONTE ROAD	NEYAGAWA BLVD	TRAFALGAR ROAD	BRITANNIA ROAD	DERRY ROAD	WINSTON CHURCHILL BLVD	MISSISSAUGA ROAD	MAVIS ROAD
PRELIMINARY RATING:	●	●	●	○	●	●	●	●	●	○
RECOMMENDATION:	CARRIED FORWARD	CARRIED FORWARD	CARRIED FORWARD	NOT CARRIED FORWARD	CARRIED FORWARD	CARRIED FORWARD	CARRIED FORWARD	CARRIED FORWARD	CARRIED FORWARD	NOT CARRIED FORWARD

2.6.3. Revised Forecasts

The previous **Section 2.6.1** detailed strategic forecasts for the initial list of transitway stations identified in the Corridor Protection Study, revised ridership forecasts were also developed for the stations recommended in the Environmental Study Report (EPR).

The EPR recommended a revised station structure based on the results of the initial Systems Planning evaluation (**Section 2.6.2**) and following input from other engineering and environmental disciplines. This recommended station structure consists of the following changes to the initial station list:

- **Appleby Line Station** – To operate as a transfer and pick-up/drop-off station only, with no park-and-ride;

- **Neyagawa Boulevard Station** – Screened out in the initial Systems Planning evaluation;
- **Winston Churchill Station** – Eliminated due to physical constraints, cost, and limited access to 407 ETR (impacts the potential for interim service);
- **Mississauga Road Station** – Parking capacity limited to 600 spaces due to property constraints; and
- **Mavis Road Station** – Screened out in the initial Systems Planning evaluation.

The EPR recommended stations were modelled in the GGHM as a new future (2041) scenario, and model outputs were converted from a.m. peak period (2-hour period) to a.m. peak hour. The resulting ridership forecasts for the EPR stations under operation of the enhanced service concept are summarized in **Table 2.9**.

TABLE 2.9: 2041 AM PEAK HOUR BOARDINGS AND ALIGHTINGS, EPR STATIONS WITH ENHANCED SERVICE

STATION	EASTBOUND					WESTBOUND				
	BRANCH ON	VOLUME IN	STATION BOARD	STATION ALIGHT	BRANCH OFF	BRANCH ON	VOLUME IN	STATION BOARD	STATION ALIGHT	BRANCH OFF
Aldershot GO	350	350	350	30	-	-	310	140	50	400
Dundas	440	1,110	200	150	-	-	700	400	70	730
Appleby*	-	1,160	-	-	-	-	700	10	10	-
Bronte	40	1,200	170	40	-	-	710	50	60	-
(east of Bronte)	-	1,330	-	-	-	-	710	-	-	-
Trafalgar	380	1,710	950	620	940	260	1,130	640	620	450
Britannia	70	1,160	270	100	-	-	1,250	50	130	340
Derry	-	1,330	730	70	-	-	1,380	290	400	20
(east of Derry)	40	2,030	-	-	260	540	1,380	-	-	20
Mississauga Road	30	1,810	540	100	-	-	1,210	40	490	60
(to/from east)	-	2,250	-	-	-	-	1,210	-	-	-

* Appleby station modelled with no park-and-ride
Source: 2041 GGHM-4, EPR stations with enhanced service

The results in the above **Table 2.9** (EPR stations) were compared to those previously shown in **Table 2.7** (initial stations) to understand the ridership impacts resulting from the EPR recommendations.

Eliminating park-and-ride at Appleby Station causes some demand to shift to adjacent stations at Bronte and Dundas. It is however noted that the model may not be particularly well-calibrated to differentiate PPUDO demand from park-and-ride demand, as eastbound a.m. peak hour station boardings drop to zero (despite PPUDO still being possible at the station).

Removal of Neyagawa Station, Winston Churchill Station and Mavis Station results in increased demands at each of stations adjacent to these. This is most significant at Derry Station, which experiences an increase of 510 total station boardings in the a.m. peak hour when Winston Churchill Station is not included.

However, not all of the demand previously observed at Neyagawa, Winston Churchill and Mavis is captured by adjacent stations, and there is some lost ridership that results. This is indicated by the change ridership both continuing east to other segments of the 407 Transitway, as well as entering the study corridor from the east. These eastbound and westbound ridership totals decrease by 180 and 160, respectively.

Overall, the study corridor is still recommended under the revised station structure recommended in the EPR, despite a slight loss in ridership when compared to results for the initial station list (from the

Corridor Protection Study). The from Brant Street to west of Hurontario is still recommended as it provides ridership increases across the remaining 407 Transitway, and achieves strategic objectives set out by the Province.

2.6.3.1. Impact on Future System Performance

Table 2.10 provides a detailed breakdown of trip data (origin and destinations) and mode shares from the 2041 EPR stations model operating under the enhanced service concept. These results are compared to those from the 2041 ‘status quo’ model (previous **Table 2.5**) to assess broad network impacts.

There is an increase in transit trips originating from the study corridor (1,100), which results in a one percentage-point increase in transit share of motorized trips from the study corridor. There is also an increase in transit trips originating from the entire 407 Transitway (1,900), indicating that the study corridor provides further benefit to the remaining segments of the transitway.

While transit growth for local trips beginning and ending in the study corridor is modest, this is in part due to this section of transitway re-routing existing trips. These existing trips still benefit from having reduced travel times, improved schedule reliability, and fewer transfers.

TABLE 2.10: 2041 AM PEAK PERIOD TRAVEL FLOWS BY MODE, EPR STATIONS MODEL

ORIGIN	DESTINATION									
	STUDY CORRIDOR	STUDY CORRIDOR W/ UGC'S	OTHER TW SECTIONS	TOTAL 407-TW	WESTERN GTHA	OTHER HALTON	OTHER PEEL	DOWNTOWN TORONTO	EASTERN GTHA	TOTAL
All Trips										
Study Corridor	112,600	133,600	22,400	156,000	11,000	28,900	49,600	800	1,600	248,000
Study Corridor w/ UGC's	128,000	178,700	25,000	203,700	31,200	42,900	64,300	1,200	1,900	345,100
Other 407-TW Sections	7,800	9,000	173,700	182,600	600	1,200	25,200	3,800	42,300	255,700
Total 407 Transitway	135,800	187,700	198,700	386,400	31,800	44,100	89,500	4,900	44,200	600,800
Western GTHA	11,800	37,600	3,500	41,100	656,300	10,200	6,500	1,300	1,800	717,100
Other Halton	32,100	49,500	4,100	53,500	7,800	49,500	13,400	200	500	125,000
Other Peel	39,600	53,300	54,700	108,000	3,700	8,900	163,800	2,600	10,400	297,300
Downtown Toronto	1,000	1,600	6,000	7,600	200	400	3,900	89,200	1,700	103,000
Eastern GTHA	1,600	2,100	90,800	92,900	1,500	600	11,800	2,000	411,000	519,900
Total	221,900	331,800	357,700	689,500	701,200	113,700	289,000	100,200	469,500	2,363,200
Transit Trips										

ORIGIN	DESTINATION									
	STUDY CORRIDOR	STUDY CORRIDOR W/ UGC'S	OTHER TW SECTIONS	TOTAL 407-TW	WESTERN GTHA	OTHER HALTON	OTHER PEEL	DOWNTOWN TORONTO	EASTERN GTHA	TOTAL
Study Corridor	9,200	11,300	3,400	14,700	1,200	1,800	6,700	100	0	24,500
Study Corridor w/ UGC's	11,000	15,100	3,700	18,800	3,800	2,700	8,400	100	100	34,000
Other 407-TW Sections	700	700	18,700	19,500	0	0	1,800	600	3,900	25,800
Total 407 Transitway	11,600	15,800	22,400	38,300	3,800	2,800	10,200	700	4,000	59,700
Western GTHA	400	3,200	100	3,200	50,000	200	100	0	0	53,600
Other Halton	4,000	5,600	300	5,900	700	2,000	1,700	0	0	10,300
Other Peel	4,700	5,800	7,400	13,300	300	200	14,400	200	300	28,600
Downtown Toronto	0	0	100	100	0	0	100	15,700	0	15,900
Eastern GTHA	0	100	10,600	10,700	0	0	500	200	36,500	48,000
Total	20,800	30,500	40,900	71,300	54,800	5,200	27,100	16,900	40,900	216,200
Percentage Transit Trips										
Study Corridor	8%	8%	15%	9%	11%	6%	14%	7%	3%	10%
Study Corridor w/ UGC's	9%	8%	15%	9%	12%	6%	13%	9%	3%	10%
Other 407-TW Sections	9%	8%	11%	11%	3%	3%	7%	15%	9%	10%
Total 407 Transitway	9%	8%	11%	10%	12%	6%	11%	13%	9%	10%
Western GTHA	4%	9%	3%	8%	8%	2%	2%	2%	1%	7%
Other Halton	12%	11%	7%	11%	9%	4%	13%	4%	1%	8%
Other Peel	12%	11%	14%	12%	7%	2%	9%	9%	3%	10%
Downtown Toronto	1%	1%	1%	1%	2%	1%	2%	18%	1%	15%
Eastern GTHA	3%	3%	12%	11%	1%	1%	4%	12%	9%	9%
Total	9%	9%	11%	10%	8%	5%	9%	17%	9%	9%

Source: 2041 'EPR Stations' GGHM-4

2.6.4. Sensitivity Analysis

A sensitivity analysis was undertaken to determine the impact of two potential changes to the EPR recommended station structure:

- Including park-and-ride at Appleby Station, which would reduce the demand relocated to adjacent stations at Dundas and Bronte.

- Adding a transitway station at Lisgar GO, by re-routing the transitway through an existing hydro corridor to the south and east of 407 ETR. Lisgar Station could provide an alternative to Winston Churchill Station, which scored highly in the initial Systems Planning evaluation but was eliminated in the EPR due to physical constraints.

These changes were modelled in the GGHM as a new future (2041) scenario, and model outputs were converted from a.m. peak period (2-hour period) to a.m. peak hour. Ridership forecasts resulting from this sensitivity analysis are shown in **Table 2.11**.

TABLE 2.11: 2041 AM PEAK HOUR BOARDINGS AND ALIGHTINGS, SENSITIVITY ANALYSIS WITH ENHANCED SERVICE

Station	Eastbound					Westbound				
	Branch On	Volume In	Station Board	Station Alight	Branch Off	Branch On	Volume In	Station Board	Station Alight	Branch Off
Aldershot GO	330	330	350	30	-	-	310	140	50	410
Dundas	430	1,080	160	150	-	-	730	400	70	730
Appleby*	-	1,090	60	-	-	-	710	30	10	-
Bronte	30	1,190	140	50	-	-	730	40	70	-
<i>(east of Bronte)</i>	-	1,280	-	-	-	-	730	-	-	-
Trafalgar	390	1,670	960	620	1,260	340	1,210	660	680	450
Britannia	-	1,060	200	130	-	-	1,060	100	160	30
Derry	-	1,160	300	50	-	-	940	180	50	-
Lisgar	-	1,390	820	380	-	-	890	420	230	-
<i>(east of Lisgar)</i>	600	2,670	-	-	-	-	910	-	-	20
Mississauga Road	20	2,140	450	30	-	-	1,310	30	470	60
<i>(to/from east)</i>	-	1,980	-	-	-	-	1,310	-	-	-

2.7. Systems Planning – Summary of Findings

This report provides the Transportation (Systems) Planning component of the 407 Transitway, Brant Street to West of Hurontario Street Environmental Assessment (EA). A number of important conclusions and directions were developed as described below.

The need and justification of the Transitway was updated and confirmed. The Transitway is a flexible piece of transit infrastructure connecting Urban Growth Centres in the west GTA, serving an under-served transit market, and supporting the intensification planned under the Provincial Growth Plan. The Transitway is unique in that it is flexible to support interlining service for access to growth areas afield

from the Transitway itself.

The interlining capability was demonstrated through the ‘enhanced’ service concept described in this report, transitway buses can be interlined to access urban growth centres in Hamilton, Burlington and Oakville, as well as connect to the Highway 403 Transitway in Mississauga and provide access to Mississauga City Centre and Pearson Airport. Additional connectivity could be provided via express service to downtown Milton and connection to the Hurontario LRT (east of the current study area). Together these services demonstrate a unique and positive service concept for the study corridor, as destinations currently served by disconnected transit services requiring multiple transfers and suffering long travel times due to congestion could instead feature direct express connections that largely bypass road congestion.

Apart from the need, justification, and service concept, the findings of this report support a number of tasks in the overall Transit Project Assessment Process (TPAP).

- **Station evaluation and screening** – Analysis of forecasts found that Neyagawa Station and Mavis Station were under-performing and could be removed from further planning. Both stations showed poor demand, with Neyagawa Station located in a mostly-rural area with limited development potential, and Mavis Station having limited access to major roads. Additionally, both provided limited network connections in terms of allowing for transfers between other transit services.
- **Station sizing** – Findings of this Systems Planning report were also used to establish appropriate station parking supply and need for supporting connection services such as need for bus bays, traffic and bus access locations, and number of entry points
- **Traffic forecasts** – Station park-and-ride forecasts were used to develop traffic forecasts as detailed in the traffic analysis portion of the EA.
- Findings were also provided to other disciplines including geotechnical, stormwater, natural environment, and design.

Overall, the proposed 407 Transitway is an important piece of transportation infrastructure linking communities in the west GTHA, and providing a longer-distance regional transit service to supplement local transit services. The transitway is intended to support the Provincial Growth Plan and Metrolinx plans for expanded transit service to meet provincial goals for sustainable travel.