SHAPING NINTH LINE

Mississauga's Northwestern Gateway

Ninth Line Corridor Study

Transportation Assessment

City of Mississauga

16-13112-001-T01

COMMUNITIES

TRANSPORTATION

BUILDINGS

INFRASTRUCTURE

MMM GROUP

July 2017

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1.0 INTRODUCTION

MMM Group Limited was retained by the City of Mississauga, as a sub-consultant to Macaulay Shiomi Howson Ltd., to prepare a Transportation Assessment on the Ninth Line Lands study area in the City of Mississauga.

By way of background, MMM had completed the Existing Conditions Assessment dated January 2015. The existing conditions assessment documents the existing traffic conditions, transit, trucks, active transportation, safety issues associated with the study area. Since then, an Emerging Land Use Concept has been developed by the project team and this Transportation Assessment aims to evaluate various future conditions with the Emerging Land Use Concept.

2.0 EXISTING TRAFFIC CONDITIONS

As noted in Section 1.0, the existing conditions assessment had been completed as part of the January 2015 submission. For the purpose of this Transportation Assessment, which focuses on the evaluation of the Emerging Land Use, the existing conditions are summarized again in this section to provide context for future assessments.

2.1 Road Network

The primary study area is bounded by Eglinton Avenue to the south, Highway 407 to the west, Highway 401 to the north and the multiple north-south road corridor roads (Rosehurst Drive, Lisgar Drive and Churchill Meadows Boulevard) approximately 500 m east of Ninth Line. The secondary study area includes three additional Ministry of Transportation Ontario (MTO) interchanges surrounding the primary study area. The major roads are described below:

- **Ninth Line** is a two-lane north-south arterial road with a posted speed limit of 70 km/h;
- **Argentia Road** is an east-west collector road that currently terminates at Ninth Line as a unsignalized 'T' intersection;
- **Derry Road** is a four-lane east-west arterial road with a posted speed limit of 80 km/h, which reduces to 60 km/h approximately 200 m east of Ninth Line;
- **Britannia Road** is a four-lane east-west arterial road with a posted speed limit of 80 km/h, which reduces to 60 km/h approximately 200 m east of Ninth Line;
- **Eglinton Avenue West/East Lower Base Line** is an east-west arterial road with a four-lane cross-section and a posted speed limit of 60 km/h;
- **Winston Churchill Boulevard** is a north-south arterial road with a four-lane cross-section and a posted speed limit of 60 km/h (between Britannia Road and north City limit) and 70 km/h (between Eglinton Avenue and Britannia Road);
- **Dundas Street West** is a six-lane east-west arterial road (Highway 403 to Winston Churchill Boulevard) with a posted speed limit of 60 km/h;
- **Rosehurst Drive** is a north-south minor collector road with a two-lane cross-section and a posted speed limit of 50 km/h (40 km/h between Hazelridge Road and a point 150 m north of Althorpe Circle);
- **Lisgar Drive** is a two-lane north-south minor collector road with a posted speed limit of 50 km/h (40 km/h between: Berryman Trail and Dillingwood Drive/Gracefield Drive; Windhaven Drive/Forest Bluff Crescent and Osprey Boulevard; Saratoga Way/Forest Bluff Crescent and Beechnut Row/Cedar Hedge Rise); and
- **Churchill Meadows Boulevard** is a north-south minor collector road with a two-lane cross-section and a posted speed limit of 50 km/h.

There are two Peel Region roadways which intersect with Ninth Line within the study area: Derry Road and Britannia Road. Within the Region's Road Characterization Study (RCS), both are designated as Suburban Connectors within the immediate proximity of Ninth Line. The objective of the Ninth Line Lands Study is not specifically intended to recommend road improvements on Regional roads. However, if the future traffic conditions identified within the corridor study suggest that improvements to either of these Regional roads is recommended, the recommended improvements will be consistent with the road character features described within the RCS for Suburban Connector Roads.

The primary study area, as requested in the scope of work of the procurement document, includes the following intersections:

- Ninth Line at Golf Club Access (Family Golf Academy parking lot) (Unsignalized);
- Ninth Line at Terragar Blvd (Unsignalized);
- Ninth Line at Argentia Road (Unsignalized);
- Ninth Line at Hazelridge Rd (Unsignalized);
- Ninth Line at Derry Road (Signalized);
- Ninth Line at Beacham St (Unsignalized);
- Ninth Line at Doug Leavens Blvd (Signalized);
- Ninth Line at Osprey Blvd (Signalized);
- Ninth Line at Parkgate Dr (Unsignalized);
- Ninth Line at Britannia Rd W (Signalized);
- Ninth Line at Freeman Terrace (Unsignalized);
- Ninth Line at McDowell Dr (Unsignalized);
- Ninth Line at Lacman Trail (Unsignalized);
- Ninth Line at Brinwood Gate (Unsignalized);
- Ninth Line at Thomas St (Signalized);
- Ninth Line at Deepwood Heights (Unsignalized);
- Ninth Line at Tacc Drive (Unsignalized);
- Ninth Line at Janice Drive (Unsignalized);
- Ninth Line at Erin Centre (Signalized);
- Ninth Line at Candlelight Dr (Unsignalized);
- Ninth Line at Skyview St (Unsignalized);
- Ninth Line at Stardust Dr (Unsignalized);
- Ninth Line at Eglinton Ave (Signalized);
- Terragar Blvd at Rosehurst Dr (Unsignalized);
- Derry Road at Rosehurst Dr/Lisgar Dr (Signalized);
- Doug Leavens Blvd at Lisgar Dr (Unsignalized);
- Osprey Blvd at Lisgar Dr (Unsignalized);

- Britannia Rd W at Maple Gate Circle/Churchill Meadows Blvd (Signalized);
- Freeman Terrace at Churchill Meadows Blvd (Unsignalized);
- McDowell Dr at Churchill Meadows Blvd (Unsignalized);
- Thomas St at Churchill Meadows Blvd (Signalized);
- Tacc Dr at Churchill Meadows Blvd (Unsignalized);
- Erin Centre Blvd at Churchill Meadows Blvd (Unsignalized);
- Eglinton Ave at Churchill Meadows Blvd (Signalized);
- Highway 407 at Britannia Road - SB Off Ramp (Signalized);
- Highway 407 at Britannia Road - NB Off Ramp (Signalized);
- Highway 407 at Derry Road - SB Off Ramp (Signalized); and
- Highway 407 at Derry Road - NB Off Ramp (Signalized).

The following interchanges were requested by MTO to be included as part of the secondary study area:

- Highway 401 at Winston Churchill Boulevard - WB Off Ramp (Signalized);
- Highway 401 at Winston Churchill Boulevard - EB Off Ramp (Signalized);
- Highway 403 at Winston Churchill Boulevard - WB Off Ramp (Signalized);
- Highway 403 at Winston Churchill Boulevard - EB Off Ramp (Signalized);
- Highway 403 at Dundas Street - SB Off Ramp (Signalized); and
- Highway 403 at Dundas Street - NB Off Ramp (Signalized).

The location of each study intersection is shown in **Figures 2.1A** and **2.1B** and the existing lane configurations are shown in **Figures 2.2A** and **2.2B**.

2.2 Data Collection

MMM obtained traffic data through the City of Mississauga, the Region of Peel, the MTO and 407ETR. For the intersections where traffic data was not available, MMM retained Accu-Traffic Inc. to conduct turning movement count surveys during typical weekday peak periods of 7:00 to 9:00 a.m. and 4:00 to 6:00 p.m. All of the turning movement count data and the signal timing plans are presented in **Appendix A**. The existing a.m. and p.m. peak hour traffic volumes are shown in **Figures 2.3A** and **2.3B**.

2.3 Methodology

Traffic conditions in the study area were analyzed using the Synchro 9 traffic analysis software. This software incorporates the methodology outlined in the *Highway Capacity Manual (HCM), Transportation Research Board, 2000*.

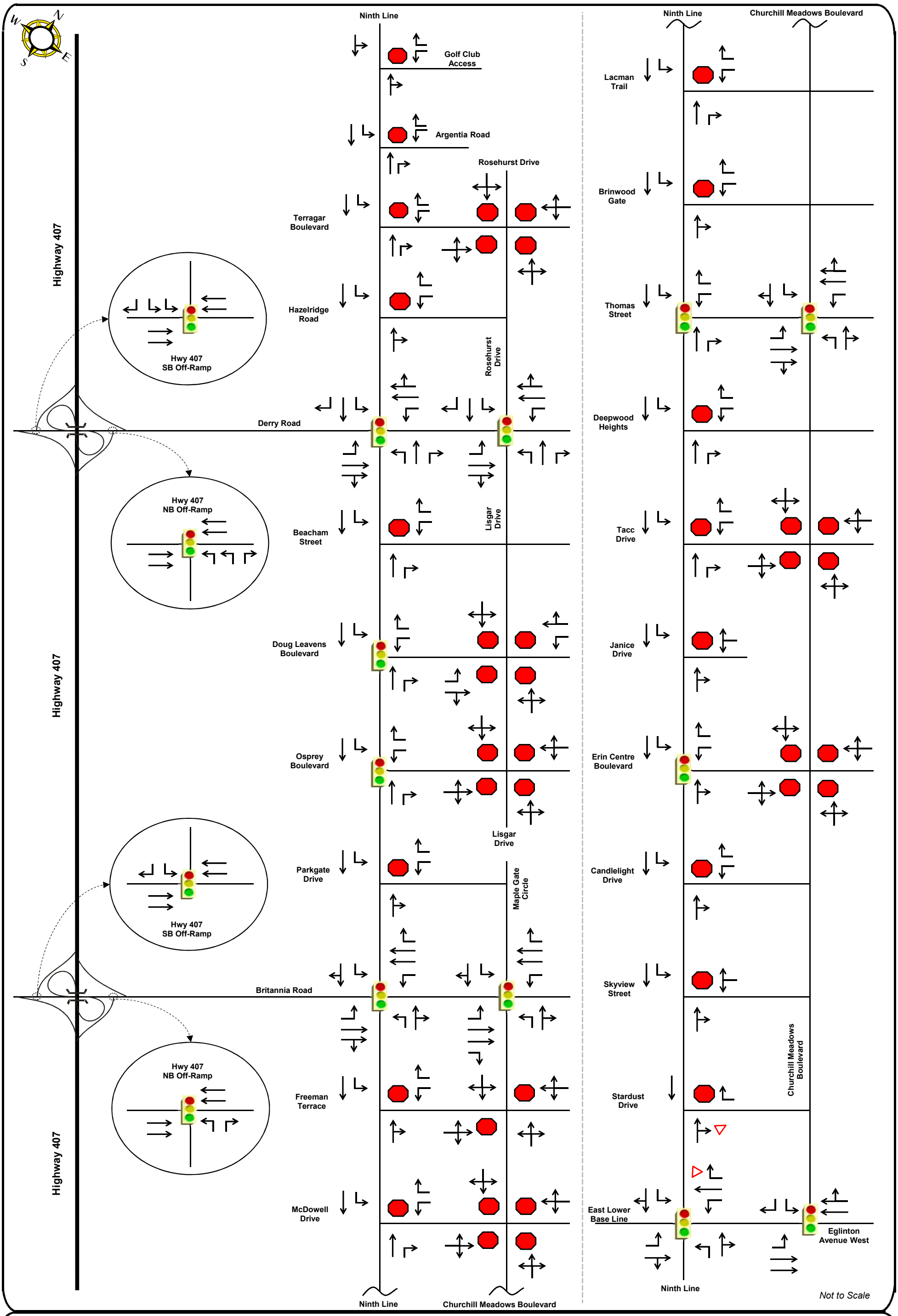
The intersection capacity analysis provides an indication of traffic operations based on calculations of volume-to-capacity (v/c) ratio and delays for individual movements at an

Figure 2.1A Ninth Line Transportation Study Network

Not to Scale

Figure 2.1B Ninth Line Transportation Study Network

Not to Scale



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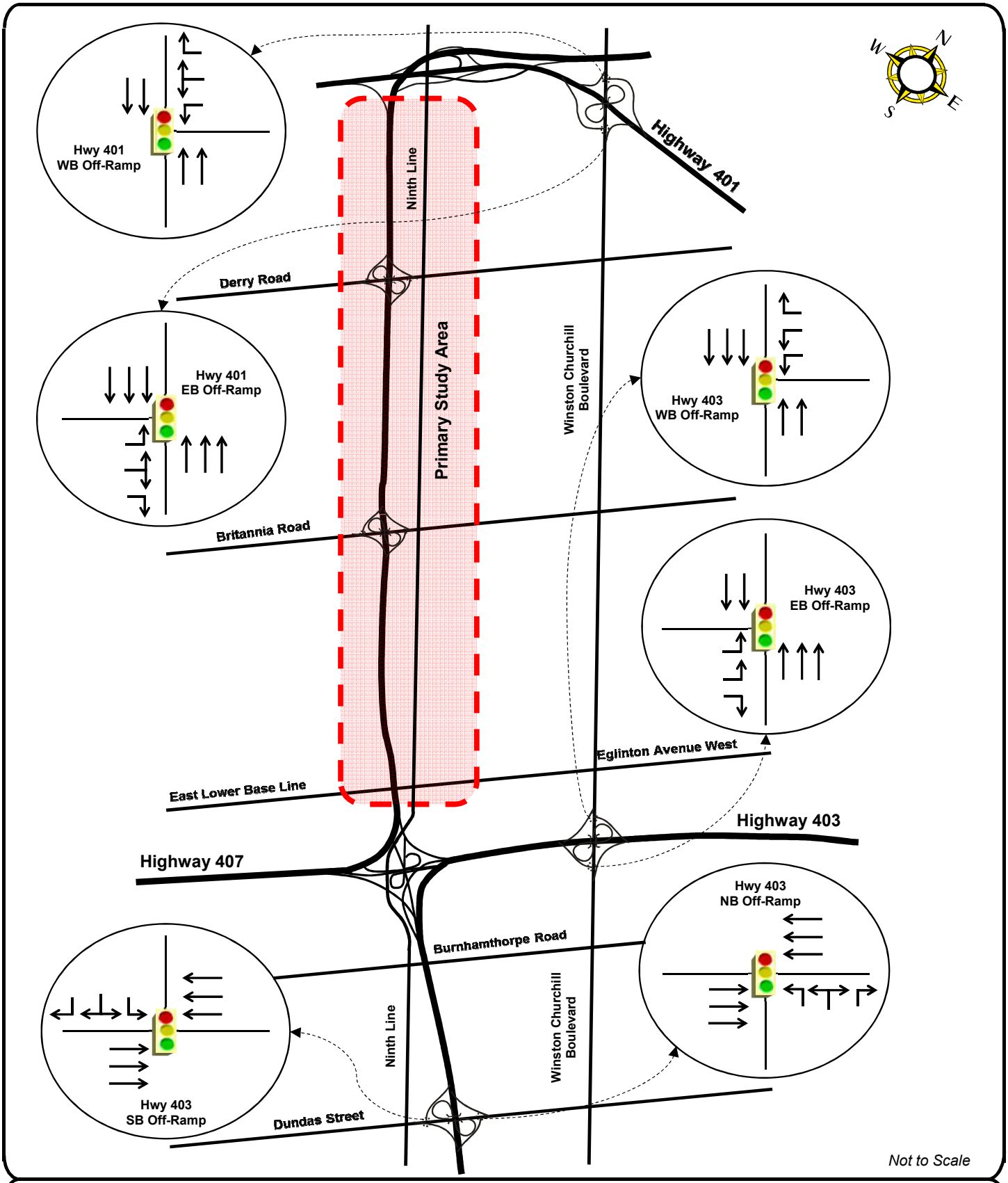
LEGEND

- Signalized Intersection
- Stop Control
- Channelized Right Turn

FIGURE 2.2A

Existing Lane Configurations - Primary Study Area



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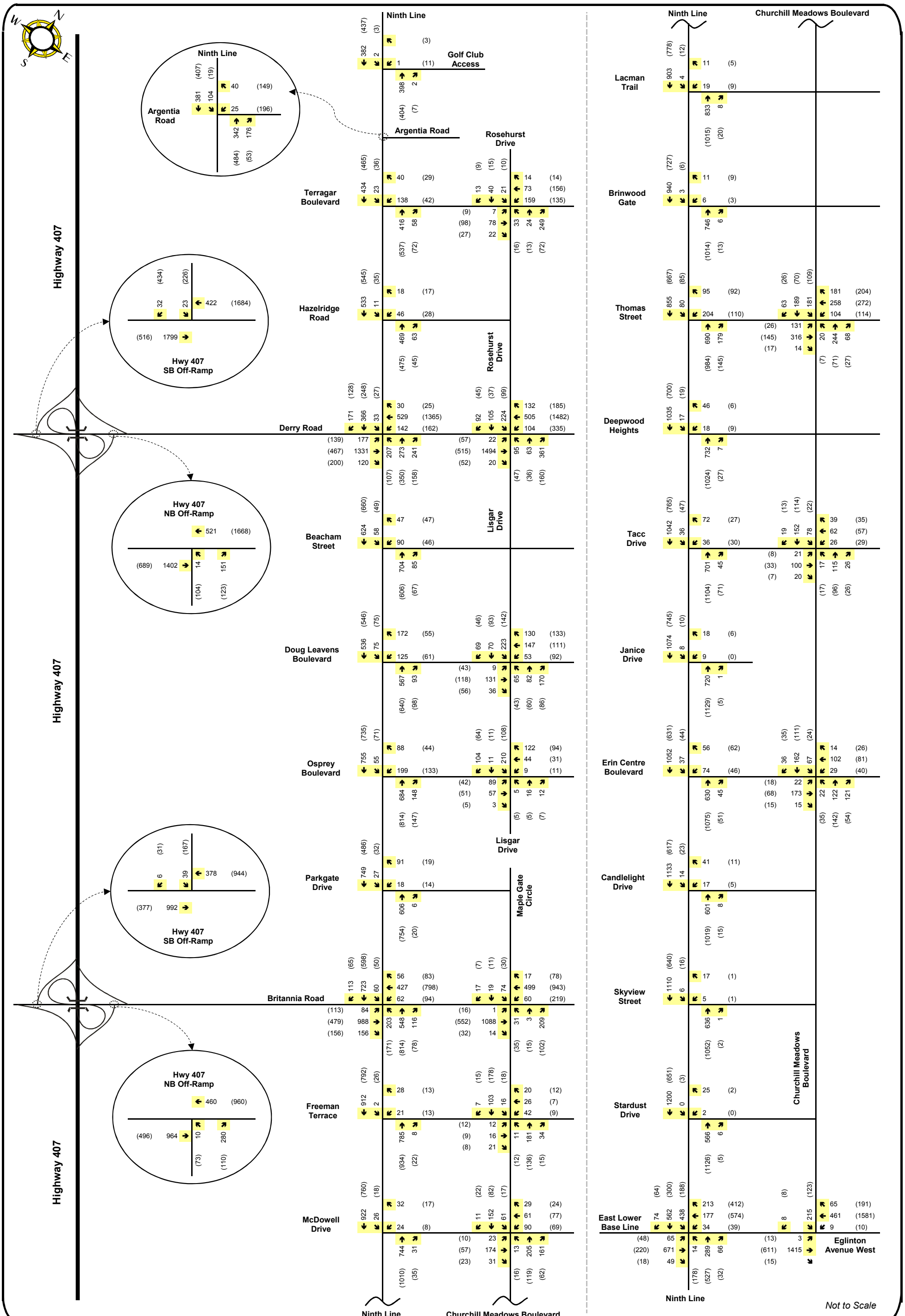
LEGEND

Signalized Intersection

Stop Control

FIGURE 2.2B

Existing Lane Configurations - Secondary Study Area



LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

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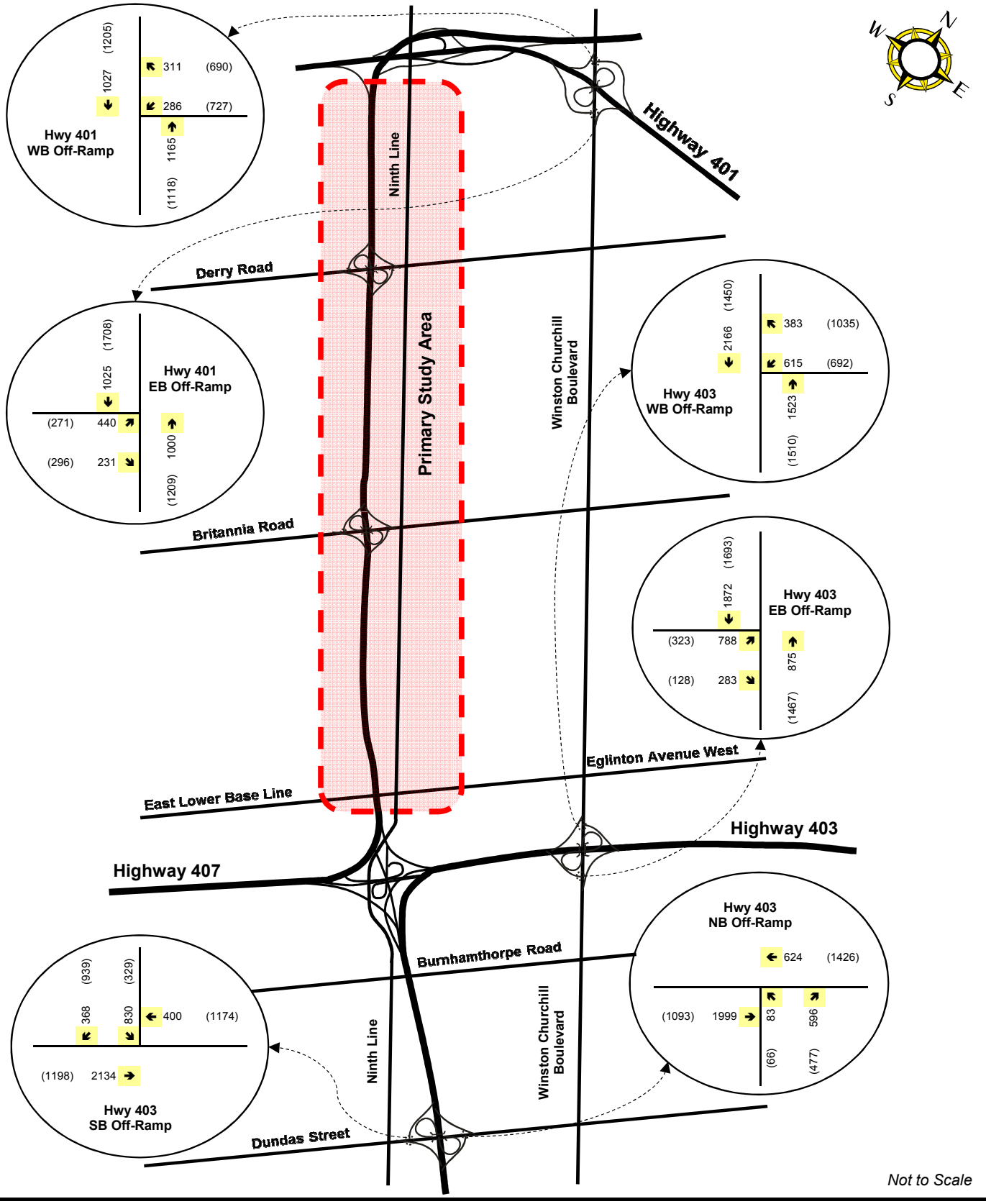
FIGURE 2.3A

Existing Traffic Volumes - Primary Study Area



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LEGEND

XX	AM Peak Hour Volumes
(XX)	PM Peak Hour Volumes

FIGURE 2.3B

Existing Traffic Volumes - Secondary Study Area

intersection. Level of Service (LOS) denoted by the letters 'A' through 'D', represent satisfactory traffic operations. LOS denoted by the letters 'E' and 'F' represent congested traffic operations. The Level of Service definitions for signalized and unsignalized intersections are included in **Appendix B**.

2.4 Calibration

As per the January 2015 Existing Conditions Assessment, some existing condition calibration was applied where the volume-to-capacity (v/c) ratios reported by Synchro exceeded the theoretical intersection capacity under existing conditions. This implies that more traffic travelled through the intersection than is considered physically feasible. As a result it is likely that the default parameters in Synchro are resulting in an underestimation of the capacity of the intersection, due to more aggressive driving behavior within the study area, resulting in:

- Reduced headways and increased lane utilization, reflected in Synchro as higher saturation flow rates; and
- Left turn vehicles utilizing more of the inter-green period at the end of the phase or even one to two seconds of the initial green time of the conflicting phases at a large intersection, resulting in a higher lost-time adjustment.

Additional surveys and assessments related to calibration parameters (i.e., lost time adjustments and saturation flow rates) were completed on Tuesday, September 23, 2014 for use at the MTO ramp terminals. The median (left-side) northbound lane at the intersection of Winston Churchill Boulevard at Highway 403 WB Off-Ramp was surveyed. The results of the survey were used to determine the calibration parameters to be applied at all MTO and 407ETR ramp terminals.

In order to calibrate the Synchro model, the following parameters were used, based on the City of Mississauga and Region of Peel guidelines, input from MTO, as well as field surveys:

<u>City and Region Intersections:</u>

- A lost time adjustment of -1.0 was applied to all movements. In instances where the theoretical capacity limit is exceeded, a lost time of up to -3.0 was applied to the critical movements;
- Saturation flow rate of 1,900 veh/hr/lane;
- Peak hour factor (PHF) of 1.0 for all movements at Region intersections; and
- PHF of 0.92 for all movements at City intersections.

MTO and 407ETR Ramp Terminals:

- No lost time adjustments except in instances where the theoretical capacity limit is exceeded, then a lost time of 2.5 seconds and 2.9 seconds was applied to the critical movements for the a.m. and p.m. peak hours, respectively;
- Saturation flow rate of 2,057 veh/hr/lane for the a.m. peak hour;
- Saturation flow rate of 2,069 veh/hr/lane for the p.m. peak hour;
- PHF was calculated based on the available 15-minute counts at each off-ramp for each of the peak hours; and
- Confirmation of the above parameters are provided in Appendix I.

These calibration measures have been maintained from existing to future condition assessment to provide an 'Apples to Apples' basis for comparison.

2.5 Existing Traffic Operations

Traffic operations were analyzed at the study intersections to determine the existing Levels of Service during the weekday a.m. and p.m. peak hours. The results of the intersection capacity analysis for existing conditions are summarized in **Table 2.1**. Detailed intersection capacity analysis sheets are included in **Appendix C**.

TABLE 2.1
EXISTING TRAFFIC CONDITIONS

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line at Derry Rd	Signalized	C (34)	--	C (26)	--
Ninth Line at Doug Leavens Blvd	Signalized	B (13)	--	A (9)	--
Ninth Line at Osprey Blvd	Signalized	B (18)	--	B (16)	--
Ninth Line at Britannia Rd	Signalized	D (48)	WB-L (1.00) NB-L (0.98) SB-TR (1.01)	D (43)	NB-TR (0.93)
Ninth Line at Thomas St	Signalized	C (22)	--	C (21)	--
Ninth Line at Erin Centre Blvd	Signalized	B (18)	--	B (18)	--
Ninth Line at East Lower Base Line/ Eglinton Ave W	Signalized	D (52)	EB-TR (0.93) NB-TR (0.93) SB-L (0.93)	D (38)	NB-TR (0.90)
Lisgar /Rosehurst Dr at Derry Rd	Signalized	C (20)	--	B (10)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Churchill Meadows Blvd/Maple Gate Circle at Britannia Rd	Signalized	B (12)	SB-L (0.95)	A (6)	--
Churchill Meadows Blvd at Thomas St	Signalized	B (17)	--	B (13)	--
Eglinton Ave W at Churchill Meadows Blvd	Signalized	B (12)	--	B (13)	--
Britannia Rd at Hwy 407 SB Off-Ramp	Signalized	A (4)	--	C (20)	--
Hwy 407 NB Off-Ramp at Britannia Rd	Signalized	B (18)	--	B (12)	--
Derry Rd at Hwy 407 SB Off-Ramp	Signalized	A (4)	--	C (23)	SB-R (1.04)
Hwy 407 NB Off-Ramp at Derry Rd	Signalized	A (6)	--	A (5)	--
Ninth Line at Golf Club Access	Unsignalized	C (20)	--	C (16)	--
Ninth Line at Terragar Blvd	Unsignalized	B (15)	--	B (14)	--
Ninth Line at Argentia Rd	Unsignalized	C (20)	--	E (39)	--
Ninth Line at Hazelridge Rd	Unsignalized	B (14)	--	B (14)	--
Ninth Line at Beacham St	Unsignalized	F (109)	WB-L (0.93) WB-R (0.93)	D (31)	--
Ninth Line at Parkgate Dr	Unsignalized	C (16)	--	C (16)	--
Ninth Line at Freeman Terrace	Unsignalized	C (19)	--	C (20)	--
Ninth Line at McDowell Dr	Unsignalized	C (19)	--	C (20)	--
Ninth Line at Lacman Trail	Unsignalized	C (19)	--	C (20)	--
Ninth Line at Brinwood Gt	Unsignalized	C (16)	--	C (22)	--
Ninth Line at Deepwood Heights	Unsignalized	C (19)	--	C (20)	--
Ninth Line at Tacc Dr	Unsignalized	C (18)	--	C (24)	--
Ninth Line at Janice Dr	Unsignalized	C (17)	--	C (22)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line at Candlelight Dr	Unsignalized	C (16)	--	C (22)	--
Ninth Line at Skyview St	Unsignalized	B (15)	--	C (22)	--
Ninth Line at Stardust Dr	Unsignalized	B (13)	--	D (26)	--
Rosehurst Dr at Terragar Blvd	Unsignalized	B (12)	--	B (11)	--
Lisgar Dr at Doug Leavens Blvd	Unsignalized	D (26)	--	C (16)	--
Lisgar Dr at Osprey Blvd	Unsignalized	B (12)	--	A (9)	--
Churchill Meadows Blvd at Freeman Terrace Blvd	Unsignalized	B (13)	--	B (12)	--
Churchill Meadows Blvd at McDowell Dr	Unsignalized	C (19)	--	A (10)	--
Churchill Meadows Blvd at Tacc Dr	Unsignalized	B (11)	--	A (9)	--
Churchill Meadows Blvd at Erin Centre Blvd	Unsignalized	B (13)	--	B (10)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (21)	--	C (32)	--
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	B (20)	--	B (14)	--
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	C (26)	--	D (37)	--
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	C (34)	--	B (18)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	C (26)	SB-LR (0.96)	C (32)	--
Hwy 403 NB Off-Ramp at Dundas St	Signalized	B (19)	NB-R (0.92)	B (15)	--

1) *For signalized intersections, the level of service is based on the overall delay of the intersection.*
2) *For two-way stop controlled intersections, the level of service is based on the delay associated with the critical movements.*
3) *For All-Way Stop Control (AWSC) intersections, the level of service is based on the overall delay of the intersection.*
4) *TR = shared through right-turn lane*

Under existing traffic conditions, the majority of the study intersections are operating at acceptable levels of service (LOS 'D' or better) and within roadway capacity. The intersections of Ninth Line at Britannia Road, Derry Road at Highway 407 southbound off-ramp, Ninth Line at Lower Base Line/Eglinton Avenue West, and Ninth Line at Beacham Street are operating with movements near or at capacity with longer delays.

As noted earlier, the signal timings have not been optimized under existing, and the actual signal timing during the time of the survey may have been slightly different, which would have contributed to the over capacity results.

This analysis of the existing conditions forms the benchmark comparison for the future conditions analyses. It should be noted that the intersections of Ninth Line at Doug Leavens Boulevard and Eglinton Avenue at Churchill Meadows Boulevard have been modeled as signalized intersections, as per the City's instruction and provided signal timing plans. This is an update from the January 2015 existing conditions assessment.

3.0 TRUCKS

The study area is in close proximity to major roadways including Highways 401, 403 and 407, as well as the future proposed GTA West Corridor and Bramwest Parkway. The study area is also near key generators of goods movement, including the Canadian Pacific (CP) Railway Milton Intermodal Terminal, the Meadowvale Business Park and the Churchill Business Park. The Region of Peel Strategic Goods Movement Network Study (April 25, 2013) has identified Derry Road and Eglinton Avenue as connector truck routes and provides information on goods movement within the study area. Truck restriction signs were observed for Thomas Street and Doug Leavens Boulevard.

An inventory of existing truck volumes and percentages is provided in **Appendix D**. Generally, truck and heavy vehicle volumes and percentages are low throughout the study area, rarely exceeding 10% of the total vehicle volumes at each approach for most study area intersections. The traffic counts conducted by the City of Mississauga include buses in the same category as heavy vehicles/trucks.

Over 20 trucks were recorded on both northbound and southbound Ninth Line during the AM peak hour, but this contributed only 2% to 3% to the traffic volume. As expected, truck volumes are highest in the vicinity of Highways 401 and 403, yet the percentages do not exceed 7% except at the Highway 401 at Winston Churchill Boulevard - westbound off ramp in the AM peak hour (11%).

A truck percentage of 15% was recorded for one approach: the Highway 407 at Derry Road - southbound off ramp during the AM peak. However, this is a volume of only eight.

Heavy vehicle/truck percentages between 11% and 12% were recorded for one or two approaches at the following intersections during the PM peak hour:

- Doug Leavens Boulevard at Lisgar Drive where the volumes ranged from 20 to 24 trucks per approach; and

- McDowell Drive at Churchill Meadows Boulevard, with a modest 11 trucks in the hour.

The Doug Leavens Boulevard and Lisgar Drive intersection of two collector roads seems to be an anomaly within the residential study area. The proximity of four schools, a small commercial plaza and MiWay bus stops to this intersection may explain the heavy vehicle activity on the day the traffic count was conducted because school buses and MiWay buses were counted in the same category.

4.0 TRANSIT

The existing transit routes within the study area are shown in **Figure 4.1**. Bus stop locations are provided in **Appendix E**. Ridership data from MiWay is provided in **Appendix F**.

The following bus routes within the study area are operated by MiWay:

- **32 Lisgar GO** operates between Lisgar GO Station on the Milton Go Train line and Tenth Line West at Trelawny Circle, generally in a north-south direction. This bus operates only during the AM/PM peak hours and is coordinated with the GO Train at Lisgar GO Station. This bus does not operate during the weekends;

- **90 Terragar-Copenhagen Loop** operates in a loop between Terragar Boulevard and Meadowvale GO Station during rush hours and between Terragar Boulevard and Copenhagen Road during off-peak hours, generally in an east-west direction. It also serves Meadowvale Town Centre. This bus operates every 20 minutes during rush hour and every 40 minutes during off-peak hours including Saturdays;

- **39 Britannia** operates between Meadowvale Town Centre and Hershey Centre, generally in an east-west direction. This bus operates every 27 minutes during rush hour and every 35 minutes during off-peak hours including weekends;

- **49/49A McDowell** operates between St. Joan of Arc Catholic Secondary School and Erin Mills Town Centre during weekday off-peak hours, generally in an east-west direction. This bus operates every 20 to 40 minutes. 49A McDowell bus route operates between St. Joan of Arc Catholic Secondary School and Streetsville GO Station during rush-hours, generally in an east-west direction. This bus operates every 20 minutes. Both bus routes do not operate on the weekend;

MiWay

Weekday Service Map

Effective: July 3, 2017

MiWay Route Service Types

- Regular Route
- Rush Hour (Peak) Route
- Non-Rush Hour (Off Peak) Route
- MiExpress Route All Day Service
- MiExpress Route AM/PM Rush Hour Service
- Route Number

Connecting Transit Services

- Oakville Transit Route
- Brampton Transit Route
- TTC Bus Route
- TTC Subway & Station
- GO Train & Station

Map Symbols

- Major Transit Terminal
- Transitway Station
- Mississauga Transitway
- Hospital
- Shopping Centre
- High School, University or College
- Recreation or Community Centre
- Ice Rink
- Public Library
- Living Arts Centre
- Civic Centre (City Hall)
- Court House
- All MiWay routes are fully accessible with low floor, wheelchair accessible buses

Not to Scale

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FIGURE 4.1

Weekday Transit Route Map

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- **41/41A Thomas** operates between the intersection of Ninth Line and Eglinton Avenue West and Erin Mills Town Centre during off-peak hours, generally in an east-west direction. This bus operates every 20 to 45 minutes including weekends. 41A Thomas bus route operates between the intersection of Ninth Line and Eglinton Avenue West and Streetsville GO Station during rush-hours, generally in an east-west direction. This bus operates every 20 minutes;

- **35 Eglinton** operates between the intersection of Ninth Line and Eglinton Avenue West and Islington TTC Station on the Bloor-Danforth Subway Line. This bus operates about every 10 minutes during most of the day and about every 20 to 30 minutes during mid-day and late evening hours. This bus does not operate on Sundays; and

- **321 Stephen Lewis-St. Joan of Arc** operates between the intersection of Winston Churchill Boulevard and Artesian Drive and the intersection of Churchill Meadows Boulevard and Thomas Street. This bus route only operates during regular school days in coordination with the two secondary school schedules.

GO Transit is responsible for operating the following train routes and bus routes within the study area:

- **Milton GO Train** operates between Milton GO Station and Union Station generally in an east-west direction. Trains operate every 10 to 20 minutes during rush-hour. 21 Milton buses operate along this route during off-peak hours and the weekend. This line also serves Square One GO Terminal and Kipling GO Station, which are connected to various regional and local transit routes;

- **27 Milton/North York GO** bus route operates between the Milton – Main at Martin stop and Finch GO Bus Terminal during rush-hours and between Meadowvale GO Station and Finch GO Bus Terminal during off-peak hours, generally in an east-west direction. This bus operates every 15 minutes during rush-hour, every 30 minutes during off-peak hours, and does not operate during the weekends; and

- **48 Guelph/York University GO** bus route operates between the University of Guelph and York University, generally in an east-west direction. This bus operates every 50 to 60 minutes during weekdays and does not operate during the weekends.

5.0 ACTIVE TRANSPORTATION

Active transportation facilities are limited within the Ninth Line Lands.

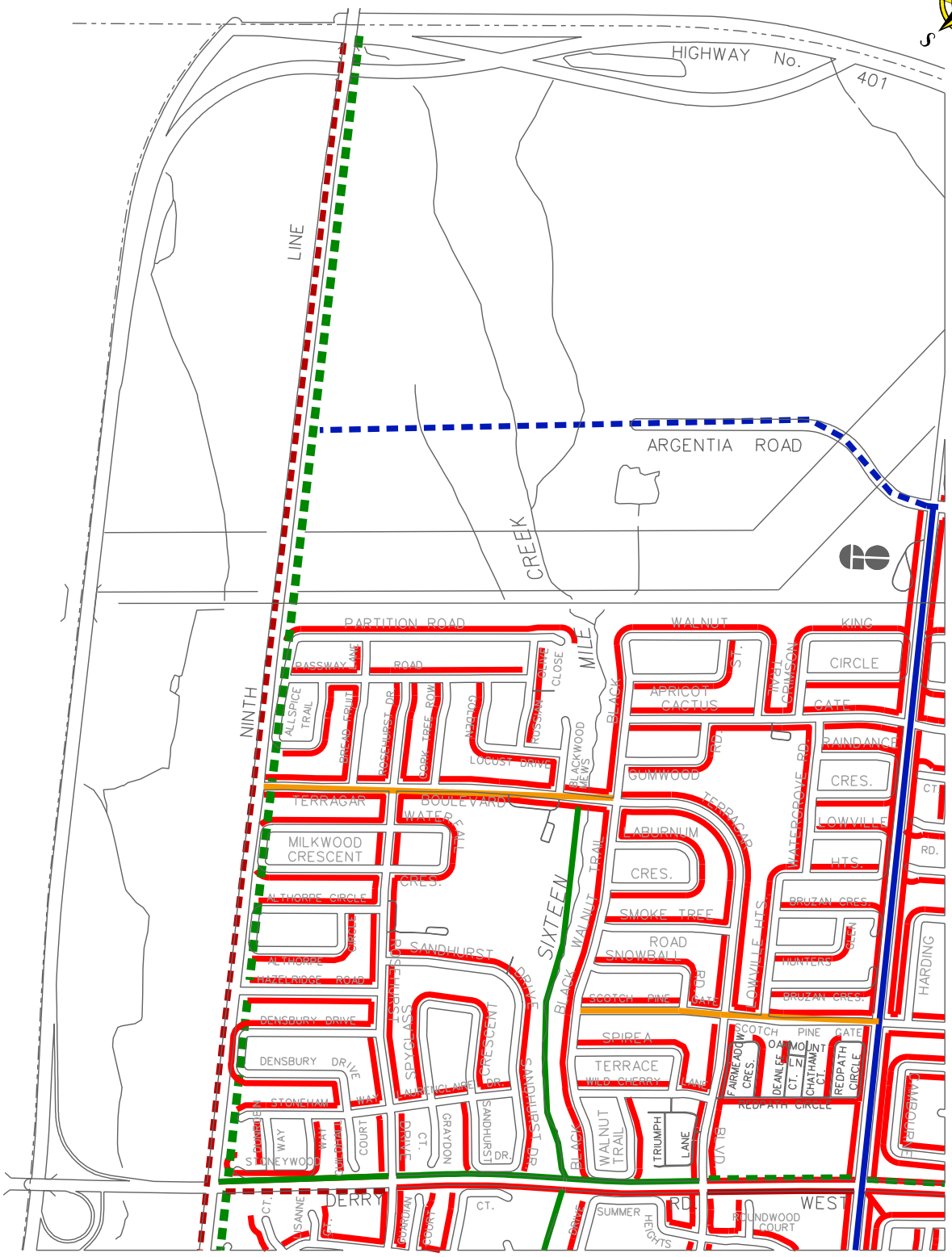
Detailed maps, showing existing and future pedestrian and cycling facilities in the study area, were provided by the City of Mississauga and are shown in **Figures 5.1A** to **5.1D.** The information presented are based on the Mississauga Cycling Master Plan.

A dedicated bike lane exists on Tenth Line West. Paved multi-use trails between Eglinton Avenue West and Lisgar GO Station, generally running in a north-south direction, connects multiple parks and schools just east of the study area. There are also several paved multi-use trails, generally running in an east-west direction, crossing within the study area and connecting to the north-south multi-use trail. Signed bike routes exist on Ninth Line, between Britannia Road West and Eglinton Avenue West, Terragar Boulevard, Scotch Pine Gate, and Osprey Boulevard. Erin Centre Boulevard also has a dedicated bike lane.

The planned future on-road cycling facilities, as identified in the Cycling Master Plan, are as follows:

- Argentia Road (bicycle lanes);
- Derry Road, east of Terragar Boulevard (multi-use trail);
- Ninth Line (multi-use trail);
- Doug Leavens Boulevard (bicycle lanes);
- Trelawny Circle (bicycle lanes);
- Grossbeak Drive (signed route);
- McDowell Drive (signed route);
- Thomas Street (bicycle lanes);
- Churchill Meadows Boulevard (sharrow lanes);
- Oscar Peterson Boulevard (signed route);
- Tacc Drive (signed route); and
- Eglinton Avenue (bicycle lanes).

An off-road multi-use trail has been proposed by the Region of Peel Active Transportation Plan, which would follow the hydro corridor situated to the south of the Ninth Line Lands study area. The City of Mississauga has proposed an off-road trail (18) Pipeline Corridor Trail, east-west north of Trelawny Circle from Ninth Line to Tenth Line West.



Not to Scale

LEGEND

- Existing Sidewalk
- Proposed Sidewalk
- Existing Multi-Use Trail
- Proposed Multi-Use Trail
- Existing Bicycle Lanes
- Proposed Bicycle Lanes
- Existing Signed Route
- Proposed Signed Route
- Proposed Sharrow Lanes

FIGURE 5.1a

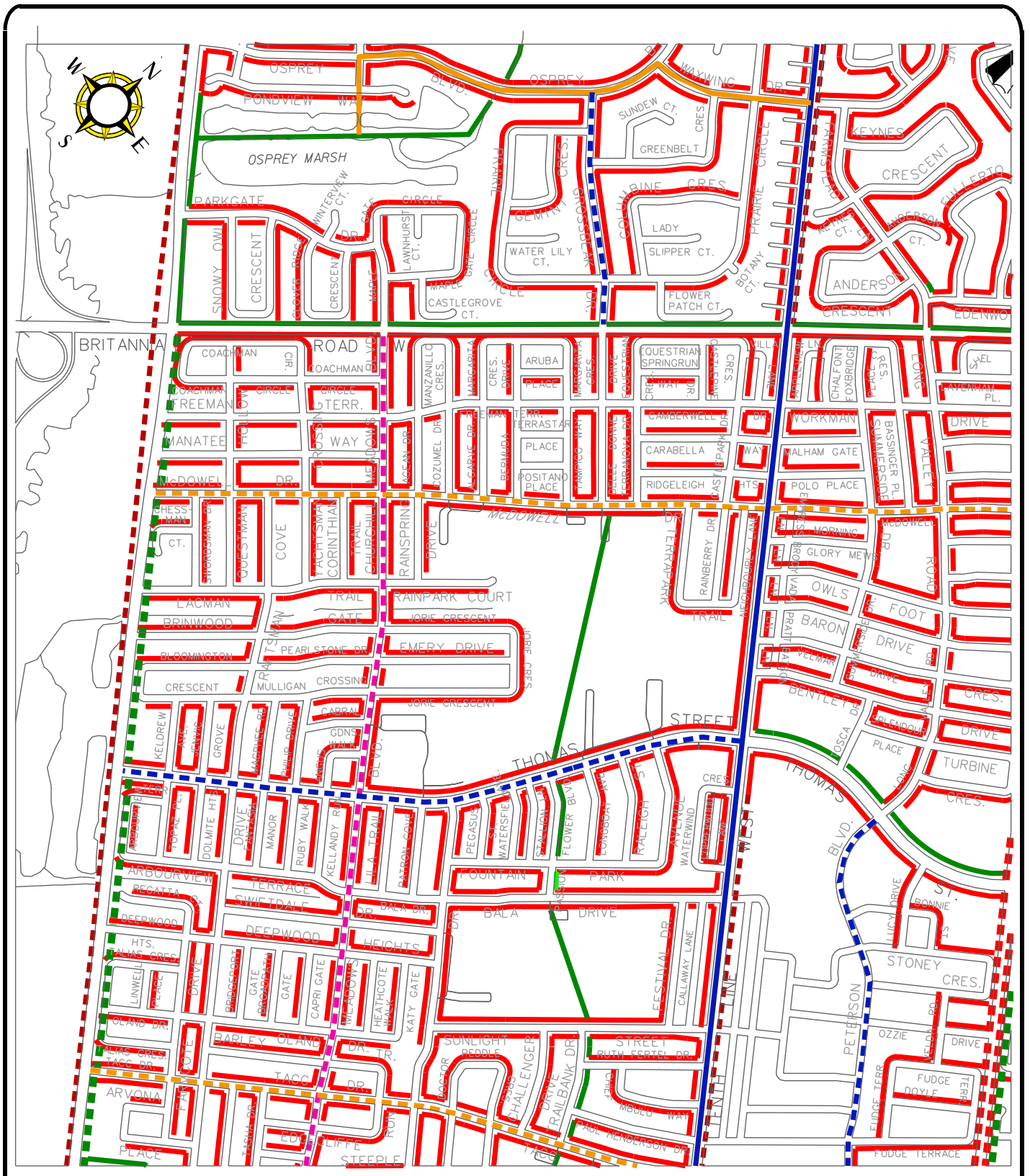
Active Transportation
Existing and Planned Facilities

LEGEND

- Existing Sidewalk
- Proposed Sidewalk
- Existing Multi-Use Trail
- Proposed Multi-Use Trail
- Existing Bicycle Lanes
- Proposed Bicycle Lanes
- Existing Signed Route
- Proposed Signed Route
- Proposed Sharrow Lanes

FIGURE 5.1b

Active Transportation
Existing and Planned Facilities

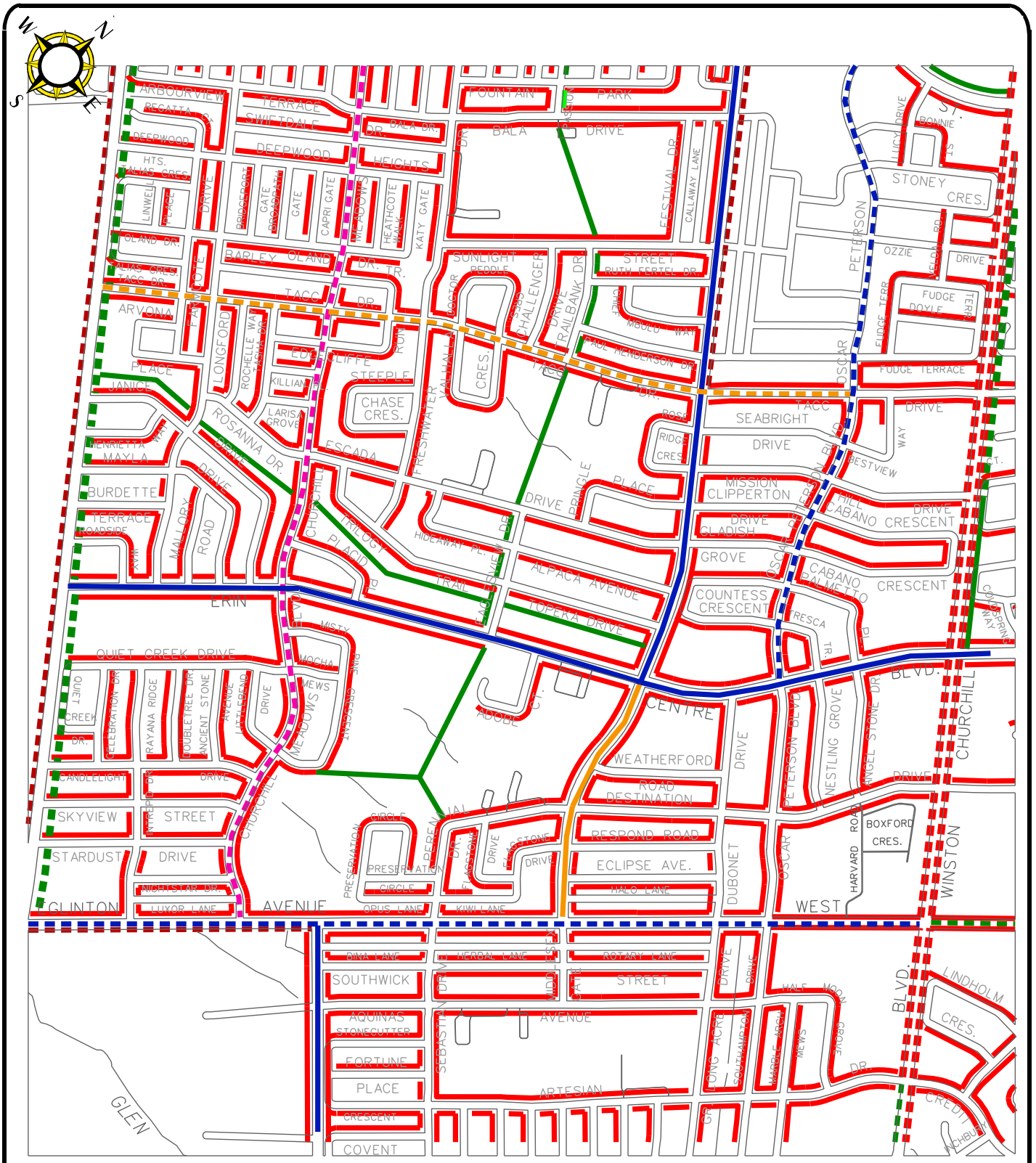


LEGEND

- Existing Sidewalk
- Proposed Sidewalk
- Existing Multi-Use Trail
- Proposed Multi-Use Trail
- Existing Bicycle Lanes
- Proposed Bicycle Lanes
- Existing Signed Route
- Proposed Signed Route
- Proposed Sharrow Lanes

FIGURE 5.1c

Active Transportation
Existing and Planned Facilities



Not to Scale

LEGEND

- Existing Sidewalk
- Proposed Sidewalk
- Existing Multi-Use Trail
- Proposed Multi-Use Trail
- Existing Bicycle Lanes
- Proposed Bicycle Lanes
- Existing Signed Route
- Proposed Signed Route
- Proposed Sharrow Lanes

FIGURE 5.1d

Active Transportation
Existing and Planned Facilities

6.0 COLLISION DATA

Information was gathered for the various collisions which occurred on Region of Peel and City of Mississauga roads. The detailed reports and summary tables are provided in **Appendix G**.

For the collision data collected at Peel Region intersections between January 2008 and December 2012, the following items were noted:

- At the intersection of Derry Road at Ninth Line, there have been five collisions resulting in personal injury;
- At the intersection of Britannia Road at Ninth Line, there have been seven collisions involving a rear-end impact between vehicles travelling south;
- At the intersection of Derry Road at Rosehurst Drive/Lisgar Drive, there have been eight collisions involving a rear-end impact between vehicles travelling west; and
- No discernable pattern was found for any one of these occurrences.

For the collision data collected along Mississauga corridors between January 2008 and November 2013, the following items were noted:

- At the intersection of Thomas Street at Churchill Meadows Boulevard, there have been 18 collisions resulting in property damage;
- At the intersection of Eglinton Avenue West at Churchill Meadows Boulevard, there have been 21 collisions resulting in property damage and eight collisions involving an angle (T-bone) impact with Vehicle 1 travelling south;
    - For the collisions involving property damage, no discernable pattern was found;
    - For the collisions involving an angle impact, the majority occurred in clear and dry conditions with daylight.
- At the intersection of Ninth Line at Eglinton Avenue West, there have been 26 collisions resulting in property damage and seven collisions involving a rear-end impact between vehicles travelling south;
- The Erin Centre Boulevard corridor, between Ninth Line and Placid Place, experiences an average of 3.9 collisions/km/year;
- The Thomas Street corridor, between Ninth Line and Lila Trail, experiences an average of 6.9 collisions/km/year;
- The Eglinton Avenue West corridor, between Ninth Line and Churchill Meadows Boulevard, experiences an average of 10 collisions/km/year;
- The Ninth Line corridor, between Eglinton Avenue West and Highway 401, experiences an average of 2.1 collisions/km/year; and
- No discernable pattern was found based on these occurrences and the calculated average collision rates.

7.0 FUTURE BACKGROUND CONDITIONS (BUSINESS AS USUAL)

7.1 Future Background Inputs

The future background (business as usual) volumes were developed based on the combination of general growth and traffic generated by background developments.

7.1.1 General Growth

Existing traffic volumes in Figures 2.3A and 2.3B were grown from the year of the count date to the horizon 2041 based on the compound growth rates provided by the City as shown below.

NORTH/ SOUTH DEMAND

	AM PEAK HOUR		PM PEAK HOUR	
	2011 vs 2041 Without		2011 vs 2041 Without	
Ninth Line	**NB**	**SB**	**NB**	**SB**
-btwn Britannia Rd and Eglinton Ave	1.17%	0.35%	0.49%	0.97%
-btwn Derry Rd and Britannia Rd	1.00%	0.00%	0.00%	1.05%
-btwn 401 and Derry Rd	1.36%	1.13%	0.80%	1.34%
Average	**1.19%**	**0.47%**	**0.46%**	**1.12%**

	2011 vs 2041 Without		2011 vs 2041 Without	
Winston Churchill Blvd	**NB**	**SB**	**NB**	**SB**
-btwn Britannia Rd and Eglinton Ave	1.72%	0.95%	1.19%	1.54%
-btwn Derry Rd and Britannia Rd	1.64%	1.65%	1.88%	1.87%
-btwn 401 and Derry Rd	1.15%	2.76%	3.37%	1.30%
Average	**1.48%**	**1.62%**	**2.02%**	**1.54%**

EAST/ WEST DEMAND

	AM PEAK HOUR		PM PEAK HOUR	
	2011 vs 2041 Without		2011 vs 2041 Without	
	EB	**WB**	**EB**	**WB**
Derry Rd btwn Eight Ln and Tenth Ln	1.94%	2.04%	1.67%	1.45%
Britannia Rd btwn Eight Ln and Tenth Ln	2.71%	2.04%	1.85%	2.39%
Eglinton Ave btwn Eight Ln and Tenth Ln	1.09%	2.08%	1.77%	1.14%
Dundas St btwn just west of 9th Ln to WCB	1.30%	1.69%	1.59%	1.56%
Average	**1.70%**	**1.95%**	**1.71%**	**1.67%**

The above growth rates are based on the City's EMME model projections and are applied on a compound basis. As per discussion with City staff, the growth rates do not assume the widening of Ninth Line within the City of Mississauga (from a two-lane cross-section to a four-lane cross-section). The purpose of this approach is to understand how much background general growth would materialize based on the current configuration of Ninth Line, since the widening of Ninth Line is primarily associated with the development of the Emerging Land Use Scenario under future total conditions. Documentation of this discussion is provided in **Appendix I**.

In addition to the City's growth rates, a 2% per annum growth rate has also been applied to the freeway off-ramp approaches at the following MTO off-ramps, as per MTO's input in Appendix I.

- Highway 401 WB/ Winston Churchill Blvd.;
- Highway 401 EB/ Winston Churchill Blvd.;
- Highway 403 WB/ Winston Churchill Blvd.;
- Highway 403 EB/ Winston Churchill Blvd.;
- Highway 403 NB/ Dundas St.; and
- Highway 403 SB/ Dundas St.

The weekday a.m. and p.m. peak hour general traffic volume growths are presented in **Figures 7.1A** and **7.1B**.

7.1.2 Background Developments

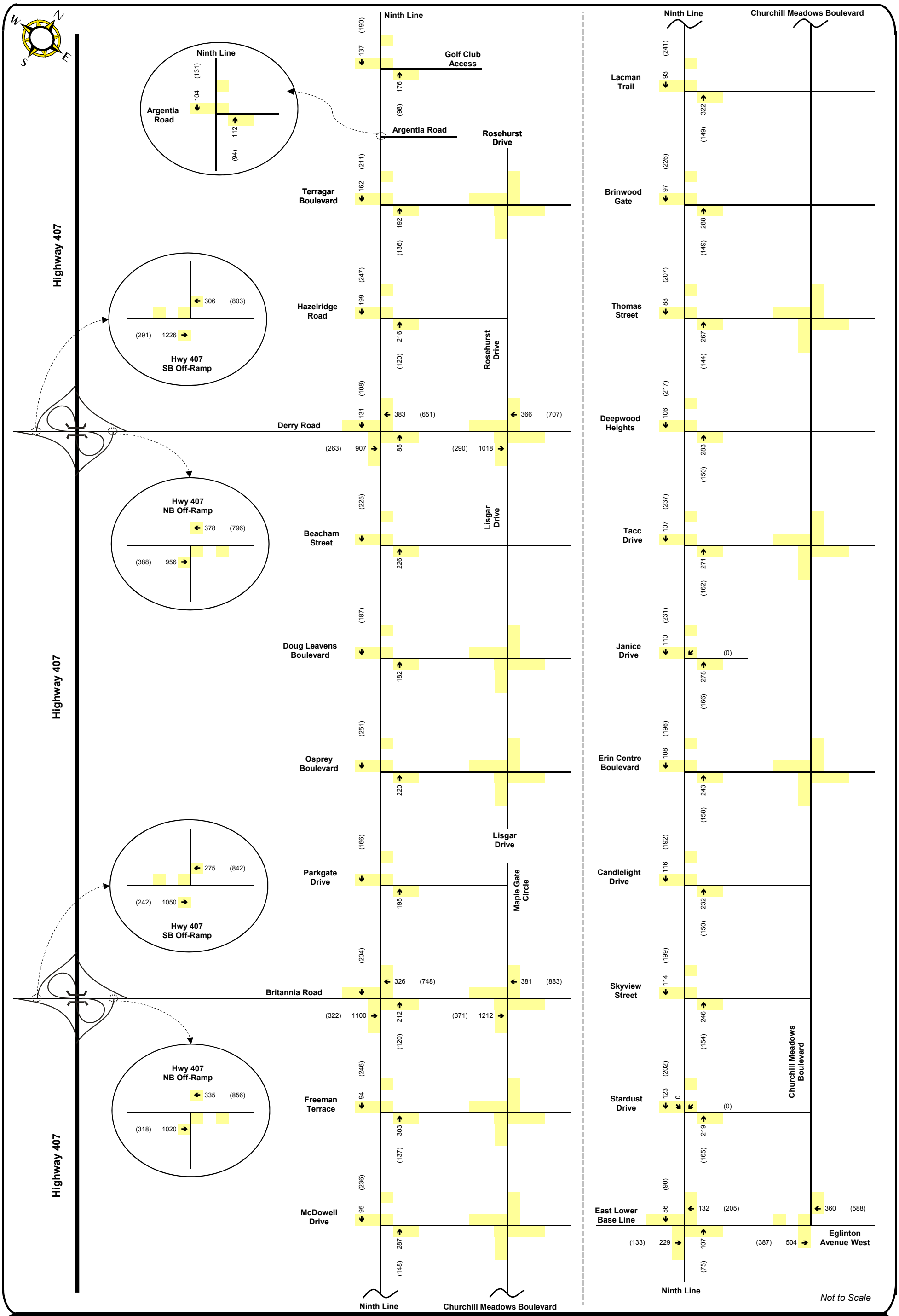
Based on discussion with City staff, the following background developments need to be considered in the future background conditions:

- Erin Mills Development – Northeast quadrant of Highway 403/407: This development comprises approximately 112,630 sq.m. of industrial park, 6,762 sq.m. of retail, and 8,074 sq.m. of office use. City staff provided a Traffic Impact Study, dated February 2014, completed by AECOM to provide context for this Ninth Line study. The site-generated traffic information was extracted and are provided in **Appendix H**. The traffic study only provides high-level site-traffic assignment information and MMM was instructed by City staff to interpret the results and incorporate the results into the future background conditions of this Ninth Line Study. The resulting site-generated traffic volumes for the Erin Mills development are shown in **Figures 7.2A** and **7.2B**.

- ProLogis Industrial Development – 10th Line at Argentia Road: This development comprises approximately 180,507 sq.m. of warehouse land use. City staff informed MMM that this background development has been incorporated in the City's EMME model and thus the growth volumes shown in Figures 7.1A and 7.1B already includes the site-generated volumes of the ProLogis development, therefore, no further forecasting was required.

7.1.3 407 Transitway Initiative

In 2008, Metrolinx's Board of Directors adopted the "Big Move", a plan that outlines a vision for a new regional transportation system, including the 407 Transitway. The Transitway is to be a separate right-of-way, located parallel to Highway 407 and includes running way, stations, platforms, parking, passenger pick-up and drop-off facilities. The Transitway will initially be implemented as bus rapid transit, with an opportunity to convert to light rail transit in the future.



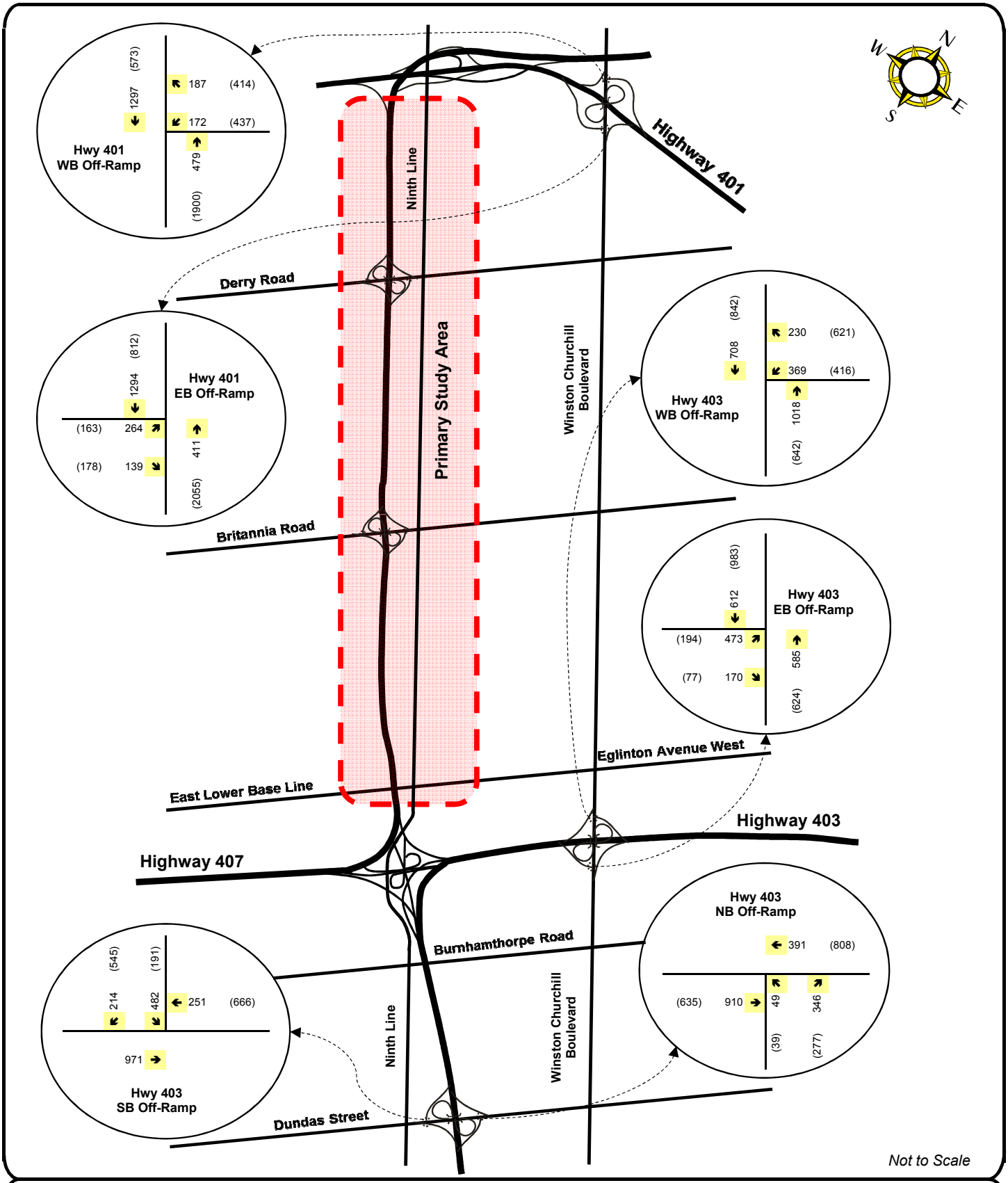
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 7.1A

Background Growth Traffic Volumes - Primary Study Area



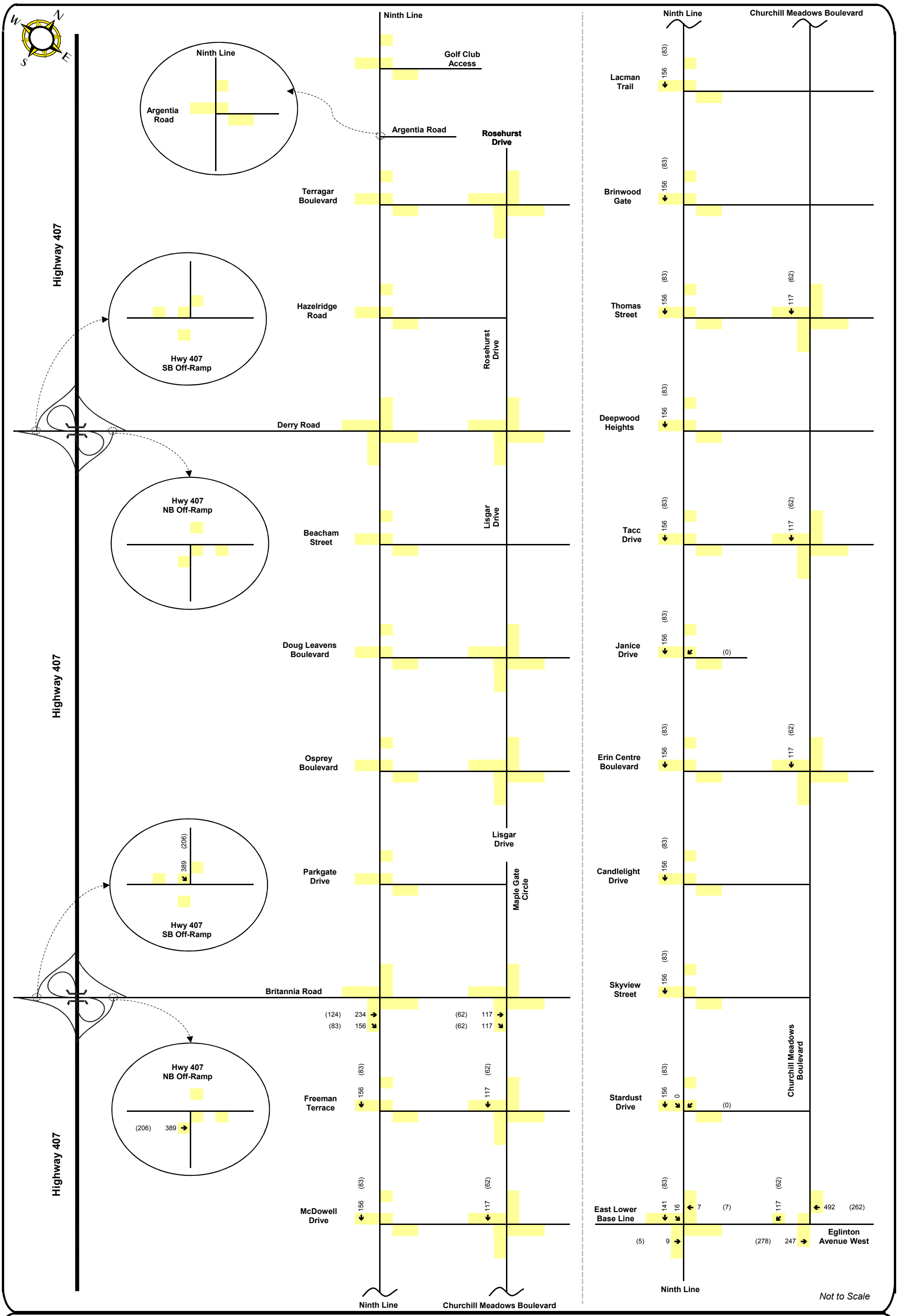
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 7.1B

Background Growth Traffic Volumes - Secondary Study Area



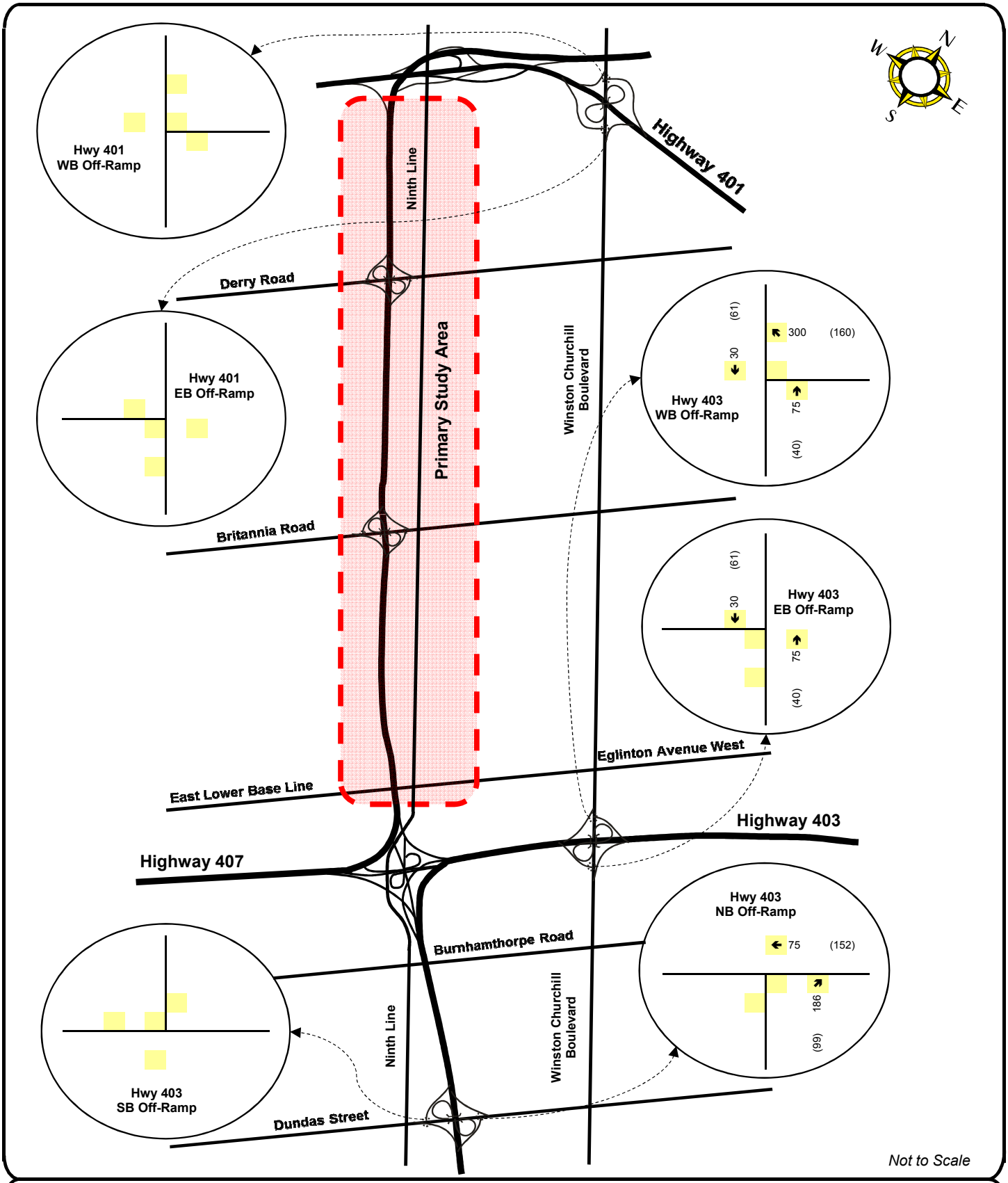
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 7.2A

Background Development Traffic Volumes-
Primary Study Area



MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 7.2B

Background Development Traffic Volumes - Secondary Study Area

Based on the 1998 Transitway Corridor Protection Study by MRC for the Ministry of Transportation Ontario (MTO), an earlier iteration of the 407 Transitway initiative consisted of three Transitway stations within the Ninth Line lands study area at Britannia Road, Derry Road and the CPR Galt station north of Derry Road. The subsequent 407 Transitway Assessment by AMEC in 2016 determined the need for only two stations within the study limits, based on comments and direction from MTO at the time of the study. The details of the two stations were not established at the time and will be determined through future Environmental Assessments (EA) in the future.

At the time of this study, Ministry of Transportation – Ontario (MTO) is in the process of initiating an EA of the 407 Transitway initiative. As a result, detailed information regarding the Transitway facilities within the Ninth Line study area is not yet available. It was confirmed with City staff that the information of the two Transitway stations at Britannia Road and Derry Road from the 1998 MRC study would be applicable for the purpose of this study. The details of the two Transitway stations based on the MRC study are provided in **Table 7.1**.

TABLE 7.1
TRANSITWAY STATION INFORMATION

Station	Interim Capacity (Spaces)	Ultimate Capacity (Spaces)
Britannia	640	640
Derry	2,160	3,360
Total	**2,800**	**4,000**

Through discussion with City staff, the ultimate parking supply shown in Table 7.1 for the Britannia and Derry Stations have been assumed to be built-out as part of the future background conditions. This provides a very conservative approach for the purpose of this assessment. It should be noted that the build-out of both stations at ultimate capacity has been assumed in both the future background and the future total conditions so as to provide an “Apples to Apples” comparison.

There are two aspects of the 407 Transitway Stations to consider for this study:

1) Auto trip generation of patrons driving to and from the stations: Based on discussion with City staff and transit experts, the following methodology has been used to forecast the trip generation associated with the 407 Transitway Stations.

   - Assume that 85% of the ultimate parking capacity is utilized during the peak periods. This would be equivalent to 0.85 auto trips per parking space.

   - Assume uniform arrival and departure rates at the stations during the morning (5:30 a.m. to 9:30 a.m.) and afternoon (3:00 p.m. to 7:00 p.m.) peak periods.

This means that the 0.85 auto trips per parking space is occupied at a rate of 0.2125 spaces per hour, or 0.2125 auto trips per hour per parking space.

- The rationale for the chosen morning and afternoon peak periods is that the majority of the trips on transit during the peak hours are work-related. Based on MMM's experience, the commuter parking lots of various transit facilities (i.e., GO Train stations) are typically near capacity well before the actual roadway morning peak hour. This is expected since those taking transit will need to account for the additional time required on transit to get to work. Similarly, commuters leaving a transit parking lot know that they can avoid the afternoon peak hour traffic congestion if they leave earlier or later. Therefore, the use of a uniform arrival and departure rate is an adequate representation of the trip generation behaviour at the future Transitway stations.

- The distribution of the 0.2125 auto trips per hour at the Transitway stations is based on information contained in the Traffic Impact Study for the Toronto Transit Commission (Proposed 650-stall Commuter Parking Lot at Downsview Subway Station – now referred to as Sheppard West Station), dated October 2002. There are many similar characteristics between the proposed parking facilities between the subway and the higher order 407 Transitway stations. For example, many of the motorists who could use this parking lot are already driving past this site on the adjacent roadways and share similar arrival and departure patterns for work-home purposes. In this study, the inbound and outbound distributions during the AM and PM peak hours were determined through parking surveys at the TTC Wilson Subway Station parking lots. The survey indicated that during the AM peak periods, all of the trips generated at the parking lot were inbound. During the PM peak periods, 90% of the trips were outbound and 10% of the trips were inbound. Based on the similarity in parking lot purposes, it was confirmed with City staff that these in/out distributions have been applied for the trips related to the 407 Transitway station parking facilities.

- Based on an arrival and departure rate of 0.2125 trips per hour per parking space, **the two Transitway stations with an ultimate parking capacity of 4,000 spaces would generate 850 inbound vehicle trips during the morning peak hour, and 85 inbound plus 765 outbound vehicle trips during the afternoon peak hour**.

- Based on the Emerging Land Use Concept and the location of the two Transitway stations, two driveways have been assumed for each station as shown in **Figure 7.5A**. It should be noted that these driveways are preliminary locations chosen for the purpose of this study. The location of the final driveways will be pending further studies as part of the Transitway evaluation.

- The Transitway trips were assigned based on the combined consideration of the distribution information extracted from the City's EMME model for the 2041 horizon year for both the AM and PM peak periods, as well as assumptions made on the forecast demographics of rider. For instance, the majority of riders were assumed to enter the study area via the easterly and westerly gateways of Derry Road and Britannia Road, the northerly and southerly gateways of Ninth Line, the residential uses on the east side of Ninth Line. The rationale is that the Transitway stations would attract riders from residential uses within a manageable distance of the stations. For example, people living in Mississauga but who are located closer to Oakville would not likely access the Derry or Britannia Transitway stations because there would likely be another Transitway station that is closer and more convenient.

- The resulting Transitway-related trip generation and assignment are shown in **Figures 7.3A** and **7.3B**.

The documentation of the confirmation on the above methodology from City Staff is provided in **Appendix I**.

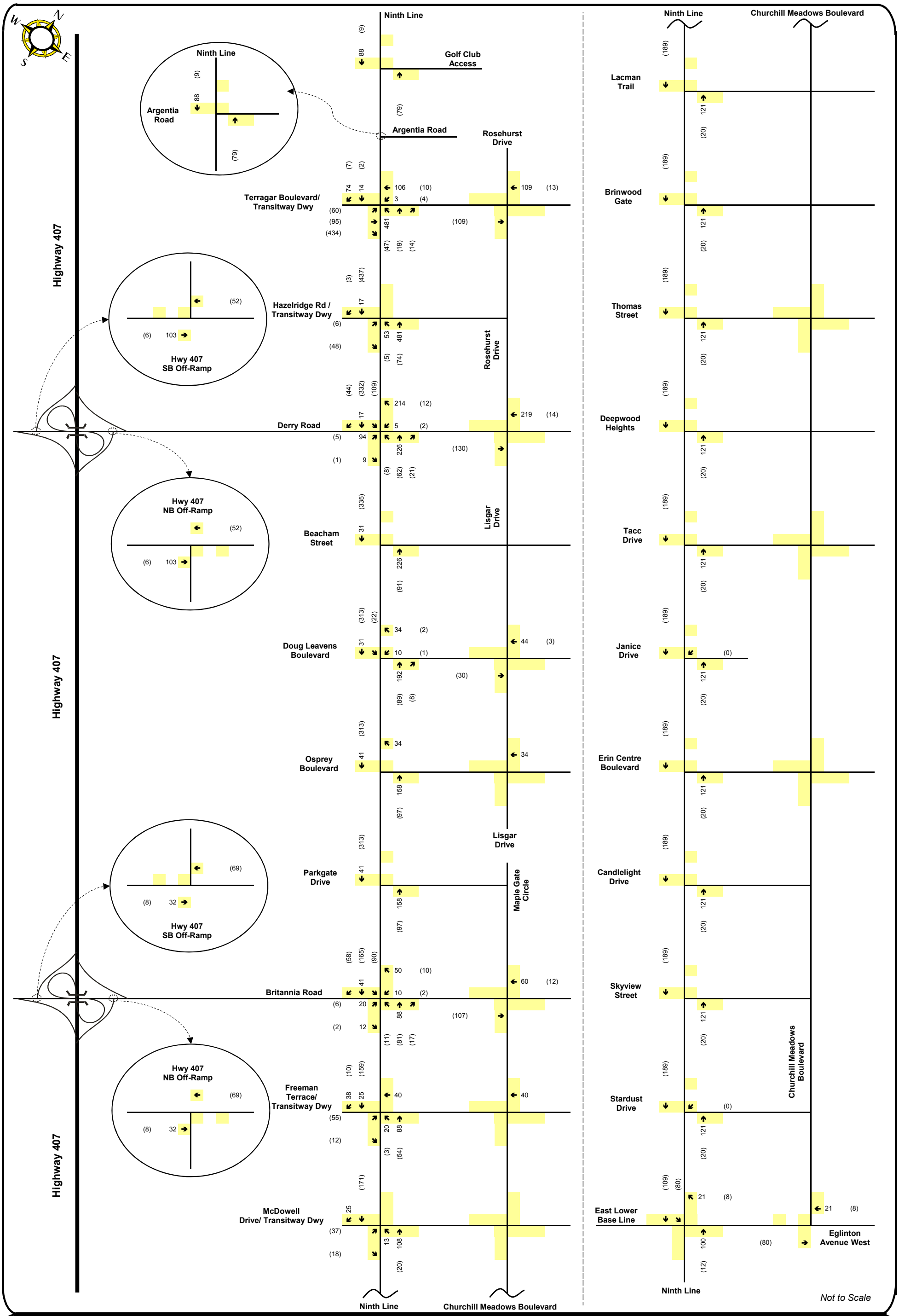
2) Influence on non-auto modal split of the land uses in the vicinity of the stations.
The non-auto modal split impacts of the two 407 Transitway stations will be discussed further in **Section 8.2** as part of the trip generation of the Emerging Land Use Concept. It should be noted that a conservative approach has been adopted where the future background non-auto modal splits have been assumed to remain the same as existing splits despite the implementation of the 407 Transitway initiative.

7.2 Future Background Volumes

The 2041 future background volumes were derived by superimposing Figures 7.1A-B, Figures 7.2A-B, and Figures 7.3A-B onto the existing volumes in Figures 2.3A-B. The resulting weekday a.m. and p.m. future background volumes are shown in **Figures 7.4A** and **7.4B**.

7.3 Future Background Improvements

There are two types of future background improvements that were incorporated in the evaluation of the business as usual conditions. The first type are those that are planned and incorporated in the City's EMME model as shown in **Appendix J**. For the second type, City staff asked MMM to identify improvements that are not planned but required to support the future background traffic volumes. Both of these types of improvements are documented below and illustrated in **Figures 7.5A** and **7.5B**.



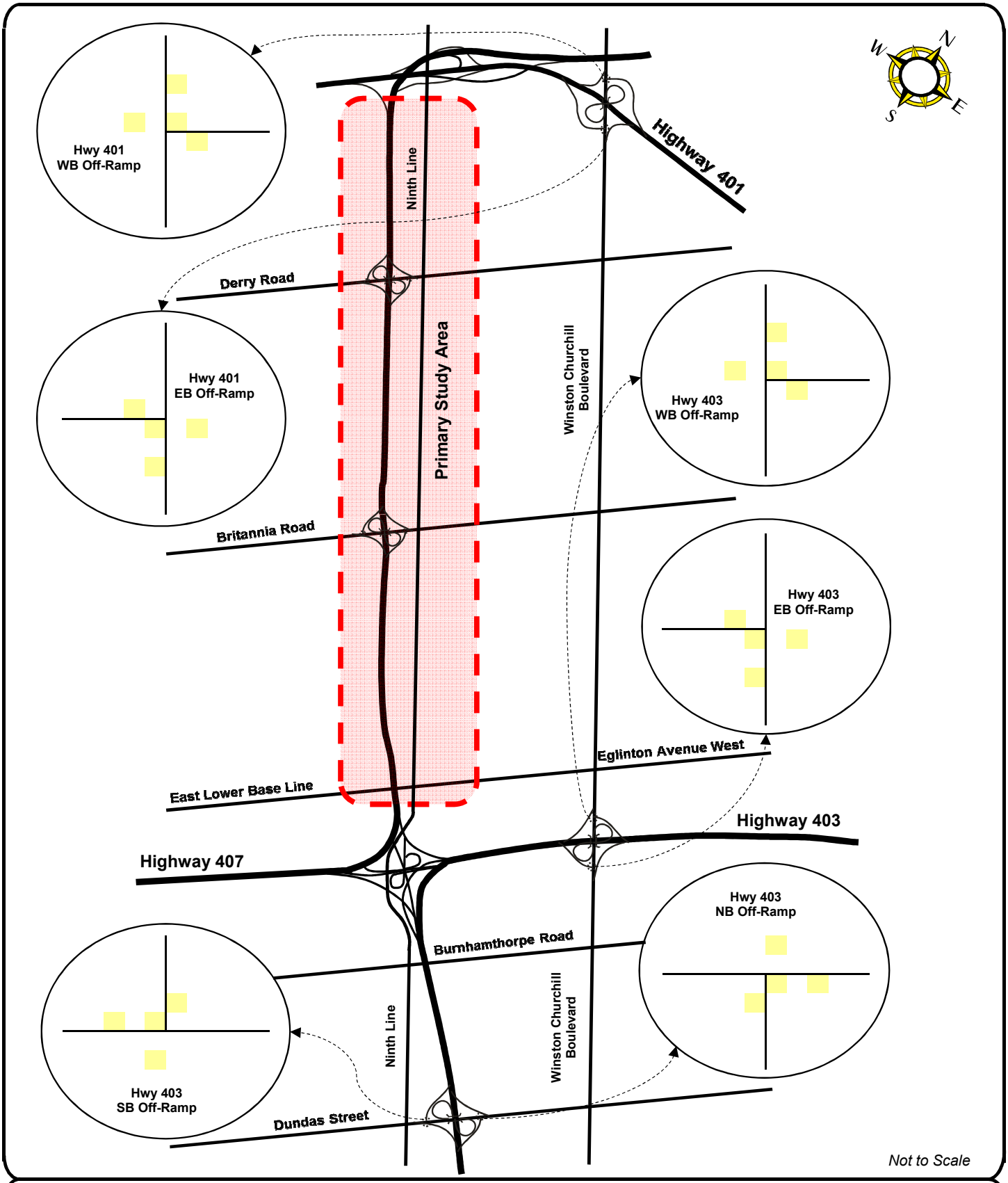
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 7.3A

407 Transitway Traffic Volumes- Primary Study Area



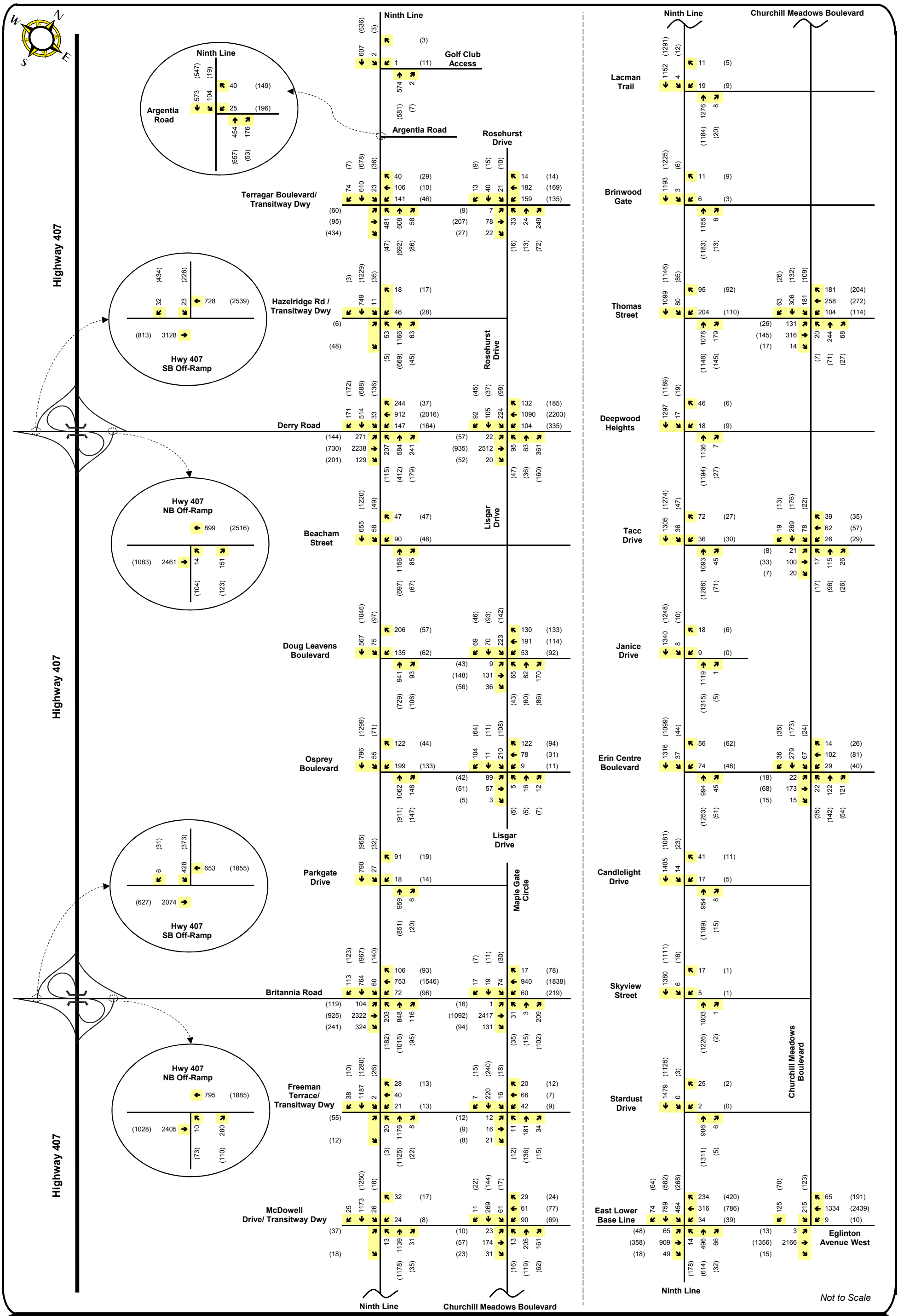
MMM GROUP

LEGEND

XX	AM Peak Hour Volumes
(XX)	PM Peak Hour Volumes

FIGURE 7.3B

407 Transitway Traffic Volumes - Secondary Study Area



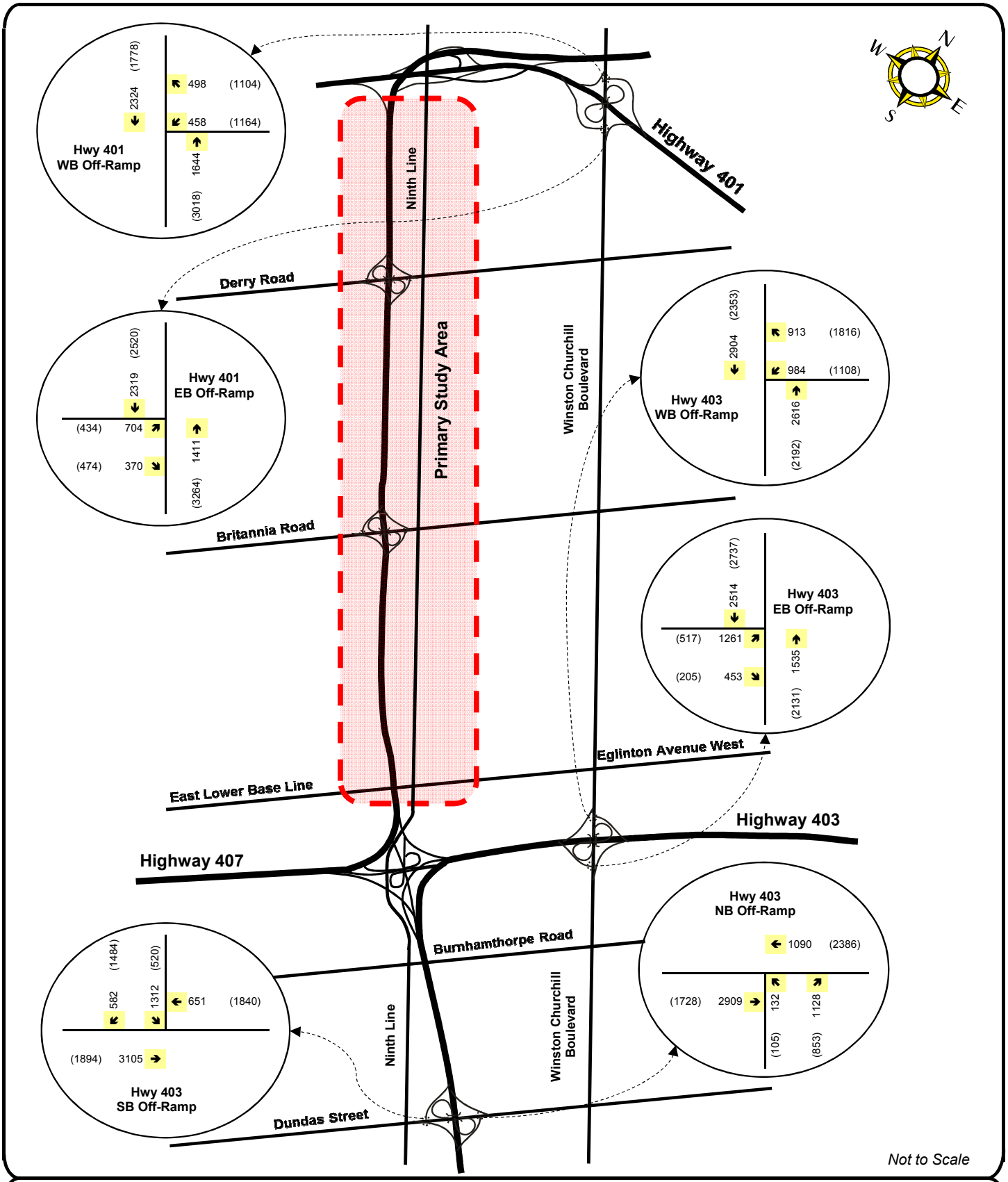
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 7.4A

2041 Future Background Traffic Volumes-
Primary Study Area



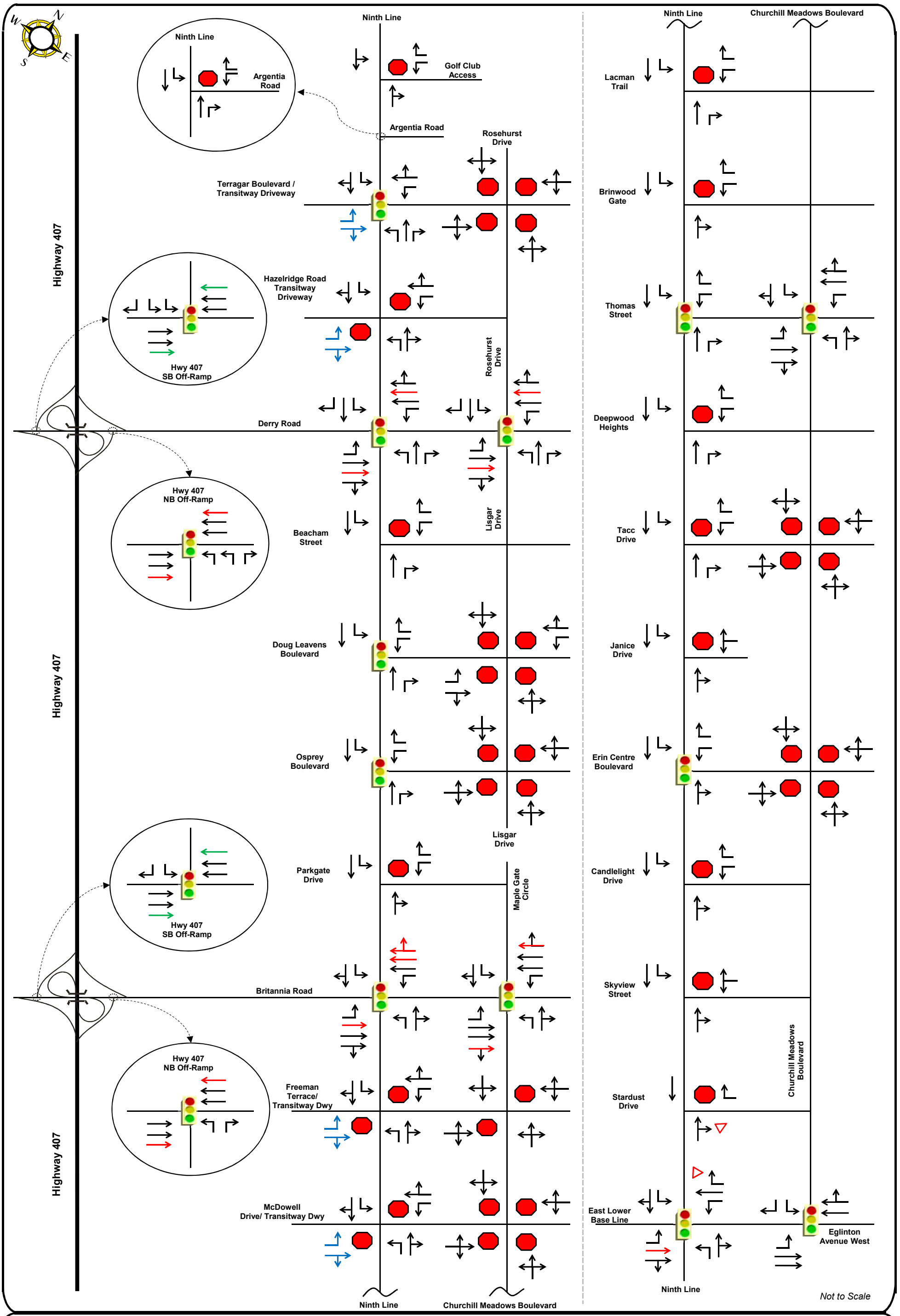
MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 7.4B

2041 Future Background Traffic Volumes - Secondary Study Area



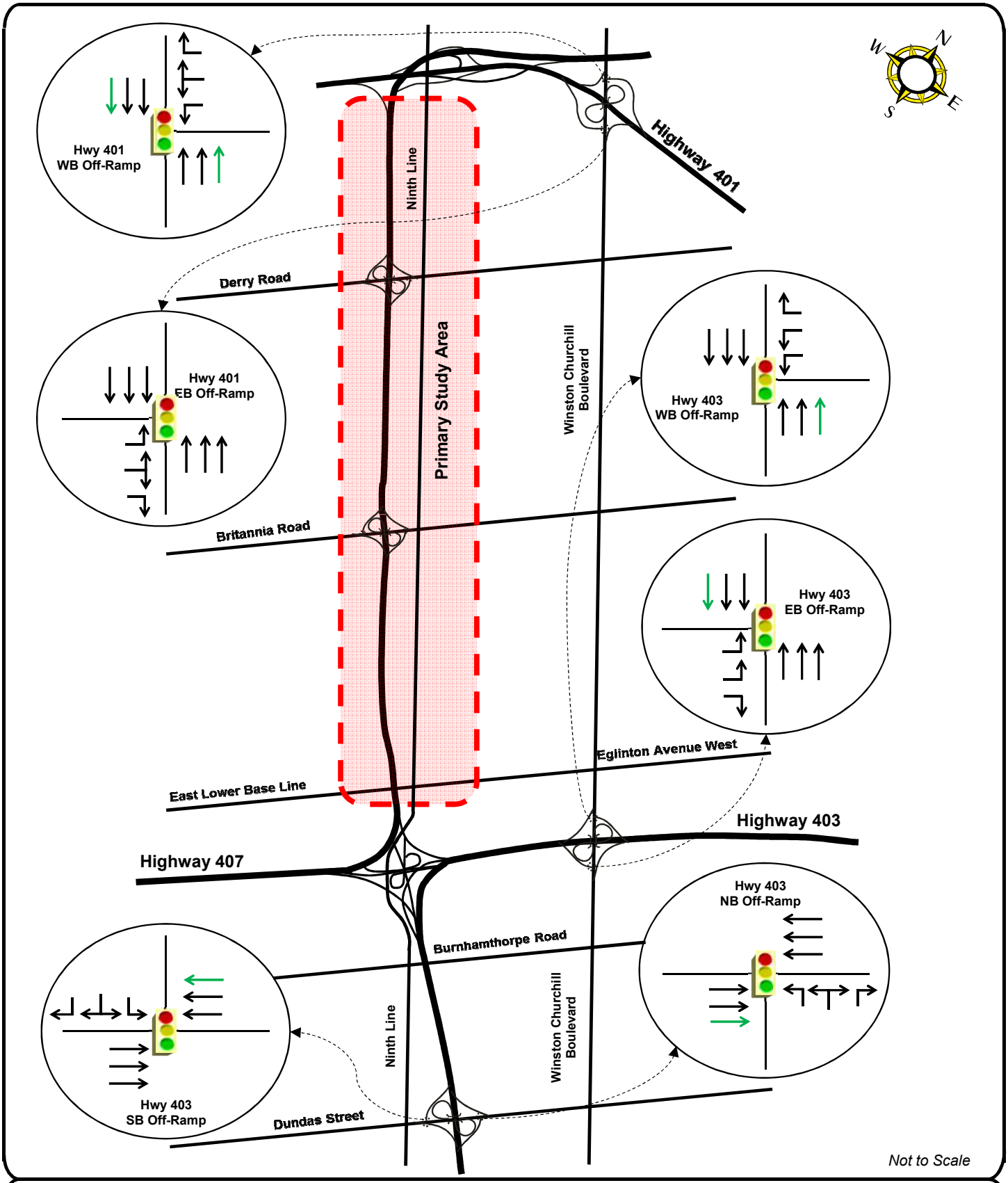
MMM GROUP

LEGEND

- Signalized Intersection
- Stop Control
- Channelized Right Turn
- Existing lane configurations
- Planned improvements
- Additional required improvements

FIGURE 7.5A

Future Background (No Ninth Line widening)
Lane Configurations -
Primary Study Area



MMM GROUP

LEGEND

- Signalized Intersection
- Stop Control
- Existing lane configurations
- Planned improvements
- Additional required improvements

FIGURE 7.5B

Future Background Lane Configurations - Secondary Study Area

7.3.1 Planned Improvements by 2041

The following planned improvements have been assumed to be in place by the 2041 horizon year:

- Widening of Winston Churchill Boulevard from 4 lanes to 6 lanes along the section of the roadway over Highway 403 (from Queen Elizabeth Way to the north City boundary);

- Widening of Winston Churchill Boulevard from 4 lanes to 6 lanes along the section of the roadway over Highway 401 (in the vicinity of the Highway 401 westbound off-ramp intersection);

- Widening of Derry Road within Halton Region's jurisdiction from 4 lanes to 6 lanes. In the context of this study, this widening would take place at the Derry/407 off-ramps and the eastbound approach of the Derry Road/Ninth Line intersection;

- Widening of Britannia Road within Halton Region's jurisdiction from 4 lanes to 6 lanes. In the context of this study, this widening would take place at the Britannia/407 off-ramps and the eastbound approach of the Britannia Road/Ninth Line intersection;

- The widening of Dundas Street West in the vicinity of Highway 403 (has already been completed);

- The signalization of Ninth Line and Doug Leavens Boulevard. The signal timing plans for this intersection was provided by City staff and are documented in Appendix A;

- The signalization of Eglinton Avenue and Churchill Meadows Boulevard. The signal timing plans for this intersection was provided by City staff and are documented in Appendix A;

- MTO has indicated that the intersection of Highway 403 Westbound off-ramp at Winston Churchill Boulevard has undergone improvements during the process of this Transportation Assessment. Specifically, the intersection has improved from a 3-legged intersection to a 4-legged intersection, with the new leg connecting to the newly built Transitway and carpool facility. In addition, the westbound right-turn lane will become a channelized right-turn lane. Upon consultation with City staff, the approach this study takes is to continue evaluating the future forecast volumes based on the current configuration of the off-ramp intersection. Since this intersection is a secondary study intersection, the focus will be on the incremental impact the Emerging Land

Use has at the intersection. Further discussion of the future evaluation of this off-ramp intersection are provided in Section 9.0; and

- MTO has indicated that the intersection of Highway 401 Westbound off-ramp at Winston Churchill Boulevard is proposed to be improved in the future. Specifically, the intersection is proposed to be converted from a 3-legged intersection to a 4-legged intersection, with the new leg connecting to a new carpool lot. Upon consultation with City staff, the approach this study takes is to continue evaluating the future forecast volumes based on the current configuration of the off-ramp intersection. Since this intersection is a secondary study intersection, the focus will be on the incremental impact the Emerging Land Use has at the intersection. Further discussion of the future evaluation of this off-ramp intersection are provided in Section 9.0.

7.3.2 Additional Required Improvements

The following additional improvements have been identified by MMM to be required in order to accommodate the future background traffic volumes.

Road Widening:

- Widening of Derry Road from 4 lanes to 6 lanes from the City's westmost limit east to Winston Churchill Boulevard. This improvement is critical because the EMME model has forecast high-levels of growth on Derry Road as a result of the widening of this road within Halton Region (from 2 lanes in each direction to 3 lanes). Without this widening, traffic volumes bottleneck in the vicinity of Ninth Line creating significantly over-capacity movements at the intersections of Derry Road/Ninth Line, and Derry Road/ Rosehurst Drive/Lisgar Drive. This is further detailed in Section 7.4.

- Widening of Britannia Road from 4 lanes to 6 lanes from the City's westmost limit east to Winston Churchill Boulevard. This improvement is critical because the EMME model has forecast high-levels of growth on Britannia Road as a result of the widening of this road within Halton Region (from 1 lane in each direction to 3 lanes). Without this widening, traffic volumes bottleneck in the vicinity of Ninth Line creating significantly over-capacity movements at the intersections of Britannia Road/Ninth Line, and Britannia Road/Maple Gate Circle/Churchill Meadows Boulevard. This is further detailed in Section 7.4.

The above recommendations to Regional roads were based on findings in Section 7.4 that showed the future forecasted traffic volumes would exceed the current capacity without these additional widenings. Regional staff noted that the Region of Peel takes a more strategic and holistic approach to addressing Regional road improvements such as road widening issues, and this is articulated in the Long Range Transportation Plan (LRTP). This approach includes exploring if the Ninth

Line Lands Study recommendations support particular overarching goals such as the movement of goods and sustainable modes of travel, transit strategies and using physical space effectively. These recommendations will be used as an input to the Region's 2017 Update of the LRTP, and subsequently to the upcoming Transportation ROPA. Until such analysis has been undertaken, Regional staff does not propose any amendments to the Regional Official Plan as it relates to transportation.

- Widening the west leg of Eglinton Avenue at Ninth Line from 1 eastbound through lane to 2. There are already two receiving lanes in the east leg of this intersection. This improvement is required to support the general background growth on Eglinton Avenue, as well as traffic generated by the Erin Mills background development in close proximity to the intersection. This is further detailed in Section 7.4.

Control and Signal timing modifications: The following improvements are needed. Signal timings at the critical intersections were also optimized.

- At the intersection of Derry Road and Ninth Line, implement a permissive/ protected phase for the westbound left-turn movement during the weekday a.m. peak hour.

- At the intersection of Derry Road and Rosehurst Drive/Lisgar Drive, implement a permissive/protected phase for the westbound left-turn movement during the weekday a.m. peak hour.

- At the intersection of Britannia Road and Maple Gate Circle/Churchill Meadows Boulevard, implement a permissive/protected phase for the westbound left-turn movement during the weekday a.m. peak hour.

- At the intersection of Ninth Line and Terragar Boulevard/Transitway Driveway, the future background volumes with the Transitway station in place meets the signal warrants as documented in **Appendix K**. The other Transitway Driveways and site driveways do not meet the signal warrant.

- The intersection of Ninth Line/Beacham Street operates at significantly over capacity as stop-controlled on Beacham Street during the weekday a.m. peak hour. As shown in Table 2.1, this intersection already operates with constrained capacity movements under existing traffic conditions. The growth along Ninth Line exacerbates the congestion resulting in long delays and queues for cars from Beacham Street to turn onto Ninth Line. This intersection is approximately 670 m and 600 m from the upstream (Derry Road) and downstream (Doug Leavens) signalized intersections on Ninth Line, respectively. Ontario Traffic Manual (OTM) signal warrant analysis was completed at this intersection based on the future background volumes.

However, the intersection does not meet the side street criteria threshold of the warrant and the warrant is not met as shown in **Appendix K**.

It is expected that the volumes turning out of Beacham Street will self-regulate based on the level of volume on Ninth Line. During the busier peak periods, motorists turning from Beacham Street may divert to the upstream or downstream signalized intersections. A sensitivity scenario where this intersection is modeled as a signalized intersection indicates that it will operate at very good level of service 'B' with no capacity constraints. This is detailed in Section 7.4. Further monitoring of this intersection in the interim is recommended as signal warrants are not yet met. Based on the order of magnitude of turning volumes from Beacham Street, this intersection has been kept as an unsignalized intersection in this study.

- At the intersection of Eglinton Avenue West and Ninth Line, implement a permissive/protected phase for the northbound left-turn movement during the weekday p.m. peak hour.

7.4 Future Background (BAU) Traffic Operations

Based on the future background volumes in Figures 7.4A and 7.4B, traffic operations were analyzed at the study intersections. The lane configurations used to evaluate the future background traffic conditions are illustrated in Figures 7.5A and 7.5B, which is inclusive of the planned and additional required improvements listed in Sections 7.3.1 and 7.3.2, but exclusive of the Ninth Line widening.

For comparison purposes, the future background traffic conditions without the additional required road improvements discussed in Section 7.3.2 have also been completed.

The results of the intersection capacity analysis for future background conditions without the additional required improvements are summarized in **Table 7.2**. Detailed intersection capacity analysis sheets are included in **Appendix L**. It should be noted that signal timing optimization was completed where appropriate, however, the cycle lengths and minimum thresholds were kept consistent with existing conditions.

TABLE 7.2
2041 FUTURE BACKGROUND TRAFFIC CONDITIONS

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line at Derry Rd	Signalized	F (89)	EB-TR (1.19) WB-L (1.16) NB-L (1.29) NB-T (0.99) SB-T (1.13)	E (73)	EB-L (1.09) WB-TR (1.14) SB-T (1.15)
Ninth Line at Derry Rd (with additional improvement)		D (48)	EB-TR (0.98) NB-L (1.05) SB-T (0.96)	D (40)	EB-L (1.03) WB-TR (0.91) SB-T (0.96)
Ninth Line at Doug Leavens Blvd	Signalized	B (16)	--	B (11)	--
Ninth Line at Osprey Blvd	Signalized	C (29)	NB-T (0.96)	D (49)	SB-T (1.11)
Ninth Line at Britannia Rd	Signalized	F (191)	EB-TR (1.52) WB-L (1.36) NB-L (1.28) NB-TR (1.35) SB-TR (1.24)	F (134)	EB-L (0.90) WB-L (1.37) WB-TR (1.18) NB-L (1.26) NB-TR (1.31) SB-L (1.12) SB-TR (1.32)
Ninth Line at Britannia Rd (with additional improvement)		F (98)	EB-TR (1.09) WB-L (1.36) NB-L (1.19) NB-TR (1.30) SB-TR (1.22)	F (96)	WB-L (1.08) WB-TR (1.02) NB-L (1.08) NB-TR (1.18) SB-L (1.12) SB-TR (1.22)
Ninth Line at Thomas St	Signalized	D (42)	NB-T (0.98) SB-T (0.99)	D (37)	NB-T (0.97) SB-T (0.98)
Ninth Line at Erin Centre Blvd	Signalized	C (29)	SB-T (0.99)	C (31)	NB-TR (0.99)
Ninth Line at East Lower Base Line/ Eglinton Ave W	Signalized	F (103)	EB-TR (1.16) NB-TR (1.21) SB-L (1.26) SB-TR (1.04)	E (79)	EB-L (0.95) WB-T (1.12) NB-L (1.18) NB-TR (0.95) SB-L (1.37)
Ninth Line at East Lower Base Line/ Eglinton Ave W (with additional improvement)		D (49)	NB-TR (0.97) SB-L (0.94)	E (76)	EB-L (0.95) WB-T (1.10) NB-TR (1.07) SB-L (1.05) SB-TR (1.01)
Lisgar /Rosehurst Dr at Derry Rd	Signalized	D (39)	EB-TR (1.01) WB-L (2.08) NB-R (0.96)	B (16)	EB-L (1.08)

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Lisgar /Rosehurst Dr at Derry Rd (with additional improvement)		B (15)	--	B (11)	--
Churchill Meadows Blvd/Maple Gate Circle at Britannia Rd	Signalized	C (21)	WB-L (1.28)	A (6)	--
Churchill Meadows Blvd/Maple Gate Circle at Britannia Rd (with additional improvement)		A (10)	SB-L (0.93)	A (6)	--
Churchill Meadows Blvd at Thomas St	Signalized	B (18)	--	B (13)	--
Eglinton Ave W at Churchill Meadows Blvd	Signalized	B (15)	--	B (19)	WB-TR (0.97)
Britannia Rd at Hwy 407 SB Off-Ramp	Signalized	C (20)	--	C (29)	--
Hwy 407 NB Off-Ramp at Britannia Rd	Signalized	D (54)	--	B (15)	--
Hwy 407 NB Off-Ramp at Britannia Rd (with additional improvement)		B (10)	--	B (10)	--
Derry Rd at Hwy 407 SB Off-Ramp	Signalized	A (4)	--	B (17)	--
Hwy 407 NB Off-Ramp at Derry Rd	Signalized	A (2)	--	B (11)	--
Hwy 407 NB Off-Ramp at Derry Rd (with additional improvement)		A (1)	--	A (3)	--
Ninth Line at Terragar Blvd/Transitway Driveway	Signalized	C (28)	--	C (27)	EB-TR (1.03)
Ninth Line at Golf Club Access	Unsignalized	D (32)	--	C (25)	--
Ninth Line at Argentia Rd	Unsignalized	D (29)	--	F (128)	WB-L (1.04)
Ninth Line at Hazelridge Rd/ Transitway Driveway	Unsignalized	E (44)	WB-L (0.36)	F (53)	WB-L (0.29)
Ninth Line at Beacham St	Unsignalized	F (656)	WB-L (2.15) WB-R (2.15)	F (226)	WB-L (1.14) WB-R (1.14)
Ninth Line at Beacham St (sensitivity)	Signalized	B (13)	--	B (11)	--
Ninth Line at Parkgate Dr	Unsignalized	D (28)	--	C (20)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line at Freeman Terrace/ Transitway Driveway	Unsignalized	F (59)	WB-TR (0.53)	F (153)	EB-L (0.79)
Ninth Line at McDowell Dr/ Transitway Driveway	Unsignalized	F (57)	WB-L (0.28)	F (85)	EB-L (0.47)
Ninth Line at Lacman Trail	Unsignalized	D (31)	--	D (27)	--
Ninth Line at Brinwood Gt	Unsignalized	E (35)	WB-L (0.09)	E (38)	WB-L (0.09)
Ninth Line at Deepwood Heights	Unsignalized	E (44)	WB-L (0.32)	E (37)	WB-L (0.10)
Ninth Line at Tacc Dr	Unsignalized	D (31)	--	D (35)	--
Ninth Line at Janice Dr	Unsignalized	D (26)	--	D (28)	--
Ninth Line at Candlelight Dr	Unsignalized	C (25)	SB-T (0.90)	D (31)	--
Ninth Line at Skyview St	Unsignalized	C (24)	--	D (31)	--
Ninth Line at Stardust Dr	Unsignalized	C (20)	SB-T (0.95)	E (37)	WB-R (0.02)
Rosehurst Dr at Terragar Blvd	Unsignalized	C (15)	--	B (11)	--
Lisgar Dr at Doug Leavens Blvd	Unsignalized	D (29)	--	C (17)	--
Lisgar Dr at Osprey Blvd	Unsignalized	B (12)	--	A (9)	--
Churchill Meadows Blvd at Freeman Terrace Blvd	Unsignalized	C (17)	--	B (13)	--
Churchill Meadows Blvd at McDowell Dr	Unsignalized	C (22)	--	B (10)	--
Churchill Meadows Blvd at Tacc Dr	Unsignalized	B (15)	--	A (10)	--
Churchill Meadows Blvd at Erin Centre Blvd	Unsignalized	C (20)	--	B (11)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (27)	--	F (95)	WB-LR (1.04) WB-R (1.14) NB-T (1.23)
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	C (27)	--	C (27)	NB-T (0.95)

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	E (66)	WB-LR (1.05) WB-R (1.10) NB-T (0.97) SB-T (1.07)	F (106)	WB-LR (1.16) WB-R (1.20) NB-T (1.01) SB-T (1.19)
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	D (36)	SB-T (0.92)	C (24)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	E (60)	EB-T (1.05) SB-LR (1.09)	D (51)	EB-T (0.93) SB-R (0.93)
Hwy 403 NB Off-Ramp at Dundas St	Signalized	E (58)	EB-T (1.08) NB-LR (0.99) NB-R (1.09)	C (24)	--

For signalized intersections, the level of service is based on the overall delay of the intersection.

1) *For two-way stop controlled intersections, the level of service is based on the delay associated with the critical movements.*
2) *For All-Way Stop Control (AWSC) intersections, the level of service is based on the overall delay of the intersection.*

As shown in Table 7.2, some of the study intersections along Derry Road and Britannia Road are forecast to operate at or over capacity under the 2041 future background conditions. This is primarily based on the conservative background growth approach discussed in Section 7.1.1. The growth rates are applied on a compound basis for 27 years from 2014 to 2041. Based on the comparison between the 2041 BAU link volumes derived from MMM's forecast volumes (Figures 7.4A and 7.4B) and the City's EMME BAU model (**Appendix J**), MMM's forecast link volumes are consistently higher in the north-south direction along Ninth Line. This indicates that MMM's future background volumes are representative of a more conservative BAU scenario. Overall, the results indicate that the introduction of the planned improvements in Section 7.3.1 and the additional improvements in Section 7.3.2 are not enough to accommodate the BAU volumes in certain corridors.

It should also be noted that EMME is a macro model that deals with link volumes as opposed to intersection capacities. As a result, the projected growth rates from EMME are likely the higher order estimations of the growth that can be accommodated by the road network as dictated by the operations of the key boundary intersections. The reality is that the growth in future background volumes will taper off and stabilize as the boundary intersections reach capacity. Any additional traffic demand in the north-south direction will likely be facilitated through alternate north-south links instead of Ninth Line.

The highway off-ramp intersections along Winston Churchill and Dundas Street are generally forecast to operate at over capacity under 2041 BAU conditions. This is again associated with the conservative general growth rate applied as per MTO request. As noted in Section 7.3.1, MTO has indicated that they have undertaken or planned improvements at Highway 403 westbound off-ramp/Winston Churchill

Boulevard and at Highway 401 westbound off-ramp/Winston Churchill Boulevard. Accordingly, the focus of this study will be on the incremental difference in delay and v/c ratios as a result of the Ninth Line-generated traffic. The results under BAU conditions will be used as the benchmark for comparison.

The unsignalized intersection of Beacham Street and Ninth Line is forecast to operate with longer delays and movements operating over capacity. As noted in Section 7.3.3, this intersection does not meet the signal warrant and the existing volumes turning from Beacham Street have the option of gravitating to a less congested intersection that may be signalized. A sensitivity has been completed to illustrate that if this intersection was signalized, it would operate at excellent levels of service, since the minor street volumes are relatively low.

7.5 Future Background (BAU) Traffic Operations with Ninth Line Widening

To provide the basis for an “Apples to Apples” comparison between the future background and future total conditions with the Emerging Land Use Concept in place (Section 8.0), an additional future background scenario with the Ninth Line widening in place has been completed. The future background volumes shown in Figures 7.4A and 7.5B have been evaluated. The intent is not to model future background growth associated with the Ninth Line widening since the City improvement is primarily earmarked for the development of the Emerging Land Use Concept.

For the purpose of this study, the Ninth Line widening has been evaluated as 4 through lanes with a continuous centre-left turn lane (5 lanes total) in the future, with the exception of the major arterial road intersections where a 6 lane cross-section is needed for a dedicated right-turn lane. This approach is a more conservative approach – the needs of additional dedicated right-turns will have to be completed in the future at a site plan application stage.

The results of the intersection capacity analysis for future background conditions with the Ninth Line widening in place are summarized in **Table 7.3**. Consistent with Table 7.2, the future background conditions without the additional road widenings discussed in Section 7.3.2 have also been evaluated. Detailed intersection capacity analysis sheets are included in **Appendix M**.

TABLE 7.3
2041 FUTURE BACKGROUND TRAFFIC CONDITIONS – WITH NINTH LINE WIDENING

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line at Derry Rd	Signalized	E (60)	EB-TR (1.08) WB-L (0.99) NB-L (1.16)	D (36)	EB-L (0.91) WB-TR (0.96) SB-T (0.92)
Ninth Line at Derry Rd (with additional improvement)		C (33)	--	C (30)	--
Ninth Line at Doug Leavens Blvd	Signalized	B (11)	--	A (7)	--
Ninth Line at Osprey Blvd	Signalized	B (16)	--	B (11)	--
Ninth Line at Britannia Rd	Signalized	F (110)	EB-TR (1.29) NB-L (1.17) NB-TR (1.09) SB-TR (1.04)	D (53)	EB-L (0.91) WB-T (0.92) NB-L (0.93) NB-TR (0.93) SB-L (0.93) SB-TR (0.98)
Ninth Line at Britannia Rd (with additional improvement)		D (42)	EB-TR (0.96) NB-L (0.96) NB-TR (0.95) SB-TR (0.97)	D (46)	SB-TR (0.92)
Ninth Line at Thomas St	Signalized	B (19)	--	B (16)	--
Ninth Line at Erin Centre Blvd	Signalized	B (13)	--	B (11)	--
Ninth Line at East Lower Base Line/ Eglinton Ave W	Signalized	E (69)	EB-TR (1.07) NB-TR (1.09) SB-L (1.11)	D (42)	WB-T (0.93) NB-L (0.93) SB-L (0.94)
Ninth Line at East Lower Base Line/ Eglinton Ave W (with additional improvement)		D (38)	--	D (44)	NB-TR (0.91)
Lisgar /Rosehurst Dr at Derry Rd	Signalized	D (36)	EB-TR (1.01) WB-L (2.08) NB-R (0.96)	B (16)	EB-L (1.08)
Lisgar /Rosehurst Dr at Derry Rd (with additional improvement)		B (16)	--	B (11)	--
Churchill Meadows Blvd/Maple Gate Circle at Britannia Rd	Signalized	B (18)	WB-L (1.28)	A (6)	--
Churchill Meadows Blvd/Maple Gate Circle at Britannia Rd (with additional improvement)		B (11)	SB-L (0.93)	A (6)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Churchill Meadows Blvd at Thomas St	Signalized	B (20)	--	B (15)	--
Eglinton Ave W at Churchill Meadows Blvd	Signalized	B (14)	--	B (19)	WB-TR (0.97)
Britannia Rd at Hwy 407 SB Off-Ramp	Signalized	C (20)	--	C (23)	--
Hwy 407 NB Off-Ramp at Britannia Rd	Signalized	C (35)	--	B (13)	--
Hwy 407 NB Off-Ramp at Britannia Rd (with additional improvement)		B (11)	--	B (12)	--
Derry Rd at Hwy 407 SB Off-Ramp	Signalized	A (4)	--	C (26)	--
Hwy 407 NB Off-Ramp at Derry Rd	Signalized	A (2)	--	A (6)	--
Hwy 407 NB Off-Ramp at Derry Rd (with additional improvement)		A (1)	--	A (3)	--
Ninth Line at Terragar Blvd/Transitway Driveway	Signalized	B (16)	--	B (20)	--
Ninth Line at Golf Club Access	Unsignalized	D (32)	--	C (25)	--
Ninth Line at Argentia Rd	Unsignalized	D (25)	--	F (66)	WB-L (0.83)
Ninth Line at Hazelridge Rd/ Transitway Driveway	Unsignalized	E (48)	WB-L (0.38)	D (34)	--
Ninth Line at Beacham St	Unsignalized	F (403)	WB-L (1.62) WB-R (1.62)	E (45)	WB-L (0.52)
Ninth Line at Beacham St (sensitivity)	Signalized	A (6)	--	A (4)	--
Ninth Line at Parkgate Dr	Unsignalized	B (13)	--	B (12)	--
Ninth Line at Freeman Terrace/ Transitway Driveway	Unsignalized	D (33)	--	D (31)	--
Ninth Line at McDowell Dr/ Transitway Driveway	Unsignalized	D (31)	--	D (28)	--
Ninth Line at Lacman Trail	Unsignalized	C (24)	--	C (21)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line at Brinwood Gt	Unsignalized	B (13)	--	B (12)	--
Ninth Line at Deepwood Heights	Unsignalized	C (17)	--	C (20)	--
Ninth Line at Tacc Dr	Unsignalized	C (19)	--	D (24)	--
Ninth Line at Janice Dr	Unsignalized	C (17)	--	B (15)	--
Ninth Line at Candlelight Dr	Unsignalized	B (12)	--	B (13)	--
Ninth Line at Skyview St	Unsignalized	B (12)	--	C (15)	--
Ninth Line at Stardust Dr	Unsignalized	A (10)	--	B (10)	--
Rosehurst Dr at Terragar Blvd	Unsignalized	C (15)	--	B (11)	--
Lisgar Dr at Doug Leavens Blvd	Unsignalized	D (29)	--	C (17)	--
Lisgar Dr at Osprey Blvd	Unsignalized	B (12)	--	A (9)	--
Churchill Meadows Blvd at Freeman Terrace Blvd	Unsignalized	C (17)	--	B (13)	--
Churchill Meadows Blvd at McDowell Dr	Unsignalized	C (22)	--	B (10)	--
Churchill Meadows Blvd at Tacc Dr	Unsignalized	B (15)	--	A (10)	--
Churchill Meadows Blvd at Erin Centre Blvd	Unsignalized	C (20)	--	B (11)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (28)	--	F (91)	WB-LR (1.09) WB-R (1.20) NB-T (1.17)
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	C (28)	--	C (27)	EB-LR (0.90) EB-R (0.91) NB-T (0.93)
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	E (66)	WB-LR (1.05) WB-R (1.10) NB-T (0.97) SB-T (1.07)	F (106)	WB-LR (1.16) WB-R (1.20) NB-T (1.01) SB-T (1.19)
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	D (36)	SB-T (0.92)	C (24)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	E (60)	EB-T (1.05) SB-LR (1.09)	D (51)	EB-T (0.93) SB-R (0.93)

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Hwy 403 NB Off-Ramp at Dundas St	Signalized	E (58)	EB-T (1.08) NB-LR (0.99) NB-R (1.09)	C (24)	--

1) *For signalized intersections, the level of service is based on the overall delay of the intersection.*
2) *For two-way stop controlled intersections, the level of service is based on the delay associated with the critical movements.*
3) *For All-Way Stop Control (AWSC) intersections, the level of service is based on the overall delay of the intersection.*
4) *LR means shared left-right turn lane*

As shown in Table 7.3, almost all of the study intersections along Ninth Line are forecast to operate at acceptable levels of services with no capacity constraints under future background conditions with the Ninth Line widening in place. The main exception is at Ninth Line and Argentia Road, where longer delays are forecast during the p.m. peak hour. However, based on signal warrants, this intersection does not meet the warrants under BAU conditions.

The results in Table 7.3 will be used as the benchmark for comparison to the future total conditions with the build-out of the Emerging Land Use Concept.

8.0 EMERGING LAND USE CONCEPT TRIP GENERATION

8.1 Land Uses

The site statistics associated with the Emerging Land Use Concept, dated September 18 2016, are provided in **Appendix N**. MMM was advised by the project team to use a population and employment forecast based on a density of a minimum 80 persons plus jobs/hectare for the purpose of this Transportation Assessment. This density is based on the most recent Provincial review of the Growth Plan and represents the planned direction for new Greenfield communities such as the Ninth Line lands. Therefore, the Ninth Line Lands have been subdivided into seven zones, as shown in **Figure 8.1**. **Table 8.1** summarizes the land uses within each zone.

Table 8.1
Emerging Land Use Concept Land Uses

Zone	Residential (units)	Commercial Retail (sq.ft. GFA)	General Office (sq.ft. GFA)	General Light Industrial (sq.ft. GFA)	Transitway Station (spaces)
1	470	--	--	--	--
2	92	--	--	--	--
3	103	--	--	--	--
4	43	1,625	--	--	640
5	1,739	26,673	--	--	--
6	1,096	7,169	--	--	3360
7A (southerly area)	--	--	3,638	26,921	--
7B (northerly area)	--	--	36,371	269,270	--
Total	**3,543**	**35,467**	**40,009**	**296,191**	**4,000**

8.2 Non-Auto Modal Splits

The existing non-auto modal splits for the study area (zones 3615-3617, 3809, 3637-3638, 3810-3811, 3634-3636, 3812, and 4024) for home-work trips were determined from the 2011 Transportation Tomorrow Survey (TTS). The non-auto modal split includes the percentages of public transit, cycling and walking during the weekday morning (7:00 to 9:00 a.m.) and afternoon (4:00 to 6:00 p.m.) peak periods. The existing modal split information is presented in **Table 8.2**.

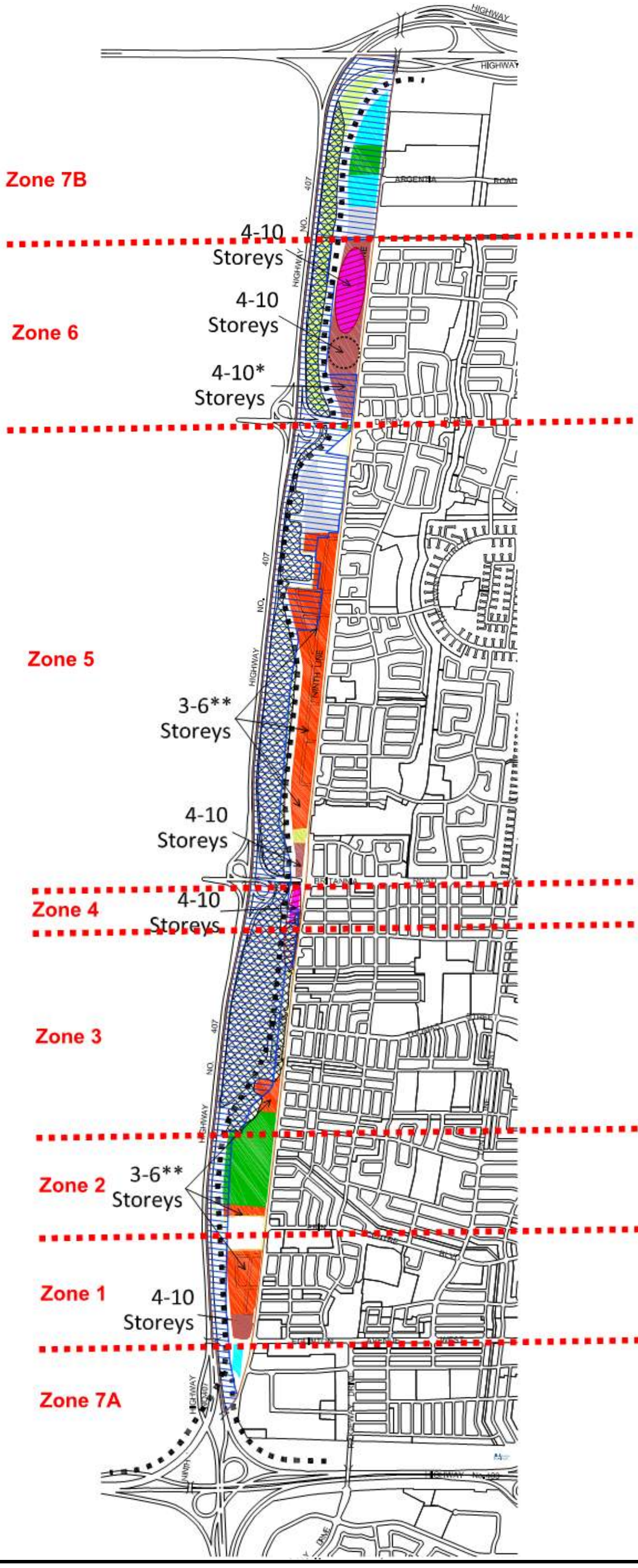


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FIGURE 8.1

Ninth Line Land Use Concept
Study Zones

Table 8.2
Existing Non-Auto Modal Split

Trip Purpose	Direction	Non-Auto Percentages	
		Weekday A.M. Peak Period	Weekday P.M. Peak Period
Work-Home Based Trips	Inbound	4%	19%
	Outbound	24%	6%

As noted earlier in Section 7.1.3, the Britannia and Derry 407 Transitway Stations assumed to be in place in the future will have an impact on the trip generation pattern of land uses surrounding the Ninth Line study area. Based on discussion with City staff as documented in Appendix I, a sensitivity methodology has been applied to evaluate the potential degree of success of the 407 Transitway program. Specifically, the non-auto modal splits shown in Table 8.2 will be increased by 5%, 10% and 20% to represent low, moderate and high-levels of ridership within the study area. **Table 8.3** summarizes the three sensitivity modal split scenarios.

Table 8.3
407 Transitway Sensitivity Non-Auto Modal Split Scenarios

407 Scenarios	Direction	Non-Auto Percentages	
		Weekday A.M. Peak Period	Weekday P.M. Peak Period
Low (5% increase)	Inbound	9%	24%
	Outbound	29%	11%
Moderate (10% increase)	Inbound	14%	29%
	Outbound	34%	16%
High (20% increase)	Inbound	24%	39%
	Outbound	44%	26%

8.3 Transportation Demand Management (TDM)

For the conservative nature of this assessment, no additional non-auto modal split increase have been considered in the future horizon beyond what is shown in Table 8.3. Nevertheless, **Section 10.0** outlines some of the TDM strategies that can be implemented as part of the Emerging Land Use Concept within the study area.

8.4 Multi-use Internal Capture Trips

Chapter 7 of the "Trip Generation Handbook – An ITE Recommended Practice" (June 2004) indicates that "a multi-use development is typically a single real-estate project that consists of two or more land use classifications between which trips can be made without using the off-site road system. Due to the nature of these land uses, the trip-making characteristics are interrelated, and some trips are made among the on-site

uses while commuting within the internal road network. This capture of trips internal to the site has the net effect of reducing vehicle trip generation between the overall development site and the external street system compared to the total number of trips generated by comparable, stand-alone sites."

Based on the mixed-use nature of the Emerging Land Use Concept, a conservative multi-use internal site capture adjustment of 10% has been applied to the trip generation of Areas 5 and 6. These areas comprise a mixture of residential, commercial or office uses that are in proximity that would likely induce live-work trips and trips where a motorist can visit more than one use within each area using the internal road network.

8.5 Trip Generation

The trip generation of the Emerging Land Use Concept were based on the Institute of Transportation Engineers (ITE) Trip Generation Manual 9th Edition. **Table 8.4** summarizes the ITE land use codes, the associated trip generation rates and the percentage splits applied for each of the land uses

Table 8.4
ITE Land Use Codes and Trip Generation Rates

ITE LAND USE	WEEKDAY PEAK HOUR RATE (X IS THE # UNITS OR SQ.FT) (T IS THE # TRIPS)	PERCENTAGE SPLIT IN (OUT)
Residential – Condominiums (# 230)	Ln (T) = 0.8 Ln(X) + 0.26 (weekday a.m.)	17% (83%)
	Ln (T) = 0.82 Ln(X) + 0.32 (weekday p.m.)	67% (33%)
General Office (# 710)	Ln (T) = 0.8 Ln(X) + 1.57 (weekday a.m.)	88% (12%)
	T = 1.12(X) + 78.45 (weekday p.m.)	17% (83%)
Commercial Retail (# 820)	Ln (T) = 0.61 Ln(X) + 2.24 (weekday a.m.)	62% (38%)
	ln(T) = 0.67 ln(X) + 3.31 (weekday p.m.)	48% (52%)
General Light Industrial (# 110)	T = 1.18(X) – 89.28 (weekday a.m.)	88% (12%)
	T = 1.43(X) – 157.36 (weekday p.m.)	12% (88%)

Based on the trip generation rates in Table 8.4, the non-auto modal splits in Table 8.3, and the use of multi-use adjustments where appropriate, *trip generation has been completed for each of the zones* summarized in Table 8.1. This approach of forecasting trip generation zone by zone is more conservative and indicative because the alternative aggregate approach of trip generation would result in lower trip

generation rates due to the logarithmic nature of the equations and it would also be harder to know how much traffic is generated by each zone.

The overall trip generation summaries based on the three 407 Transitway sensitivity scenarios are provided in **Tables 8.5A**, **B** and **C**. Detailed trip generation of each zone for the 10% non-auto increase scenario are provided in **Appendix O**, the summation of which match the totals in Table 8.5B. The same methods are used to calculate the 5% and 20% trip generation scenarios.

Table 8.5A
Net New Site Auto Trip Generation (5% Non-Auto Increase)

Uses	Net Proposed Magnitude	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Residential	3,543	198	966	948	467
General Office	40,009 ft^2	55	8	10	49
Commercial Retail	35,467 ft^2	21	13	63	68
General Light Industrial	296,191 ft^2	240	33	34	253
Sub Total		514	1,020	1,055	837
Multi-Use Trips (NCHRP)		-17	-72	-77	-41
Non-auto Modal Split (Existing + 5%)		-45	-274	-235	-88
Net New Site Trips		452	674	743	708
Total Inbound/Outbound Trips		**1,126**		**1,451**	

Table 8.5B
Net New Site Auto Trip Generation (10% Non-Auto Increase)

Uses	Net Proposed Magnitude	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Residential	3,543	198	966	948	467
General Office	40,009 ft^2	55	8	10	49
Commercial Retail	35,467 ft^2	21	13	63	68
General Light Industrial	296,191 ft^2	240	33	34	253
Sub Total		514	1,020	1,055	837
Multi-Use Trips (NCHRP)		-17	-72	-77	-41
Non-auto Modal Split (Existing + 10%)		-70	-322	-284	-127
Net New Site Trips		427	626	694	669
Total Inbound/Outbound Trips		**1,053**		**1,363**	

Table 8.5C
Net New Site Auto Trip Generation (20% Non-Auto Increase)

Uses	Net Proposed Magnitude	Weekday A.M. Peak Hour		Weekday P.M. Peak Hour	
		Inbound	Outbound	Inbound	Outbound
Residential	3,543	198	966	948	467
General Office	40,009 ft^2	55	8	10	49
Commercial Retail	35,467 ft^2	21	13	63	68
General Light Industrial	296,191 ft^2	240	33	34	253
Sub Total		514	1,020	1,055	837
Multi-Use Trips (NCHRP)		-17	-72	-77	-41
Non-auto Modal Split (Existing + 20%)		-119	-416	-382	-207
Net New Site Trips		378	532	596	589
Total Inbound/Outbound Trips		**910**		**1,185**	

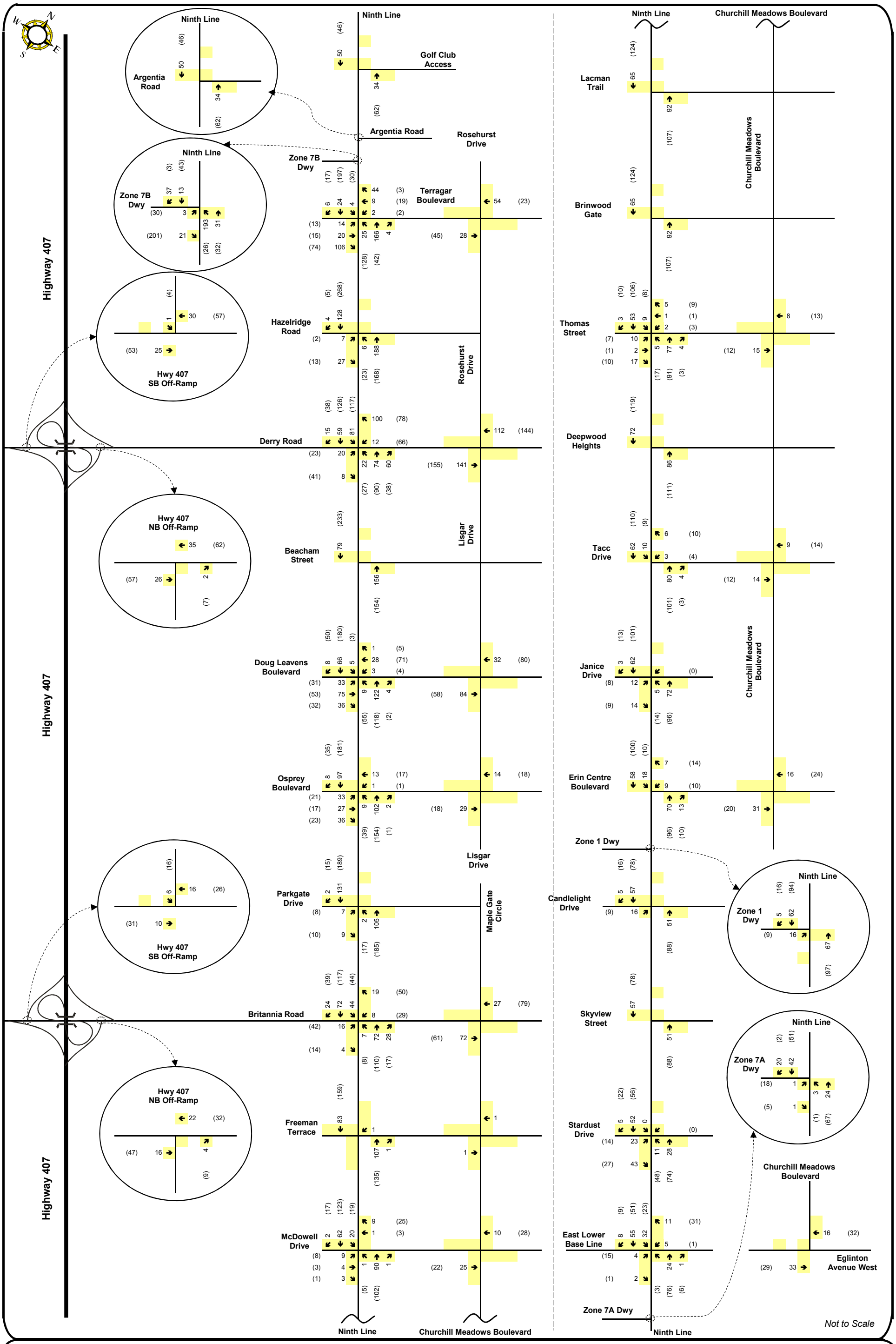
8.6 Trip Distribution and Assignment

The distribution and assignment of the site-generated traffic was developed based on the trip distribution information provided by City staff as shown in Appendix N, as well as existing traffic patterns in the vicinity of the study area and the route logic to minimize motorist travel distance and maximize connectivity. Route logic is based on the consideration of how the study intersections are operating under existing and future background conditions. For example, if a study intersection is already dealing with at, or near capacity turning constraints under BAU conditions, then drivers will likely gravitate to another route/movement that is less congested, while recognizing that drivers will not opt for an overly circuitous route.

MMM staff also confirmed with City staff that the site-generated traffic from each zone are assumed to primarily enter and exit from the driveways aligned with the study intersections, which is a conservative assessment. The locations of all of the access locations assumed to serve the Ninth Line subject land uses are illustrated in the site-generated traffic volume figures noted below.

At the driveway/study intersections evaluated, City staff instructed MMM to assume that the lane configurations on the west leg of the intersection should be matched with the existing east leg where possible. If improvements are required at the driveway/study intersections, they were determined in **Section 9.0** and documented accordingly.

The resulting assignment of the net site-generated traffic associated with the three trip generation scenarios summarized in Tables 8.5A, B and C are illustrated in **Figures 8.2 A-B**, **8.3 A-B** and **8.4 A-B**, respectively.



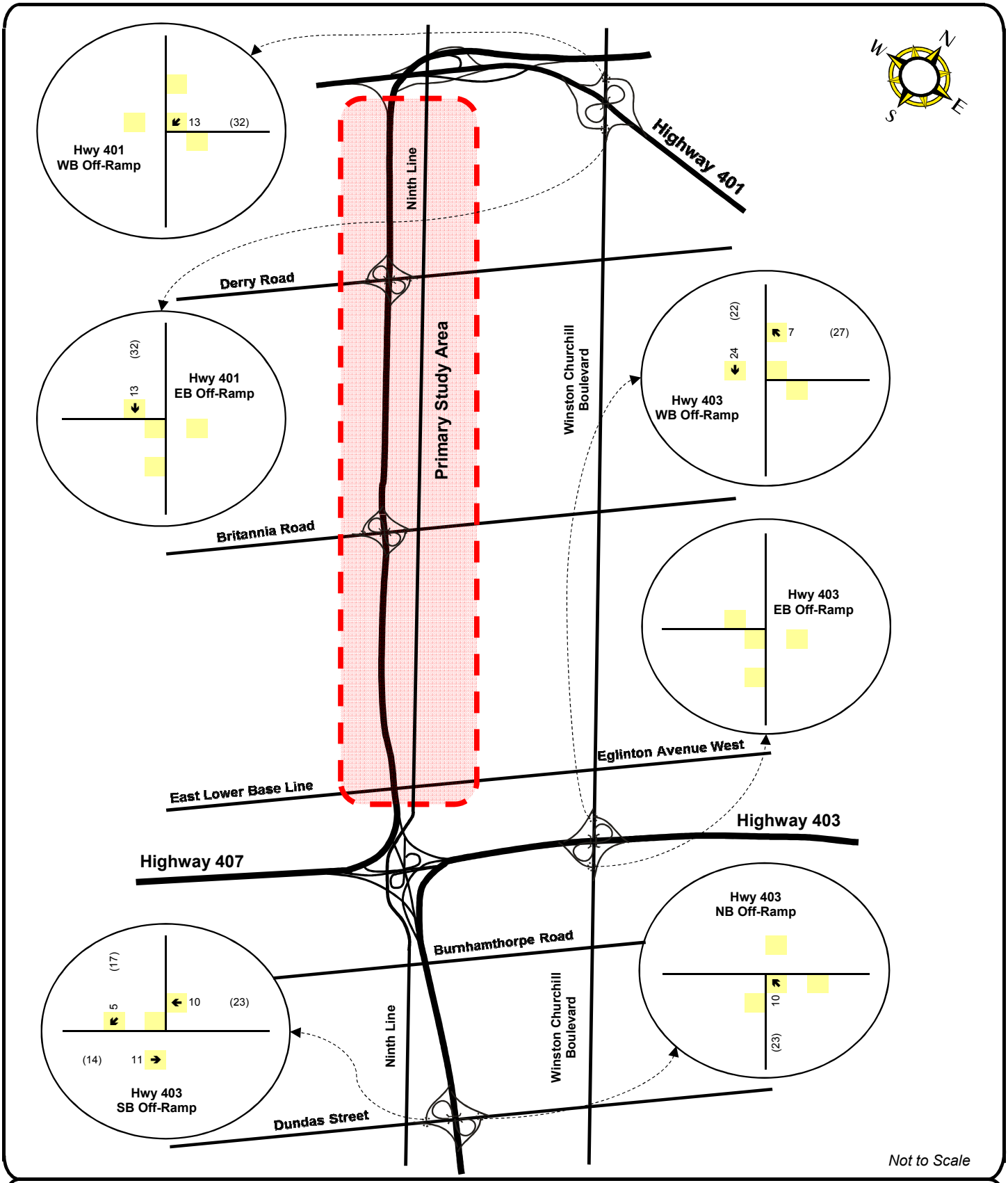
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 8.2A

Emerging Land Use-Generated Volumes
(5% Non-Auto Transitway Scenario)
Primary Study Area



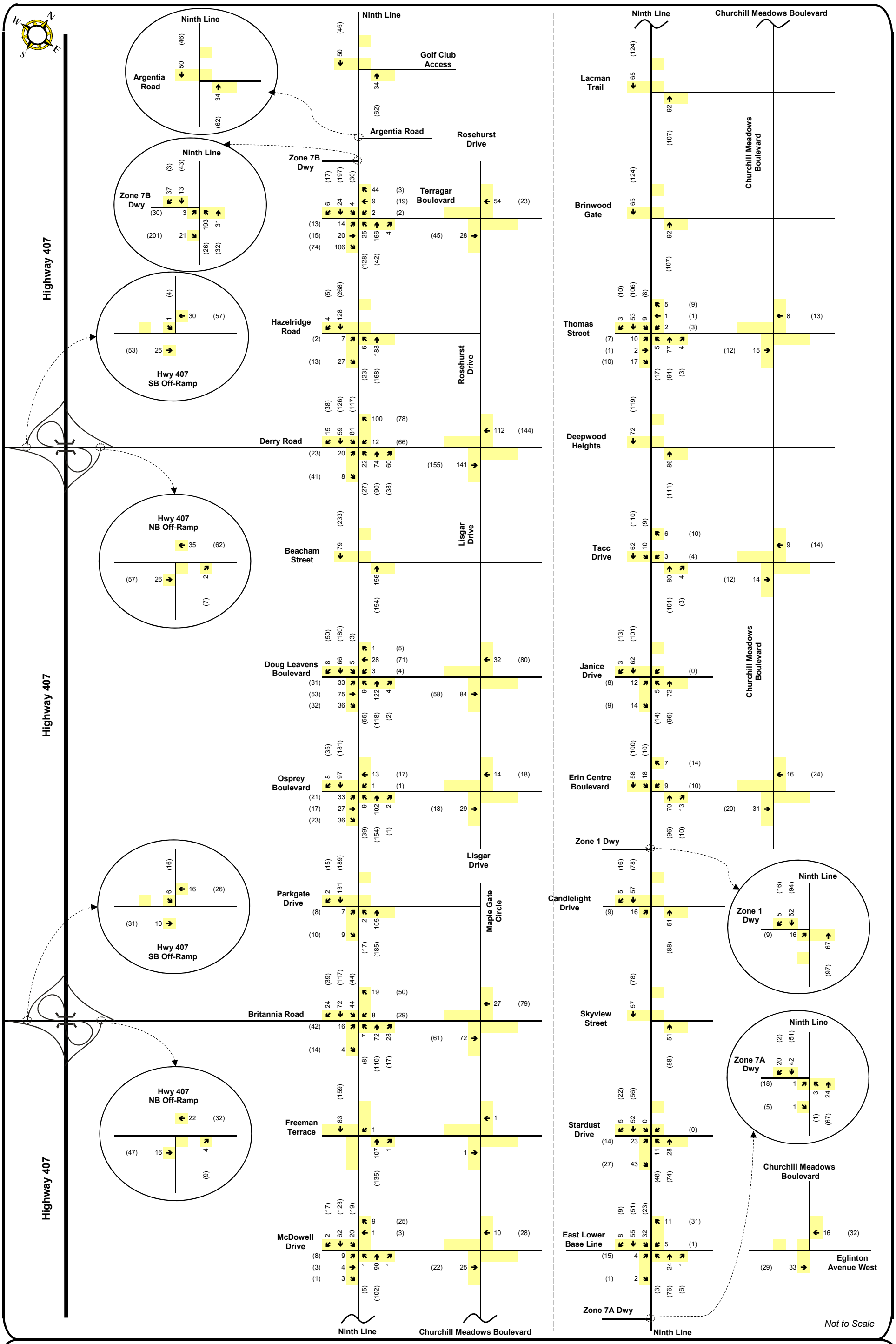
MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 8.2B

Emerging Land Use-Generated Volumes
(5% Non-Auto Transitway Scenario)
Secondary Study Area



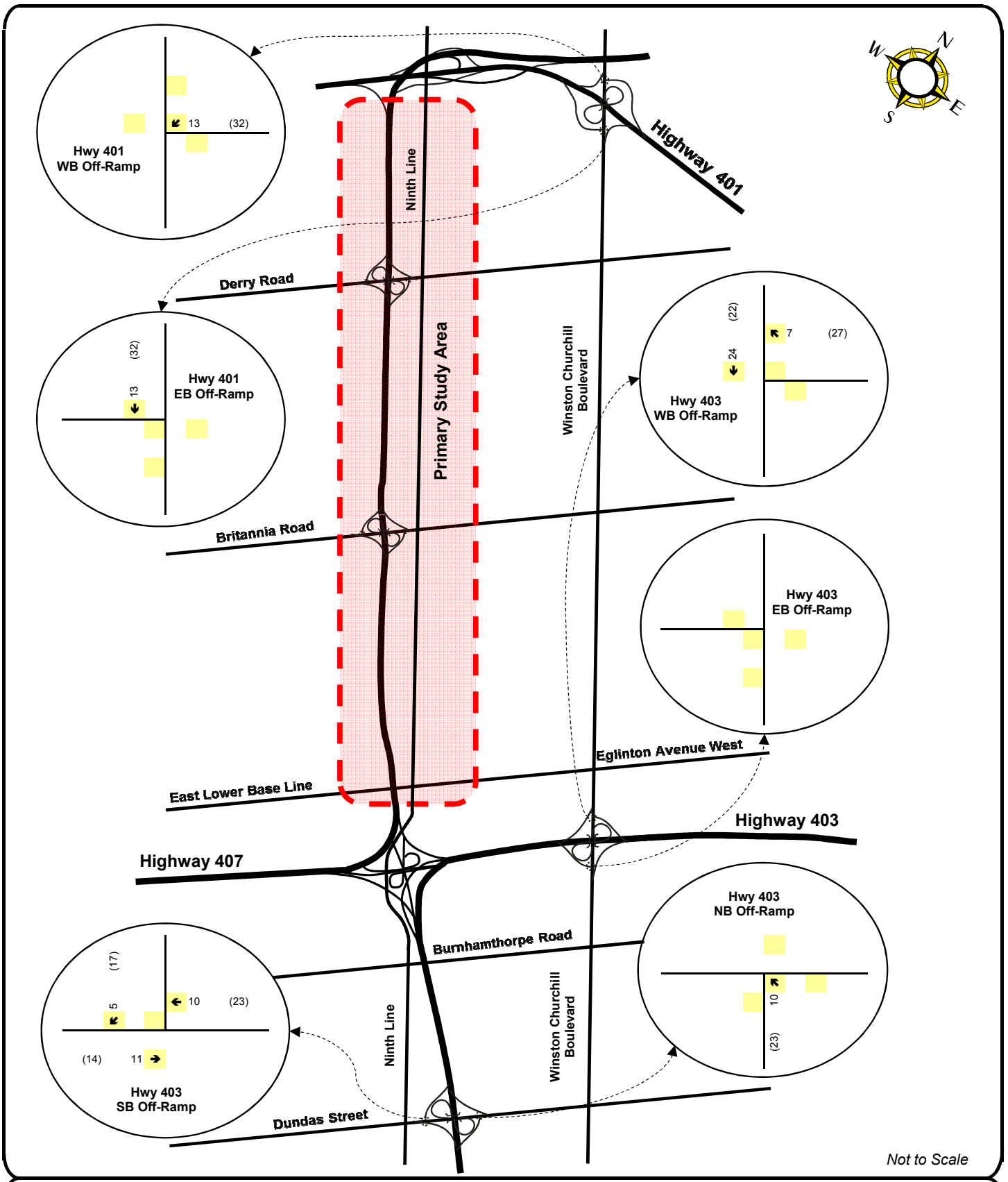
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 8.3A

Emerging Land Use-Generated Volumes
(10% Non-Auto Transitway Scenario)
Primary Study Area



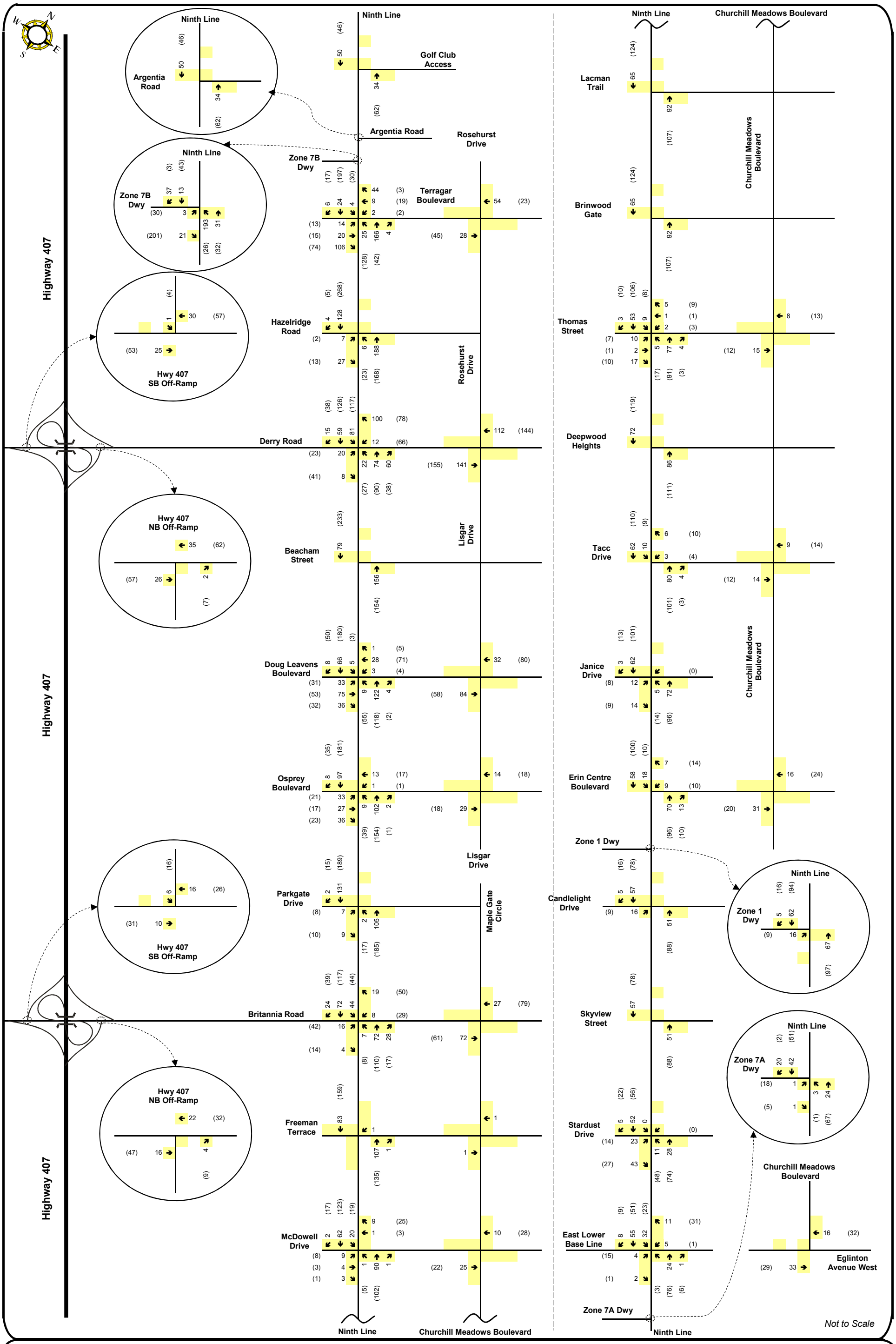
MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 8.3B

Emerging Land Use-Generated Volumes
(10% Non-Auto Transitway Scenario)
Secondary Study Area



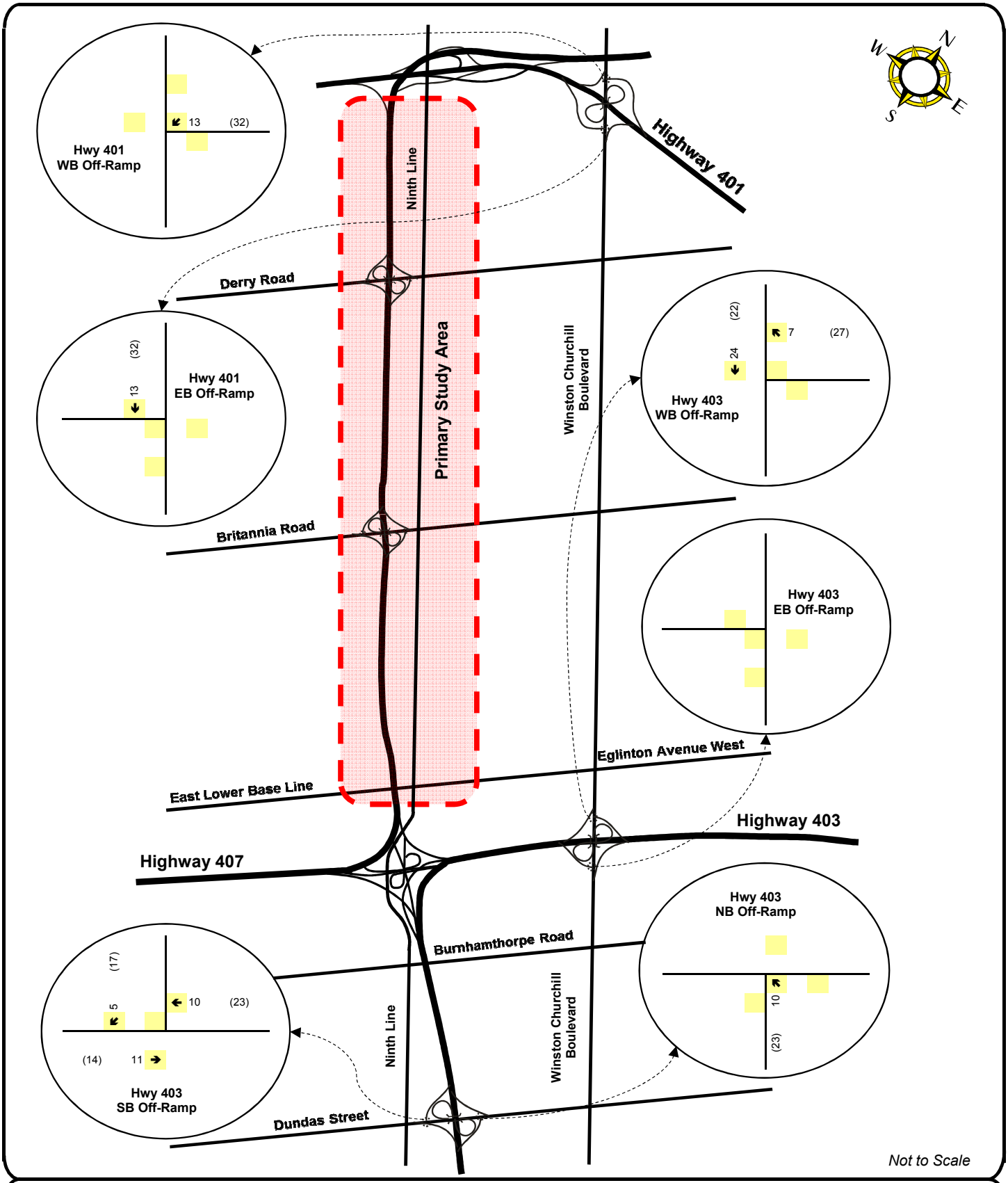
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 8.4A

Emerging Land Use-Generated Volumes
(20% Non-Auto Transitway Scenario)
Primary Study Area



MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 8.4B

Emerging Land Use-Generated Volumes
(20% Non-Auto Transitway Scenario)
Secondary Study Area

9.0 FUTURE TOTAL CONDITIONS (WITH CONCEPT LAND USE)

The following future total scenarios have been evaluated as part of this Transportation Assessment:

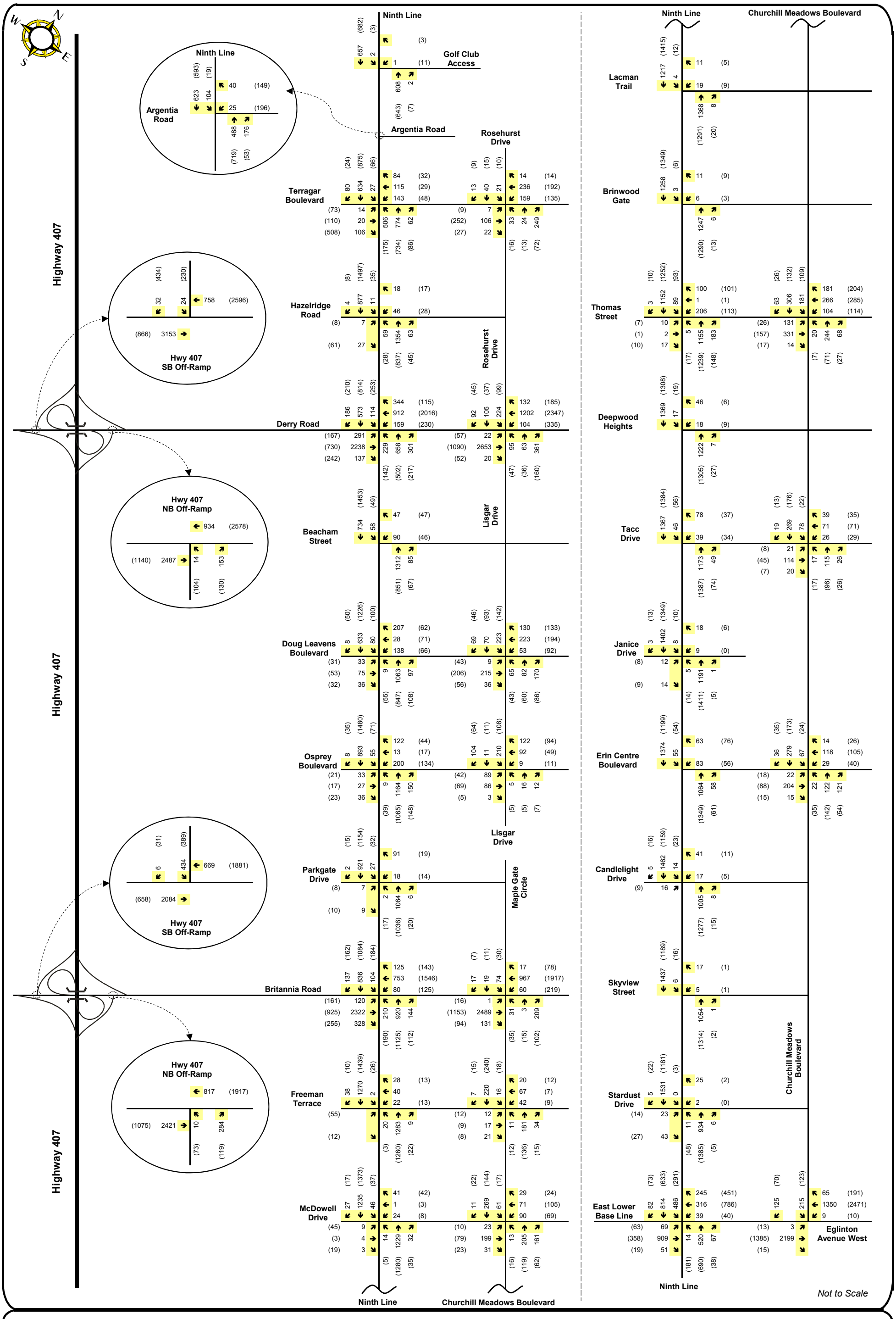
- **Scenario 1:** Emerging Land Use Concept – with 5% increase in non-auto modal split from the implementation of 407 Transitway.
- **Scenario 2:** Emerging Land Use Concept – with 10% increase in non-auto modal split from the implementation of 407 Transitway.
- **Scenario 3:** Emerging Land Use Concept – with 20% increase in non-auto modal split from the implementation of 407 Transitway.
- **Scenario 4:** Emerging Land Use Concept plus the extension of Argentia Road. The moderate 407 Transitway Scenario 2 (with a 10% increase in non-auto modal split) has been applied since it represents the middle ground of the non-auto sensitivity.
- **Scenario 5:** Emerging Land Use Concept plus Greater Toronto Area West Highway Corridor (GTA West) – with 10% increase in non-auto modal split from the implementation of 407 Transitway. The moderate 407 Transitway Scenario 2 (with a 10% increase in non-auto modal split) has been applied since it represents the middle ground of the non-auto sensitivity.

9.1 Scenario 1 Future Total Assessment – 5% Increase in Non-Auto Modal Split

Scenario 1 traffic volumes are derived by superimposing Figures 8.2A-B (site-generated traffic from the Emerging Land Use Scenario with 5% increase in non-auto modal split) onto the 2041 future background volumes in Figures 7.4A-B. The resulting Scenario 1 future total volumes are shown in **Figures 9.1A** and **9.1B**.

Based on these future total volumes, traffic operations were analyzed at the study intersections. The results of the intersection capacity analysis are summarized in **Table 9.1**. Detailed intersection capacity analysis sheets are included in **Appendix P**.

The intersection of Ninth Line and Terragar Boulevard needs to be signalized under future total conditions. This is primarily to do with both the Emerging Land Use Concept (specifically Zone 6) and the 407 Transitway traffic. OTM signal warrant analysis was completed at this intersection based on the future total volumes in Figures 9.1A and 9.1B. This intersection meets the signal warrants as shown in Appendix K. This improvement has been carried forward for all five of the future total scenarios.



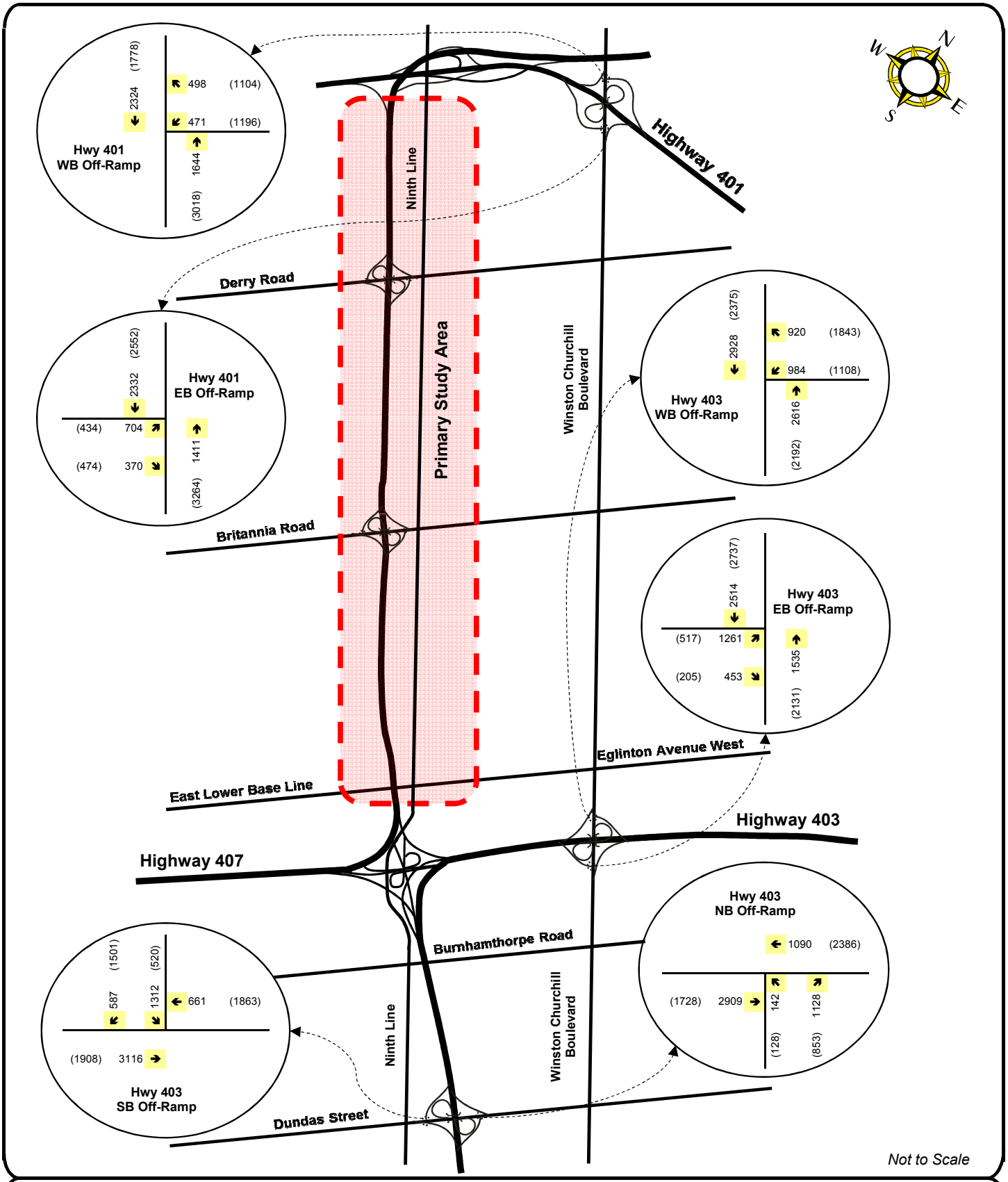
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 9.1A

2041 Future Total Traffic Volumes
(5% Non-Auto Transitway Scenario)



MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.1B

2041 Future Total Traffic Volumes
(5% Non-Auto Transitway Scenario)
Secondary Study Area

TABLE 9.1
2041 FUTURE TOTAL TRAFFIC CONDITIONS – SCENARIO 1 (5% NON-AUTO INCREASE)

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line & Area 6-Transitway Driveway/ Terragar Boulevard	Signalized	B (18)	--	C (29)	EB-TR (0.91) NB-L (0.94)
Ninth Line & Derry Road	Signalized	D (39)	EB-TR (0.90) NB-L (0.91)	D (37)	WB-TR (0.93) SB-L (0.94)
Ninth Line & Area 5 Driveway/Doug Leavens Boulevard	Signalized	B (18)	--	B (11)	--
Ninth Line & Area 5 Driveway/Osprey Boulevard	Signalized	B (20)	--	B (17)	--
Ninth Line & Britannia Road	Signalized	D (54)	EB-TR (1.03) NB-L (1.00) NB-TR (1.00) SB-TR (0.98)	E (57)	EB-L (0.95) NB-L (0.97) NB-TR (1.00) SB-L (0.94) SB-TR (1.00)
Ninth Line & Area 3 Driveway/ Thomas Street	Signalized	C (22)	--	B (18)	--
Ninth Line & Erin Centre Boulevard	Signalized	B (15)	--	B (12)	--
Ninth Line & East Lower Base Line/Eglinton Avenue West	Signalized	D (42)	SB-L (0.94)	D (49)	EB-L (0.90) WB-T (0.92) NB-TR (0.96) SB-L (0.95)
Lisgar Drive/Rosehurst Drive & Derry Road	Signalized	B (16)	--	B (14)	EB-L (0.92) WB-L (0.97)
Churchill Meadows Boulevard/Maple Gate Circle & Britannia Road	Signalized	A (9)	SB-L (0.93)	A (6)	--
Churchill Meadows Boulevard & Thomas Street	Signalized	B (20)	--	B (15)	--
Eglinton Avenue West & Churchill Meadows Boulevard	Signalized	B (15)	--	C (20)	WB-TR (0.98)
Britannia Road & Hwy 407 SB Off-Ramp	Signalized	C (21)	--	C (26)	--
Hwy 407 NB Off-Ramp & Britannia Road	Signalized	B (10)	--	B (11)	--
Derry Road & Hwy 407 SB Off-Ramp	Signalized	A (4)	--	C (23)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Hwy 407 NB Off-Ramp & Derry Road	Signalized	A (1)	--	A (3)	--
Ninth Line & Argentia Road	Unsignalized	D (28)	--	F (98)	WB-L (0.95)
Ninth Line & Golf Club Access	Unsignalized	E (35)	WB-L (0.01)	D (28)	--
Ninth Line & Area 6-Transitway Driveway/ Hazelridge Road	Unsignalized	F (82)	WB-L (0.54)	F (52)	WB-L (0.21)
Ninth Line & Beacham Street	Unsignalized	F (759)	WB-L (2.36) WB-R (2.36)	F (131)	WB-L (0.90) WB-R (0.90)
	Signalized	A (7)	--	A (4)	--
Ninth Line & Area 5 Driveway/Parkgate Drive	Unsignalized	C (18)	--	C (16)	--
Ninth Line & Freeman Terrace / Area 4 - Transitway Driveway	Unsignalized	E (41)	WB-L (0.19)	E (41)	EB-L (0.36)
Ninth Line & Area 4-Transitway Driveway / McDowell Drive	Unsignalized	E (36)	WB-L (0.18)	E (41)	EB-L (0.31)
Ninth Line & Lacman Trail	Unsignalized	D (27)	--	C (23)	--
Ninth Line & Brinwood Gate	Unsignalized	B (13)	--	B (12)	--
Ninth Line & Deepwood Heights	Unsignalized	C (20)	--	C (22)	--
Ninth Line & Tacc Drive	Unsignalized	C (21)	--	D (28)	--
Ninth Line & Area 2 Driveway/Janice Drive	Unsignalized	D (29)	--	D (28)	--
Ninth Line & Area 1 Driveway/Candlelight Drive	Unsignalized	E (49)	EB-L (0.19)	D (31)	--
Ninth Line & Skyview Street	Unsignalized	B (13)	--	C (16)	--
Ninth Line & Area 1 Driveway/Stardust Drive	Unsignalized	E (38)	EB-LTR (0.40)	C (21)	--
Rosehurst Drive & Terragar Boulevard	Unsignalized	C (19)	--	B (12)	--
Lisgar Drive & Doug Leavens Boulevard	Unsignalized	E (50)	WB-TR (0.90)	C (24)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Lisgar Drive & Osprey Boulevard	Unsignalized	B (13)	--	A (9)	--
Churchill Meadows Boulevard & Freeman Terrace	Unsignalized	C (17)	--	B (13)	--
Churchill Meadows Boulevard & McDowell Drive	Unsignalized	D (26)	--	B (11)	--
Churchill Meadows Boulevard & Tacc Drive	Unsignalized	C (15)	--	A (10)	--
Churchill Meadows Boulevard & Erin Centre Boulevard	Unsignalized	C (22)	--	B (11)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (28)	--	F (94)	WB-LR (1.09) WB-R (1.20) NB-T (1.19)
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	C (28)	--	C (27)	EB-LR (0.90) EB-R (0.91) NB-T (0.93)
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	E (70)	WB-LR (1.03) WB-R (1.09) NB-T (0.98) SB-T (1.10)	F (111)	WB-LR (1.15) WB-R (1.21) NB-T (1.03) SB-T (1.22)
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	D (37)	EB-L (0.92) SB-T (0.90)	C (24)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	E (62)	EB-T (1.06) SB-LR (1.07)	D (51)	EB-T (0.91) SB-R (0.96)
Hwy 403 NB Off-Ramp at Dundas St	Signalized	E (58)	EB-T (1.08) NB-LR (0.99) NB-R (1.09)	C (24)	--

With the addition of the Ninth Line land use concept traffic volumes, almost all of the signalized study intersections are forecast to operate at acceptable levels of service 'D' or better with no capacity issues. The busiest intersection is at Ninth Line at Britannia Road during the a.m. peak hour, when three of the movements operate at capacity.

Some of the unsignalized intersections that have been modeled as the driveway intersections to the uses along the west side of Ninth Line (i.e., Ninth Line at Hazelridge Road and Ninth Line at Freeman Terrace) are forecast to operate with slightly longer delays during the peak hours. However, it is expected that motorists who frequent the Ninth Line corridor will adapt to the traffic conditions and gravitate towards the route of least resistance and delay (i.e., driving through signalized intersections or making multiple right-turns to avoid a more difficult left-turn). These intersections do not meet the signal warrants.

The future volumes at the 3-legged intersection of Ninth Line and Argentia Road does not meet the signal warrants as shown in Appendix K. As an unsignalized intersection, the intersection is operating at acceptable levels of service, but would not be an attractive route for traffic generated by the Emerging Land Use. This is because left turns from an unsignalized intersection tends to be less attractive than a right turn from a downstream intersection such as Derry Road.

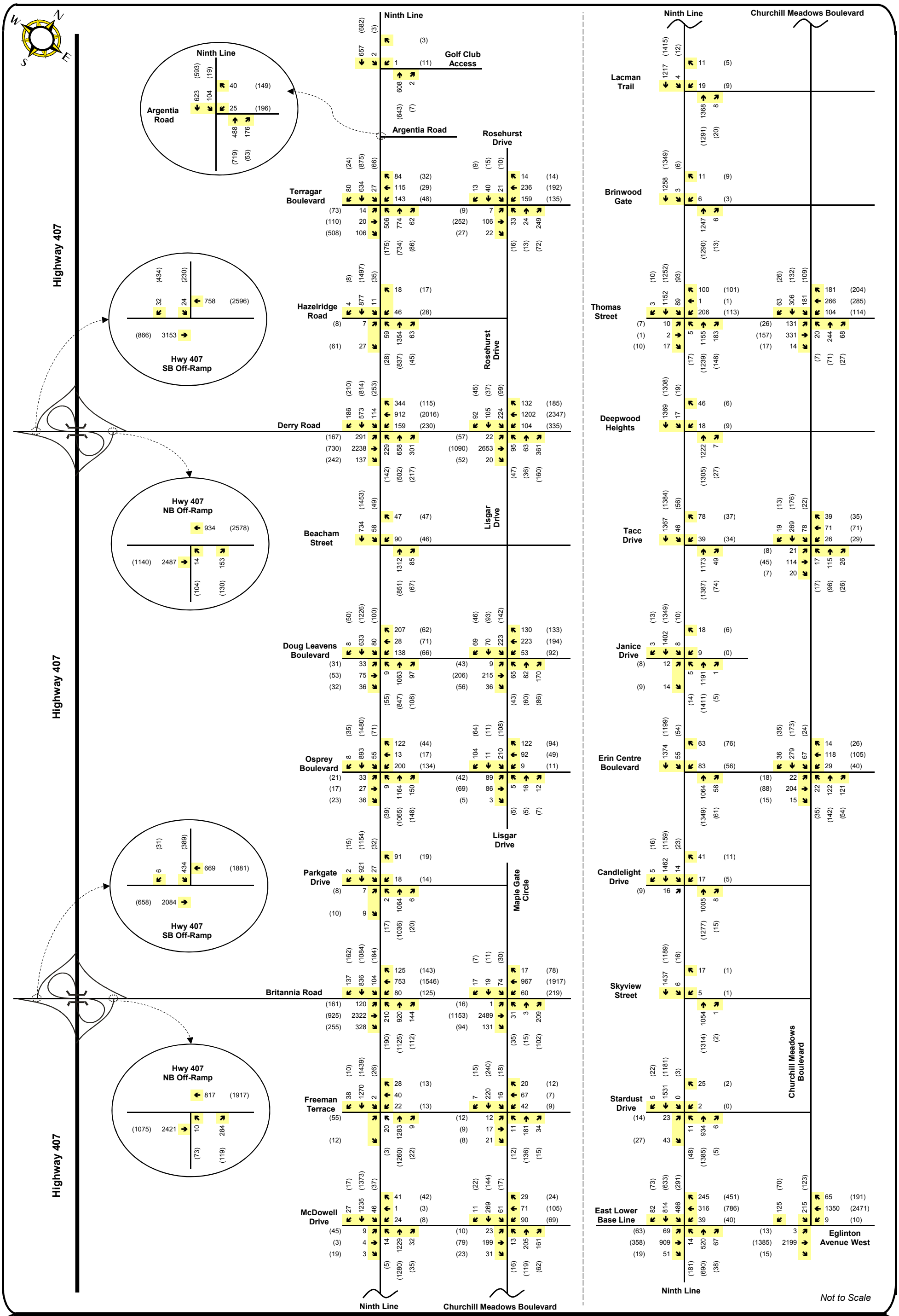
At the highway off-ramp intersections along Winston Churchill Boulevard and Dundas Street, the intersection delays increased by a maximum of 5 seconds, and on average less than 2 seconds per intersection, in comparison between the 2041 BAU and the 2041 future total conditions. The v/c ratios remain virtually unchanged with very minor increases. This indicates that the site-generated traffic from the Ninth Line corridor will have minimal impact on the secondary ramp study intersections. The Highway 407 off-ramp intersections on Derry Road and Britannia Road are forecast to continue operating well.

In general, the critical movements at the study intersections are an extension of the future background conditions presented in Table 7.3. The overall results indicate that the widening of Ninth Line, the implementation of the Transitway are sufficient to support the traffic volumes associated with the Emerging Land Use Concept. No additional improvements are needed beyond those required for future background conditions as summarized in Section 7.0.

9.2 Scenario 2 Future Total Assessment – 10% Increase in Non-Auto Modal Split

Scenario 2 traffic volumes are derived by superimposing Figures 8.3A-B (site-generated traffic from the Emerging Land Use Scenario with 10% increase in non-auto modal split) onto the 2041 future background volumes in Figures 7.4A-B. The resulting Scenario 2 future total volumes are shown in **Figures 9.2A** and **9.2B**. Traffic operations were analyzed at the study intersections based on these volumes.

The results of the intersection capacity analysis are summarized in **Table 9.2**. Detailed intersection capacity analysis sheets are included in **Appendix Q**.



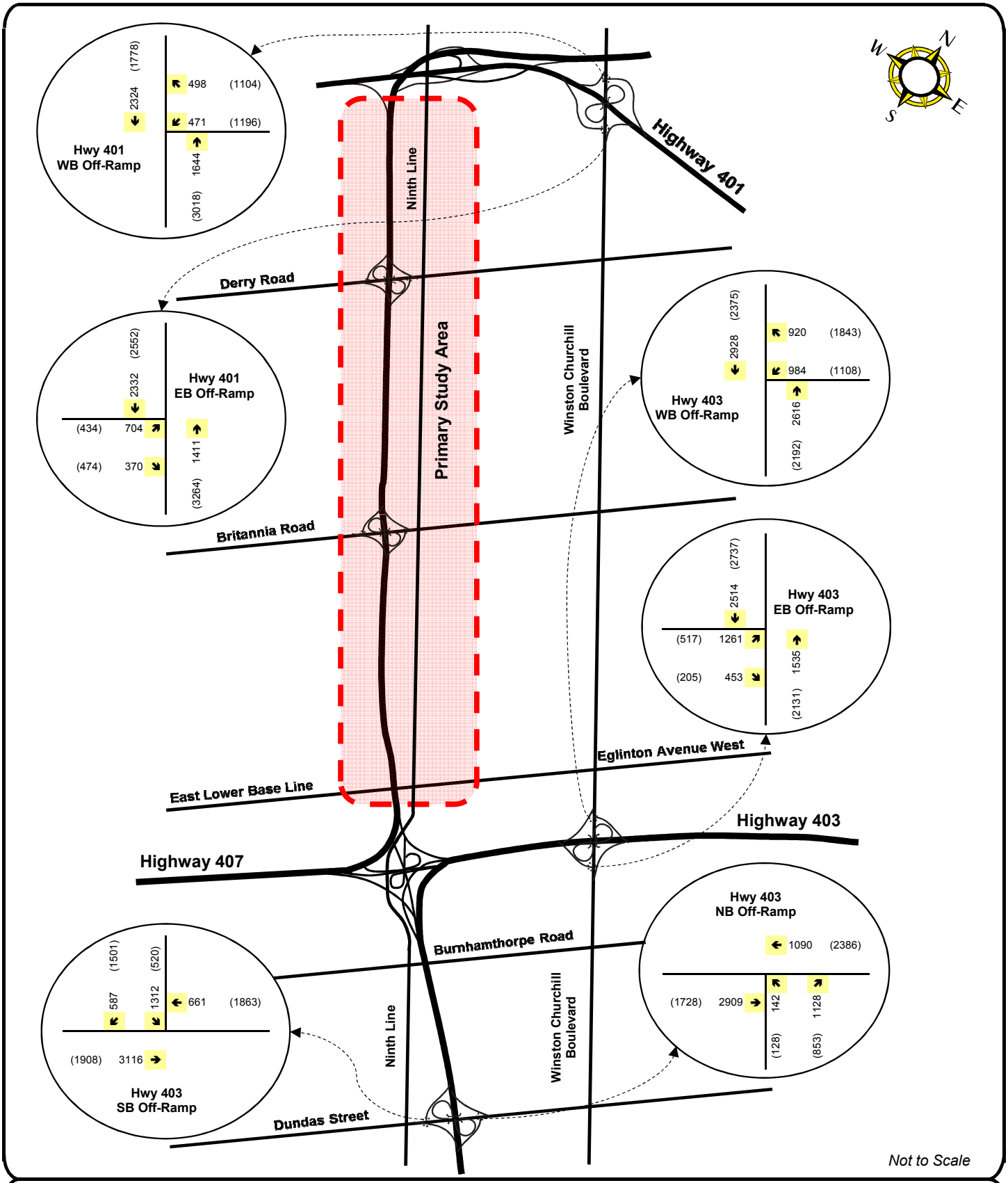
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 9.2A

2041 Future Total Traffic Volumes
(10% Non-Auto Transitway Scenario)



MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.2B

2041 Future Total Traffic Volumes
(10% Non-Auto Transitway Scenario)
Secondary Study Area

TABLE 9.2
2041 FUTURE TOTAL TRAFFIC CONDITIONS – SCENARIO 2 (10% NON-AUTO INCREASE)

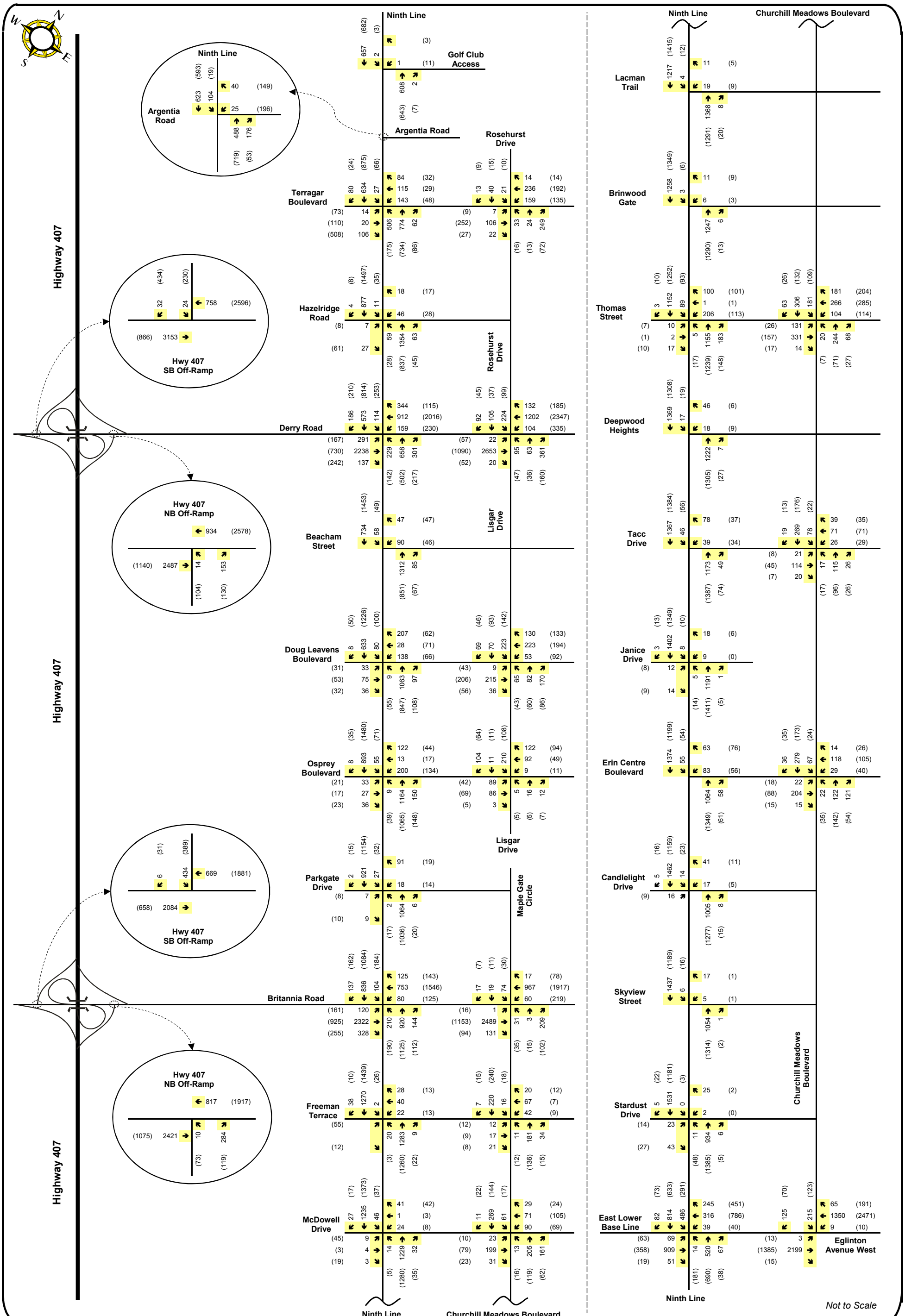
Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line & Area 6-Transitway Driveway/ Terragar Boulevard	Signalized	B (17)	--	C (27)	EB-TR (0.91)
Ninth Line & Derry Road	Signalized	D (38)	EB-TR (0.90)	D (36)	WB-TR (0.92) SB-L (0.93)
Ninth Line & Area 5 Driveway/Doug Leavens Boulevard	Signalized	B (17)	--	B (11)	--
Ninth Line & Area 5 Driveway/Osprey Boulevard	Signalized	B (20)	--	B (16)	--
Ninth Line & Britannia Road	Signalized	D (53)	EB-TR (1.03) NB-L (1.00) NB-TR (1.00) SB-TR (0.98)	E (56)	EB-L (0.95) NB-L (0.97) NB-TR (0.99) SB-L (0.93) SB-TR (0.99)
Ninth Line & Area 3 Driveway/ Thomas Street	Signalized	C (22)	--	B (18)	--
Ninth Line & Erin Centre Boulevard	Signalized	B (15)	--	B (12)	--
Ninth Line & East Lower Base Line/Eglinton Avenue West	Signalized	D (42)	SB-L (0.93)	D (48)	EB-L (0.90) WB-T (0.91) NB-TR (0.96) SB-L (0.94)
Lisgar Drive/Rosehurst Drive & Derry Road	Signalized	B (16)	--	B (14)	EB-L (0.90) WB-L (0.97)
Churchill Meadows Boulevard/Maple Gate Circle & Britannia Road	Signalized	A (9)	SB-L (0.93)	A (6)	--
Churchill Meadows Boulevard & Thomas Street	Signalized	B (20)	--	B (15)	--
Eglinton Avenue West & Churchill Meadows Boulevard	Signalized	B (15)	--	C (20)	WB-TR (0.98)
Britannia Road & Hwy 407 SB Off-Ramp	Signalized	C (21)	--	C (26)	--
Hwy 407 NB Off-Ramp & Britannia Road	Signalized	B (10)	--	B (11)	--
Derry Road & Hwy 407 SB Off-Ramp	Signalized	A (4)	--	C (23)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Hwy 407 NB Off-Ramp & Derry Road	Signalized	A (1)	--	A (3)	--
Ninth Line & Argentia Road	Unsignalized	D (28)	--	F (96)	WB-L (0.94)
Ninth Line & Golf Club Access	Unsignalized	E (35)	WB-L (0.01)	D (28)	--
Ninth Line & Area 6-Transitway Driveway/ Hazelridge Road	Unsignalized	F (78)	WB-L (0.52)	F (51)	WB-L (0.20)
Ninth Line & Beacham Street	Unsignalized	F (724)	WB-L (2.28) WB-R (2.28)	F (123)	WB-L (0.88)
	Signalized	A (7)	--	A (4)	--
Ninth Line & Area 5 Driveway/Parkgate Drive	Unsignalized	C (18)	--	C (16)	--
Ninth Line & Freeman Terrace / Area 4 - Transitway Driveway	Unsignalized	E (40)	WB-L (0.19)	E (40)	EB-L (0.35)
Ninth Line & Area 4-Transitway Driveway / McDowell Drive	Unsignalized	E (36)	WB-L (0.18)	E (40)	EB-L (0.31)
Ninth Line & Lacman Trail	Unsignalized	D (26)	--	C (23)	--
Ninth Line & Brinwood Gate	Unsignalized	B (13)	--	B (12)	--
Ninth Line & Deepwood Heights	Unsignalized	C (20)	--	C (22)	--
Ninth Line & Tacc Drive	Unsignalized	C (21)	--	D (28)	--
Ninth Line & Area 2 Driveway/Janice Drive	Unsignalized	D (29)	--	D (27)	--
Ninth Line & Area 1 Driveway/Candlelight Drive	Unsignalized	E (47)	EB-L (0.16)	D (30)	--
Ninth Line & Skyview Street	Unsignalized	B (13)	--	C (16)	--
Ninth Line & Area 1 Driveway/Stardust Drive	Unsignalized	E (37)	EB-LTR (0.37)	C (21)	--
Rosehurst Drive & Terragar Boulevard	Unsignalized	C (19)	--	B (12)	--
Lisgar Drive & Doug Leavens Boulevard	Unsignalized	E (47)	WB-TR (0.88) SB-LTR (0.88)	C (23)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Lisgar Drive & Osprey Boulevard	Unsignalized	B (13)	--	A (9)	--
Churchill Meadows Boulevard & Freeman Terrace	Unsignalized	C (17)	--	B (13)	--
Churchill Meadows Boulevard & McDowell Drive	Unsignalized	D (25)	--	B (11)	--
Churchill Meadows Boulevard & Tacc Drive	Unsignalized	C (15)	--	A (10)	--
Churchill Meadows Boulevard & Erin Centre Boulevard	Unsignalized	C (22)	--	B (11)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (28)	--	F (94)	WB-LR (1.09) WB-R (1.20) NB-T (1.19)
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	C (28)	--	C (27)	EB-LR (0.90) EB-R (0.91) NB-T (0.93)
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	E (70)	WB-LR (1.03) WB-R (1.09) NB-T (0.98) SB-T (1.10)	F (109)	WB-LR (1.17) WB-R (1.22) NB-T (1.01) SB-T (1.20)
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	D (37)	EB-L (0.92) SB-T (0.90)	C (24)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	E (62)	EB-T (1.06) SB-LR (1.07)	D (51)	EB-T (0.91) SB-R (0.96)
Hwy 403 NB Off-Ramp at Dundas St	Signalized	E (58)	EB-T (1.08) NB-LR (0.99) NB-R (1.09)	C (24)	--

1) *For signalized intersections, the level of service is based on the overall delay of the intersection.*
2) *For two-way stop controlled intersections, the level of service is based on the delay associated with the critical movements.*
3) *For All-Way Stop Control (AWSC) intersections, the level of service is based on the overall delay of the intersection.*
4) *LR means shared left-right turn lane*

The results in Table 9.2 represent a more successful implementation scenario of the 407 Transitway service that results in a 10% non-auto modal split increase for the Ninth Line Emerging Land Use Concept. As expected, the findings are slightly better than the 5% non-auto modal split scenario presented in Scenario 1. Consistent with Scenario 1, the Ninth Line widening can accommodate the Emerging Land Use Concept and no additional improvements are needed beyond those required for future background conditions as summarized in Section 7.0 and the impacts to the highway off-ramp intersections along Winston Churchill Boulevard and Dundas Street are minimal.



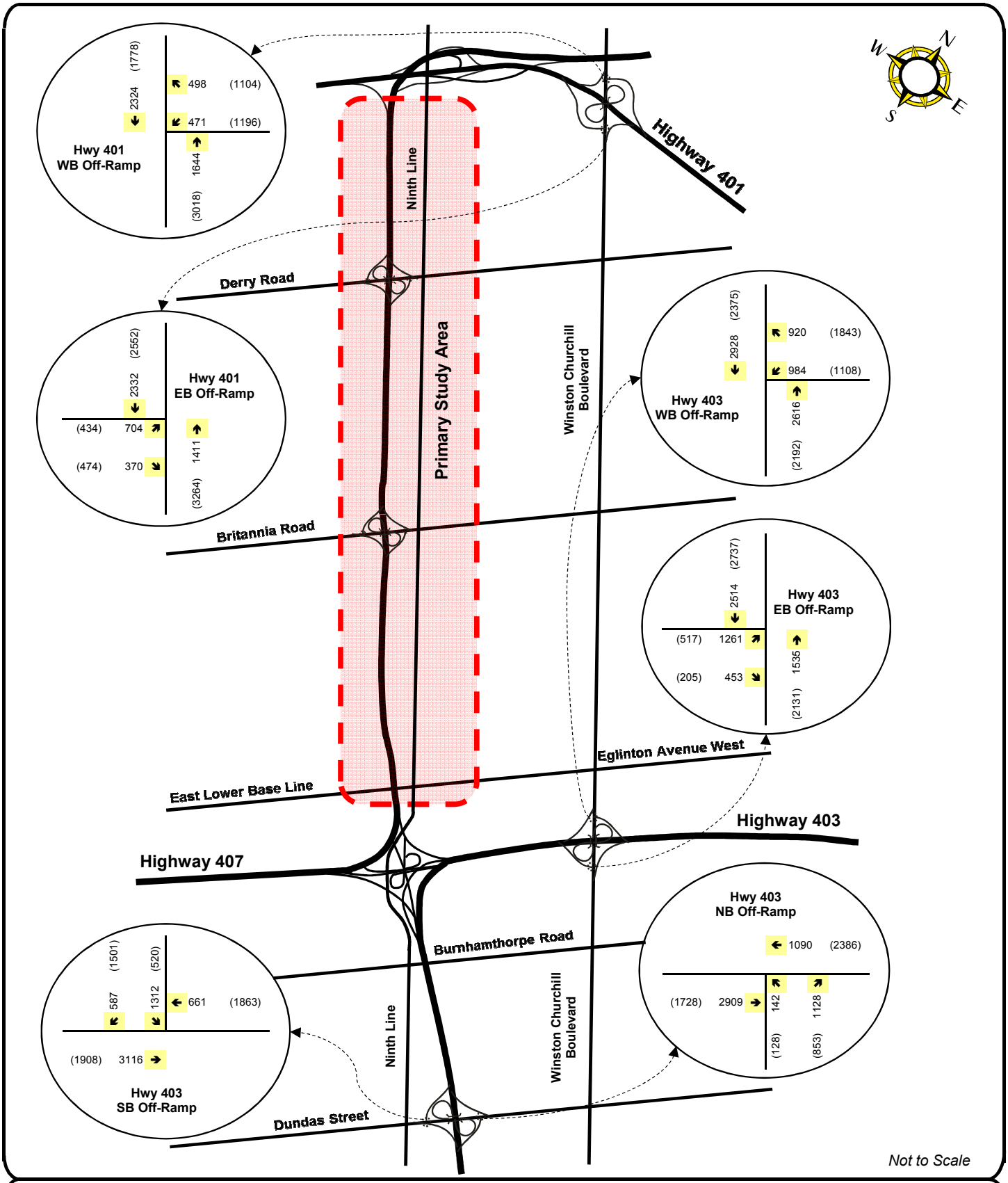
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 9.3A

2041 Future Total Traffic Volumes
(20% Non-Auto Transitway Scenario)



MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.3B

2041 Future Total Traffic Volumes
(20% Non-Auto Transitway Scenario)
Secondary Study Area

9.3 Scenario 3 Future Total Assessment – 20% Increase in Non-Auto Modal Split

Scenario 3 traffic volumes are derived by superimposing Figures 8.4A-B (site-generated traffic from the Emerging Land Use Scenario with 20% increase in non-auto modal split) onto the 2041 future background volumes in Figures 7.4A and 7.4B. The resulting Scenario 3 future total volumes are shown in **Figures 9.3A** and **9.3B**. Traffic operations were analyzed at the study intersections based on these volumes. The results of the intersection capacity analysis are summarized in **Table 9.3**. Detailed intersection capacity analysis sheets are included in **Appendix R**.

TABLE 9.3
2041 FUTURE TOTAL TRAFFIC CONDITIONS – SCENARIO 3 (20% NON-AUTO INCREASE)

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line & Area 6-Transitway Driveway/ Terragar Boulevard	Signalized	B (17)	--	C (25)	EB-TR (0.90)
Ninth Line & Derry Road	Signalized	D (38)	EB-TR (0.90)	D (35)	WB-TR (0.90) SB-L (0.90)
Ninth Line & Area 5 Driveway/Doug Leavens Boulevard	Signalized	B (17)	--	B (10)	--
Ninth Line & Area 5 Driveway/Osprey Boulevard	Signalized	B (20)	--	B (16)	--
Ninth Line & Britannia Road	Signalized	D (52)	EB-TR (1.03) NB-L (1.00) NB-TR (0.99) SB-TR (0.96)	E (54)	EB-L (0.91) NB-L (0.97) NB-TR (0.98) SB-L (0.90) SB-TR (0.97)
Ninth Line & Area 3 Driveway/ Thomas Street	Signalized	C (22)	--	B (18)	--
Ninth Line & Erin Centre Boulevard	Signalized	B (15)	--	B (12)	--
Ninth Line & East Lower Base Line/Eglinton Avenue West	Signalized	D (42)	SB-L (0.93)	D (48)	WB-T (0.91) NB-TR (0.95) SB-L (0.94)
Lisgar Drive/Rosehurst Drive & Derry Road	Signalized	B (16)	--	B (13)	WB-L (0.94)
Churchill Meadows Boulevard/Maple Gate Circle & Britannia Road	Signalized	A (9)	SB-L (0.93)	A (6)	--
Churchill Meadows Boulevard & Thomas Street	Signalized	B (20)	--	B (15)	--
Eglinton Avenue West & Churchill Meadows Boulevard	Signalized	B (15)	--	B (20)	WB-TR (0.98)

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Britannia Road & Hwy 407 SB Off-Ramp	Signalized	C (21)	--	C (26)	--
Hwy 407 NB Off-Ramp & Britannia Road	Signalized	B (10)	--	B (11)	--
Derry Road & Hwy 407 SB Off-Ramp	Signalized	A (4)	--	C (22)	--
Hwy 407 NB Off-Ramp & Derry Road	Signalized	A (1)	--	A (3)	--
Ninth Line & Argentia Road	Unsignalized	D (27)	--	F (92)	WB-L (0.93)
Ninth Line & Golf Club Access	Unsignalized	D (35)	--	D (28)	--
Ninth Line & Area 6-Transitway Driveway/ Hazelridge Road	Unsignalized	F (74)	WB-L (0.51)	E (49)	EB-L (0.09)
Ninth Line & Beacham Street	Unsignalized	F (677)	WB-L (2.19) WB-R (2.19)	F (103)	WB-L (0.81)
	Signalized	A (7)	--	A (4)	--
Ninth Line & Area 5 Driveway/Parkgate Drive	Unsignalized	C (18)	--	C (17)	--
Ninth Line & Freeman Terrace / Area 4 - Transitway Driveway	Unsignalized	E (39)	WB-L (0.19)	E (39)	EB-L (0.34)
Ninth Line & Area 4-Transitway Driveway / McDowell Drive	Unsignalized	E (35)	WB-L (0.18)	E (37)	EB-L (0.28)
Ninth Line & Lacman Trail	Unsignalized	D (26)	--	C (23)	--
Ninth Line & Brinwood Gate	Unsignalized	B (13)	--	B (12)	--
Ninth Line & Deepwood Heights	Unsignalized	C (20)	--	C (22)	--
Ninth Line & Tacc Drive	Unsignalized	C (21)	--	D (27)	--
Ninth Line & Area 2 Driveway/Janice Drive	Unsignalized	D (28)	--	D (26)	--
Ninth Line & Area 1 Driveway/Candlelight Drive	Unsignalized	E (46)	EB-L (0.14)	D (30)	--
Ninth Line & Skyview Street	Unsignalized	B (12)	--	C (16)	--
Ninth Line & Area 1 Driveway/Stardust Drive	Unsignalized	D (35)	--	C (20)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Rosehurst Drive & Terragar Boulevard	Unsignalized	C (18)	--	B (12)	--
Lisgar Drive & Doug Leavens Boulevard	Unsignalized	E (43)	WB-TR (0.86) SB-LTR (0.86)	C (21)	--
Lisgar Drive & Osprey Boulevard	Unsignalized	B (13)	--	A (9)	--
Churchill Meadows Boulevard & Freeman Terrace	Unsignalized	C (17)	--	B (13)	--
Churchill Meadows Boulevard & McDowell Drive	Unsignalized	D (25)	--	B (11)	--
Churchill Meadows Boulevard & Tacc Drive	Unsignalized	B (15)	--	A (10)	--
Churchill Meadows Boulevard & Erin Centre Blvd	Unsignalized	C (22)	--	B (11)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (27)	--	F (93)	WB-LR (1.09) WB-R (1.18) NB-T (1.19)
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	C (28)	--	C (27)	EB-LR (0.90) EB-R (0.91) NB-T (0.93)
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	E (70)	WB-LR (1.03) WB-R (1.09) NB-T (0.98) SB-T (1.10)	F (110)	WB-LR (1.15) WB-R (1.20) NB-T (1.03) SB-T (1.22)
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	D (37)	EB-L (0.92) SB-T (0.90)	C (24)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	E (62)	EB-T (1.06) SB-LR (1.07)	D (51)	EB-T (0.91) SB-R (0.96)
Hwy 403 NB Off-Ramp at Dundas St	Signalized	E (58)	EB-T (1.08) NB-LR (0.99) NB-R (1.09)	C (24)	--

1) For signalized intersections, the level of service is based on the overall delay of the intersection.
2) For two-way stop controlled intersections, the level of service is based on the delay associated with the critical movements.
3) For All-Way Stop Control (AWSC) intersections, the level of service is based on the overall delay of the intersection.
4) LR means shared left-right turn lane

The results in Table 9.3 represent an even more successful implementation scenario of the 407 Transitway service that results in a 20% non-auto modal split increase for the Ninth Line Emerging Land Use Concept. As expected, the findings are incrementally better than the 5% and 10% non-auto modal split scenarios. Consistent with Scenarios 1 and 2, the Ninth Line widening can readily accommodate the Emerging Land Use Concept and no additional improvements are needed beyond those required for future background conditions as summarized in Section 7.0 and the impacts to the highway off-ramp intersections along Winston Churchill Boulevard and Dundas Street are minimal.

9.4 Scenario 4 Future Total Assessment – 10% Increase in Non-Auto Modal Split Plus Argentia Road Extension over Highway 407

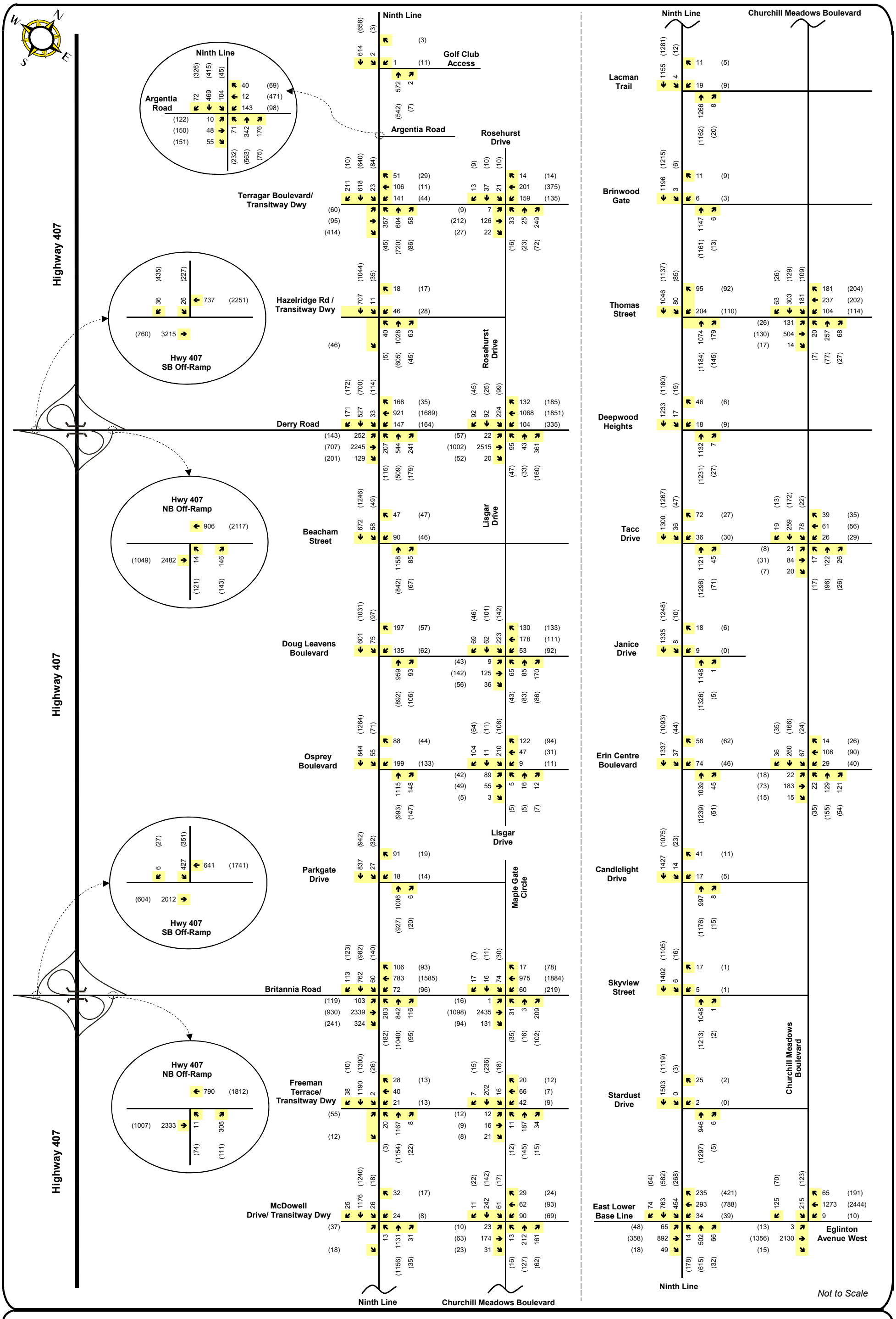
Scenario 4 assumes the westerly extension of Argentia Road from Ninth Line over Highway 407. City staff provided EMME plots depicting the modeled impact on the study area traffic volumes with the Argentia Road extension in place. The plots are provided in Appendix J. The magnitude of the impact on parallel roads such as Derry Road and Britannia Road was developed by relating the difference in link traffic volumes to the do nothing traffic volumes. The percentages derived for each link, as shown in Appendix J, were then applied to the 2041 future background volumes in Figures 7.4A and 7.4B. The future volumes at Argentia Road and Ninth Line were derived in a similar method, but also with consideration of the absolute EMME growth expected in the extended leg of the intersection. The resulting 2041 future background volumes with the Argentia Road extension in place are shown in **Figures 9.4A** and **9.4B**.

With the extension of Argentia Road over Highway 407 in place and the future projected volumes at this intersection, the 4-legged intersection meets the signal warrants as shown in Appendix K. As such, the intersection of Argentia Road and Ninth Line has been modeled as a signalized intersection under this future total scenario. Accordingly, the signalization and extension improvements are expected to make Argentia Road an alternate travel route for traffic generated by the Emerging Land Use in the Ninth Line corridor – particularly the Emerging Land use zones that are closer to Argentia Road.

The traffic assignments have been updated in **Figure 9.5A** and **9.5B** to reflect this adjustment in traffic distribution. For example, some of the traffic previously taking Derry or other east-west routes that may be busier are reassigned to take Argentia Road instead. As noted earlier, this incorporates the 10% non-auto modal split adjustment, which is the middle ground of the Transitway sensitivity.

The resulting Scenario 4 future total traffic volumes were then derived by superimposing Figures 9.5A and 9.5B onto the 2041 future background volumes in Figures 9.4A and 9.5B. The resulting Scenario 4 future total volumes are shown in **Figures 9.6A** and **9.6B**.

Based on these future total volumes, traffic operations were analyzed at the study intersections. The results of the intersection capacity analysis are summarized in **Table 9.4**. Detailed intersection capacity analysis sheets are included in **Appendix S.**



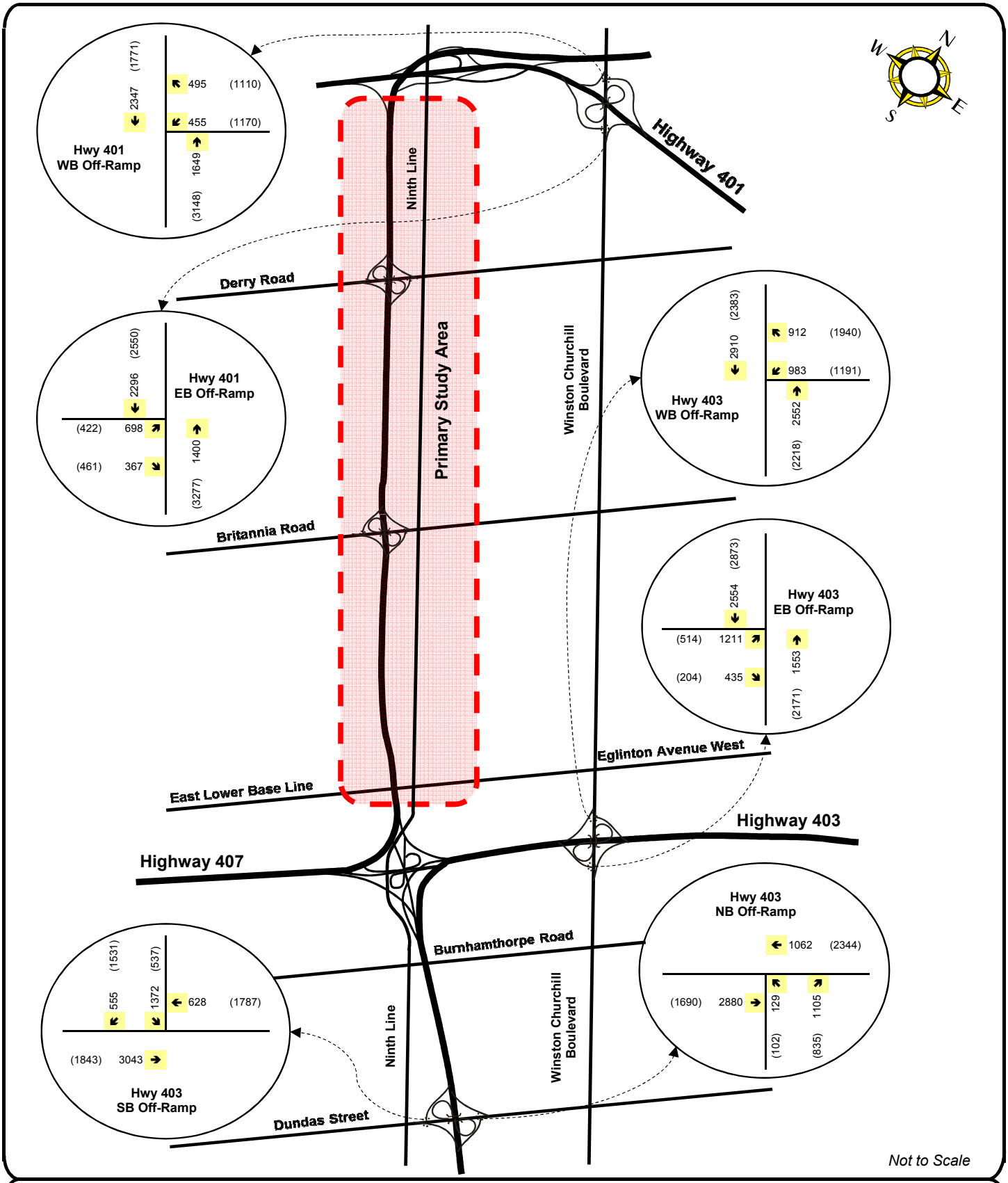
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 9.4A

2041 Future Background Traffic Volumes-with Argentia Road Extension



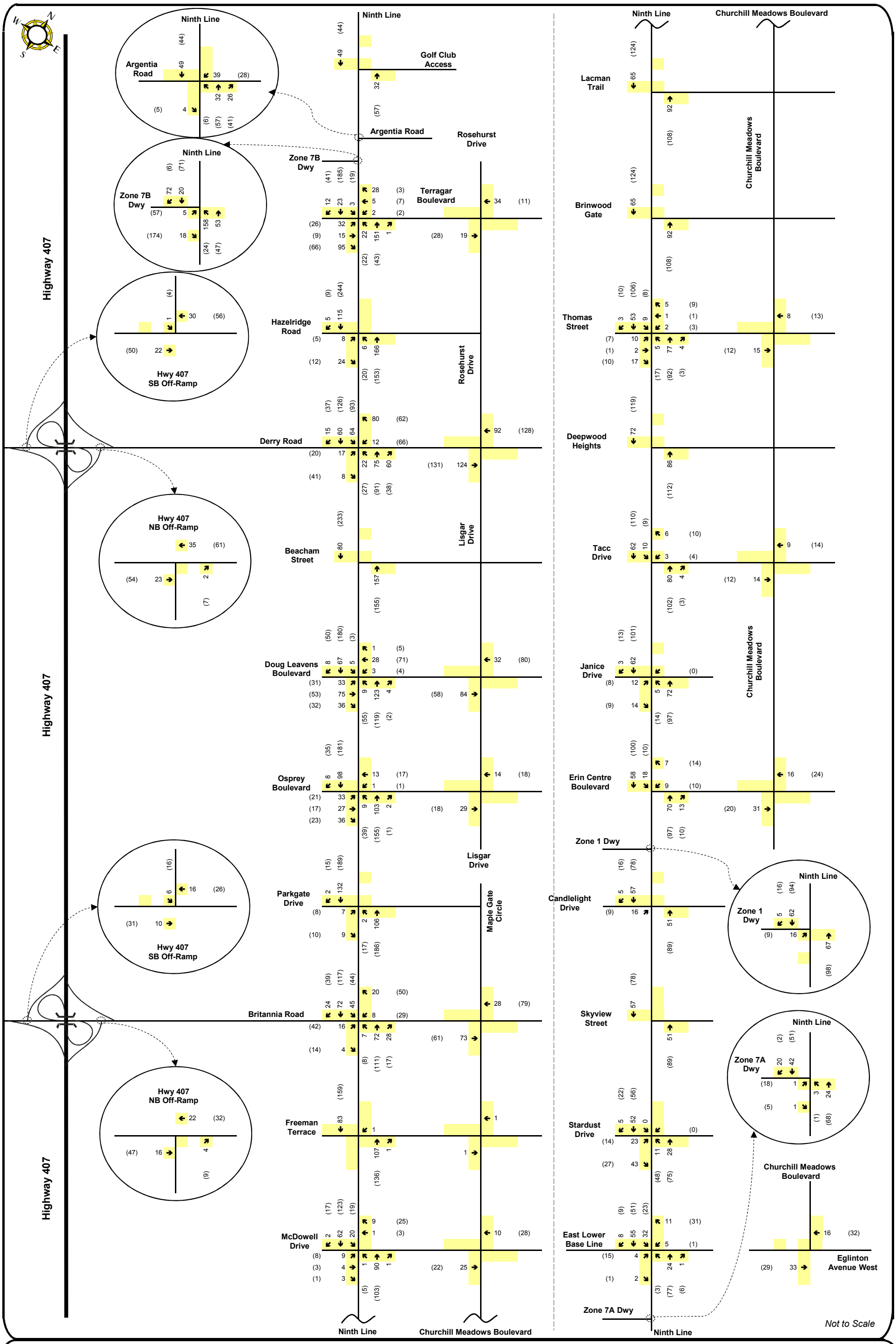
MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.4B

2041 Future Background Traffic Volumes - With Argentia Road Extension Secondary Study Area



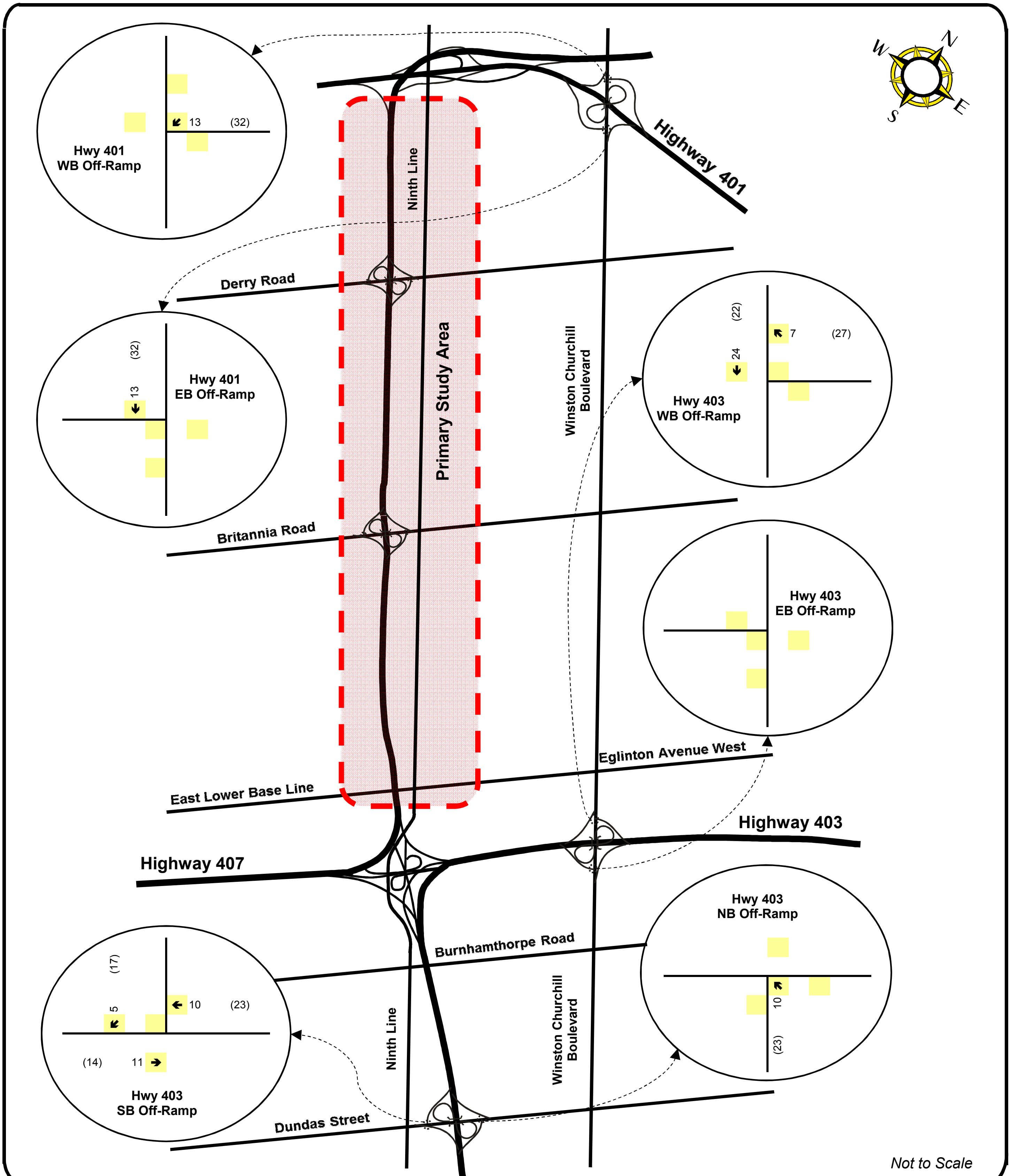
LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

MMM GROUP

FIGURE 9.5A

Emerging Land Use-Generated Volumes
(10% Non-Auto Transitway Scenario)
with Argentia Road Extension over Highway 407 - Primary Study Area



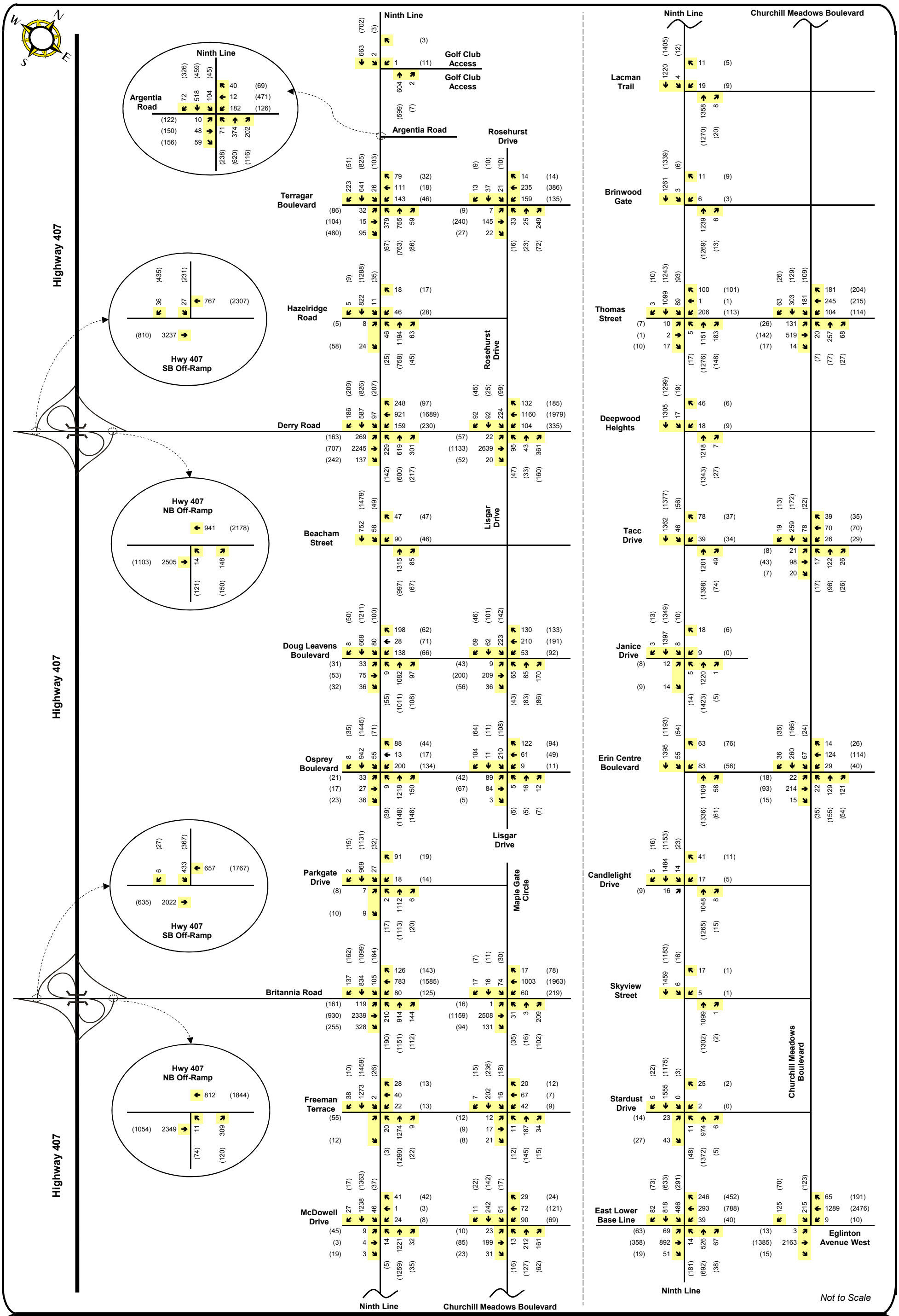
LEGEND

XX	AM Peak Hour Volumes
(XX)	PM Peak Hour Volumes

MMM GROUP

FIGURE 9.5B

Emerging Land Use-Generated Volumes
(10% Non-Auto Transitway Scenario)
with Argentia Road Extension over Highway 407
Secondary Study Area

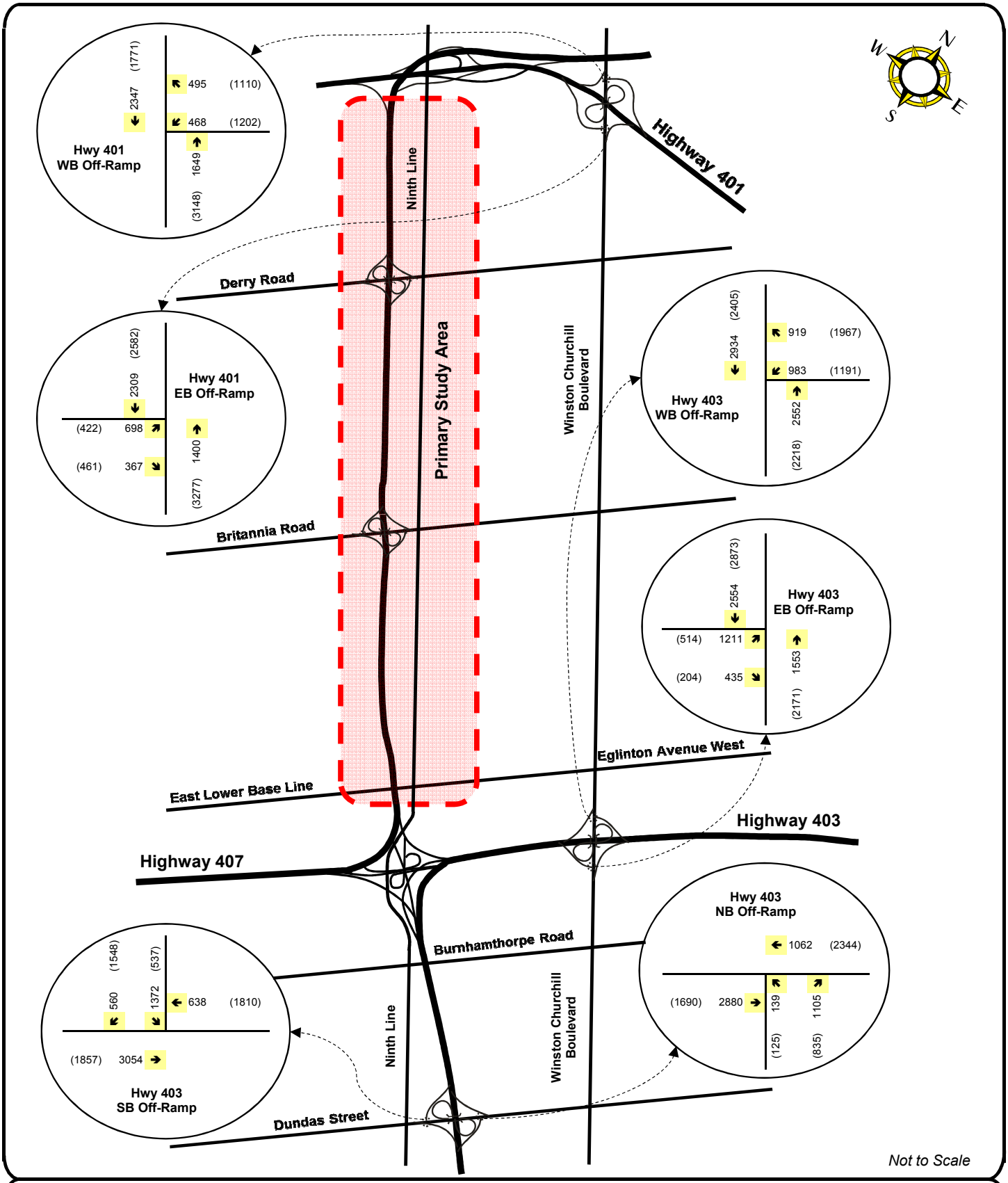


LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.6A

2041 Future Total Traffic Volumes
(Argentia Road Extension Scenario)



MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.6B

2041 Future Total Traffic Volumes
(Argentia Road Extension Scenario)
Secondary Study Area

TABLE 9.4
2041 FUTURE TOTAL TRAFFIC CONDITIONS – SCENARIO 4 (ARGENTIA EXTENSION)

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line & Argentia Road	Signalized	B (16)	--	C (31)	WB-TR (0.90) NB-L (0.92)
Ninth Line & Area 6-Transitway Driveway/ Terragar Boulevard	Signalized	B (15)	--	C (23)	--
Ninth Line & Derry Road	Signalized	D (38)	EB-TR (0.91) NB-L (0.90)	C (34)	--
Ninth Line & Area 5 Driveway/Doug Leavens Boulevard	Signalized	B (17)	--	B (12)	--
Ninth Line & Area 5 Driveway/Osprey Boulevard	Signalized	C (20)	--	B (16)	--
Ninth Line & Britannia Road	Signalized	D (54)	EB-TR (1.04) NB-L (1.00) NB-TR (0.99) SB-TR (0.98)	E (58)	EB-L (0.95) NB-L (0.97) NB-TR (1.01) SB-L (0.93) SB-TR (1.00)
Ninth Line & Area 3 Driveway/ Thomas Street	Signalized	C (22)	--	B (18)	--
Ninth Line & Erin Centre Boulevard	Signalized	B (15)	--	B (12)	--
Ninth Line & East Lower Base Line/Eglinton Avenue West	Signalized	D (42)	SB-L (0.93)	D (49)	WB-T (0.92) NB-TR (0.96) SB-L (0.94)
Lisgar Drive/Rosehurst Drive & Derry Road	Signalized	B (16)	--	B (14)	WB-L (1.01)
Churchill Meadows Boulevard/Maple Gate Circle & Britannia Road	Signalized	B (10)	SB-L (0.93)	A (6)	--
Churchill Meadows Boulevard & Thomas Street	Signalized	C (20)	--	B (15)	--
Eglinton Avenue West & Churchill Meadows Boulevard	Signalized	B (14)	--	C (20)	WB-TR (0.98)
Britannia Road & Hwy 407 SB Off-Ramp	Signalized	C (20)	--	C (24)	--
Hwy 407 NB Off-Ramp & Britannia Road	Signalized	B (12)	--	B (11)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Derry Road & Hwy 407 SB Off-Ramp	Signalized	A (4)	--	C (22)	--
Hwy 407 NB Off-Ramp & Derry Road	Signalized	A (1)	--	A (3)	--
Ninth Line & Golf Club Access	Unsignalized	E (35)	WB-L (0.01)	D (27)	--
Ninth Line & Area 6-Transitway Driveway/ Hazelridge Road	Unsignalized	E (50)	WB-L (0.39)	E (37)	EB-L (0.04)
Ninth Line & Beacham Street	Unsignalized	F (745)	WB-L (2.33) WB-R (2.33)	F (236)	WB-L (1.17) WB-R (1.17)
	Signalized	A (7)	--	A (4)	--
Ninth Line & Area 5 Driveway/Parkgate Drive	Unsignalized	C (19)	--	C (18)	--
Ninth Line & Freeman Terrace / Area 4 - Transitway Driveway	Unsignalized	E (40)	WB-L (0.19)	E (43)	EB-L (0.37)
Ninth Line & Area 4-Transitway Driveway / McDowell Drive	Unsignalized	E (35)	WB-L (0.18)	E (39)	EB-L (0.30)
Ninth Line & Lacman Trail	Unsignalized	D (26)	--	C (23)	--
Ninth Line & Brinwood Gate	Unsignalized	B (13)	--	B (12)	--
Ninth Line & Deepwood Heights	Unsignalized	C (20)	--	C (23)	--
Ninth Line & Tacc Drive	Unsignalized	C (21)	--	D (28)	--
Ninth Line & Area 2 Driveway/Janice Drive	Unsignalized	D (29)	--	D (27)	--
Ninth Line & Area 1 Driveway/Candlelight Drive	Unsignalized	E (49)	EB-L (0.16)	D (30)	--
Ninth Line & Skyview Street	Unsignalized	B (13)	--	C (16)	--
Ninth Line & Area 1 Driveway/Stardust Drive	Unsignalized	E (39)	EB-LTR (0.39)	C (21)	--
Rosehurst Drive & Terragar Boulevard	Unsignalized	C (20)	--	C (22)	--
Lisgar Drive & Doug Leavens Boulevard	Unsignalized	E (40)	SB-LTR (0.84)	C (24)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Lisgar Drive & Osprey Boulevard	Unsignalized	B (13)	--	A (9)	--
Churchill Meadows Boulevard & Freeman Terrace	Unsignalized	C (17)	--	B (13)	--
Churchill Meadows Boulevard & McDowell Drive	Unsignalized	D (25)	--	B (11)	--
Churchill Meadows Boulevard & Tacc Drive	Unsignalized	B (14)	--	A (10)	--
Churchill Meadows Boulevard & Erin Centre Boulevard	Unsignalized	C (21)	--	B (12)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (28)	--	F (104)	WB-LR (1.09) WB-R (1.21) NB-T (1.24)
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	C (27)	--	C (26)	EB-R (0.90) NB-T (0.93)
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	E (69)	WB-LR (1.03) WB-R (1.09) NB-T (0.96) SB-T (1.10)	F (127)	WB-LR (1.23) WB-R (1.29) NB-T (1.04) SB-T (1.24)
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	D (36)	EB-L (0.90) SB-T (0.90)	C (24)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	E (63)	EB-T (1.06) SB-LR (1.09)	D (52)	EB-T (0.92) SB-R (0.96)
Hwy 403 NB Off-Ramp at Dundas St	Signalized	D (55)	EB-T (1.07) NB-LR (0.97) NB-R (1.07)	C (23)	--

1) For signalized intersections, the level of service is based on the overall delay of the intersection.
2) For two-way stop controlled intersections, the level of service is based on the delay associated with the critical movements.
3) For All-Way Stop Control (AWSC) intersections, the level of service is based on the overall delay of the intersection.
4) LR means shared left-right turn lane

The results in Table 9.4 indicate that with the Emerging Land Use built-out and the extension of Argentia Road, most of the study intersections continue to operate at acceptable levels of service and within capacity. Overall, the total volumes on the study road network remains very similar with or without the Argentia Road extension. Based on the EMME model outputs as shown in Appendix J, there are generally some growth on Ninth Line as a result of more motorists destined to and from the Argentia Road connection. At the same time, the volumes along some of the east-west roads such as Britannia Road and Eglinton Avenue, as well as some of the highway off-ramps have decreased as a result of diverted traffic volumes onto Argentia Road.

From an infrastructure needs perspective, the key east-west intersections along Derry Road, Britannia Road and Eglinton Avenue are still forecast to operate at v/c ratios greater than 0.9. This indicates that even with the extension of Argentia Road over Highway 407, the widening improvements to Derry and Britannia Roads will still be needed to support the 2041 traffic volumes. Without these improvements, it is expected that the sections of Derry and Britannia Road within the City's jurisdiction would operate at over capacity.

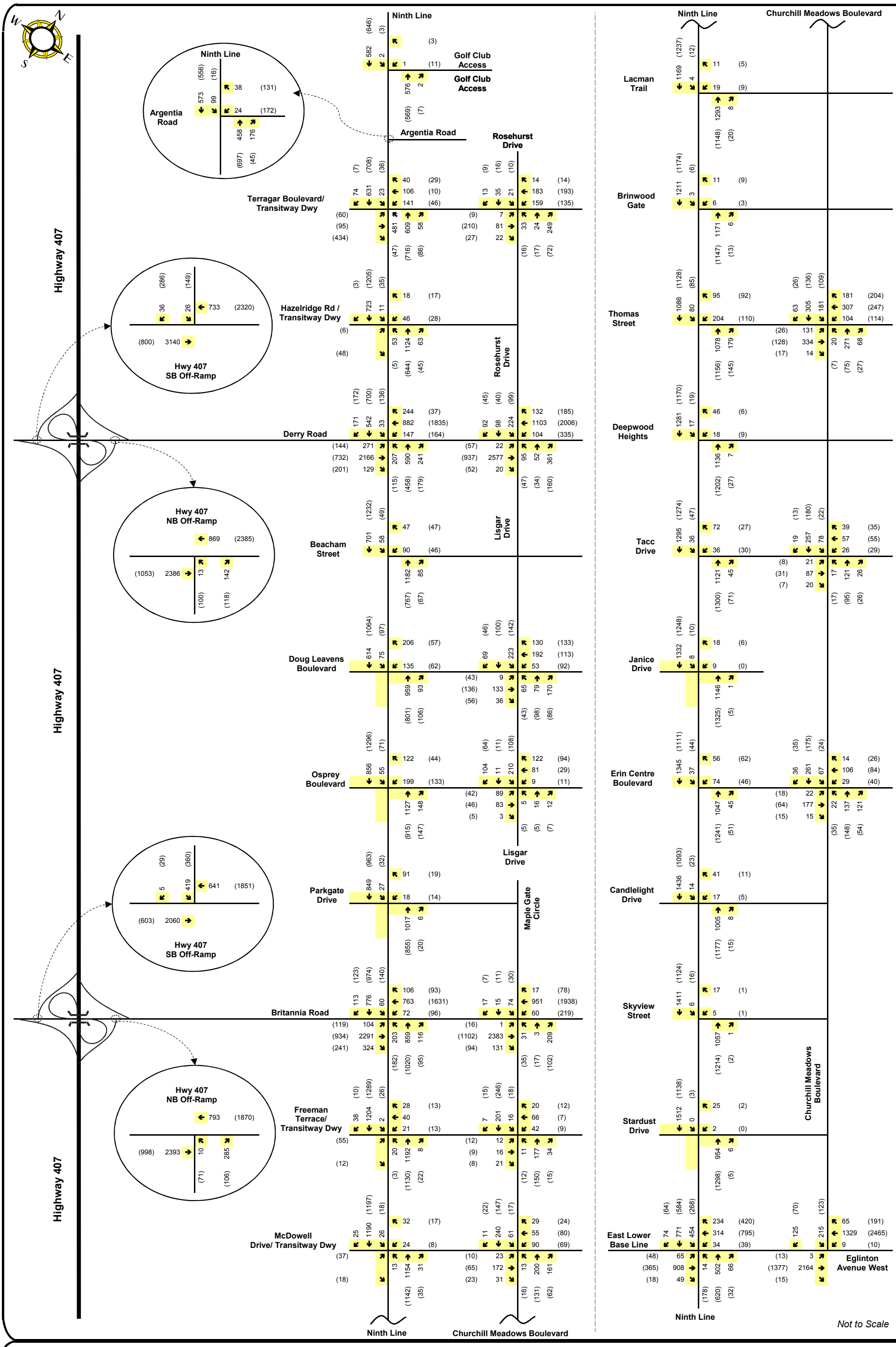
With the Argentia Road extension, the intersection at Ninth Line improves as a four-legged signalized intersection that is forecast to operate at good levels of service. Overall, with the Ninth Line widening and the Argentia Road extension, the study road network can accommodate the Emerging Land Use Concept traffic without the need for additional improvements beyond those required for future background conditions as summarized in Section 7.0.

The impacts to the highway off-ramp intersections along Winston Churchill Boulevard and Dundas Street are relatively minimal. The only exception is the Highway 401 westbound off-ramp at Winston Churchill Boulevard, where the delay increases by 13 seconds during the p.m. peak hour and the v/c ratio of the northbound through movement increases by 0.07. The Argentia Road extension may result in more vehicles turning from Argentia Road onto Winston Churchill Boulevard. However, as noted in Section 7.3.1, MTO is planning to improve this off-ramp intersection. Furthermore, it is anticipated that based on the good levels of service and the available capacity at Argentia Road and Ninth Line, some of the vehicles on Argentia Road will turn onto Ninth Line and proceed north to Steeles Avenue and one of the other north-south corridors - instead of Winston Churchill Boulevard if the longer delays persist at the off-ramp intersection.

9.5 Scenario 5 Future Total Assessment – 10% Increase in Non-Auto Modal Split Plus Greater Toronto Area West Highway Corridor

Scenario 5 assumes the build-out of the Greater Toronto Area West Highway Corridor (GTA West). In general terms, the GTA West will feature a 400-series Highway, a transitway, potential goods movement priority feature, and connect onto Highway 401 between Trafalgar Road and Highway 407. City staff provided EMME plots depicting the impact on the study area traffic volumes with this development. The plots are provided in Appendix J.

The magnitude of impact was developed by relating the difference in link traffic volumes to the do nothing traffic volumes. The percentages derived for each link, as shown in Appendix J, were then applied to the 2041 future background volumes in Figures 7.4A-B. The resulting 2041 future background volumes with the GTA West in place are shown in **Figure 9.7A** and **9.7B**.



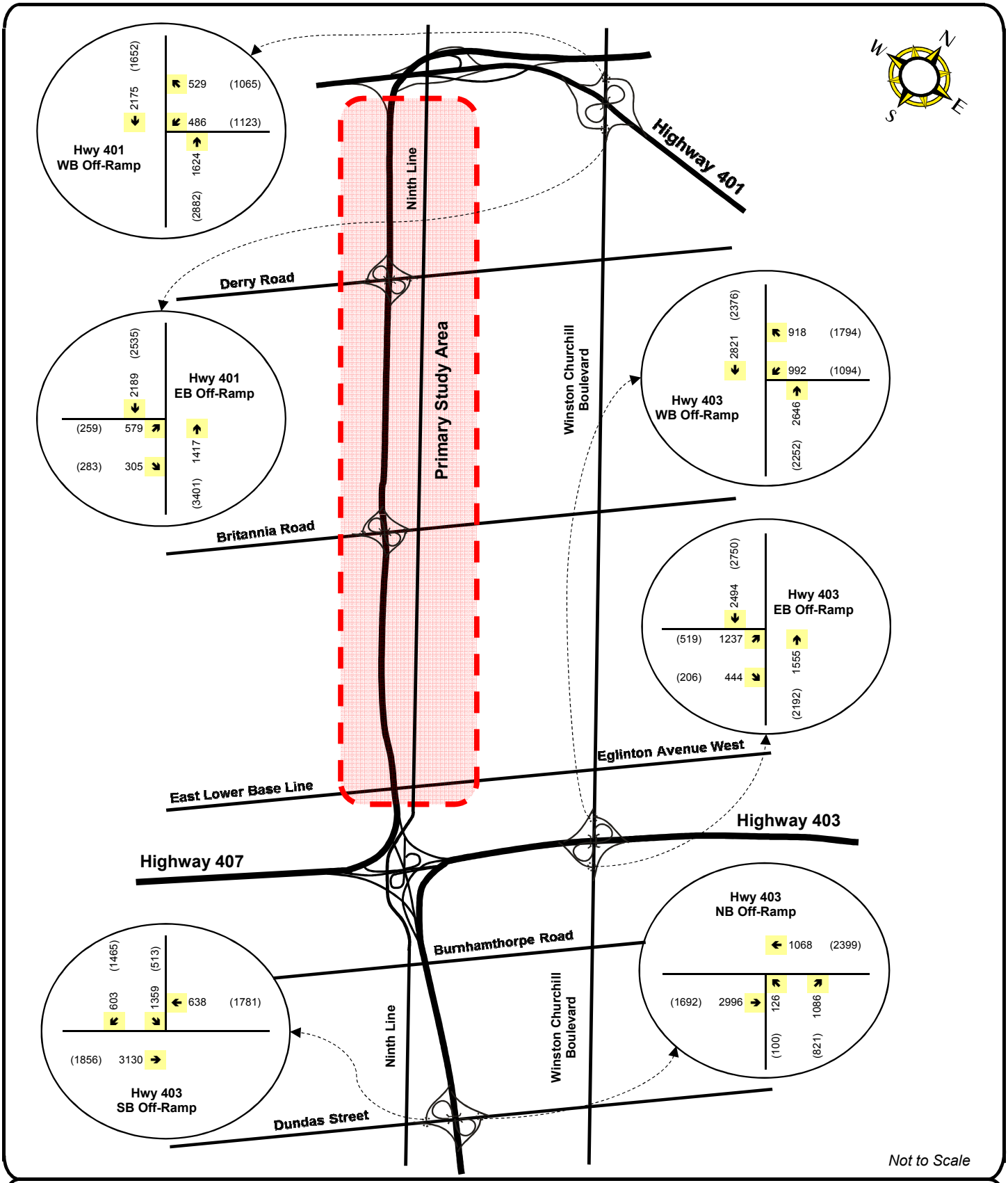
Not to Scale

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.7A

2041 Future Background Traffic Volumes
(GTA West Scenario)



Not to Scale

MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.7B

2041 Future Background Traffic Volumes
(GTA West Scenario)
Secondary Study Area

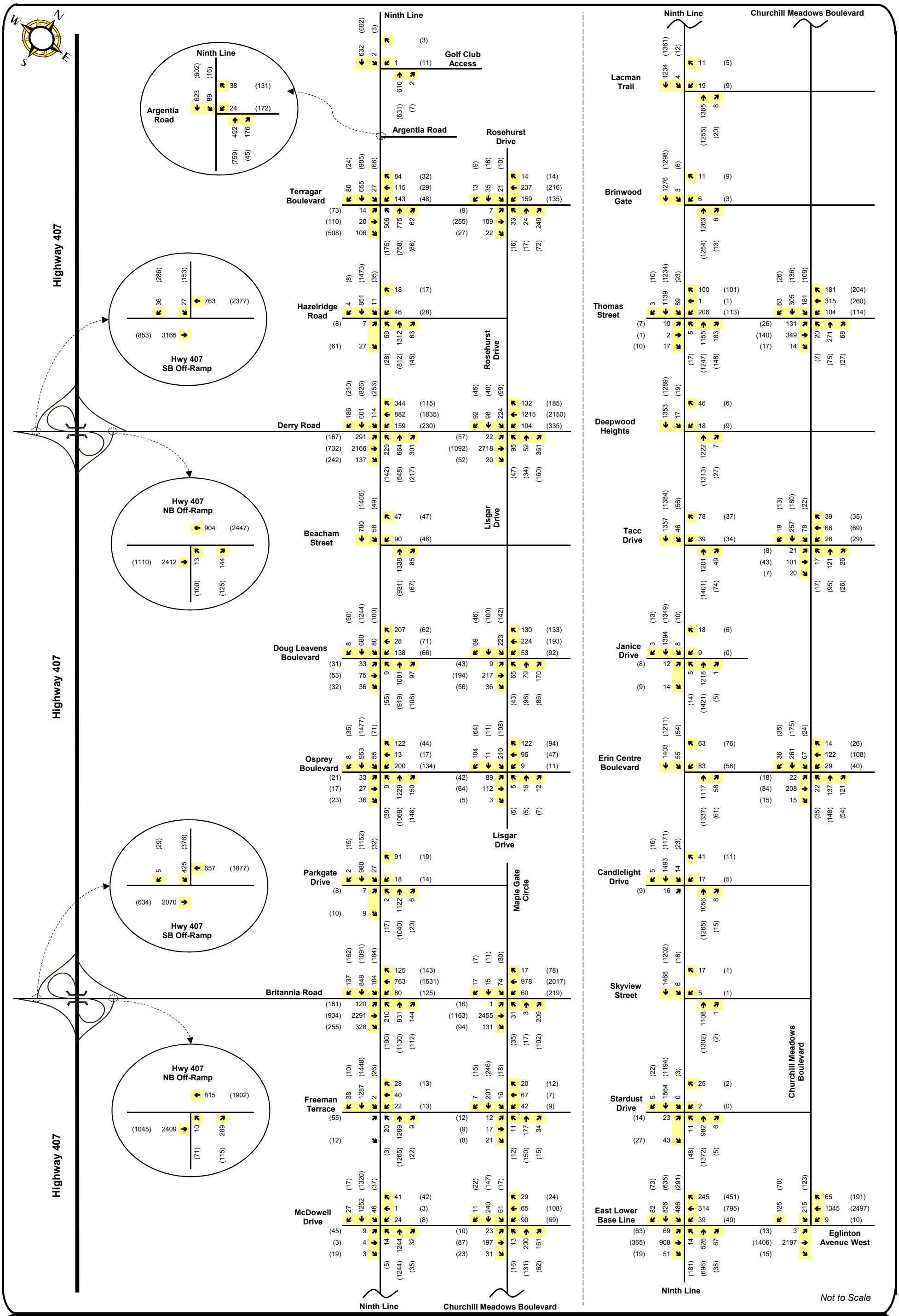
While it is acknowledged that some of the Land Use Concept trip assignment may change as a result of GTA West, the trip assignments have been maintained in Scenario 5. This results in a conservative assessment and also allows for an "Apples to Apples" comparison between Scenario 5 and other scenarios.

Scenario 5 future total traffic volumes were then derived by superimposing Figures 8.3A and 8.3B (site-generated traffic from the Emerging Land Use Scenario with 10% increase in non-auto modal split) onto the 2041 future background volumes in Figures 9.7A-B. The resulting Scenario 5 future total volumes are shown in **Figures 9.8A** and **9.8B**.

Based on these future total volumes, traffic operations were analyzed at the study intersections. The results of the intersection capacity analysis are summarized in **Table 9.5**. Detailed intersection capacity analysis sheets are included in **Appendix T.**

TABLE 9.5
2041 FUTURE TOTAL TRAFFIC CONDITIONS – SCENARIO 5

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line & Area 6-Transitway Driveway/ Terragar Boulevard	Signalized	B (18)	--	C (28)	EB-TR (0.91) NB-L (0.94)
Ninth Line & Derry Road	Signalized	D (39)	--	D (36)	WB-TR (0.90) SB-L (0.92)
Ninth Line & Area 5 Driveway/Doug Leavens Boulevard	Signalized	B (17)	--	B (11)	--
Ninth Line & Area 5 Driveway/Osprey Boulevard	Signalized	C (20)	--	B (16)	--
Ninth Line & Britannia Road	Signalized	D (53)	EB-TR (1.02) NB-L (1.00) NB-TR (1.01) SB-TR (0.99)	E (57)	EB-L (0.95) NB-L (0.97) NB-TR (1.00) SB-L (0.93) SB-TR (1.00)
Ninth Line & Area 3 Driveway/ Thomas Street	Signalized	C (22)	--	B (18)	--
Ninth Line & Erin Centre Boulevard	Signalized	B (15)	--	B (12)	--
Ninth Line & East Lower Base Line/Eglinton Avenue West	Signalized	D (42)	SB-L (0.93)	D (50)	EB-L (0.94) WB-T (0.93) NB-TR (0.96) SB-L (0.95)
Lisgar Drive/Rosehurst Drive & Derry Road	Signalized	B (17)	--	B (13)	WB-L (0.97)



LEGEND

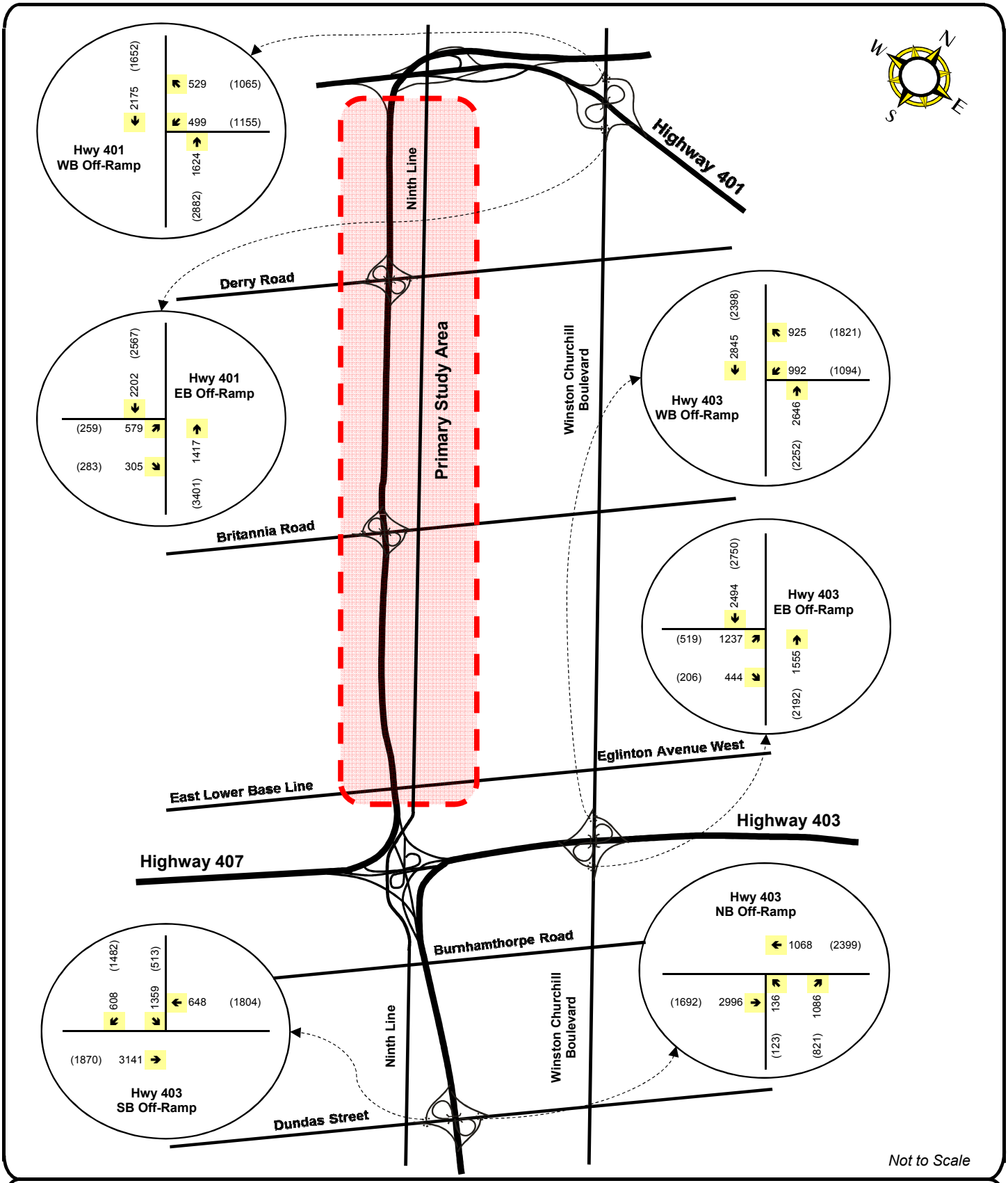
XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

Not to Scale

FIGURE 9.8A

2041 Future Total Traffic Volumes
(GTA West Scenario)

MMM GROUP



Not to Scale

MMM GROUP

LEGEND

XX AM Peak Hour Volumes
(XX) PM Peak Hour Volumes

FIGURE 9.8B

2041 Future Total Traffic Volumes
(GTA West Scenario)
Secondary Study Area

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Churchill Meadows Boulevard/Maple Gate Circle & Britannia Road	Signalized	A (9)	SB-L (0.93)	A (6)	--
Churchill Meadows Boulevard & Thomas Street	Signalized	C (21)	--	B (15)	--
Eglinton Avenue West & Churchill Meadows Boulevard	Signalized	B (15)	--	C (21)	WB-TR (0.99)
Britannia Road & Hwy 407 SB Off-Ramp	Signalized	C (20)	--	C (25)	--
Hwy 407 NB Off-Ramp & Britannia Road	Signalized	B (11)	--	B (11)	--
Derry Road & Hwy 407 SB Off-Ramp	Signalized	A (4)	--	B (16)	--
Hwy 407 NB Off-Ramp & Derry Road	Signalized	A (1)	--	A (3)	--
Ninth Line & Argentia Road	Unsignalized	D (27)	--	F (83)	WB-L (0.87)
Ninth Line & Golf Club Access	Unsignalized	D (34)	WB-L (0.01)	D (28)	--
Ninth Line & Area 6-Transitway Driveway/ Hazelridge Road	Unsignalized	F (70)	WB-L (0.49)	E (49)	EB-L (0.09)
Ninth Line & Beacham Street	Unsignalized	F (821)	WB-L (2.48) WB-R (2.48)	F (167)	WB-L (1.00) WB-R (1.00)
	Signalized	A (7)	--	A (4)	--
Ninth Line & Area 5 Driveway/Parkgate Drive	Unsignalized	C (19)	--	C (17)	--
Ninth Line & Freeman Terrace / Area 4 - Transitway Driveway	Unsignalized	E (41)	WB-L (0.20)	E (41)	EB-L (0.36)
Ninth Line & Area 4-Transitway Driveway / McDowell Drive	Unsignalized	E (37)	WB-L (0.19)	E (36)	EB-L (0.28)
Ninth Line & Lacman Trail	Unsignalized	D (27)	--	C (22)	--
Ninth Line & Brinwood Gate	Unsignalized	B (13)	--	B (12)	--
Ninth Line & Deepwood Heights	Unsignalized	C (20)	--	C (22)	--

Intersections	Control Type	A.M. Peak Hour		P.M. Peak Hour	
		LOS (Delay in seconds)	Critical Movements (v/c)	LOS (Delay in seconds)	Critical Movements (v/c)
Ninth Line & Tacc Drive	Unsignalized	C (21)	--	D (28)	--
Ninth Line & Area 2 Driveway/Janice Drive	Unsignalized	D (29)	--	D (27)	--
Ninth Line & Area 1 Driveway/Candlelight Drive	Unsignalized	E (50)	EB-L (0.17)	D (31)	--
Ninth Line & Skyview Street	Unsignalized	B (13)	--	C (16)	--
Ninth Line & Area 1 Driveway/Stardust Drive	Unsignalized	E (39)	EB-LTR (0.39)	C (21)	--
Rosehurst Drive & Terragar Boulevard	Unsignalized	C (19)	--	B (13)	--
Lisgar Drive & Doug Leavens Boulevard	Unsignalized	E (35)	WB-TR (0.82)	D (26)	--
Lisgar Drive & Osprey Boulevard	Unsignalized	B (13)	--	A (9)	--
Churchill Meadows Boulevard & Freeman Terrace	Unsignalized	C (17)	--	B (13)	--
Churchill Meadows Boulevard & McDowell Drive	Unsignalized	C (22)	--	B (11)	--
Churchill Meadows Boulevard & Tacc Drive	Unsignalized	B (14)	--	A (10)	--
Churchill Meadows Boulevard & Erin Centre Boulevard	Unsignalized	C (21)	--	B (11)	--
Winston Churchill Blvd at Hwy 401 WB Off-Ramp	Signalized	C (28)	--	F (81)	WB-LR (1.03) WB-R (1.14) NB-T (1.15)
Winston Churchill Blvd at Hwy 401 EB Off-Ramp	Signalized	C (23)	--	B (18)	--
Winston Churchill Blvd at Hwy 403 WB Off-Ramp	Signalized	E (69)	WB-LR (1.02) WB-R (1.07) NB-T (1.01) SB-T (1.08)	F (109)	WB-LR (1.17) WB-R (1.22) NB-T (1.02) SB-T (1.19)
Winston Churchill Blvd at Hwy 403 EB Off-Ramp	Signalized	D (36)	EB-L (0.91)	C (24)	--
Dundas St at Hwy 403 SB Off-Ramp	Signalized	E (68)	EB-T (1.07) SB-LR (1.10)	D (50)	SB-R (0.95)
Hwy 403 NB Off-Ramp at Dundas St	Signalized	E (59)	EB-T (1.08) NB-LR (1.00) NB-R (1.09)	C (23)	--

1) For signalized intersections, the level of service is based on the overall delay of the intersection.
2) For two-way stop controlled intersections, the level of service is based on the delay associated with the critical movements.
3) For All-Way Stop Control (AWSC) intersections, the level of service is based on the overall delay of the intersection.
4) LR means shared left-right turn lane

Based on the EMME model outputs as shown in Appendix J, traffic are gravitating to the GTA West facility via Trafalgar Road, Highway 407 and Highway 401 from the west. The results in Table 9.5 indicate that with the Emerging Land Use built-out and the GTA West, almost all of the study intersections are forecast to operate at acceptable levels of service during both the weekday a.m. and p.m. peak hour. The infrastructure improvements required under the other Scenarios are still applicable with the implementation of the GTA West.

The busier intersections of Derry Road, Britannia Road and Eglinton Avenue at Ninth Line, from future total Scenarios 1 through 4 continue to be the case for Scenario 5. The findings suggest that the build-out of the GTA West will not have significant negative impact on the Ninth Line study corridor and no additional improvements are required to support the Emerging Land Use Concept traffic. The impacts to the highway off-ramp intersections along Winston Churchill Boulevard and Dundas Street are also minimal. In fact, intersection operations improve at the Highway 401 off-ramp intersections onto Winston Churchill Boulevard with the implementation of the GTA West, relative to the future background conditions with Ninth Line widening.

10.0 TRANSPORTATION DEMAND MANAGEMENT STRATEGIES

TDM is a wide range of policies, programs, services and products that influence how, why, when and where people travel to make travel behaviours more sustainable. It can, include the most efficient and effective use of existing transportation infrastructure.

As outlined in the assessment of future total Scenarios 1 through 5, it is imperative to encourage and enhance non-auto modal split within the study area. Doing so will lead to the accommodation of not only the site-generated traffic from the Emerging Land Use Concept, but also the future background development and general growth. In conjunction with the land use policy being developed the following Transportation Demand Management (TDM) strategies can be considered to help provide programs that support all who live, work, visit the community via non-single occupant auto modes.

Transit

- Take advantage of the proximity to the two 407 Transitway Stations by working with local transit services or car-share providers to complete the last mile trip. Doing so will reduce the number of transit riders driving to the stations and creating congestion in and around the gateways. For example, parking supply equivalencies or dedicated/preferred parking facilities could be established for car-share providers such as Zipcar, AutoShare, Uber, etc;

- Build in conditions for future developments to promote Presto Card use. For example for residential or office uses, Presto Cards preloaded with certain amount could be given out to encourage the use of local public transit;

- Work with Smart Commute Halton Region and Mississauga to optimize the use of available infrastructures noted in Section 4.0, to further reduce peak hour auto trips and to introduce new and more proactive TDM measures. For example, pilot projects such as providing transit schedule information screens at central locations within the Emerging Land Use Concept could help raise awareness on the availability and convenience of transit;

- Use of technology – TDM programs have long utilized online ride matching programs to encourage carpooling, transit planners to increase the ease of taking transit among others. As technology has evolved there is an exciting opportunity to develop smart phone apps that will provide all visitors, workers and residents with information about all travel options to and from the Ninth Line lands

Active Transportation

Protect for cycling potential through cycling-related infrastructure and enforcement of bicycle parking provision in future development proposals. Cycling aspects in the Mississauga Cycling Master Plan (Chapter 11) will be protected. For instance, bicycle racks should be located in visible and safe locations near entrances to major uses. For longer-term storage of bicycles, there should be covered bicycle lockers and shower facilities available for workers and storage in the residential buildings for those living on site.

Bike sharing is a program where there could be a promotional opportunity to encourage cycling and make access to bicycles simpler for those working and visiting the site, as well as those destined to and from the 407 Transitway stations.
To encourage the use a bike share program and longer-term participation, discounted fees for memberships could be provided. Bicycles could be used for workday travel rather than taxis or a private car for shorter trips. An area to accommodate a bike station could be reserved as part of future development proposals.

Parking

Unbundle residential parking spaces, meaning that only those persons who specifically request and ultimately purchase a parking space are guaranteed one. This parking demand strategy will, in essence, serve to target buyers who do not rely on automobile ownership. The high cost of purchasing a parking space, coupled with the other TDM strategies, will make this development more desirable to users of non-single auto modes of travel.

In addition to the establishment of minimum parking requirements in the By-laws, maximum parking rates should also be included. This is an important tool to limit the number of auto trips from the study area and have a positive influence on non-auto modes.

Priority parking is an important part of the encouragement of the use of sustainable transportation. Providing parking near entrances for carpools, electric vehicles and carshare will help to encourage the use of these modes. Registered carpools could also be provided with discounted or free parking to encourage increasing vehicle occupancies for those coming on site. In addition, carshare program investment could be initiated by allowing reductions in regular parking requirement based on the provision of carshare spaces.

TDM Coordinator

The creation of a program supporting sustainable mobility requires oversight and day-to-day management. Key to the achievement of the Ninth Line TDM measures is the on-going development and support for TDM programs and their coordination, marketing and monitoring. This requires that an individual is located onsite who will assume an ongoing role and responsibility as TDM Coordinator. This ongoing role and responsibility would be focused on developing TDM programs and ensuring that they are sustained over the long term. This would include working with external agencies such as 407 Transitway, Mississauga MiWay, Mississauga Smart Commute staff, Halton Region Smart Commute staff, carshare companies, as well as the monitoring of the effectiveness of any TDM initiatives. It should be noted that the City of Mississauga already has a TDM coordinator.

Case Studies of TDM Implementation

Sample applications of TDM strategies in North America are provided below for context.

Location	Description of Site	Programs undertaken
North York Centre, Toronto, ON	North York Centre is located along Yonge Street in the northern end of the City of Toronto. It has evolved over time to include several condominiums, office buildings and retail establishments. The surrounding communities are stable residential areas. Yonge Street is also a major conduit of traffic from communities beyond North York Centre.	Home-based trips generated within the study areas are much more reliant on walking than trips into the area. "The findings suggest an adaptation of the travel patterns of residents to the mixed-use nature with a higher reliance on walking for study area residents relative to people coming from outside A survey conducted in North York Centre determined the extent that workers used the retail and hospitality facilities within the node and how they travel to reach the facilities. Where there is a high number of mixed-use buildings, employees frequented restaurants in their own buildings more frequently. Modal share for trips within nodes by workers: 16% by car; 67% by walking and 17% by bus or subway (Neptis Foundation).
Legacy Town Centre, Plano TX	Plano is a suburb of Dallas-Fort Worth. The Legacy Town Centre develop encompasses 75 acres within the Legacy Business Park. It contains a mix of uses – retail, commercial, office, residential, hotel. The area is very walkable and adjacent to a DART station.	The Legacy Town Centre is situated in an existing suburban business park with freestanding corporate offices, surrounded by residential and commercial neighbourhoods. Upon build out, it is intended to be a major suburban activity centre that will serve the residents of the site as well as those around it. The internal trip capture surveys indicated that while there were a significant number of trips made, very few were from office to other locations while there was a high number from retail to other locations on site.
Atlantic Station, Atlanta, GA	This development is located on a former steel mill site that has been rehabilitated in proximity to the midtown area of Atlanta. At full build out it will include: retail, residential, employment on 138 acres, with 6 million square feet of office, 2 million square feet of retail/entertainment, and 3,000 to 5,000 residential units.	They concluded that, based on the Atlantic Station results, adults were more likely to increase their levels of walking for both recreation and transportation, decrease their automobile travel, and increase their use of public transportation upon moving to a mixed-use development The urban form and transportation options did not alone account for the modal shares on the site. The transportation plan that was developed for the site includes the development of the Atlantic Station Access and Mobility Program (ASAP+), which provides the multi-modal site with a number of programs to encourage the use of sustainable modes.

11.0 SAFETY

As part of the Ninth Line Study, the key safety implications have been identified as follow:

- The implementation of the two 407 Transitway stations within the study area increases the frequency and proportion of heavy vehicles (buses). The implication of this should be communicated to stakeholders;
- Driving patterns may change as the characteristics of the Ninth Line corridor evolves with additional lanes and intensification. Speed adherence monitoring may be considered;
- At the detailed design and site plan application stages, the sightlines from the proposed driveways/roads onto Ninth Line should be included, especially with the speed differential from the driveway onto Ninth Line. This includes the evaluation of turn storages and the need for dedicated turn lanes to accommodate the land use that materializes;
- After the implementation of certain improvements, ensure that turning movement counts be done to see if turning patterns warrant the need for pavement marking changes. For example, if the number of left-turns drastically exceed the number of through, then a dedicated left-turn storage should be considered to avoid last minute lane changes, weaving patterns or lane blockages;
- With the intensification of residential uses on the west side of Ninth Line, there will be a need to ensure pedestrian and student safety to and from uses such as parks and school sites. For example, a pedestrian assessment or School Crossing Guard Study should be completed (based on the OTC 2017 School Crossing Guard Guide) to understand the provision of how students will safely get to school without necessarily being driven. Furthermore, pedestrian crossing times at signalized intersections should be based on the appropriate walk speed and the crossing distance of the intersection so that there is sufficient time to cross safely;
- The collision rates along Ninth Line within the study area are relatively low. As the road is widened, ongoing monitoring of the collision rates along the corridor should be undertaken; and
- Cycling operations should be evaluated based on the intended plan for cyclist either to have dedicated lanes, multi-use path or on-road. (i.e., sufficient signage, storage area and buffer space).

In certain instances, improvements have been made where the widening of roadways reduces the need to merge or weave since the number of receiving lanes matches the through lanes (to prevent lane drops). As there will be buses servicing stops along Ninth Line, it is important to consider how the bus stops will be implemented. (i.e., lay-by, curbside, queue jump lane, or if transit signal priority is required particularly with additional Transitway vehicles). Further monitoring of the safety aspects as the Ninth Line corridor redevelops is recommended.

12.0 CONCLUSIONS

Based on the preceding assessment the following key findings have been identified:

407 Transitway Stations

The two Transitway stations modeled in the vicinity of Britannia Road and Derry Road along Ninth Line are projected to generate 850 trips during either the weekday a.m. or p.m. peak hours. This is based on the very conservative assumption that the parking capacity of both stations total 4,000 parking spaces.

Future Background Traffic Conditions

Under future background conditions (business as usual), which includes the EMME projected general growth, background development-generated traffic and the 407 Transitway-generated traffic, the following improvements are required *in addition* to the planned improvements by the City and the surrounding jurisdictions:

Road Widening:

- Widening of Derry Road from 4 lanes to 6 lanes from the City's westmost limit eastward to Winston Churchill Boulevard;

- Widening of Britannia Road from 4 lanes to 6 lanes from the City's westmost limit eastward to Winston Churchill Boulevard; and

- Widening the west leg of Eglinton Avenue at Ninth Line from 1 eastbound through lane to 2. There are already two receiving lanes in the east leg of this intersection to facilitate this improvement.

Control and Signal timing modifications:

- At the intersection of Derry Road and Ninth Line, implement a permissive/ protected phase for the westbound left-turn movement during the weekday a.m. peak hour;

- At the intersection of Derry Road and Rosehurst Drive/Lisgar Drive, implement a permissive/protected phase for the westbound left-turn movement during the weekday a.m. peak hour;

- At the intersection of Britannia Road and Maple Gate Circle/Churchill Meadows Boulevard, implement a permissive/protected phase for the westbound left-turn movement during the weekday a.m. peak hour;

- Signals are recommended at the intersection of Ninth Line and Terragar Boulevard/Transitway Driveway since signal warrants are met under future background conditions to support the Transitway-related traffic volumes;

- The monitoring of signal warrants at the intersection of Ninth Line/Beacham Street; and

- At the intersection of Eglinton Avenue West and Ninth Line, implement a permissive/protected phase for the northbound left-turn movement during the weekday p.m. peak hour.

Emerging Land Use Concept

Under the most conservative 407 Transitway implementation scenario of 5% increase in non-auto modal split, the proposed Emerging Land Use Concept is forecast to generate 1,126 and 1,451 trips during the weekday a.m. and p.m. peak hours, respectively.

Under the moderate 407 Transitway implementation scenario of 10% increase in non-auto modal split, the proposed Emerging Land Use Concept is forecast to generate 1,053 and 1,363 trips during the weekday a.m. and p.m. peak hours, respectively.

Under the most successful 407 Transitway implementation scenario of 20% increase in non-auto modal split, the proposed Emerging Land Use Concept is forecast to generate 910 and 1,185 trips during the weekday a.m. and p.m. peak hours, respectively.

Future Total Traffic Conditions

Five future total scenarios have been evaluated in this assessment:

- **Scenario 1:** Emerging Land Use Concept – with 5% increase in non-auto modal split from the implementation of 407 Transitway. The traffic volumes associated with this scenario can be accommodated with the widening of Ninth Line. The recommended additional background improvements such as the widening of Derry and Britannia are still required to support the overall 2041 volumes. The impacts to the highway off-ramp intersections are minimal;

- **Scenario 2:** Emerging Land Use Concept – with 10% increase in non-auto modal split from the implementation of 407 Transitway. The traffic volumes associated with this scenario can be accommodated with the widening of Ninth Line. The recommended additional background improvements such as the

widening of Derry and Britannia are still required to support the overall 2041 volumes. The impacts to the highway off-ramp intersections are minimal;

- **Scenario 3:** Emerging Land Use Concept – with 20% increase in non-auto modal split from the implementation of 407 Transitway. The traffic volumes associated with this scenario can be accommodated with the widening of Ninth Line. The recommended additional background improvements such as the widening of Derry and Britannia are still required to support the overall 2041 volumes. The impacts to the highway off-ramp intersections are minimal;

- **Scenario 4:** Emerging Land Use Concept plus the extension of Argentia Road over Highway 407 – with 10% increase in non-auto modal split from the implementation of 407 Transitway. The traffic volumes associated with this scenario can be accommodated without additional improvements beyond what is required for the future total Scenarios 1 to 3. The recommended additional background improvements such as the widening of Derry and Britannia are still required to support the overall 2041 volumes; and

- **Scenario 5:** Emerging Land Use Concept plus the Greater Toronto Area West Highway Corridor – with 10% increase in non-auto modal split from the implementation of 407 Transitway. The traffic volumes associated with this scenario can be accommodated without additional improvements beyond what is required for the future total Scenarios 1 to 3. The recommended additional background improvements such as the widening of Derry and Britannia are still required to support the overall 2041 volumes. The impacts to the highway off-ramp intersections are minimal.