

REGIONAL MUNICIPALITY OF YORK

# LANGSTAFF ROAD EA STUDY - WESTON ROAD TO HIGHWAY 7 TRAFFIC ANALYSIS REPORT

AUGUST 2021





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## TRAFFIC ANALYSIS REPORT

REGIONAL MUNICIPALITY OF YORK

TECHNICAL REPORT

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# TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	TRANSPORTATION NETWORK.....	2
2.1	Road Network and Land Use.....	2
2.2	Transit Network.....	3
2.2.1	Bus.....	3
2.2.2	Subway.....	4
2.2.3	Commuter Rail.....	4
2.3	Active Transportation Network.....	4
3	EXISTING (2016) TRAFFIC CONDITIONS.....	6
3.1	Existing Intersection Lane Configuration.....	6
3.2	Traffic Volumes.....	9
3.2.1	Data Sources.....	9
3.2.2	Existing (2016) Traffic Volumes.....	10
3.2.3	Commercial Vehicles.....	13
3.2.4	Screenline Analysis for Existing Conditions.....	16
3.3	Intersection Operations.....	20
3.3.1	Langstaff Road.....	21
3.3.2	Highway 400 Interchange Ramp Terminals.....	25
3.4	Highway 400 Mainline Operations.....	26
3.5	Rail Exposure Index.....	26
4	COLLISION HISTORY.....	28
4.1	Collisions at Intersections.....	29
4.2	Collisions at Mid-Block Locations.....	33
5	FUTURE (2041) TRAFFIC CONDITIONS.....	34
5.1	York Region's Transportation Master Plan (2016).....	34
5.1.1	Strategic Goods Movement Network Context.....	35
5.2	Langstaff Road Improvement Scenarios.....	36
5.3	Screenline Analysis for Future Conditions.....	36
5.3.1	Capacity Analysis Results.....	49



<b>5.4</b>	<b>Future Lane Configuration Recommendations</b> .....	<b>52</b>
5.4.1	Future Intersection Lane Configuration – Simulation 1 .....	52
5.4.2	Future Intersection Lane Configuration – Simulation 2.....	5-59
<b>5.5</b>	<b>Interim Lane Configurations Recommendations</b> .....	<b>66</b>
5.5.1	Interim (2041) Traffic Volumes .....	68
5.5.2	Interim (2041) Intersection Operations .....	70
<b>5.6</b>	<b>Needs and Justifications</b> .....	<b>72</b>
<b>6</b>	<b>HIGHWAY 400 AND LANGSTAFF ROAD INTERCHANGE</b> .....	<b>74</b>
<b>6.1</b>	<b>Highway 400 Interchange Design Alternatives</b> .....	<b>74</b>
<b>6.2</b>	<b>Future 2041 Highway 400 Traffic Conditions</b> .....	<b>75</b>
6.2.1	Average Travel Times .....	75
6.2.2	Average Speeds.....	76
<b>6.3</b>	<b>Highway 400 Ultimate Widening</b> .....	<b>78</b>
<b>6.4</b>	<b>Study Findings</b> .....	<b>80</b>
<b>7</b>	<b>CONCLUSION</b> .....	<b>81</b>
<b>7.1</b>	<b>Langstaff Road Improvements</b> .....	<b>81</b>
<b>7.2</b>	<b>Future Corridor Study</b> .....	<b>82</b>

## TABLES

TABLE 3-1: SURVEY DATES FOR LANGSTAFF ROAD INTERSECTIONS.....	9
TABLE 3-2: TRUCK VOLUMES ON REGIONAL ROADS IN STUDY AREA VICINITY.....	13
TABLE 3-3: VOLUME TO CAPACITY RATIO RATINGS .....	17
TABLE 3-4: INTERSECTION LOS CRITERIA.....	21
TABLE 3-5: LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS – MORNING PEAK HOUR .....	22
TABLE 3-6: LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS – AFTERNOON PEAK HOUR .....	23
TABLE 3-7: HIGHWAY 400 RAMP TERMINAL LOS SUMMARY AND CRITICAL MOVEMENTS – MORNING PEAK HOUR.....	25



TABLE 3-8: HIGHWAY 400 RAMP TERMINAL LOS SUMMARY AND CRITICAL MOVEMENTS – AFTERNOON PEAK HOUR.....	25
TABLE 3-9: RAIL EXPOSURE INDEX CALCULATION .....	26
TABLE 3-10: FUTURE 2041 RAIL EXPOSURE INDEX CALCULATION.....	27
TABLE 4-1: INTERSECTION COLLISION DETAILS.....	31
TABLE 5-1: YORK REGION GROWTH TARGETS WITHIN EXTENDED AREA .....	34
TABLE 5-2: LANGSTAFF ROAD EA IMPROVEMENT SCENARIOS.....	36
TABLE 5-3: COMPARISON OF VOLUMES FOR SCREENLINE ADJACENT TO HIGHWAY 400 .....	47
TABLE 5-4: COMPARISON OF CRITICAL SCREENLINE V/C RATIOS.....	49
TABLE 5-5: COMPARISON OF SCREENLINE VOLUMES .....	51
TABLE 5-6: FUTURE (2041) LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS - MORNING PEAK HOUR .....	5-56
TABLE 5-7: FUTURE (2041) LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS - AFTERNOON PEAK HOUR.....	5-58
TABLE 5-8: FUTURE (2041) LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS - MORNING PEAK HOUR .....	63
TABLE 5-9: FUTURE (2041) LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS - AFTERNOON PEAK HOUR.....	64
TABLE 5-10: INTERIM (2041) LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS - MORNING PEAK HOUR .....	70
TABLE 5-11: INTERIM (2041) LANGSTAFF ROAD INTERSECTION LOS SUMMARY AND CRITICAL MOVEMENTS - AFTERNOON PEAK HOUR.....	71
TABLE 6-1: HIGHWAY 400 INTERCHANGE IMPROVEMENT SCENARIOS.....	74
TABLE 6-2: FUTURE 2041 MORNING PEAK PERIODS - AVERAGE TRAVEL TIME .....	75
TABLE 6-3: FUTURE 2041 AFTERNOON PEAK PERIODS - AVERAGE TRAVEL TIME.....	76
TABLE 6-4: FUTURE 2041 MORNING PEAK PERIODS - AVERAGE SPEED .....	76
TABLE 6-5: FUTURE 2041 AFTERNOON PEAK PERIODS - AVERAGE SPEED .....	77



TABLE 6-6: FUTURE 2041 AFTERNOON PEAK PERIODS - AVERAGE TRAVEL TIME NORTHBOUND .....	79
TABLE 6-7: FUTURE 2041 AFTERNOON PEAK PERIODS - AVERAGE SPEEDS NORTHBOUND .....	79

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## EXHIBITS

EXHIBIT 1-1: LANGSTAFF ROAD EA STUDY AREA .....	1
EXHIBIT 2-1: EXISTING ROAD NETWORK .....	2
EXHIBIT 2-2: YRT BUS ROUTE MAP .....	3
EXHIBIT 2-3: ACTIVE TRANSPORTATION NETWORK .....	5
EXHIBIT 3-1: LANGSTAFF ROAD EXISTING INTERSECTION LANE CONFIGURATIONS .....	7
EXHIBIT 3-2: HIGHWAY 400/HIGHWAY 7 I/C RAMP TERMINAL LANE CONFIGURATIONS .....	8
EXHIBIT 3-3: HIGHWAY 400/BASS PRO MILLS DRIVE I/C RAMP TERMINAL LANE CONFIGURATION .....	8
EXHIBIT 3-4: HIGHWAY 400/RUTHERFORD ROAD I/C RAMP TERMINAL LANE CONFIGURATIONS .....	8
EXHIBIT 3-5: LANGSTAFF ROAD EXISTING PEAK HOUR TURNING VOLUMES .....	11
EXHIBIT 3-6: HIGHWAY 400/HIGHWAY 7 I/C PEAK HOUR TURNING VOLUMES .....	12
EXHIBIT 3-7: HIGHWAY 400/BASS PRO MILLS DRIVE I/C PEAK HOUR TURNING VOLUMES .....	12
EXHIBIT 3-8: HIGHWAY 400/RUTHERFORD ROAD I/C PEAK HOUR TURNING VOLUMES .....	12
EXHIBIT 3-9: 8-HOUR TRUCK TURNING MOVEMENT COUNTS AND TRUCK MODAL SHARE (%) IN THE VICINITY OF STUDY AREA .....	15
EXHIBIT 3-10: SCREENLINE LOCATIONS .....	17
EXHIBIT 3-11: EXISTING - MORNING PEAK HOUR NORTH- SOUTH SCREENLINE V/C .....	18
EXHIBIT 3-12: EXISTING - MORNING PEAK HOUR EAST- WEST SCREENLINE V/C .....	19
EXHIBIT 3-13: EXISTING - MORNING PEAK HOUR LINK V/C AT CN RAIL YARD .....	20
EXHIBIT 4-1: TOTAL COLLISION DISTRIBUTION WITHIN STUDY AREA (2011-2015) .....	28
EXHIBIT 4-2: INTERSECTION COLLISION DISTRIBUTION WITHIN STUDY AREA (2011-2015) .....	29
EXHIBIT 4-3: APPARENT DRIVER ACTION AT SELECT LOCATIONS (CLEAR ENVIRONMENT, EXCLUDING REAR-END COLLISIONS) .....	32
EXHIBIT 4-4: MID-BLOCK COLLISION DISTRIBUTION (REPORTED AT NEAREST INTERSECTION) IN STUDY AREA .....	33



EXHIBIT 5-1: FUTURE BASE CASE - AM PEAK HOUR NORTH-SOUTH SCREENLINE V/C .....	37
EXHIBIT 5-2: FUTURE BASE CASE - AM PEAK HOUR EAST- WEST SCREENLINE V/C .....	38
EXHIBIT 5-3: FUTURE BASE CASE - AM PEAK HOUR LINK V/C AT CN RAIL YARD .....	39
EXHIBIT 5-4: LANGSTAFF EAST IMPROVEMENTS .....	40
EXHIBIT 5-5: FUTURE EAST IMPROVEMENTS - AM PEAK HOUR NORTH-SOUTH SCREENLINE V/C .....	40
EXHIBIT 5-6: FUTURE EAST IMPROVEMENTS - AM PEAK HOUR EAST-WEST SCREENLINE V/C .....	41
EXHIBIT 5-7: FUTURE EAST IMPROVEMENTS - AM PEAK HOUR LINK V/C AT CN RAIL YARD .....	41
EXHIBIT 5-8: LANGSTAFF WIDENED FOR TRANSIT/HOV AND CONNECTION OF LANGSTAFF .....	42
EXHIBIT 5-9: FUTURE BUILD CONNECTION & TRANSIT/HOV LANES - AM PEAK HOUR NORTH-SOUTH SCREENLINE V/C .....	43
EXHIBIT 5-10: FUTURE BUILD CONNECTION & TRANSIT/HOV LANES - AM PEAK HOUR EAST-WEST SCREENLINE V/C .....	43
EXHIBIT 5-11: FUTURE BUILD CONNECTION & TRANSIT/HOV LANES - AM PEAK HOUR LINK V/C AT CN RAIL YARD .....	44
EXHIBIT 5-12: LANGSTAFF WIDENED FOR TRANSIT/HOV, BUILD CONNECTION AND INTERCHANGE IMPROVEMENTS .....	45
EXHIBIT 5-13: FUTURE BUILD CONNECTION, TRANSIT/HOV LANES AND FULL IC - AM PEAK HOUR NORTH-SOUTH SCREENLINE V/C .....	45
EXHIBIT 5-14: FUTURE BUILD CONNECTION, TRANSIT/HOV LANES AND FULL IC - AM PEAK HOUR EAST-WEST SCREENLINE V/C .....	46
EXHIBIT 5-15: FUTURE BUILD CONNECTION, TRANSIT/HOV LANES AND FULL IC - AM PEAK HOUR LINK V/C AT CN RAIL YARD) .....	46
EXHIBIT 5-16: FUTURE BUILD CONNECTION, 6-GPL AND FULL IC - AM PEAK HOUR NORTH-SOUTH SCREENLINE V/C .....	48
EXHIBIT 5-17: FUTURE BUILD CONNECTION, 6-GPL AND FULL IC - AM PEAK HOUR EAST-WEST SCREENLINE V/C .....	48
EXHIBIT 5-18: FUTURE BUILD CONNECTION, 6-GPL AND FULL IC - AM PEAK HOUR LINK V/C AT CN RAIL YARD .....	49
EXHIBIT 5-19: LANGSTAFF ROAD PROPOSED INTERSECTION LANE CONFIGURATIONS – SIMULATION 1 .....	53
EXHIBIT 5-20: FUTURE (2041) LANGSTAFF ROAD PEAK HOUR TURNING VOLUMES – SIMULATION 1 .....	55



EXHIBIT 5-21: LANGSTAFF ROAD PROPOSED INTERSECTION LANE CONFIGURATION - SIMULATION 2.....	5-60
EXHIBIT 5-22: FUTURE (2041) LANGSTAFF ROAD PEAK HOUR TURNING VOLUMES - SIMULATION 2.....	62
EXHIBIT 5-23: LANGSTAFF ROAD INTERIM INTERSECTION LANE CONFIGURATIONS.....	67
EXHIBIT 5-24: INTERIM (2041) LANGSTAFF ROAD PEAK HOUR TURNING VOLUMES .....	69
EXHIBIT 6-1: HIGHWAY 400 LANE CONFIGURATION AT MAJOR MACKENZIE DRIVE .....	78

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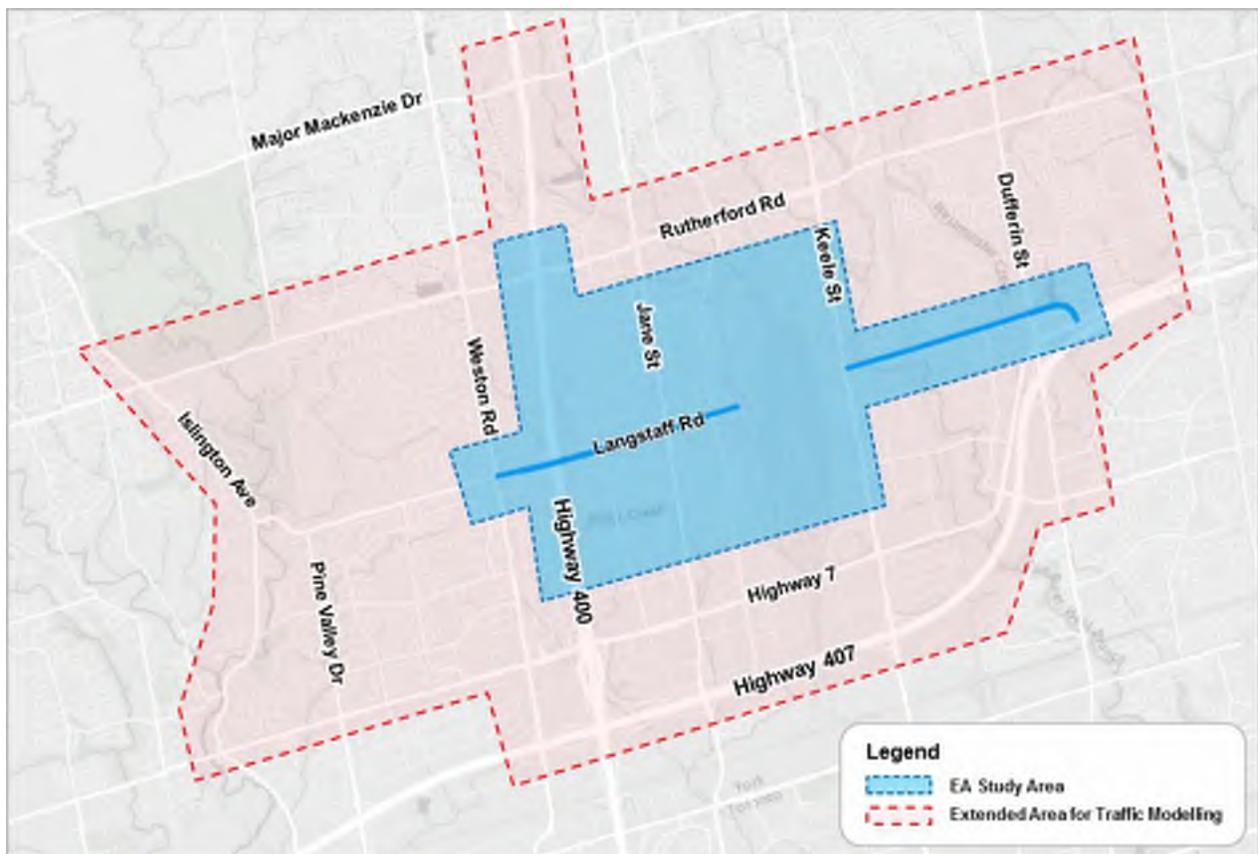
## *APPENDICES*

- A** MODELLED HIGHWAY 400 TRAFFIC VOLUMES
- B** SELECTED FIGURES FROM 2015 YORK REGION TRANSPORTATION FACT BOOK
- C** AIMSUN MODEL DEVELOPMENT AND CALIBRATION
- D** DETAILED SUMMARY OF MICROSIMULATION EXISTING RESULTS
- E** 2016 YORK REGION TRANSPORTATION MASTER PLAN MAPS
- F** WESTON ROAD TO HIGHWAY 7 STUDY CONCEPT PLAN AND PROFILE
- G** DETAILED SUMMARY OF MICROSIMULATION RESULTS - SIMULATION 1
- H** DETAILED SUMMARY OF MICROSIMULATION RESULTS - SIMULATION 2
- I** DETAILED SUMMARY OF MICROSIMULATION INTERIM RESULTS
- J** HIGHWAY 400 AND LANGSTAFF ROAD INTERCHANGE CONCEPT PLANS
- K** HIGHWAY 400 AND LANGSTAFF ROAD INTERCHANGE SPEED CONTOUR PLOTS

# 1 INTRODUCTION

York Region initiated a Class EA Study to examine the future transportation needs for Langstaff Road between Weston Road and Highway 7, in the City of Vaughan. The EA Study examines the transportation network improvement needs within the study area, including a new connection across the CN MacMillan Rail Yard, a road/rail grade separation on Langstaff Road east of Keele Street, improvements to the existing roadway and Highway 400/Langstaff Road interchange improvements to accommodate additional access to and from the north. WSP Canada Inc. has been retained by York Region to carry out the Preliminary Design and Class Environmental Assessment (EA) Study (Schedule C). The study area for the Langstaff Road EA includes from Weston Road to Highway 7, as presented in Exhibit 1-1.

**Exhibit 1-1: Langstaff Road EA Study Area**



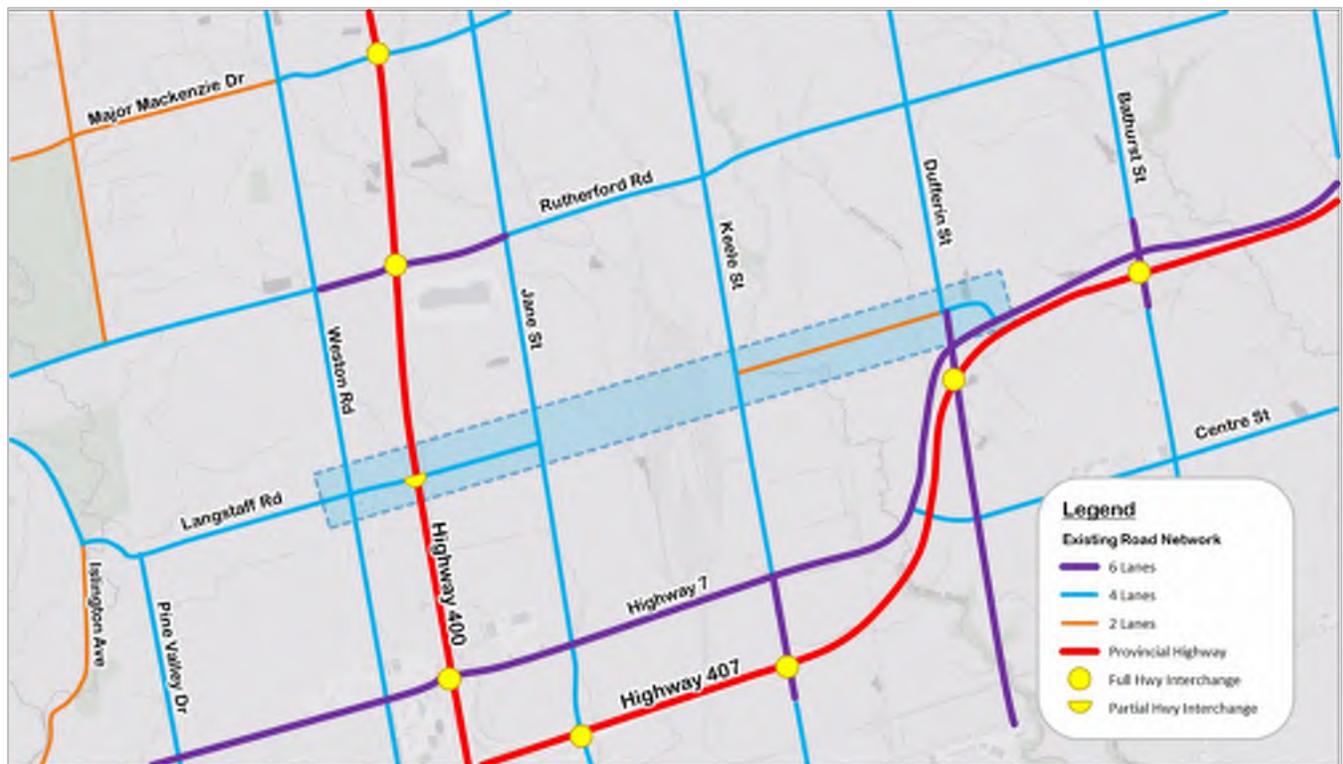
The purpose of this traffic analysis report is to document the existing (2016) traffic conditions, discuss the proposed Langstaff Road improvements and assess the future (2041) traffic conditions. This report includes a discussion of the current and proposed intersection lane configurations for Langstaff Road, a robust assessment of the traffic operations and a review of historic collision data. The existing and future traffic analysis results presented in this report are based on the re-calibrated Aimsun model, following the provision of the most recent traffic count data for the Highway 400 and Langstaff Road Interchange ramps, and travel time data for the Highway 400.

# 2 TRANSPORTATION NETWORK

## 2.1 ROAD NETWORK AND LAND USE

Langstaff Road, as it relates to the EA Study, is a Regional arterial road that runs between Islington Avenue to the west and Highway 7 to the east. The segment of Langstaff Road under consideration in this EA study, between Weston Road and Highway 7, is approximately 6 km in length. Due to the location of the CN Rail Yard, Langstaff Road is discontinuous between Jane Street and Keele Street; the western segment is currently a four-lane roadway, whereas the eastern segment operates with a two-lane cross-section. A short segment of Langstaff Road west of Jane Street (terminating at the CN Rail Yard) is a four-lane collector road under the jurisdiction of the City of Vaughan. Exhibit 2-1 presents the Langstaff Road study area, including the surrounding regional road network.

**Exhibit 2-1: Existing Road Network**



Langstaff Road is connected to Highway 400 through a partial interchange that provides access to and from the south (excluding 407ETR). Highway 400, a provincial highway, is an important element of the transportation system supporting the function and growth of York Region. While it may impose a physical barrier between communities on either side of the highway, its location in the study area serves major business centres and employment areas in the City of Vaughan.

Land uses adjacent to the segments of Langstaff Road in the study area between Weston Road and Dufferin Street are predominately commercial and industrial, whereas land uses between Dufferin Street and Highway 7 are

primarily residential. The mix of land use within the Langstaff Road study area and the discontinued sections of the road due to the CN Rail Yard pose heavy constraints to the transportation network.

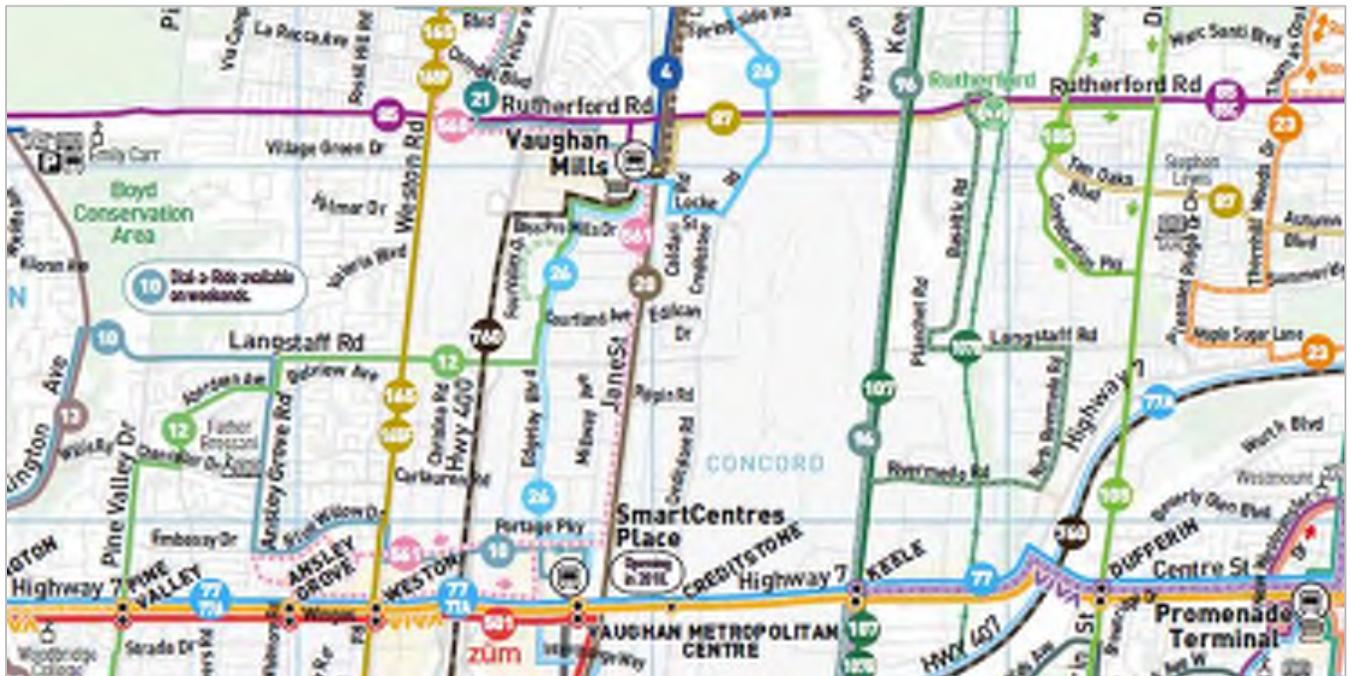
## 2.2 TRANSIT NETWORK

The study area is served by various transit routes that are part of the regional public transit network. The roadway is also in close proximity to other bus routes that operate on other transit corridors with regular frequency throughout the week. Transit stations/terminals of significance near the study area include the Vaughan Mills Bus Terminal and Rutherford GO Station. The Langstaff Road study area is also situated near the Vaughan Metropolitan Centre (VMC) district along Highway 7, between Highway 400 and Creditstone Road. This area is being developed as a regional transit hub in association with the Toronto Transit Commission's (TTC) Line 1 Subway Extension (also known as the Toronto-York Spadina Subway Extension) into York Region.

### 2.2.1 BUS

York Region Transit (YRT/Viva) is the regional transit operator that provides bus services to various segments of Langstaff Road within the study area. A map of the YRT/Viva bus routes, effective as of December 17, 2017, is presented in Exhibit 2-2 for the study area.

Exhibit 2-2: YRT Bus Route Map



Source: YRT/Viva System Map (2017)

Details for the bus routes that serve the study area are provided below:

- Route 12 (Pine Valley): An all-day bus route that operates Monday to Saturday with headways of 30-60 minutes. This bus route includes a segment of Langstaff Road between the western study area limit and Edgeley Boulevard.

- Route 107B (Keele North, to Rutherford GO Station): A weekday bus route with a frequency of 22-32 minutes. This route travels on Langstaff Road between Planchet Road and North Rivermede Road and provides a transit connection between the Rutherford GO station and the TTC Line 1 stations at Pioneer Village and York University.

Higher-order bus rapid transit (BRT) is provided near the Langstaff Road study area by YRT/Viva, with a dedicated busway along Highway 7, currently operational between Wigwoss-Helen and Post Road. The most recent segment of the bus right-of-way, which is part of the Highway 7 West BRT network running along Highway 7 & Centre St, was completed in November 2019.

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### 2.2.2 SUBWAY

TTC Line 1 provides subway services between the cities of Toronto and Vaughan, with a northern terminus at VMC. The recent addition of subway access to the local transit network, near the Langstaff Road study area, will likely change travel patterns in the area moving forward. Following the beginning of revenue service of the TTC Line 1 subway extension, YRT/Viva will open the SmartCentres Place Bus Terminal within the VMC district that will serve as a regional transit hub.

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### 2.2.3 COMMUTER RAIL

GO Transit, a division of Metrolinx, provides a commuter rail service on the Barrie GO train line within the Langstaff Road study area east of Keele Street, which intersects Langstaff Road at an at-grade rail crossing. GO Transit passengers can access the service at the nearby Rutherford GO station. A one-way train service is provided throughout the week with trains travelling southbound in the morning to Union Station (located in downtown Toronto), and northbound in the afternoon and evening originating from Union Station. Metrolinx is currently in the process of increasing the daily service frequency and expanding the Barrie rail corridor as part of its Regional Express Rail project.

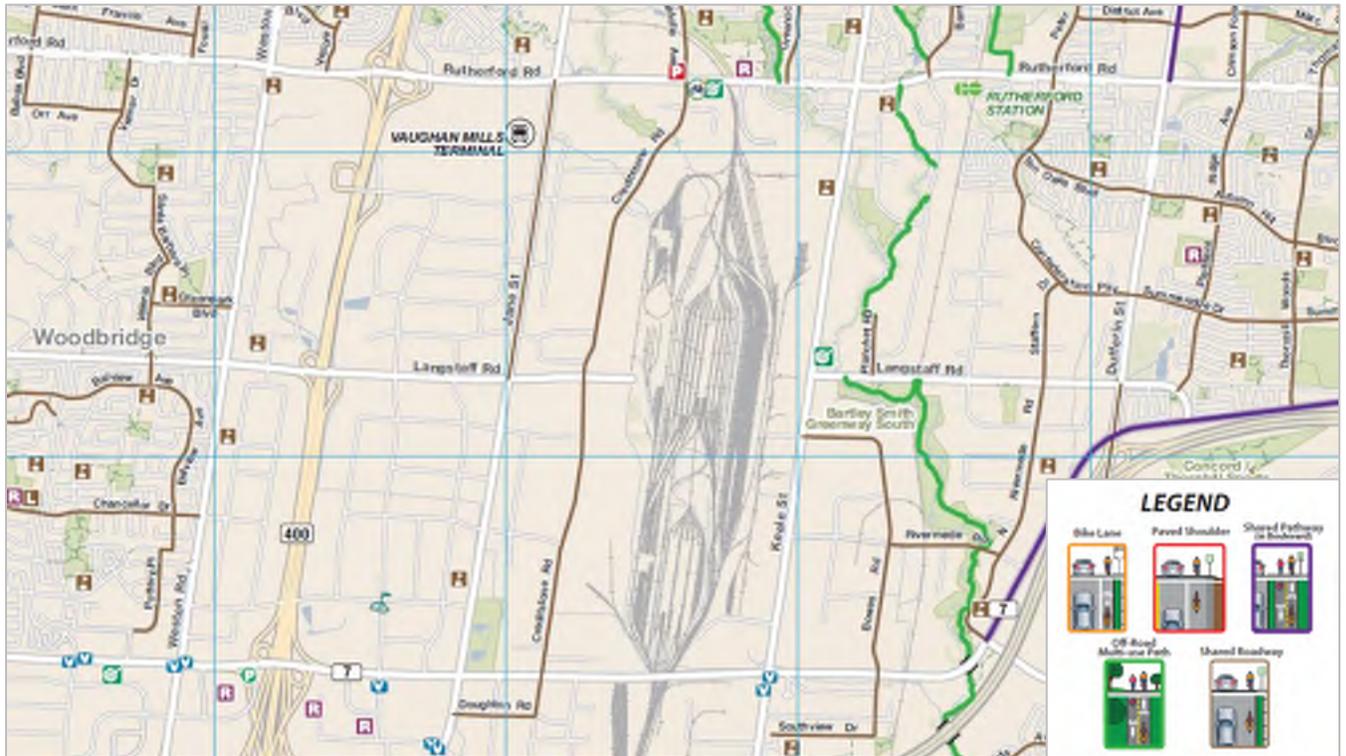
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## 2.3 ACTIVE TRANSPORTATION NETWORK

Active transportation facilities within the Langstaff Road study area are generally limited to pedestrian sidewalks. In the study area west of the CN Rail Yard, sidewalks are provided on both sides of Langstaff Road, with the exception of the crossing over Highway 400 where the sidewalk is provided only on the south side. In the eastern segment of the study area, sidewalks are discontinuous along Langstaff Road between Keele Street and Dufferin Street. Sidewalks are provided on both sides of the road between Dufferin Street and Highway 7.

Exhibit 2-3 presents the active transportation facilities (i.e. bike lanes, multi-use paths or shared roadways) around the study area.

Exhibit 2-3: Active Transportation Network



Source: York Cycling (2015)

# 3 EXISTING (2016) TRAFFIC CONDITIONS

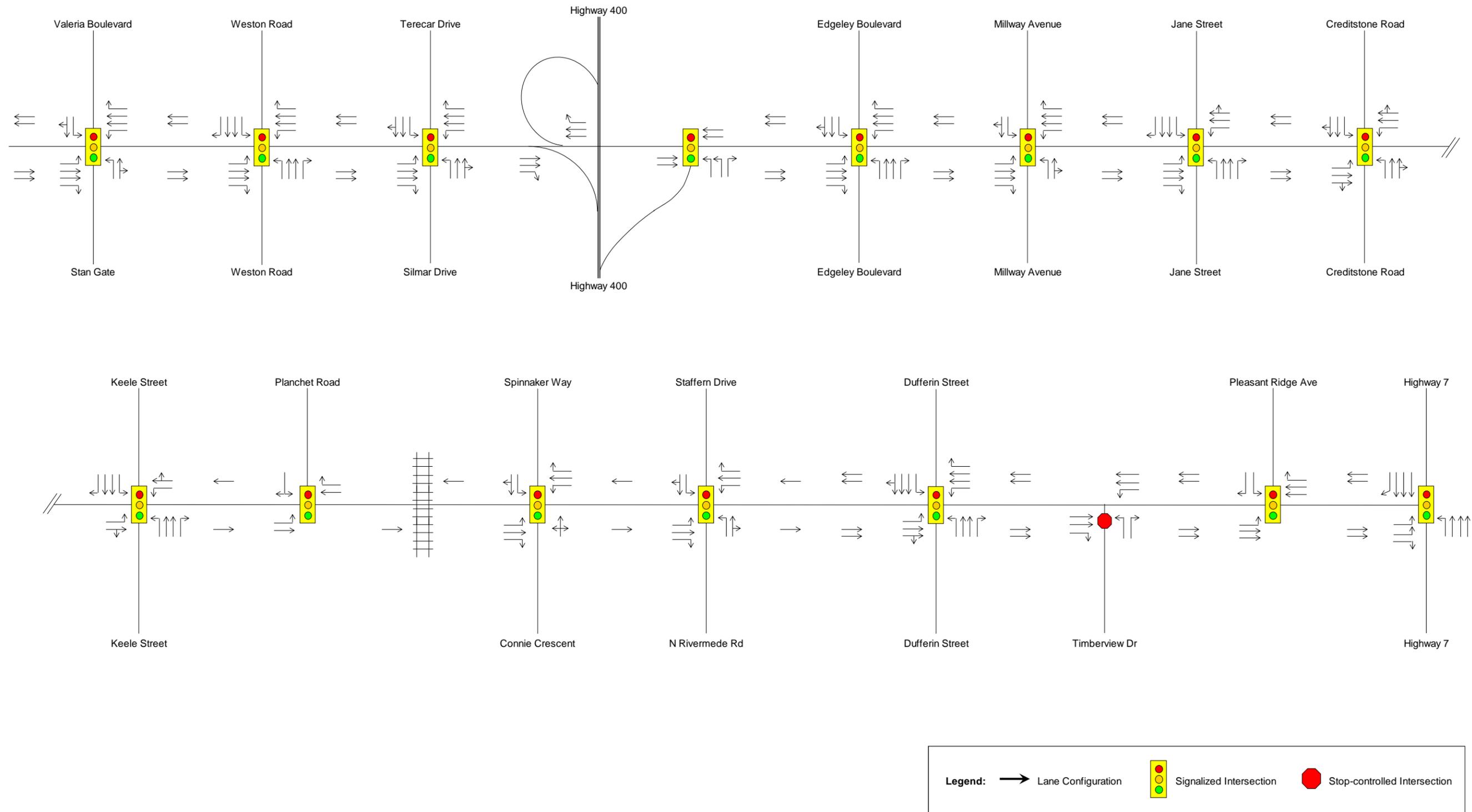
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## 3.1 EXISTING INTERSECTION LANE CONFIGURATION

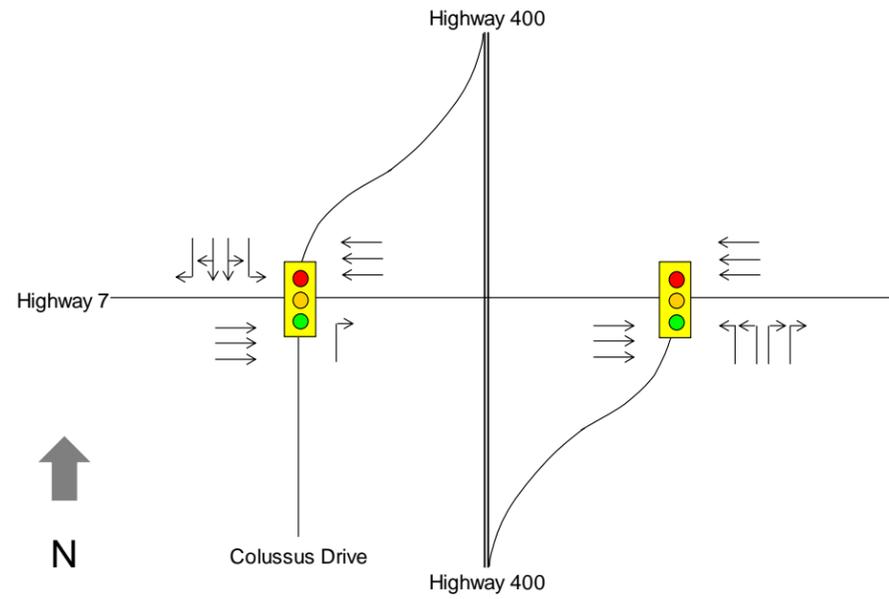
The existing intersection lane configuration and intersection control type for the Langstaff Road EA study area is presented in Exhibit 3-1. There is a total of 15 signalized intersections, one stop-controlled intersection and one at-grade railway crossing.

Improvements to the Highway 400 interchange with Langstaff Road are also considered as part of this Class EA study. Therefore, an assessment of the traffic operations at this interchange, as well as the adjacent Highway 400 interchanges at Highway 7, Bass Pro Mills Drive and Rutherford Road, have been included as part of the analysis. The existing intersection lane configurations and traffic control type at the highway ramp terminal intersections, associated with the adjacent Highway 400 interchanges with Highway 7, Bass Pro Mills Drive and Rutherford Road are presented in Exhibit 3-2, Exhibit 3-3 and Exhibit 3-4, respectively.

**Exhibit 3-1: Langstaff Road Existing Intersection Lane Configurations**



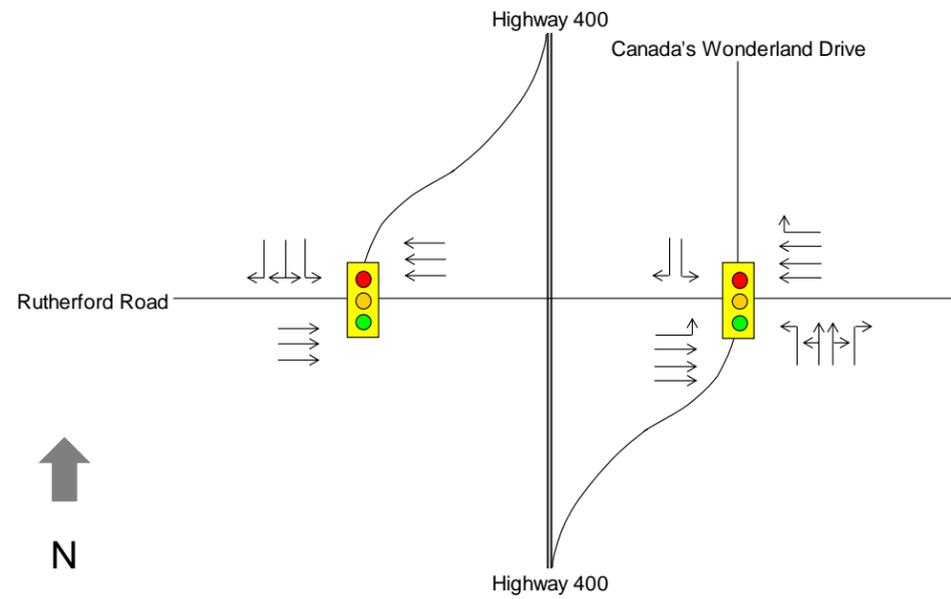
**Exhibit 3-2: Highway 400/Highway 7 I/C Ramp Terminal Lane Configurations**



**Exhibit 3-3: Highway 400/Bass Pro Mills Drive I/C Ramp Terminal Lane Configuration**



**Exhibit 3-4: Highway 400/Rutherford Road I/C Ramp Terminal Lane Configurations**



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## 3.2 TRAFFIC VOLUMES

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### 3.2.1 DATA SOURCES

#### ARTERIAL ROAD INTERSECTIONS

Turning movement counts (TMC) for all regional Langstaff Road study area intersections were provided by the Region for the purpose of analyzing existing traffic operations. TMC data and automatic traffic record (ATR) counts were also collected from the City of Vaughan, Ministry of Transportation of Ontario (MTO) and 407ETR for intersections and ramps, under their respective jurisdictions. A summary of the data collection dates for each study area intersection is provided in Table 3-1.

**Table 3-1: Survey Dates for Langstaff Road Intersections**

LANGSTAFF ROAD INTERSECTION	DATA COLLECTION DATE
Valeria Boulevard/Stan Gate	Wednesday, 02 March, 2016
Weston Road	Wednesday, 02 March, 2016
Terecar Drive/Silmar Drive	Tuesday, 20 December, 2016
Highway 400 East Ramp Terminal	Thursday, 26 May, 2016
Edgeley Boulevard	Tuesday, 06 December, 2016
Millway Avenue	Tuesday, 06 December, 2016
Jane Street	Tuesday, 06 December, 2016
Creditstone Road	Friday, 10 June, 2011
Keele Street	Tuesday, 06 December, 2016
Planchet Road	Tuesday, 06 December, 2016
Spinnaker Way/Connie Crescent	Tuesday, 06 December, 2016
Staffern Drive/North Rivermede Road	Tuesday, 06 December, 2016
Dufferin Street	Tuesday, 06 December, 2016
Timberview Drive	Tuesday, 06 December, 2016
Pleasant Ridge Avenue	Tuesday, 20 December, 2016
Highway 7	Tuesday, 06 December, 2016

#### HIGHWAY 400

All available mainline and interchange ramp inventory volumes were obtained from MTO for the Highway 400 segment extending from 407ETR to Major Mackenzie Drive. As part of the model re-calibration, updated vehicle classification counts for the Highway 400 interchanges at Highway 7, Langstaff Road, Bass Pro Mills Drive and Rutherford Road, and travel time data for the Highway 400 were conducted in May 2018 to inform the re-calibration process. The highway 400 data collection consisted of several traffic counts conducted at each mainline location over multiple seasons in 2016, and more recent ramp volumes conducted in May 2018.

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### 3.2.2 EXISTING (2016) TRAFFIC VOLUMES

The traffic data was reviewed and balanced to reflect existing conditions on Langstaff Road. Exhibit 3-5 presents the peak hour turning movement volumes representative of typical 2016 weekday conditions. The following morning and afternoon peak periods and peak hours are:

- Morning Peak Period – **06:00 am – 09:00 am**
- Morning Peak Hour – **08:00 am – 09:00 am**
- Afternoon Peak Period – **03:00 pm – 06:00 pm**
- Afternoon Peak Hour – **05:00 pm – 06:00 pm**

Peak hour turning movement volumes at the Highway 400 Ramp Terminal intersections at Highway 7, Bass Pro Mills Drive and Rutherford Road are presented in Exhibit 3-6, Exhibit 3-7 and Exhibit 3-8, respectively.

Available ATR counts were also obtained from York Region to assist in estimating traffic demand on Langstaff Road. These counts reflect the following mid-block locations:

- Weston Road to Silmar Drive;
- Highway 400 to Edgeley Boulevard;
- Millway Avenue to Jane Street;
- Keele Street to Planchet Road;
- Staffern Drive/North Rivermede Drive to Dufferin Street; and
- Dufferin Street to Timberview Drive.

All of this available information was considered in establishing the turning movement volumes for the study area. Traffic volumes for Highway 400 applied in the Langstaff Road EA study are provided in Appendix A.

**Exhibit 3-5: Langstaff Road Existing Peak Hour Turning Volumes**

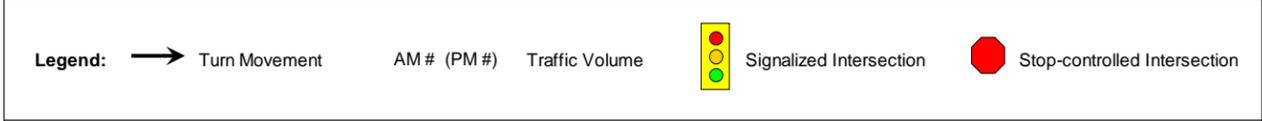
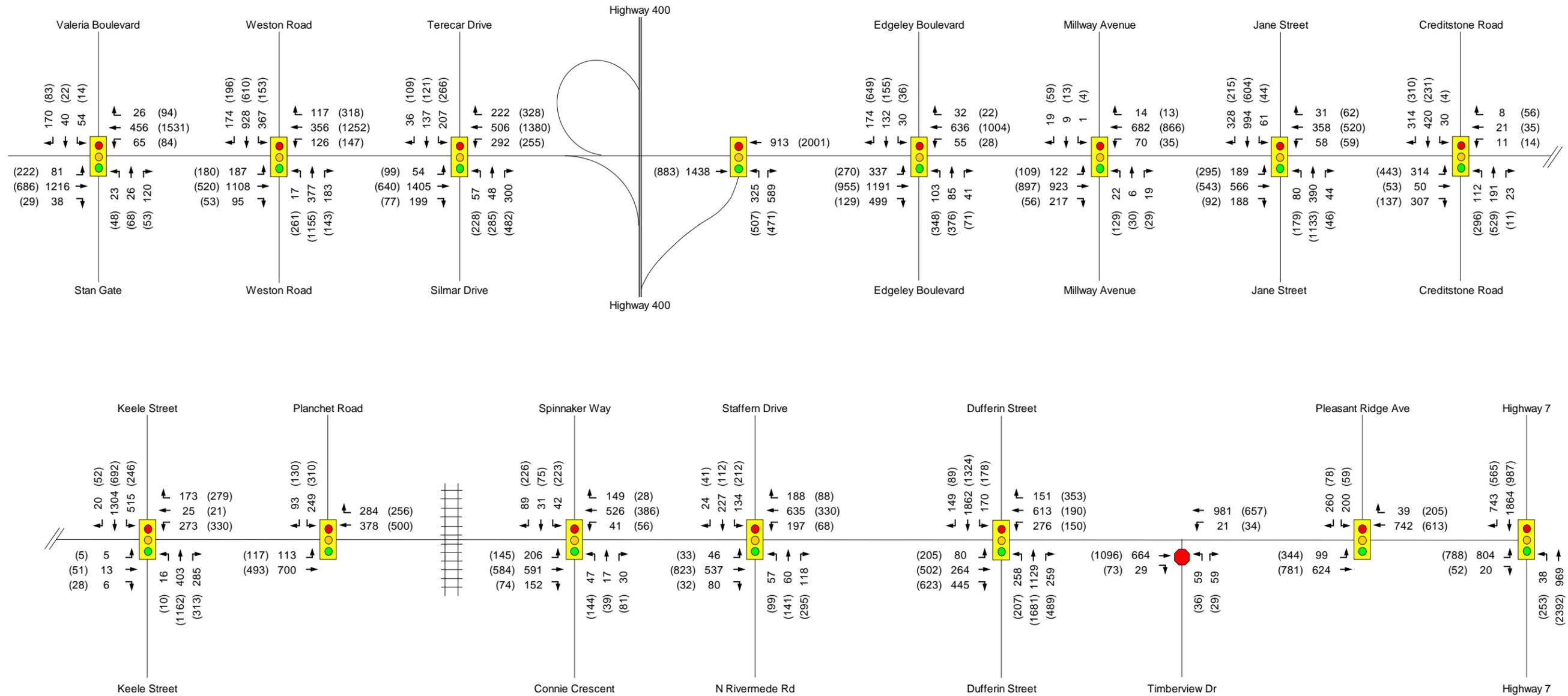
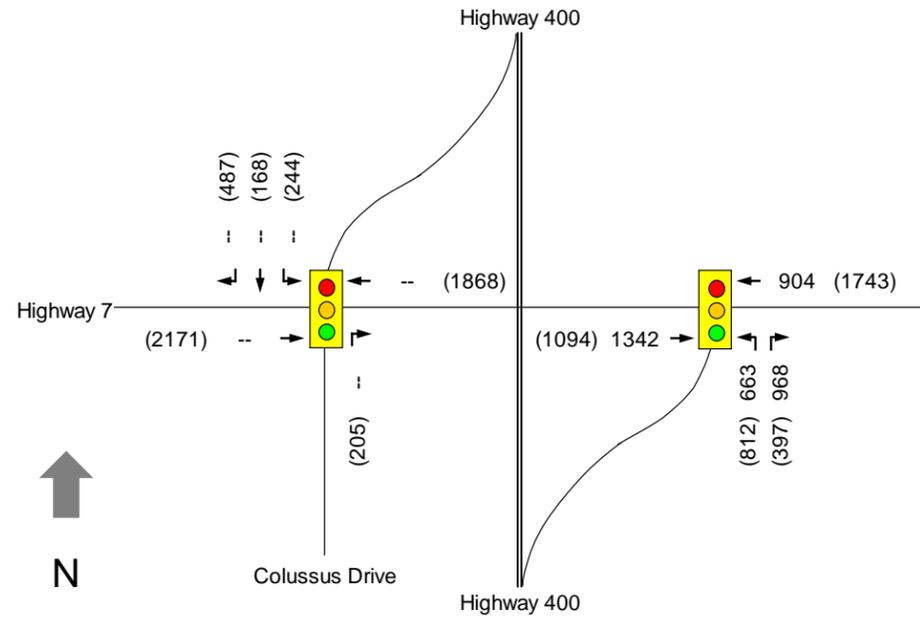


Exhibit 3-6: Highway 400/Highway 7 I/C Peak Hour Turning Volumes



\* Note: AM volumes unavailable for the West Ramp Terminal intersection

Exhibit 3-7: Highway 400/Bass Pro Mills Drive I/C Peak Hour Turning Volumes

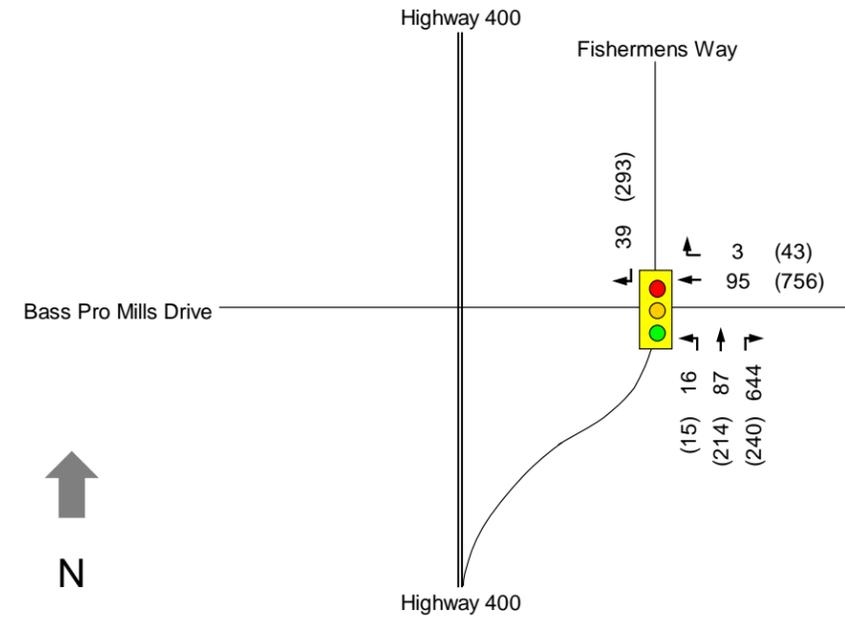
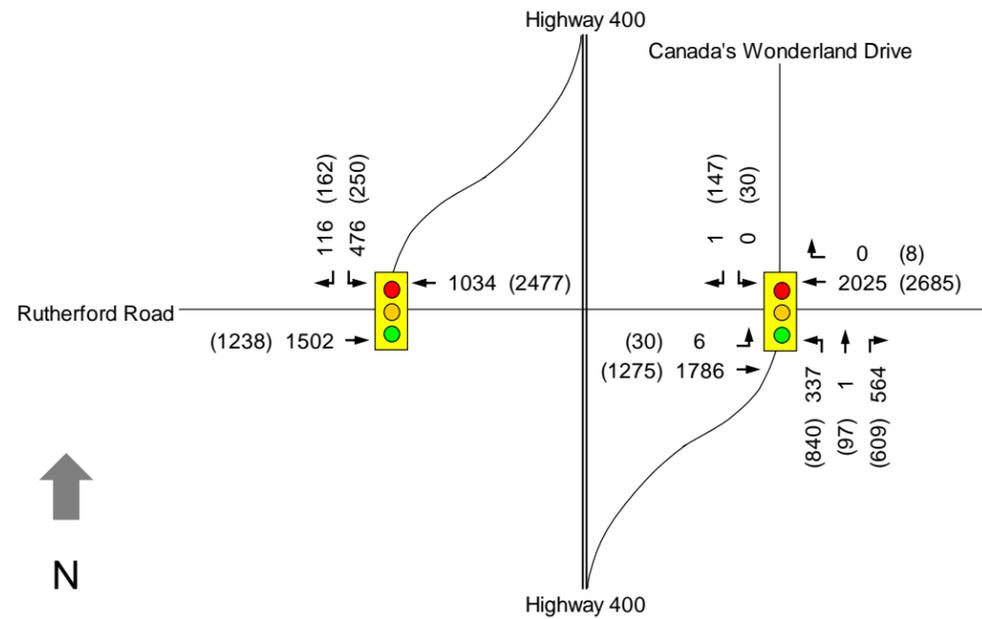


Exhibit 3-8: Highway 400/Rutherford Road I/C Peak Hour Turning Volumes



### 3.2.3 COMMERCIAL VEHICLES

Truck traffic is an important consideration with respect to the Langstaff Road EA as commercial and industrial areas surrounding the EA study area, along with the CN Rail Yard, generate and attract high volumes of trucks (commercial vehicles). According to York Region's 2015 Transportation Fact Book, the section of Highway 7 between Highway 400 and Keele Street is ranked as the highest truck volume location in the Region<sup>1</sup>. Furthermore, intersections along Keele Street, near the Langstaff Road study area at Bowes Road and Rutherford Road, represent the sixth and seventh highest truck volume locations in the Region, respectively. Appendix B includes figures extracted from the 2015 Transportation Fact Book relating to regional truck volumes.

#### DAILY TRUCK VOLUMES

A review of eight-hour and 24-hour truck volumes derived from available 2015 ATR counts along regional road segments in the vicinity of the study area is provided in Table 3-2.

**Table 3-2: Truck Volumes on Regional Roads in Study Area Vicinity**

REGIONAL ROAD LOCATION & DESCRIPTION	8-HR TRUCKS		24-HR TRUCKS	
	VOLUME	%	VOLUME	%
Rutherford Rd (Weston Rd to Vellore Woods Blvd)	1268	5%	2579	5%
Rutherford Rd (Highway 400 to Sweetriver Blvd)	1216	4%	2339	4%
Rutherford Rd (Julliard Dr to Jane St)	1285	4%	2460	4%
Rutherford Rd (Jacob Keffer Pkwy to Barrhill Rd/Westburne Dr)	2231	8%	4069	8%
Langstaff Rd (Weston Rd to Silmar Dr/Terecar Dr)	1230	7%	2158	7%
Langstaff Rd (Highway 400 to Edgeley Blvd)	1138	7%	1987	7%
Langstaff Rd (Millway Ave to Jane St)	1080	7%	1829	7%
Langstaff Rd (Keele St to Planchet Rd)	611	6%	1206	7%
Langstaff Rd (Staffern Dr/North Rivermede Rd to Dufferin St)	762	6%	1266	6%
Highway 7 (Weston Rd to Famous Ave)	4066	10%	8231	10%
Highway 7 (Highway 400 to Commerce St)	4727	10%	9382	10%
Highway 7 (Jane St to Maplecrete Rd)	2761	8%	5430	8%
Highway 7 (Hillside Ave to Bowes Rd /Baldwin Ave)	1981	6%	3928	6%
Weston Rd (Langstaff Rd to Greenpark Blvd/Crestmount Blvd)	888	5%	1732	5%
Weston Rd (Northview Blvd to Fieldstone Dr/Chrislea Rd)	1369	9%	2372	8%
Jane St (Highway 7 to Portage Pkwy)	698	4%	1194	4%
Keele St (Alberta Dr to Sherwood Park Dr)	877	5%	1653	5%
Keele St (Highway 7 to Administration Rd)	1774	9%	3362	9%
Dufferin St (Fernstaff Crt to Confederation Pkwy/Summeridge Dr)	1194	5%	2582	6%
Dufferin St (407ETR to Langstaff Rd)	1178	5%	2328	5%

The existing data reflects high truck volumes along Highway 7 in the east-west direction, and along Weston Road and Keele Street between Highway 7 and Langstaff Road in the north-south direction. To provide some perspective

<sup>1</sup> Page 40, 2015 Transportation Fact Book, Regional Municipality of York

on the significance of truck volumes, the Region considers roadways with more than 2,500 trucks per eight-hour period and/or more than 10% medium and heavy trucks as *Primary Arterial Goods Movement Corridors*.

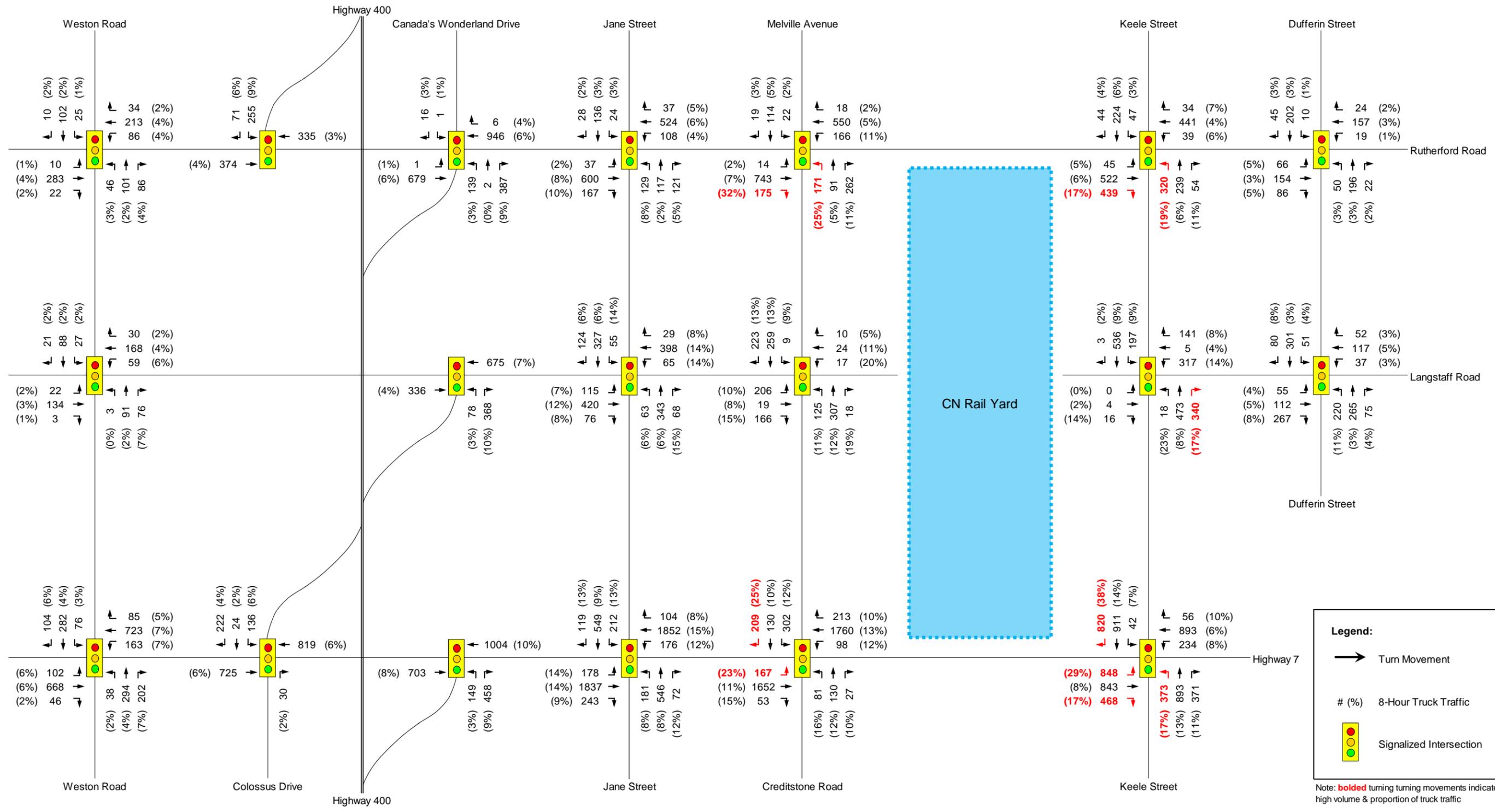
Exhibit 3-9 presents the eight-hour truck TMC's and the corresponding truck modal share (%) at several intersections along Langstaff Road, Rutherford Road and Highway 7 within the vicinity of the study area. Further examination of intersection turning movements, particularly the movements with a higher proportion of truck traffic (greater than 15%), reveals a noticeable truck travel pattern; a significant number of trucks travelling from west of Jane Street along Highway 7 and Rutherford Road, approaching the EA study area, and vice versa travelling on Creditstone Road and Keele Street.

Truck turning volumes between the north and west approaches of the Highway 7/Keele Street intersection range from 820 to 850 trucks in the eight-hour period. At the Rutherford intersection with Keele Street, truck traffic turning between the west and south approaches are in the order of 320 to 440 trucks during the same period.

### **PEAK HOUR TRUCK PROPORTIONS**

For modelling detailed peak hour traffic operations in the Langstaff Road study area, existing truck turning movement volumes were evaluated to calculate corresponding morning and afternoon peak hour truck percentages. The evaluation determined overall study area truck percentages of approximately 7% and 5% for the morning and afternoon peak hours, respectively.

Exhibit 3-9: 8-Hour Truck Turning Movement Counts and Truck Modal Share (%) in the Vicinity of Study Area



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### 3.2.4 SCREENLINE ANALYSIS FOR EXISTING CONDITIONS

A screenline analysis was undertaken to better understand the existing performance and operation on specific corridors within the Langstaff Road study area. A screenline is generally a linear feature such as a road, a river, a rail line or a municipal boundary that is used to evaluate cumulative travel demand of similar roadway facilities crossing such features. Local streets are generally excluded from screenline analyses as their function is to provide accessibility to businesses and neighbourhoods to local collector and regional arterial roads. A volume over capacity (V/C) ratio was established by comparing the cumulative travel demand to available screenline capacity.

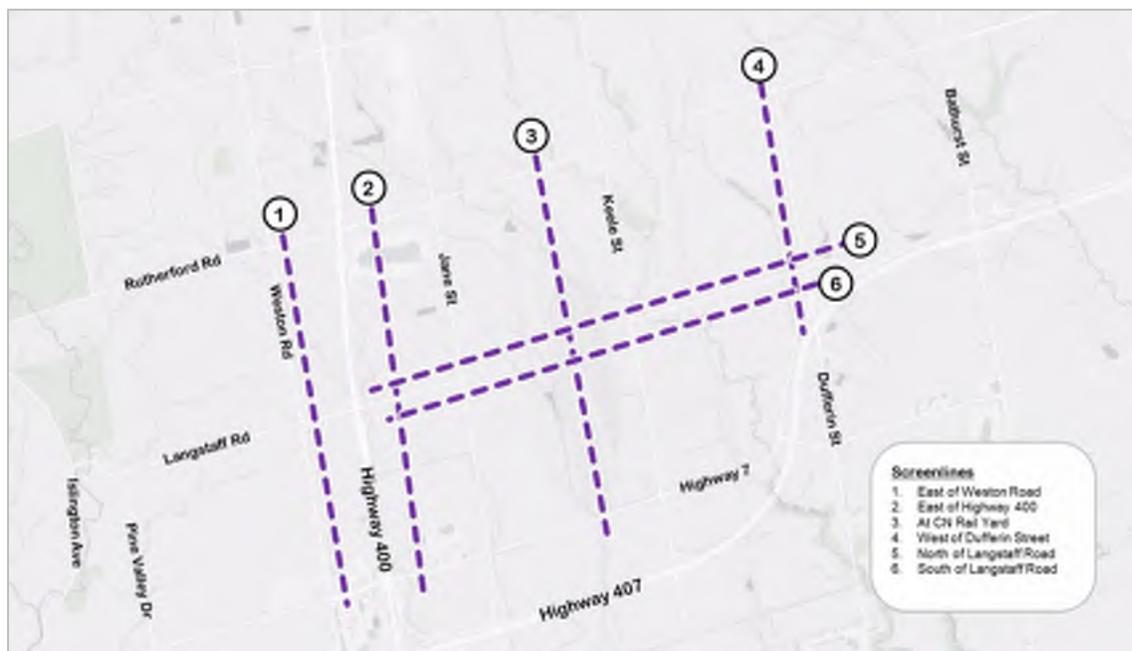
The analysis considered a total of six screenlines, displayed in Exhibit 3-10. For the north-south screenlines, the following east-west corridors were considered (from north to south):

- Rutherford Road;
- Langstaff Road; and
- Highway 7.

For the east-west screenlines, the following north-south corridors were considered (from west to east):

- Edgeley Boulevard;
- Jane Street;
- Creditstone Road;
- Keele Street, and
- Dufferin Street.

### Exhibit 3-10: Screenline Locations



The analysis was conducted using the York Region Travel Demand Forecasting (YRTDF) model. This model is an Emme-based, conventional four-step transportation demand forecasting model, simulating the morning peak hour travel demands for existing and future planning horizon years. For this EA Study, the travel demand analysis evaluated the YRTDF model results for the existing (2016) and future (2041) planning horizon.

The assigned arterial traffic volumes and lane capacities were obtained from the YRTDF model and used to calculate the screenline V/C ratios. In general, a capacity of 900 vehicles and 500 vehicles, per hour, per lane, were modelled for General Purpose Lanes (GPL) and High Occupancy Vehicle (HOV) lanes on major arterial corridors, respectively.

The V/C ratios and the respective Level of Service (LOS) are defined by four levels or grades of generalized traffic conditions and characteristics. These commonly used measurements for roadways and intersections are presented in Table 3-3.

**Table 3-3: Volume to Capacity Ratio Ratings**

V/C RATIO	LOS	FACILITY OPERATION	SCREENLINE OPERATION
≤ 0.85	A - C	Free/Stable Flow	Good/Uncongested
0.86 to 1.00	D	Unstable Flow	Unstable
1.01 to 1.10	E	Congested	Congested
> 1.10	F	Very Congested	Very Congested

The 2016 morning peak hour operating conditions for the north-south and east-west screenlines are presented in Exhibit 3-11 and Exhibit 3-12, respectively. The existing link V/C ratios near the CN Rail Yard (for Rutherford Road and Highway 7) are presented in Exhibit 3-13.

Exhibit 3-11: Existing - Morning Peak Hour North-South Screenline V/C



The north-south screenline analysis results (presented in Exhibit 3-11) for the existing morning peak hour demonstrate that the westbound traffic flow, near the CN Rail Yard, operates in an *Unstable* condition with a V/C ratio of 0.87 (Screenline 3). The westbound traffic flow operates in an *Uncongested* condition west of Jane Street with V/C ratios of less than 0.8 (Screenline 1 and (Screenline 2).

However, in the eastbound direction, the flow of traffic operates in an *Unstable* condition east of Weston Road (Screenline 1) and becomes *Very Congested* with a V/C ratio of 1.08 east of Highway 400 (Screenline 2). The eastbound traffic operates in a *Congested* condition near the CN Rail Yard with a V/C ratio of 0.92 (Screenline 3), and then *Uncongested* condition just west of Dufferin Street (Screenline 4). Between Jane Street and Dufferin Street, Langstaff Road is surrounded by industrial and commercial land use, which attracts/generates a significant number of trips to the study area during the morning peak hour.

Exhibit 3-12: Existing - Morning Peak Hour East-West Screenline V/C



The analysis of the east-west screenlines (Exhibit 3-12) demonstrate that the northbound traffic is currently operating in *Uncongested* conditions with V/C ratios of 0.47 and 0.52 north and south of Langstaff Road, respectively. However, southbound traffic is considered to be *Congested* or *Very Congested* with V/C ratios reaching 1.00; indicating that the north-south corridors are at a planning level capacity and are very likely to need additional capacity to accommodate future traffic growth.

Exhibit 3-13: Existing - Morning Peak Hour Link V/C at CN Rail Yard



Since Langstaff Road is discontinuous at Keele Street and Jane Street, the east-west traffic often relies on other parallel corridors such as Rutherford Road and Highway 7. Further analysis of the existing east-west corridors near the CN MacMillan Rail Yard (Exhibit 3-12) indicate that Rutherford Road operates in a *Very Congested* condition in both the westbound and eastbound directions, with V/C ratios of above 1.00. The eastbound traffic on Highway 7 between Jane Street and Keele Street operates in an *Unstable* condition with a V/C ratio of 0.82, while the westbound traffic operates in an *Uncongested* condition.

The results for the existing screenline analysis demonstrate that the traffic operation and existing roadway capacity on the east-west corridors within the study area is limited, particularly west of Jane Street and across the CN Rail Yard during the morning peak hour. The southbound traffic (peak direction during the morning peak hour) demand is approaching the planning level capacity. These morning peak hour conditions on the existing road network indicate the potential need for additional east-west roadway capacity in the study area.

### 3.3 INTERSECTION OPERATIONS

An evaluation of the existing operations for the intersections along Langstaff Road was performed using an *Aimsun*-based micro-simulation model. *Aimsun* is a fully integrated traffic modelling software that incorporates macro-scopic functionalities with meso-scopic and micro-scopic traffic simulation. It facilitates detailed assessments of traffic operations along Langstaff Road, combined with dynamic traffic route-choice assignment options relating to the local road network for the study area. Details for the development and calibration of the *Aimsun* micro-simulation model are provided in Appendix C.

The travel demand was extracted from the YRTDF model for the 2016 planning horizon and applied in the *Aimsun* micro-simulation model. The demand matrices were subsequently adjusted to meet the existing Langstaff Road

peak hour TMC's and the updated Highway 400 ramp traffic volumes (presented above in Exhibit 3-5). The current signal timing plans, provided by York Region and the City of Vaughan, were incorporated for all the signalized intersections within the Langstaff Road study area corridor. The signal timing plans for the extended study area were obtained for all major intersections between Regional roads, and signal timings for minor intersections (i.e. local roads connecting Rutherford Road and Highway 7) were optimized using a combination of *Synchro* and estimated traffic demand.

The existing traffic operating performance was assessed based on delays, level of service (LOS) and queuing conditions. Table 3-4 summarizes the criteria on which the LOS was determined.

**Table 3-4: Intersection LOS Criteria**

LEVEL OF SERVICE	AVERAGE DELAY PER VEHICLE (SECONDS)	
	SIGNALIZED INTERSECTIONS	STOP-CONTROLLED INTERSECTIONS
	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

### 3.3.1 LANGSTAFF ROAD

Summaries of weekday morning and afternoon peak hour intersection operations within the Langstaff Road study area are presented in Table 3-5 and Table 3-6, respectively. It presents the overall intersection delays and LOS, as well as the delays, LOS and 95<sup>th</sup> percentile vehicular queue lengths for critical movements (i.e. operating at LOS *E* or *F*). These critical movements indicate operational issues resulting in long delays and potential congestion. A complete breakdown of delays, LOS and 95<sup>th</sup> percentile queue lengths by intersection for all turning movements in each peak hour is provided in Appendix D.

**Table 3-5: Langstaff Road Intersection LOS Summary and Critical Movements – Morning Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Stan Gate/Valeria Blvd	11 s	B	NBL	58 s	E	23 m
			NBTR	70/16 s	E/B	23 m
			SBTR	60/16 s	E/B	44 m
Weston Rd at Langstaff Rd	35 s	C	WBL	87 s	F	61 m
Langstaff Rd at Silmar Dr/Terecar Dr	18 s	B	NBL	60 s	E	9 m
			SBL	60s	E	28 m
			SBTR	58/17 s	E/B	19 m
Hwy 400 East Ramp Terminal at Langstaff Rd	13 s	B	-	-	-	-
Langstaff Rd at Edgeley Blvd	14 s	B	NBL	56 s	E	39 m
			NBTR	65/59 s	E/E	9 m
			SBTR	56/14s	E/B	53 m
Langstaff Rd at Millway Ave	8 s	A	NBL	59 s	E	33 m
			NBTR	63/26 s	E/C	12 m
			SBL	61 s	E	3 m
			SBTR	63/17 s	E/B	15 m
Jane St at Langstaff Rd	24 s	C	EBL	70 s	E	55 m
			EBTR	56/22 s	E/C	86 m
Langstaff Rd at Creditstone Rd	11 s	B	-	-	-	-
Keele St at Langstaff Rd	18 s	B	WBL	59 s	E	64 m
Langstaff Rd at Planchet Rd	11 s	B	SBL	56 s	E	36 m
Langstaff Rd at Connie Cres/Spinnaker Way	20 s	C	NBL	58 s	E	19 m
			NBTR	55/9 s	E/A	16 m
			SBL	62 s	E	65 m
			SBTR	62/15 s	E/B	28 m
Langstaff Rd at North Rivermede Rd/Staffern Dr	31 s	C	NBL	95 s	F	66 m
			NBTR	55/33 s	E/C	74 m
Dufferin St at Langstaff Rd	72 s	E	EBL	56 s	E	27 m
			WBL	134 s	F	165 m
			NBL	151 s	F	194 m
			SBL	100 s	F	34 m
			SBTR	101/88 s	F/F	281 m
Langstaff Rd at Timberview Dr (Stop-controlled)	2 s	A	-	-	-	-
Langstaff Rd at Pleasant Ridge Ave	15 s	B	-	-	-	-
Highway 7 at Langstaff Rd	12 s	B	-	-	-	-

In the morning peak hour, all assessed intersections operate with an overall acceptable LOS (i.e. *LOS D* or better) with the exception of the Langstaff Road and Dufferin Street intersection, which operates at *LOS E* with an average vehicle delay of 72 seconds. Critical movements operating at *LOS E* or *F* are generally observed at left turning movements due to higher left-turning volumes and higher opposing through volumes; these critical movements are

located at the major Langstaff Road intersections with Weston Road, Silmar Drive/Terecar Drive, Jane Street and Keele Street, and have a maximum delay of 87 seconds, and 95<sup>th</sup> percentile queue length of 61 metres.

For the Langstaff Road and Dufferin Street intersection, significant southbound traffic volumes combined with heavy turning movement volumes from the other approaches result in poor operations at this intersection, operating at *LOS E*. Simulated average delays of up to 151 seconds and 95<sup>th</sup> percentile queues of up to 281 metres cause congestion on the approaches leading up to the intersection. It is worth noting that this intersection has a substantial eastbound right turn demand of approximately 400 vehicles, and a southbound through and right turn demand of approximately 1,900 vehicles in the morning peak hour.

**Table 3-6: Langstaff Road Intersection LOS Summary and Critical Movements – Afternoon Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Stan Gate/Valeria Blvd	19 s	B	EBL	77 s	E	76 m
			NBL	59 s	E	38 m
			SBL	59 s	E	15 m
Weston Rd at Langstaff Rd	59 s	E	EBL	187 s	F	105 m
			WBL	67 s	E	89 m
			WBT	64 s	E	158 m
			NBL	90 s	F	114 m
			NBT	57 s	E	183 m
SBL	77 s	E	45 m			
Langstaff Rd at Silmar Dr/Terecar Dr	36 s	D	EBL	64 s	E	18 m
Hwy 400 East Ramp Terminal at Langstaff Rd	35 s	C	NBL	91 s	F	170 m
Langstaff Rd at Edgeley Blvd	28 s	C	EBL	70 s	E	52 m
Langstaff Rd at Millway Ave	14 s	B	NBL	60 s	E	37 m
			NBTR	58/27 s	E/C	21 m
			SBL	57 s	E	12 m
			SBTR	61/24 s	E/C	48 m
Jane St at Langstaff Rd	32 s	C	EBL	75 s	E	90 m
Langstaff Rd at Creditstone Rd	13 s	B	-	-	-	-
Keele St at Langstaff Rd	13 s	B	-	-	-	-
Langstaff Rd at Planchet Rd	21 s	C	SBLR	56/50 s	E/D	52 m
Langstaff Rd at Connie Cres/Spinnaker Way	235 s	F	SBL	624 s	F	79 m
			SBR	581 s	F	630 m
Langstaff Rd at North Rivermede Rd/Staffern Dr	27 s	C	NBL	62 s	E	58 m
			NBTR	63/45 s	E/D	102 m
Dufferin St at Langstaff Rd	63 s	E	EBL	60s	E	101 m
			WBL	73 s	E	69 m
			NBL	119 s	F	84 m
			NBT	98 s	F	296 m
			SBL	105 s	F	22 m
Langstaff Rd at Timberview Dr (Stop-controlled)	2 s	A	-	-	-	-

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Pleasant Ridge Ave	10 s	B	-	-	-	-
Highway 7 at Langstaff Rd	16 s	B	-	-	-	-

As presented in Table 3-6, the overall LOS for the afternoon peak-hour conditions are acceptable (i.e. LOS *D* or better) for the majority of the Langstaff Road intersections. Intersections with LOS *E* or *F* include the Langstaff Road intersections with Weston Road, Connie Cres/Spinnaker Way, and Dufferin Street. For the Langstaff Road intersections with an acceptable overall LOS, the critical movements are generally left turning movements with higher traffic demands; the average delays and 95<sup>th</sup> percentile queues at these intersections measure up to approximately 91 seconds and 170 metres, respectively.

Traffic operational issues at the Langstaff Road intersections with Weston Road and Dufferin Street in the afternoon peak hour cause road congestion that extends past upstream intersections. To the west of the study area, heavy traffic volumes on the east and south approaches of the Langstaff Road and Weston Road intersection cause traffic congestion between Weston Road and Highway 400 eastern ramp terminal.

To the east of the study area, heavy traffic volumes primarily on the west and south approaches of the Langstaff Road and Dufferin Street intersection, result in traffic congestion in the northbound direction from the 407ETR ramps and in the eastbound direction from Langstaff Road at Staffern Drive/North Rivermede Road. The northbound right turn movement is substantial during the afternoon peak-hour, corresponding to a traffic volume of approximately 670 vehicles.

### 3.3.2 HIGHWAY 400 INTERCHANGE RAMP TERMINALS

A summary of the intersection operations for the weekday morning and afternoon peak-hour ramp terminals at the adjacent Highway 400 interchanges at Highway 7 and Rutherford Road are presented in Table 3-7 and Table 3-8, respectively. The overall intersection delay and LOS, as well as the delays, LOS and 95<sup>th</sup> percentile vehicular queue lengths for critical movements (i.e. operating at LOS *E* or *F*) are detailed below.

A complete breakdown of delays, LOS and 95<sup>th</sup> percentile queue lengths by intersection for all turning movements in each peak hour is provided in Appendix D.

**Table 3-7: Highway 400 Ramp Terminal LOS Summary and Critical Movements – Morning Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Highway 400/Highway 7 IC West Ramp Terminal	34 s	C	NBR	70 s	E	31 m
			SBL	59 s	E	88 m
			SBT	75 s	E	141 m
Highway 400/Highway 7 IC East Ramp Terminal	15 s	B	-	-	-	-
Highway 400/Rutherford Rd IC West Ramp Terminal	15 s	B	SBL	59 s	E	70 m
Highway 400/Rutherford Rd IC East Ramp Terminal	29 s	C	EBL	88 s	F	22 m
			NBT	57 s	E	84 m
			SBL	78 s	E	20 m

During the morning peak-hour, the assessed Highway 400 ramp terminal intersections operate with an overall acceptable LOS (i.e. LOS *C* or better). The limited critical movements modelled at these intersections operate at LOS *E*, and have delays of up to 78 seconds, and 95<sup>th</sup> percentile queue length of up to 141 metres.

**Table 3-8: Highway 400 Ramp Terminal LOS Summary and Critical Movements – Afternoon Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Highway 400/Highway 7 IC West Ramp Terminal	29 s	C	NBR	104 s	F	64 m
Highway 400/Highway 7 IC East Ramp Terminal	18 s	B	-	-	-	-
Highway 400/Rutherford Rd IC West Ramp Terminal	16 s	B	SBL	60 s	E	64 m
Highway 400/Rutherford Rd IC East Ramp Terminal	57 s	E	EBL	202 s	F	11 m
			NBL	177 s	F	282 m
			NBT	106 s	F	232 m
			NBR	61 s	E	134 m

During the afternoon peak-hour, the assessed Highway 400 ramp terminal intersections operate with an overall acceptable LOS, with the exception of Highway 400 and Rutherford Road East Ramp Terminal, which operates at an overall LOS *E*. The delays at this ramp terminal measure up to 57 seconds overall, and 95<sup>th</sup> percentile queue lengths of up to 282 metres. Downstream traffic impacts (starting at the Rutherford Road and Jane Street intersection) in the eastbound direction influence operations at the ramp terminals.

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## 3.4 HIGHWAY 400 MAINLINE OPERATIONS

Highway 400, from north of Major Mackenzie Drive to south of 407ETR, was also assessed in the *Aimsun*-based micro-simulation model to evaluate the existing (2016) mainline operating conditions. The simulated mainline operations were then compared to the most recent observed travel time and speed data for May 2018 provided by MTO to ensure that the micro-simulation model generally reflects observed conditions. Results of the mainline operational analysis confirm highly congested conditions on Highway 400 occurring in the peak directions of the modelled highway segment.

In the morning peak hour, congestion is experienced in the southbound direction upstream of Langstaff Road. Modelled highway traffic operations reflect reduced southbound travel speeds ranging between 60-80 km/h upstream of Langstaff Road. Consequently, the congestion impacts southbound travel times in the modelled Highway 400 segment from Major Mackenzie Drive to 407ETR, resulting in an overall travel time of approximately 405 seconds (or 6 minutes 45 seconds); this corresponds to a delay of approximately 90 seconds (or 1.5 minutes).

Traffic congestion occurs in the northbound direction during the afternoon peak hour. Modelled Highway 400 northbound travel time from 407ETR to Major Mackenzie Drive was approximately 640 seconds (or 10 minutes 40 seconds), corresponding to a delay of approximately 325 seconds (or 5 minutes 25 seconds).

Further details on the analysis of Highway 400 mainline operations are provided in Appendix C.

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## 3.5 RAIL EXPOSURE INDEX

Metrolinx's Barrie Line intersects Langstaff Road at an at-grade rail crossing located approximately 700 metres east of the Langstaff Road/Keele Street intersection. The Barrie Line, which includes two tracks, operates GO Transit commuter rail service throughout the day; this rail line is not used for freight service. As of January 2018, 15 trains are scheduled to cross Langstaff Road each weekday.

The rail exposure index (EI) is a metric commonly used to assess rail crossing impacts and safety treatment needs as it relates to road users. The index is calculated from the AADT volume of the road and the average daily number of trains using the crossing. The calculation of the exposure index shown in Table 3-9 was based on the available existing AADT volume and train volume information at the onset of the Langstaff Road Class EA study.

**Table 3-9: Rail Exposure Index Calculation**

AADT Volume <sup>2</sup> (2015)	18,125
Daily Number of Trains (2015)	15
Exposure Index	<b>271,900</b>

As of February 2020, Transport Canada revised their guidelines for the assessment of rail crossing impacts for grade separation. Considerations are now warranted for grade separation if:

- The average annual daily traffic (AADT) volume exceeds 100,000;
- The average number of trains are 150 or more per day; or
- The Cross Product exceeds 1 million

Based on Metrolinx's GO Transit Expansion Project, the Barrie line is expected to provide service every 15 minutes from Union Station to Aurora, about 180 trains daily will be anticipated based on the Barrie Rail Corridor Expansion

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<sup>2</sup> AADT volume derived from June 2015 York Region ATR data for Langstaff Road between Staffern Drive/North Rivermede Road and Dufferin Street

EPR. Table 3-10 provides the rail exposure index calculated from the forecasted future 2041 average annual daily traffic (AADT) volume with Langstaff Road at six lanes (including the crossing over CN MacMillan Yard) and the anticipated daily number of trains.

**Table 3-10: Future 2041 Rail Exposure Index Calculation**

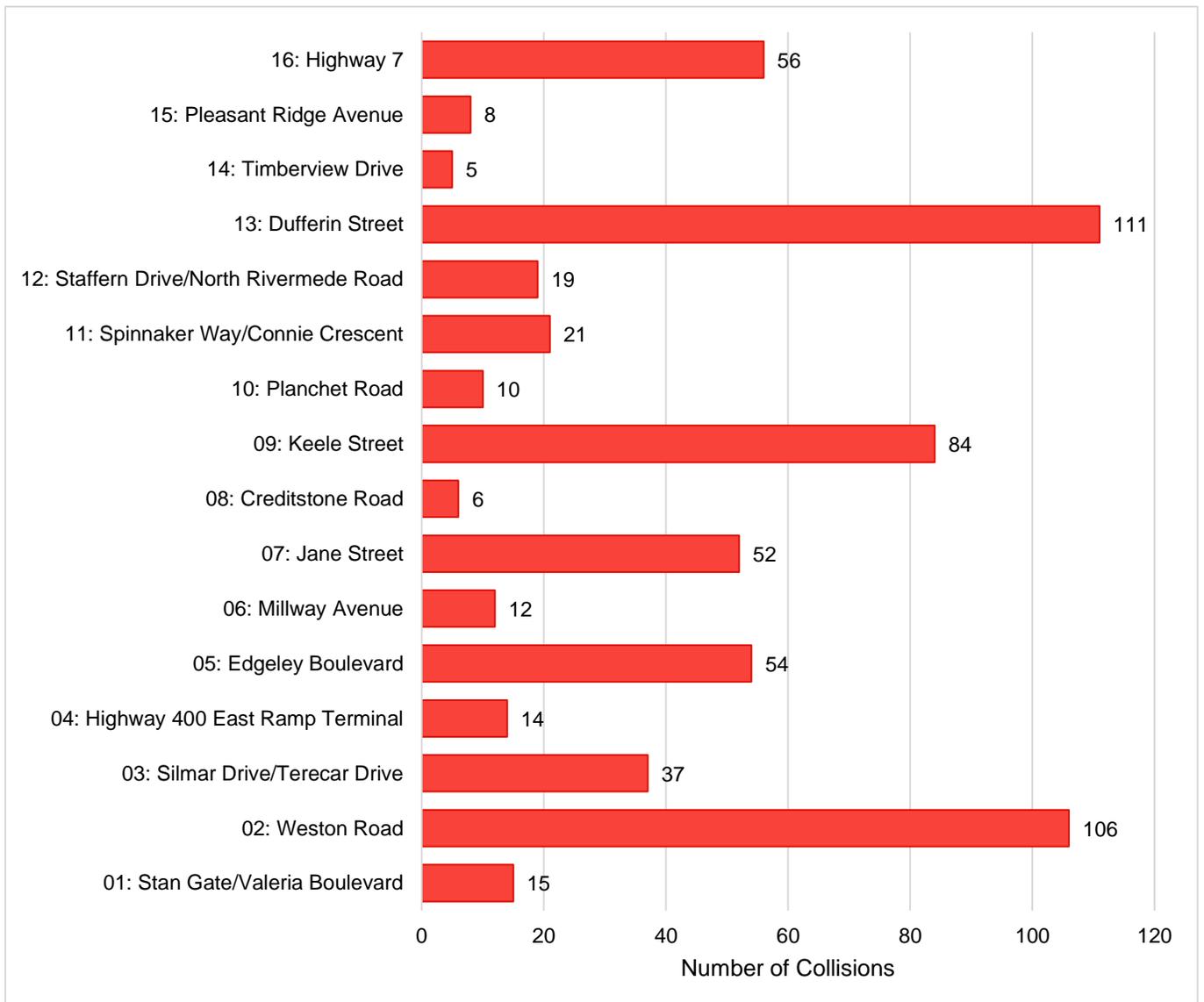
	Future Ultimate Conditions (6-lane)
AADT Volume	53,684
Daily Number of Trains	144
Exposure Index	<b>7,730,496</b>

Based on the assessment of the rail exposure index, the future Langstaff Road rail crossing is expected to exceed the minimum EI threshold value/warrant of 1 million for grade separation consideration.

# 4 COLLISION HISTORY

Collision data for the study area was provided by York Region and the City of Vaughan for a five-year period from 2011 to 2015. The collision data identifies the total number of collisions and its characteristics relating to collision severity, initial impact type and environment conditions at the time of the collision. Within the five-year period, a total of 610 collisions were recorded in the study area corridor. The distribution of the collisions is presented in Exhibit 4-1.

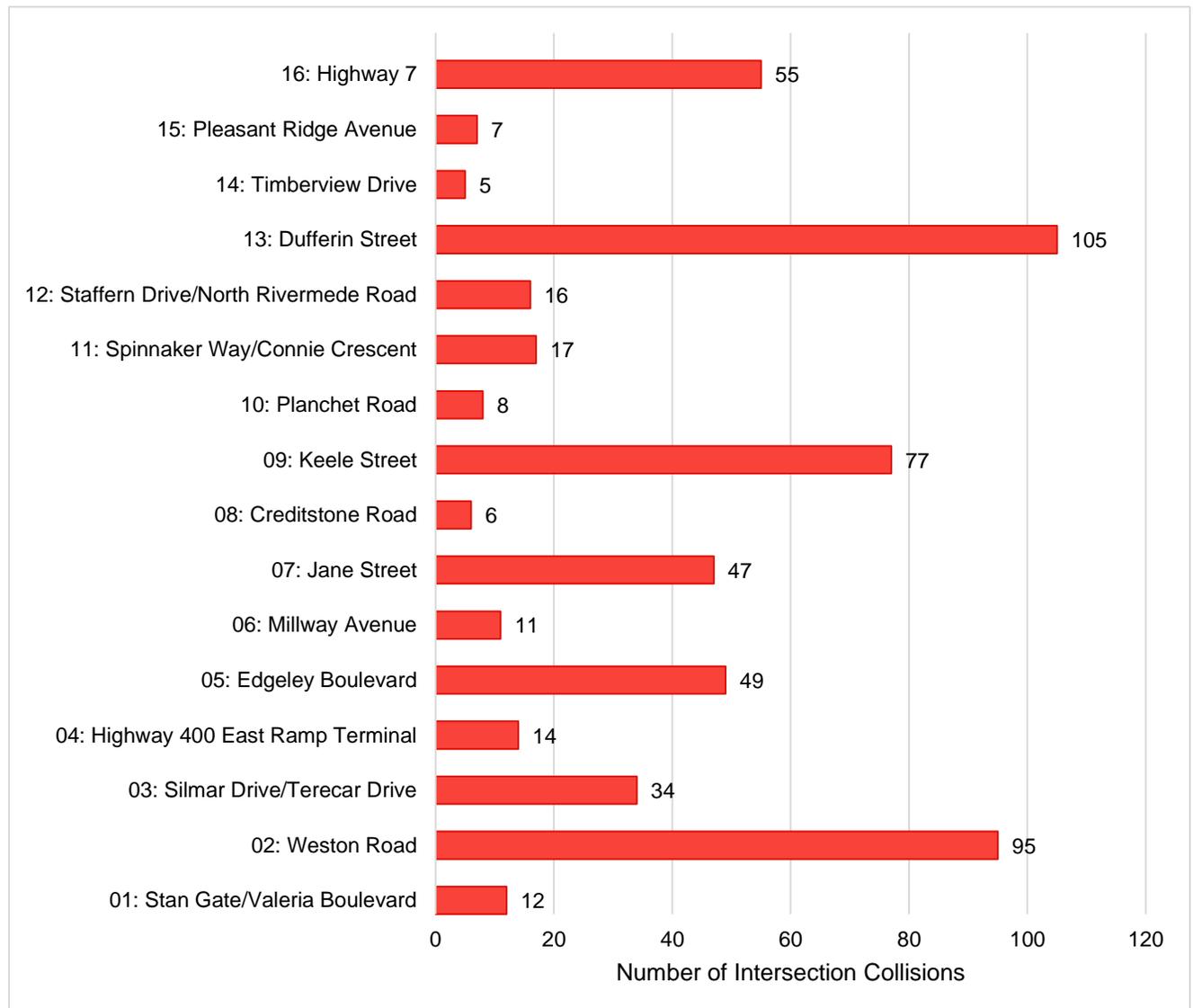
**Exhibit 4-1: Total Collision Distribution within Study Area (2011-2015)**



## 4.1 COLLISIONS AT INTERSECTIONS

Within the five-year period, 558 of the 610 collisions within the Langstaff Road EA study area were located at Langstaff Road intersections, with the collision location classified as *At Intersection* or *Intersection Related*. The majority of these collisions (80%) occurred under *Clear* environment condition. Approximately half of the intersection collisions were resulting from *Rear-end* (49%) collisions, with the bulk of the remaining collisions identified with impact types of *Angle* (19%) and *Turning Movement* (18%). *Non-fatal Injuries* occurred in 27% of all study area intersections collisions, while the rest were *Property Damage Only* (46%) or *Non-reportable* (26%). The distribution of intersection collisions in the study area is presented in Exhibit 4-2.

**Exhibit 4-2: Intersection Collision Distribution within Study Area (2011-2015)**



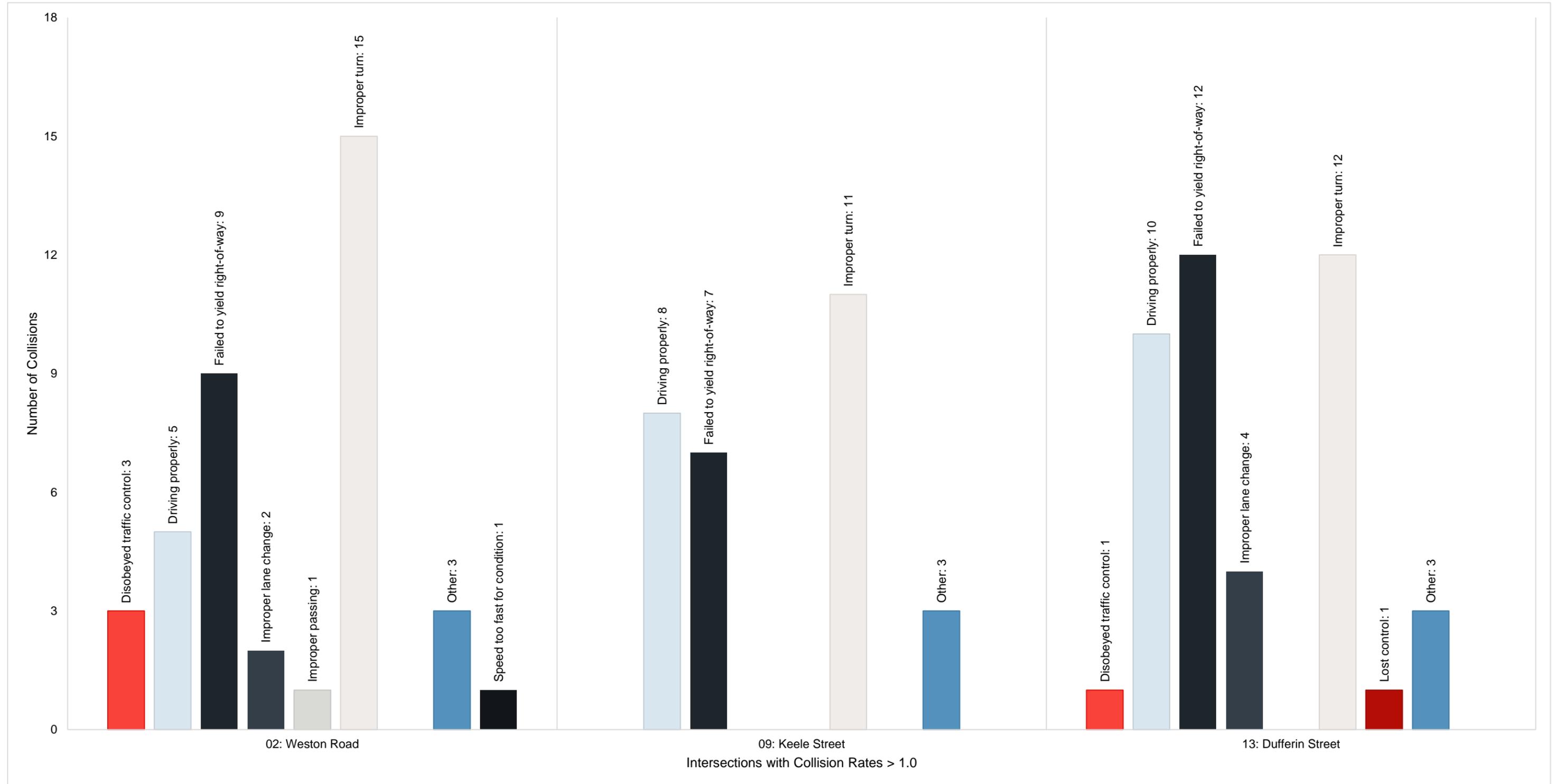
Further details on the intersection collision data are presented in Table 4-1. Calculated intersection collision rates identify the Langstaff Road intersections with Weston Road, Keele Street and Dufferin Street, as locations with more than 1.0 collision per million vehicles entering; the rates at these locations were 1.19, 1.44 and 1.10, respectively.

The Langstaff Road intersections with Weston Road, Keele Street and Dufferin Street accounted for 277 (approximately 50%) of the total 558 intersection collisions. Of the 277 collisions, 137 or 49% were *Rear-end* collisions. Environmental conditions were a factor in 29 of the 140 *Non-Rear-end* intersection collisions. For the remaining 111 intersection collisions (i.e. intersection collisions at the three identified locations that were not a *Rear-End* impact type and occurred in *Clear* environment conditions) the *Apparent Driver Action* is provided in Exhibit 4-3; the majority of these collisions (ranging from 72% to 87% at each intersection) reported some form of driver error involvement.

Table 4-1: Intersection Collision Details

LANGSTAFF ROAD INTERSECTION	ADT	5-YEAR COLLISION TOTAL	COLLISION RATE (PER MILLION VEHICLES)	NUMBER OF COLLISIONS BY FACTOR																							
				CLASSIFICATION/SEVERITY				INITIAL IMPACT TYPE						ENVIRONMENT CONDITION						LIGHT							
				NON-FATAL INJURY	PROPERTY DAMAGE ONLY	NON-REPORTABLE	APPROACHING	ANGLE	REAR END	SIDESWIPE	TURNING MOVEMENT	SMV UNATTENDED	SMV OTHER	CLEAR	RAIN	SNOW	FREEZING RAIN	DRIFTING SNOW	FOG, MIST, SMOKE, DUST	DAYLIGHT	DAYLIGHT, ARTIFICIAL	DAWN	DAWN, ARTIFICIAL	DUSK	DUSK, ARTIFICIAL	DARK	DARK, ARTIFICIAL
Stan Gate/Valeria Boulevard	23270	12	0.28	7	5	0	1	2	5	1	2	1	0	11	1	0	0	0	0	11	0	0	0	1	0	0	0
				58%	42%	0%	8%	17%	42%	8%	17%	8%	0%	92%	8%	0%	0%	0%	0%	92%	0%	0%	0%	8%	0%	0%	0%
Weston Road	43850	95	1.19	27	39	29	3	17	48	6	19	0	2	78	12	4	0	0	0	74	2	0	0	2	1	10	5
				28%	41%	31%	3%	18%	51%	6%	20%	0%	2%	83%	13%	4%	0%	0%	0%	79%	2%	0%	0%	2%	1%	11%	5%
Silmar Drive/Terecar Drive	47370	34	0.39	14	10	10	0	14	11	1	6	0	2	25	5	3	0	0	0	26	1	0	0	1	0	2	4
				41%	29%	29%	0%	41%	32%	3%	18%	0%	6%	76%	15%	9%	0%	0%	0%	76%	3%	0%	0%	3%	0%	6%	12%
Highway 400 East Ramp Terminal	37830	14	0.20	6	3	5	0	0	13	0	1	0	0	13	0	0	0	0	0	11	0	0	0	0	0	1	1
				43%	21%	36%	0%	0%	93%	0%	7%	0%	0%	100%	0%	0%	0%	0%	0%	85%	0%	0%	0%	0%	0%	8%	8%
Edgeley Boulevard	37830	49	0.71	13	21	15	0	12	20	2	12	0	3	41	6	2	0	0	0	40	1	0	0	2	1	2	3
				27%	43%	31%	0%	24%	41%	4%	24%	0%	6%	84%	12%	4%	0%	0%	0%	82%	2%	0%	0%	4%	2%	4%	6%
Millway Avenue	19930	11	0.30	4	5	2	0	1	5	1	2	0	2	9	1	1	0	0	0	7	0	0	0	0	1	3	0
				36%	45%	18%	0%	9%	45%	9%	18%	0%	18%	82%	9%	9%	0%	0%	0%	64%	0%	0%	0%	0%	9%	27%	0%
Jane Street	36310	47	0.71	11	23	13	0	8	24	5	8	0	0	36	10	1	0	0	0	29	2	0	0	1	2	8	4
				23%	49%	28%	0%	18%	53%	11%	18%	0%	0%	77%	21%	2%	0%	0%	0%	63%	4%	0%	0%	2%	4%	17%	9%
Creditstone Road (details unavailable)	16740	6	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Keele Street	29400	77	1.44	18	34	25	1	17	36	5	14	0	3	60	11	4	0	1	0	59	0	1	0	2	0	10	4
				23%	44%	32%	1%	22%	47%	7%	18%	0%	4%	79%	14%	5%	0%	1%	0%	78%	0%	1%	0%	3%	0%	13%	5%
Planchet Road	16660	8	0.26	3	3	2	0	0	7	0	1	0	0	6	2	0	0	0	0	6	0	1	0	0	0	0	1
				38%	38%	25%	0%	0%	88%	0%	13%	0%	0%	75%	25%	0%	0%	0%	0%	75%	0%	13%	0%	0%	0%	0%	13%
Spinnaker Way/Connie Crescent	17170	17	0.54	4	10	3	0	3	7	3	1	0	3	10	4	3	0	0	0	11	1	0	0	0	0	2	3
				24%	59%	18%	0%	18%	41%	18%	6%	0%	18%	59%	24%	18%	0%	0%	0%	65%	6%	0%	0%	0%	0%	12%	18%
Staffern Drive/North Rivermede Road	20480	16	0.43	2	9	5	0	3	10	0	3	0	0	11	5	0	0	0	0	10	0	0	0	1	0	2	3
				13%	56%	31%	0%	19%	63%	0%	19%	0%	0%	69%	31%	0%	0%	0%	0%	63%	0%	0%	0%	6%	0%	13%	19%
Dufferin Street	52400	105	1.10	24	57	24	4	15	53	15	16	1	1	89	9	5	1	1	0	86	0	0	1	1	0	8	9
				23%	54%	23%	4%	14%	50%	14%	15%	1%	1%	85%	9%	5%	1%	1%	0%	82%	0%	0%	1%	1%	0%	8%	9%
Timberview Drive	24060	5	0.11	0	4	1	0	1	1	2	1	0	0	4	0	0	1	0	0	4	0	0	0	1	0	0	0
				0%	80%	20%	0%	20%	20%	40%	20%	0%	0%	80%	0%	0%	20%	0%	0%	80%	0%	0%	0%	20%	0%	0%	0%
Pleasant Ridge Avenue	23890	7	0.16	1	4	2	0	3	1	0	2	0	1	5	2	0	0	0	0	6	0	0	0	0	0	1	0
				14%	57%	29%	0%	43%	14%	0%	29%	0%	14%	71%	29%	0%	0%	0%	0%	86%	0%	0%	0%	0%	0%	14%	0%
Highway 7	59670	55	0.51	16	29	10	2	7	26	6	11	0	3	39	6	7	0	0	1	35	0	1	0	1	1	10	7
				29%	53%	18%	4%	13%	47%	11%	20%	0%	5%	74%	11%	13%	0%	0%	2%	64%	0%	2%	0%	2%	2%	18%	13%
Study Area Total	-	558	-	150	256	146	11	103	267	47	99	2	20	437	74	30	2	2	1	415	7	3	1	13	6	59	44
				27%	46%	26%	2%	19%	49%	9%	18%	0%	4%	80%	14%	5%	0%	0%	0%	76%	1%	1%	0%	2%	1%	11%	8%

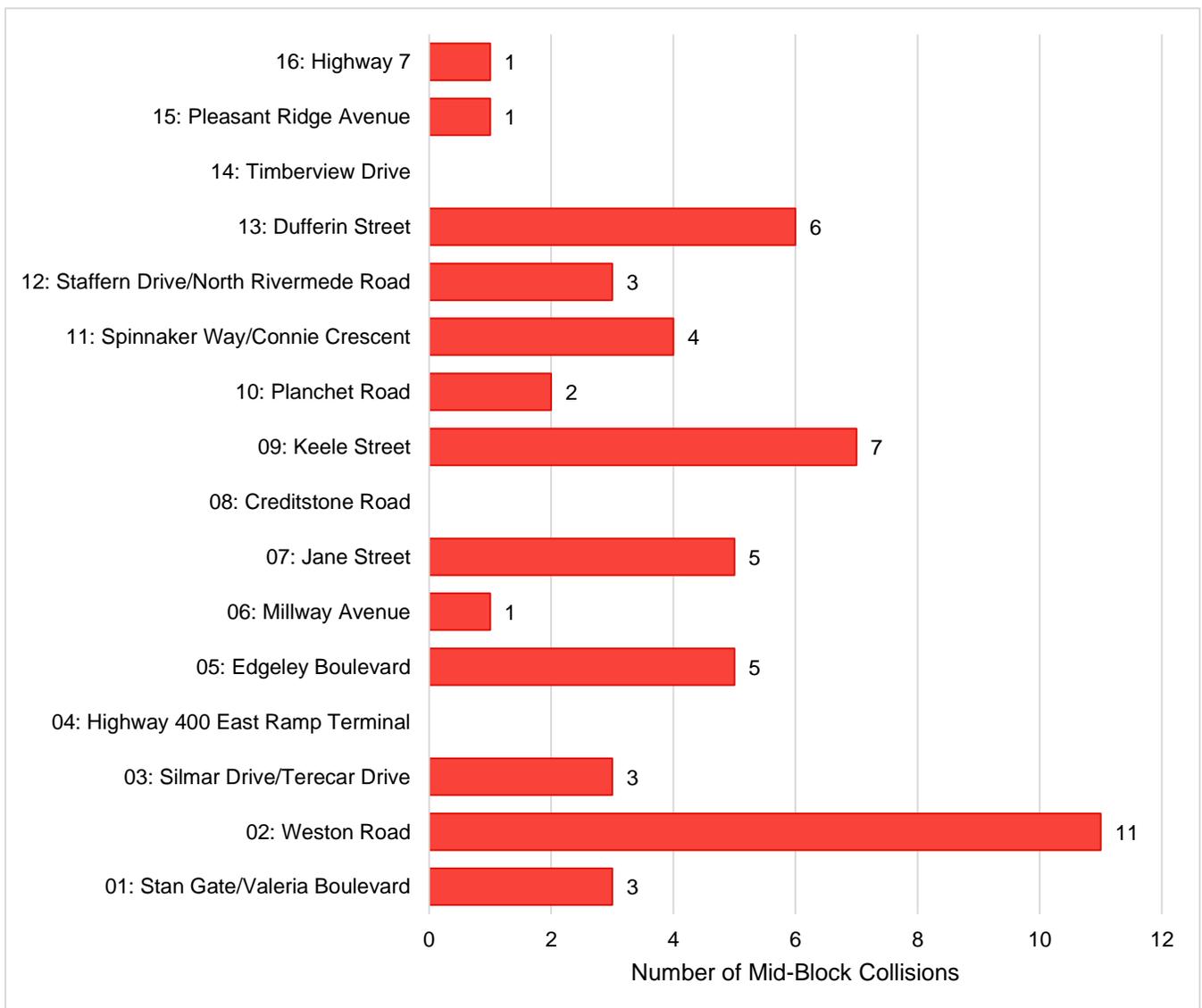
Exhibit 4-3: Apparent Driver Action at Select Locations (Clear Environment, Excluding Rear-End Collisions)



## 4.2 COLLISIONS AT MID-BLOCK LOCATIONS

Mid-block collisions accounted for 52 (or 9%) of the total 610 study area collisions within the five-year period. The distribution of mid-block collisions on Langstaff Road, is illustrated in Exhibit 4-4; this exhibit includes collisions classified at *Non-Intersection*, *At/Near Private Driveway* and *At Rail Crossing* locations, reported at the nearest intersection. Three quarters of these collisions occurred under *Clear* environmental conditions. Half of the mid-block collisions resulted from *Rear-end* impact, with the bulk of the remaining collisions caused by the vehicle *Angle* (20%) and *Turning Movement* (20%). *Non-fatal Injuries* occurred in 17% of the mid-block collisions, while the rest were *Property Damage Only* (83%). The collision rates for the mid-block collisions were not calculated due to the lower number of reported collisions.

**Exhibit 4-4: Mid-Block Collision Distribution (Reported at Nearest Intersection) in Study Area**



# 5 FUTURE (2041) TRAFFIC CONDITIONS

## 5.1 YORK REGION'S TRANSPORTATION MASTER PLAN (2016)

York Region's Transportation Master Plan (TMP) was updated and received Regional Council approval in 2016. The Region's TMP identifies the need for improvements on Langstaff Road between Weston Road and Highway 7, which is divided into three sections: Weston Road to Jane Street, Jane Street to Keele Street, and Keele Street to Dufferin Street. York Region has proposed network improvements in each of these sections with a vision to build and improve the transportation network and connectivity, provide close residential/work opportunities, promote efficient movement of goods and people, and invest in infrastructure to support future growth.

Population and employment within the extended area (as outlined in Exhibit 1-1), is expected to increase by approximately 35% from the current 2016 population of 135,698, and 16% from the current employment of 132,969 by 2041, respectively. The population and employment forecast for 2031 and 2041 are presented in Table 5-1. The increase in travel demand associated with future growth will continue to affect the operating performance of the transportation network in the area unless additional network capacity and improved efficiency are provided, particularly for the eastbound and westbound movements near the CN Rail Yard where the transportation network capacity is severely limited.

**Table 5-1: York Region Growth Targets within Extended Area**

GROWTH TARGETS	2016		2031		2041	
	Population		Population		Population	
Total <sup>3</sup>	135,698	132,969	163,771	147,317	183,388	154,521
Increase from 2016	-	-	28,074	14,348	47,691	21,552
Average Annual Growth Rate (from 2016)	-	-	1.4%	0.7%	1.4%	0.6%

To address York Region's future transportation needs, the 2016 York Region TMP identifies the following improvements and implementation timing—illustrated by Map 18 provided in Appendix E—on Langstaff Road within the study area:

- Weston Road to Jane Street (ID: 2079), and Keele Street to Dufferin Street (ID: 2081)
  - Widen to 6 lanes with transit/HOV lanes
    - ❖ TMP Phase (Weston Road to Jane Street): 2027 to 2031
    - ❖ TMP Phase (Keele Street to Dufferin Street): 2022 to 2026
    - ❖ Part of the Frequent Transit Network to support BRT/Rapid Transit
    - ❖ Barrie GO Rail Grade Separation east of Keele Street

<sup>3</sup> Based on the Region staff-preferred growth scenario with a 45% intensification target, presented in November 2015 as part of the Region's municipal comprehensive review process.

- Jane Street to Keele Street (ID: 2080)
  - Construct connection over CN Rail Yard on Langstaff Road
    - ❖ Provide 6 lanes with transit/HOV lanes
    - ❖ TMP Phase: 2027 to 2031
    - ❖ Part of the Frequent Transit Network to support BRT/Rapid Transit

The 2016 TMP also recommends the following network improvements on other regional roads within the extended study area:

- Weston Road: Widen to 6 lanes including Transit/HOV lanes, from Steeles Avenue to Major Mackenzie Drive;
- Jane Street: Rapid Transit Corridor between Highway 7 and Major Mackenzie Drive;
- Keele Street: Widen to 6 lanes including Transit/HOV lanes from Highway 7 to Rutherford Road;
- Dufferin Street: Widening to 6 lanes including Transit/HOV lanes from Langstaff Road to Rutherford Road; and
- Rutherford Road/Carville Road/16th Avenue: Widening for Transit/HOV lanes from Jane Street to McCowan Road.

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### 5.1.1 STRATEGIC GOODS MOVEMENT NETWORK CONTEXT

Langstaff Road, between Highway 400 and Dufferin Street, is identified as part of the Region's Strategic Goods Movement Network (SGMN) in the 2016 York Region TMP, illustrated by Map 11 in Appendix E. This strategic network is intended to facilitate safe and efficient movement of goods to and from key origins and destinations including Provincial highways, intermodal rail yards and commercial and industrial employment areas. Langstaff Road is designated as a *Primary Arterial Goods Movement Corridor* in the SGMN as it meets the following qualifications:

- An urban arterial serving employment and industrial lands;
- Is expected to handle more than 2,500 trucks per 8-hour period and more than 10% modal split of medium and heavy trucks;
- Contains mixed traffic and minimal overlap with rapid transit corridors;
- Provides accessibility to employment lands; and
- Ensures that trucks can easily access 400-series highways and their destinations to support regional economic growth.

In order to accommodate trucks on Primary Arterial Good Movement Corridors, the TMP generally considers these roadways to apply freight-supportive street design standards and land use planning policies and are typically future six-lane corridors with inclusion of truck-only design elements in special cases.

## 5.2 LANGSTAFF ROAD IMPROVEMENT SCENARIOS

To assess the future (2041) transportation conditions with alternative improvements and to identify potential transportation needs within the study area of the Langstaff Road EA, an initial five improvement scenarios (presented in Table 5-2) were assessed using the Region’s travel demand model (YRTDF). These potential improvements include a six-lane widening of Langstaff Road, with additional transit / High Occupancy Vehicle (HOV) lanes or General-Purpose Lanes (GPL), provision of a new connection across the CN Rail Yard (presented in Appendix F) and Highway 400 interchange improvements. It’s noted that the following future improvement scenarios consider all other planned/proposed road network and major transit improvements to the surrounding road network, as identified in the 2016 York Region TMP and outlined in Section 5.1.

**Table 5-2: Langstaff Road EA Improvement Scenarios**

IMPROVEMENT SCENARIOS	EXISTING LANGSTAFF ROAD	LANGSTAFF CONNECTION ACROSS CN RAIL YARD	HIGHWAY 400 INTERCHANGE
1. Base Case	No change	No link	No change
2. Langstaff Road East Improvements	4GPL (between Keele & Dufferin)	No link	No change
3. Widen Langstaff Road for Transit/HOV and Build Langstaff Connection	4GPL+2HOV	4GPL+2HOV	No change
4. Widen Langstaff Road for Transit/HOV, Build Connection and Interchange Improvement	4GPL+2HOV	4GPL+2HOV	Convert to full interchange
5. Widen Langstaff Road for Goods Movement, Build Connection and Interchange Improvement	6GPL	6GPL	Convert to full interchange

Scenario 5 (Ultimate Future Conditions) represents the context-sensitive improvement alternative for the study area. Despite being contradictory to current Regional policy pertaining to six-lane roadway widening projects, the inclusion of this scenario was essential based on the local conditions, adjacent land use of the commercial and industrial employment areas surrounding the study area and supporting 2016 York Region TMP strategic goods movement network initiatives.

The widening of Langstaff Road to a six GPL cross-section can also benefit adjacent parallel corridors, such as Rutherford Road and Highway 7, by providing an opportunity for enhanced modal separation between different travel modes. In scenario 5, commercial vehicle traffic would likely be drawn away from the parallel roadways to Langstaff Road, which would enhance traffic operations and safety on the Rutherford Road transit/HOV facility and Highway 7 rapid transit corridor for all road users, including motorists, transit passengers, pedestrians and cyclists.

## 5.3 SCREENLINE ANALYSIS FOR FUTURE CONDITIONS

A screenline analysis was undertaken to assess the future 2041 traffic impacts associated with the initial five Langstaff Road improvement scenarios. This analysis follows the same methodology defined in Section 0 utilizing the York Region Travel Demand Forecasting (YRTDF) model. However, to establish meaningful HOV lane usage

estimates on roadways for the future 2041 planning horizon road networks, the YRTDF model was modified to estimate automobile trips by vehicle occupancy. The changes apply carpool data derived from the 2011 Transportation Tomorrow Survey (TTS) for single occupant vehicles (SOV), HOV with two persons (HOV2) and HOV with three or more persons (HOV3+). Proportions for each of the vehicle occupancy classes were calculated and incorporated to the YRTDF automobile trip matrices on a planning district basis to preserve original YRTDF travel demand totals. The 2011 TTS-derived vehicle occupancy proportions were maintained in all planning horizons to provide conservative forecasts. The demand forecasting process also included a review of the YRTDF-modelled transportation road network for each of the planning horizons in the vicinity of Langstaff study area to confirm assumed road network attributes as well as network improvements identified in the 2016 York Region TMP.

### Scenario 1 – Base Case

The 2041 AM peak hour operating conditions for the Base Case scenario for the north-south and east-west screenlines are presented in Exhibit 5-1 and Exhibit 5-2, respectively. The existing link V/C ratios for the CN Rail Yard (for Rutherford Road and Highway 7) are presented in Exhibit 5-3.

**Exhibit 5-1: Future Base Case - AM Peak Hour North-South Screenline V/C**



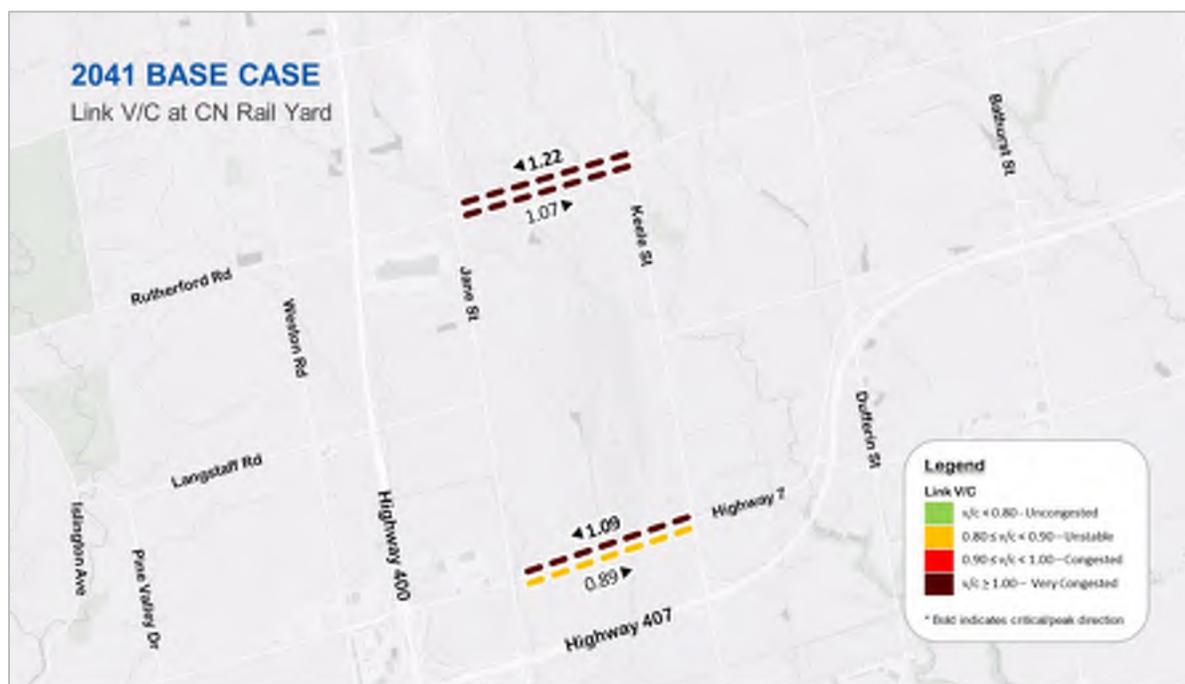
The forecasted traffic growth for the future 2041 planning horizon for the Base Case scenario, shows that the eastbound and westbound corridors will operate with either approaching or heavy traffic demands, or will operate over planning level capacity (Exhibit 5-1). The westbound traffic flow near the CN Rail Yard (Screenline 3) is expected to operate in *Very Congested* conditions. Traffic flows travelling in the same direction will operate in an *Unstable* condition, with a V/C ratio of 0.80 west of Dufferin Street (Screenline 4). The eastbound direction shows *Congested* conditions with a V/C ratio of 0.95 just east of Weston Road (Screenline 1), and *Very Congested* conditions with a V/C ratio of 1.19 east of Highway 400 (Screenline 3).

Exhibit 5-2: Future Base Case - AM Peak Hour East-West Screenline V/C



The east-west screenline analysis results show that the southbound traffic condition will deteriorate from an *Unstable* operation to a *Very Congested* operation by 2041 during the AM Peak Hour, with V/C ratios of 1.17 and 1.11 north of Langstaff Road (Screenline 5) and south of Langstaff Road (Screenline 6), respectively. While the northbound traffic will continue to operate in an *Uncongested* condition.

Exhibit 5-3: Future Base Case - AM Peak Hour Link V/C at CN Rail Yard



Despite the inclusion other road improvements outlined in the York TMP, and specifically the HOV lanes on Rutherford Road, this east-west link at the CN Rail Yard will remain over capacity (Exhibit 5-3). The eastbound and westbound traffic flows are expected to both operate at *Very Congested* conditions with V/C ratios of 1.07 and 1.22, respectively. At Highway 7, the eastbound traffic is expected to operate at *Unstable* conditions, while the westbound direction is expected to operate in a *Very Congested* condition.

### Scenario 2 – Langstaff East Improvements

This scenario includes the widening of Langstaff Road between Keele Street and Dufferin Street from two GPLs to four GPLs, as shown in Exhibit 5-4. This improvement is expected to provide additional capacity for the eastbound and westbound movements on Langstaff Road east of the CN Rail Yard. The 2041 AM peak hour operating conditions for Scenario 2 for the north-south, east-west and at the CN Rail Yard screenlines are presented in Exhibit 5-5, Exhibit 5-6 and Exhibit 5-7, respectively.

Exhibit 5-4: Langstaff East Improvements

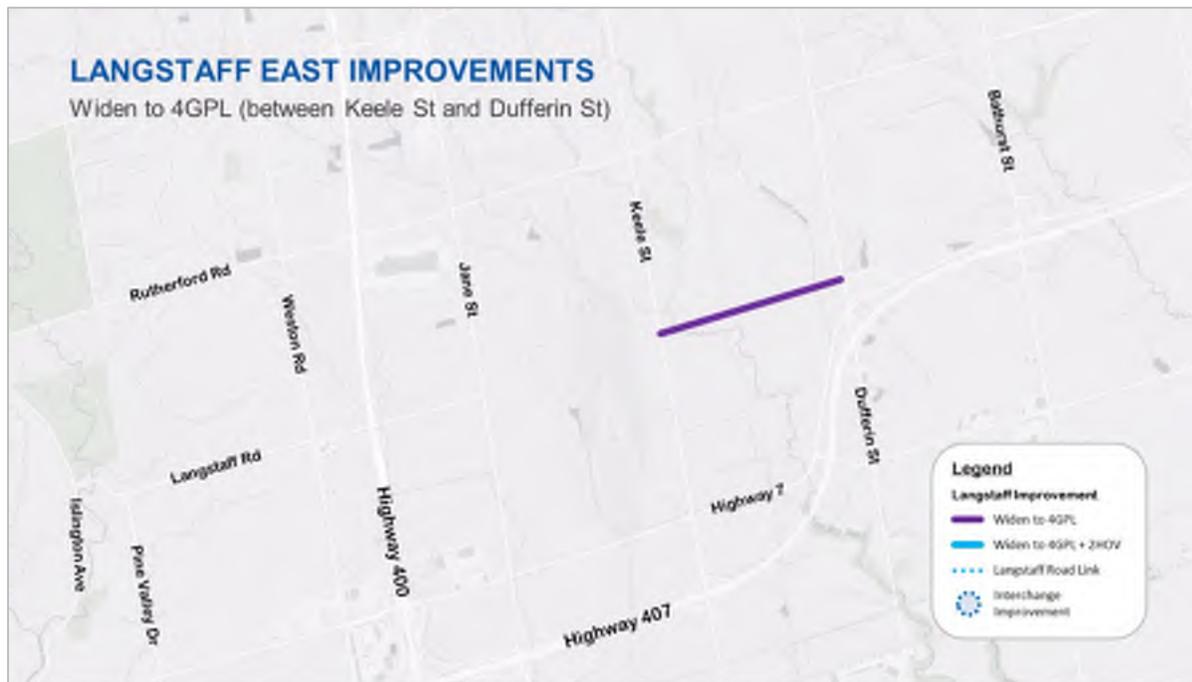


Exhibit 5-5: Future East Improvements - AM Peak Hour North-South Screenline V/C



Exhibit 5-6: Future East Improvements - AM Peak Hour East-West Screenline V/C

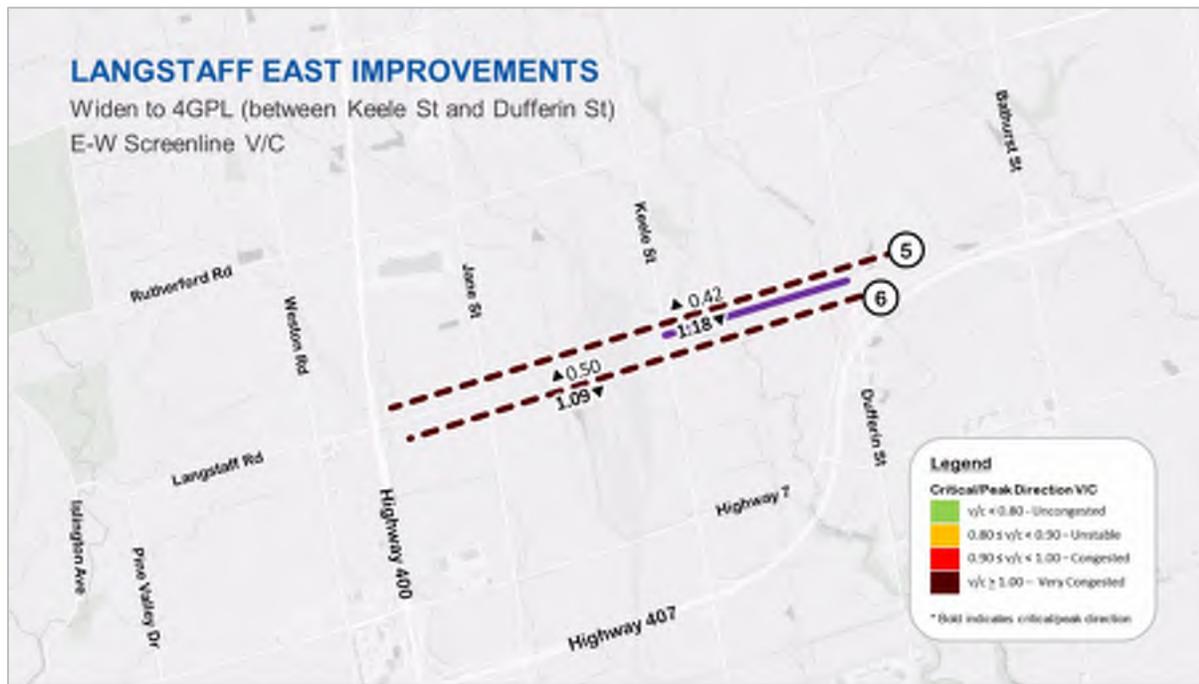
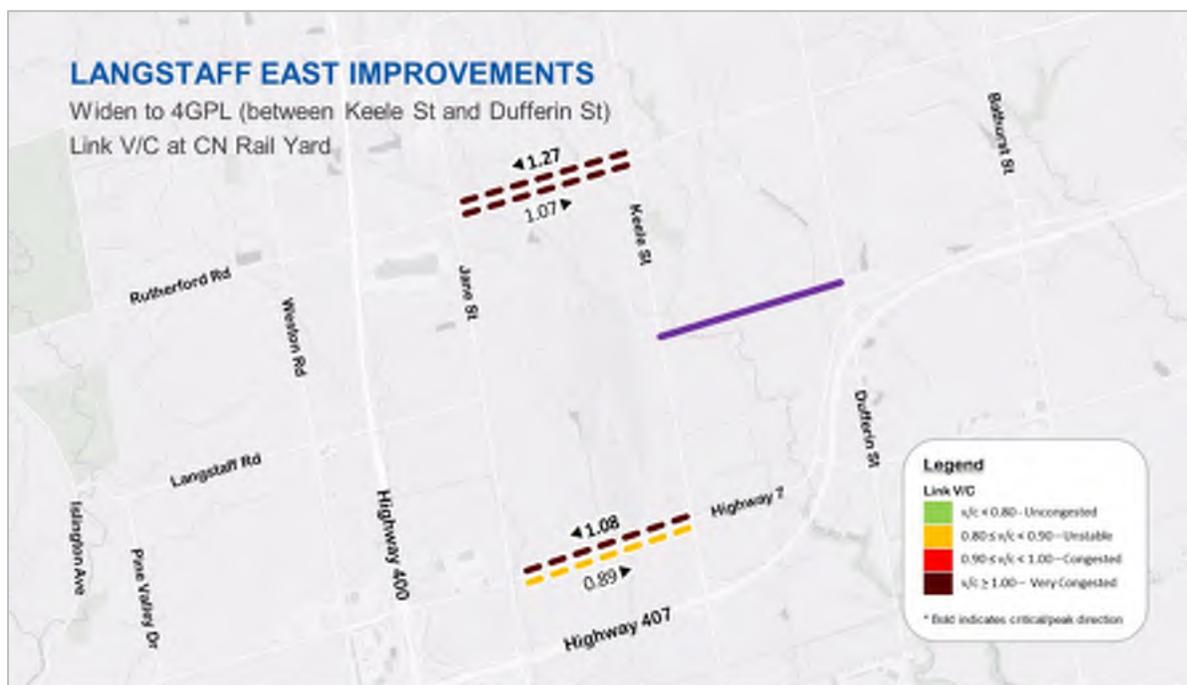


Exhibit 5-7: Future East Improvements - AM Peak Hour Link V/C at CN Rail Yard



The widening on Langstaff Road between Keele Street and Dufferin Street only, marginally improves the westbound 2041 AM Peak Hour traffic flow west of Dufferin Street from Unstable to Uncongested conditions, with a V/C ratio of 0.77 (Screenline 4). The analysis results for this scenario show that the operating conditions for all other screenlines are expected to remain similar to the Base Case, as illustrated in Exhibit 5-5, Exhibit 5-6 and Exhibit 5-7.

### Scenario 3 – Provision of Langstaff connection and Transit/HOV Lanes

Scenario 3 includes the provision of a connecting link on Langstaff Road across the CN Rail Yard between Jane Street and Keele Street, and the widening of Langstaff Road between Weston Road and Dufferin Street to a six-lane cross-section, including a transit/HOV lane in each direction. As illustrated in Exhibit 5-8, provision on the Langstaff Road connection is expected to provide continuity for the eastbound and westbound directions on Langstaff Road and alleviate traffic congestion from parallel corridors within the area. Exhibit 5-9, Exhibit 5-10 and Exhibit 5-11 illustrate the screenline operating conditions for Scenario 3.

**Exhibit 5-8: Langstaff Widened for Transit/HOV and Connection of Langstaff**

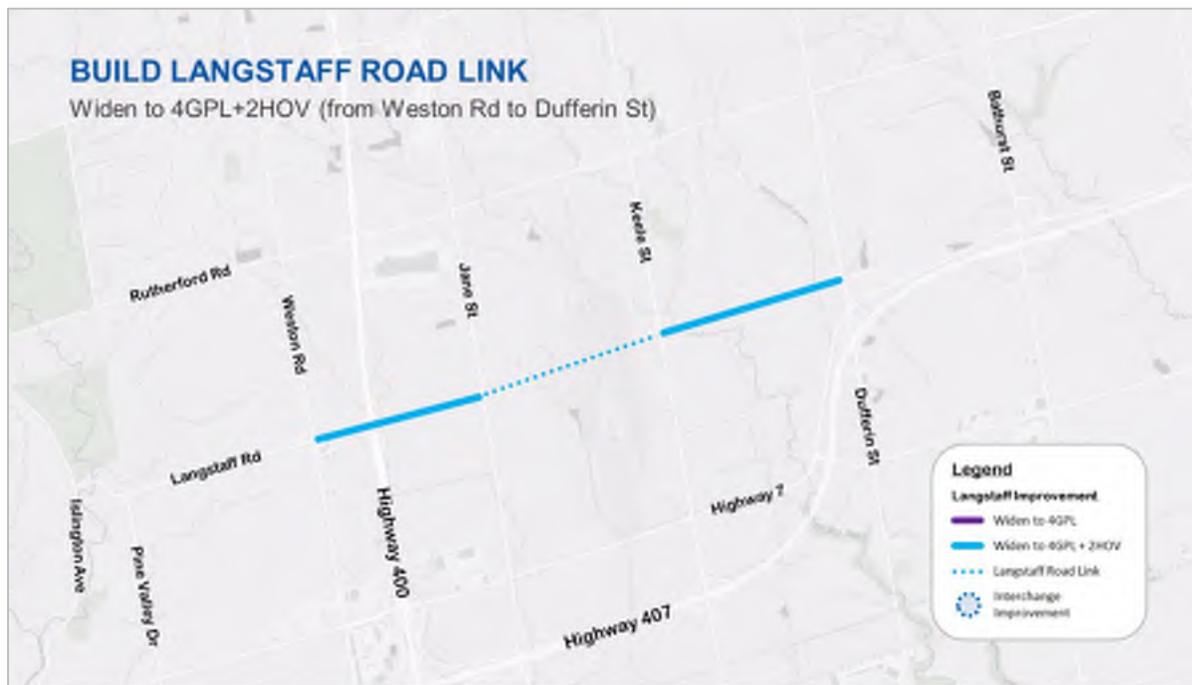
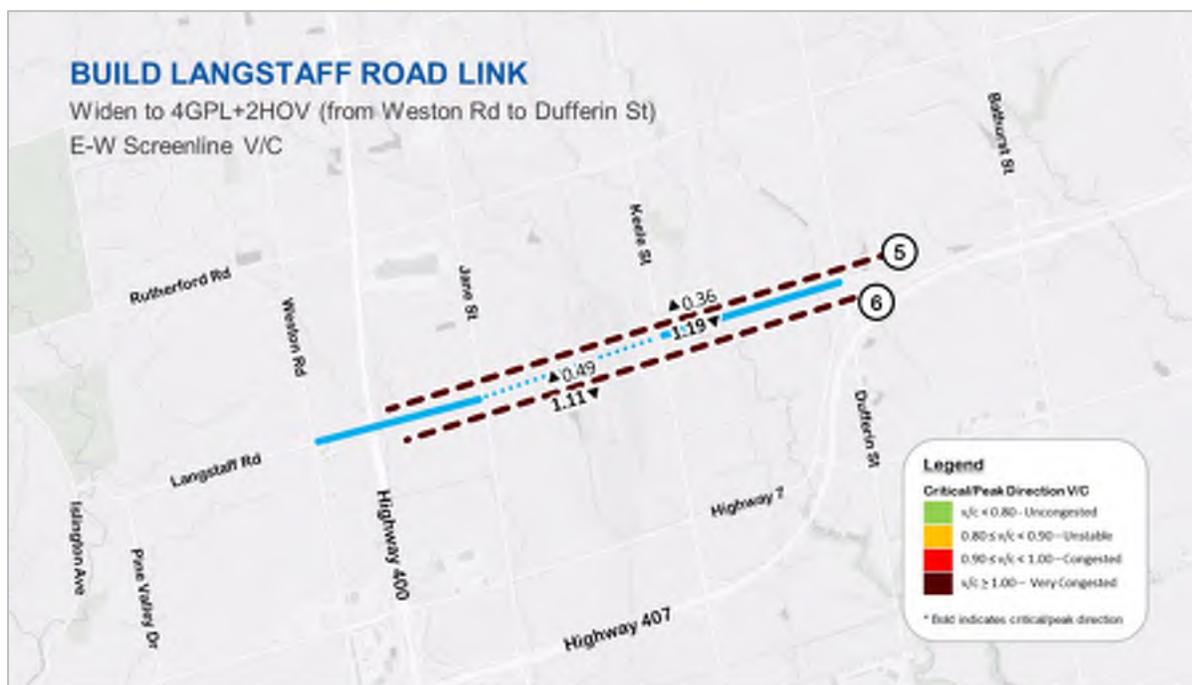


Exhibit 5-9: Future Build Connection & Transit/HOV Lanes - AM Peak Hour North-South Screenline V/C



Exhibit 5-10: Future Build Connection & Transit/HOV Lanes - AM Peak Hour East-West Screenline V/C



Scenario 3 shows improvements in operating conditions at two screenline locations compared to Scenario 2: at the CN Rail Yard (Screenline 3). At the CN MacMillan Rail Yard screenline (Screenline 3), the westbound traffic flow shows a reduction in the V/C ratio at 1.01 compared to 1.16 for Scenario 2. The eastbound traffic flow is also expected to improve from *Congested* to *Unstable* conditions. However, the increased road network capacity along Langstaff Road yields negligible improvement on the screenlines east of Jane Street (Screenline 1 and 2). It is also expected to have slightly more congested conditions just west of Dufferin Street (Screenline 4) from *Uncongested* in Scenario 2 to *Unstable* in Scenario 3. The scenario improvements will also have marginal improvements on the northbound and southbound traffic flow (presented in Exhibit 5-10).

**Exhibit 5-11: Future Build Connection & Transit/HOV Lanes - AM Peak Hour Link V/C at CN Rail Yard**



Further analysis of the east-west links near the CN MacMillan Rail Yard shows noticeable improvement to the 2041 AM Peak Hour operating conditions (Exhibit 5-11), specifically on Rutherford Road, as traffic in the area will utilize the added network capacity provided by the Langstaff Road connection, reducing travel demand on the parallel corridors. The westbound traffic flow on Rutherford Road could experience a reduction in congestion with a decrease in the V/C ratio from 1.27 (in Scenario 2) to 1.07. In addition, the westbound traffic flow on Highway 7 will improve from being Very Congested to Congested with a V/C of 0.97. The Langstaff Road connection across the CN Rail Yard is expected to be fully utilized and manage traffic volumes in the range of 1600-2300 in the morning peak hour; these volumes correspond to operating conditions of Uncongested in the eastbound direction and borderline Very Congested in the westbound direction.

### Scenario 4 – Provision of Langstaff Connection, Transit/HOV Lanes and Interchange Improvements

Scenario 4 includes all the provisions considered in Scenario 3, combined with an improvement to the existing Highway 400 partial interchange at Langstaff Road to a full interchange, providing highway access to and from the north. Scenario 4 is presented in Exhibit 5-12. The future traffic conditions for Scenario 4 are presented in Exhibit 5-13, Exhibit 5-14 and Exhibit 5-15.

Exhibit 5-12: Langstaff Widened for Transit/HOV, Build Connection and Interchange Improvements

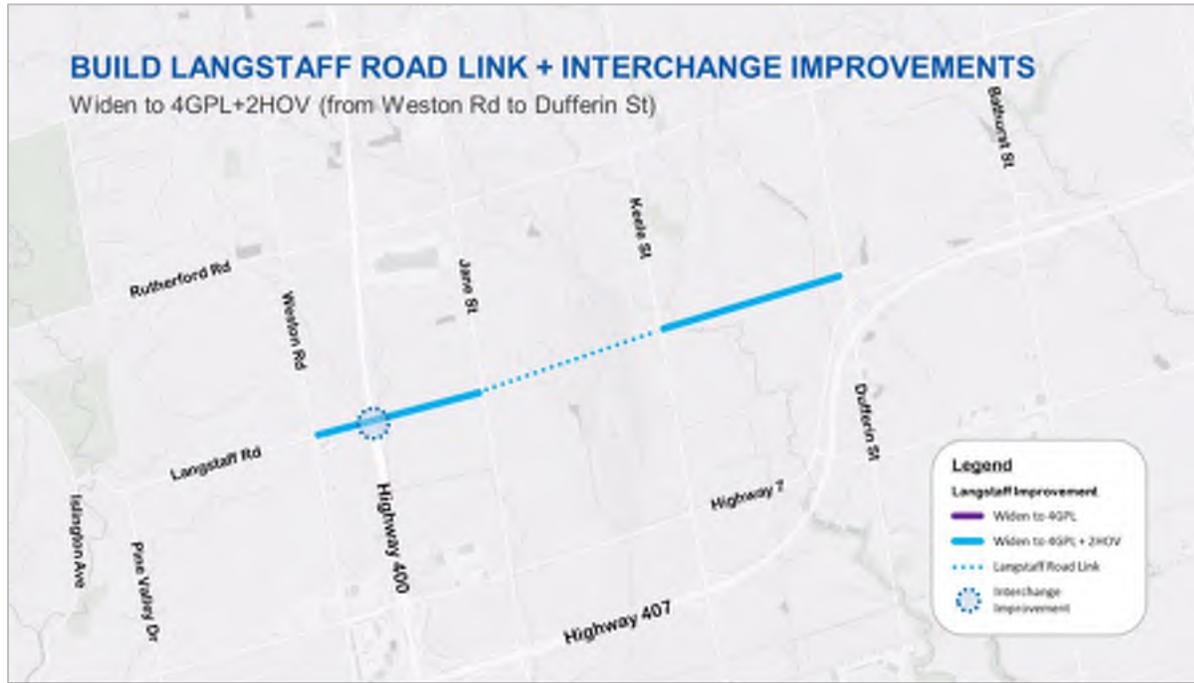


Exhibit 5-13: Future Build Connection, Transit/HOV Lanes and Full IC - AM Peak Hour North-South Screenline V/C



Exhibit 5-14: Future Build Connection, Transit/HOV Lanes and Full IC - AM Peak Hour East-West Screenline V/C



Exhibit 5-15: Future Build Connection, Transit/HOV Lanes and Full IC - AM Peak Hour Link V/C at CN Rail Yard



As can be expected using screenline level analysis, results of Scenario 4 show very marginal improvements at the screenline V/C ratios, compared to the Scenario 3, since no additional arterial roadway capacity is introduced in the study area. A detailed examination of the north-south screenlines east of Weston Road and Highway 400 between Scenario 3 and 4 provide a greater understanding in relation to the Highway 400/Langstaff Road interchange

improvement. Inspection of the link volumes adjacent to the interchange along the two screenlines presented in Table 5-3, show notable changes in traffic demands on the arterial corridors.

**Table 5-3: Comparison of Volumes for Screenline Adjacent to Highway 400**

SCREENLINE	ARTERIAL ROAD	WESTBOUND		EASTBOUND	
		Partial IC (Scenario 3)	Full IC (Scenario 4)	Partial IC (Scenario 3)	Full IC (Scenario 4)
East of Weston Road	Rutherford Road	1025	1012	2242	2185
	Langstaff Road	669	754	2318	2488
	Highway 7	2761	2743	2739	2787
East of Weston Road Screenline Total		4455	4509	7299	7460
East of Highway 400	Rutherford Road	1920	1828	3077	3070
	Langstaff Road	1530	1743	2518	2505
	Highway 7	3177	3144	3660	3647
East of Highway 400 Screenline Total		6627	6715	9255	9222

For the screenline east of Weston Road (Screenline 1), the Highway 400/Langstaff Road interchange draws some additional traffic volumes to the arterial roads, resulting in a combined direction increase of 215 vehicles. Volumes remain relatively consistent between the partial interchange and full interchange alternatives for the screenline east of Highway 400 (Screenline 2), though indicates a redistribution of traffic along the links in the westbound direction; traffic volumes in the westbound direction increase on Langstaff Road and decrease on Rutherford Road and Highway 7.

**Scenario 5 – Provision of Langstaff Connection, Interchange Improvements and Widening for Goods Movement Corridor**

This scenario considers a provision of the Langstaff Road connection across the CN Rail Yard between Jane Street and Keele Street, widening of Langstaff Road between Weston Road and Dufferin Street to six GPLs and Highway 400 interchange improvements to provide highway access to and from the north at Langstaff Road.

These improvements provide context-sensitive transportation system improvements relating to the adjacent land use of commercial and industrial employment areas surrounding the Langstaff EA study area and support the strategic goods movement network initiatives as outlined in the 2016 York TMP. The screenline analysis results for this scenario are presented in Exhibit 5-16, Exhibit 5-17 and Exhibit 5-18.

Exhibit 5-16: Future Build Connection, 6-GPL and Full IC - AM Peak Hour North-South Screenline V/C



Exhibit 5-17: Future Build Connection, 6-GPL and Full IC - AM Peak Hour East-West Screenline V/C



**Exhibit 5-18: Future Build Connection, 6-GPL and Full IC - AM Peak Hour Link V/C at CN Rail Yard**



In general, the operating performance of this scenario is similar to Scenario 4, with the exception of the westbound link V/C at the planned Langstaff Road connection, which now operates at Congested conditions, as opposed to Very Congested conditions in the previous scenario (Exhibit 5-18).

### 5.3.1 CAPACITY ANALYSIS RESULTS

A summary of capacity analysis results (using V/C ratios) for all analysis scenarios is provided in Table 5-4. The V/C results were calculated based on the simulated volumes shown in Table 5-3.

**Table 5-4: Comparison of Critical Screenline V/C Ratios**

Future (2041) Conditions						
	Existing (2016) Conditions	Scenario 1: Base Case	Scenario 2: East Improvements	Scenario 3: Widen for Transit/HOV and Build Connection	Scenario 4: Widen for Transit/HOV, Build Connection & Interchange Improvement	Scenario 5: Widen for Goods Movement, Build Connection & Interchange Improvement
<b>North-South Screenline V/C</b>						
East of Weston Road	0.81	0.95	0.95	0.94	0.96	0.97
East of Highway 400	1.08	1.19	1.19	1.19	1.18	1.21
At CN Rail Yard	0.92	1.15	1.16	1.01	1.01	1.03

West of Dufferin Street	0.68	0.80	0.77	0.82	0.82	0.84
East-West Screenline V/C						
North of Langstaff Road	0.99	1.17	1.18	1.19	1.19	1.19
South of Langstaff Road	1.00	1.11	1.09	1.11	1.11	1.11
Link V/C @ CN Rail Yard						
Rutherford Road	1.10	1.22	1.27	1.07	1.07	1.06
Langstaff Road	-	-	-	1.00	1.00	1.12
Highway 7	0.82	1.09	1.08	0.97	0.97	0.95

Scenario 5 (widening Langstaff Road with six general purpose lanes, connecting Langstaff Road across CN MacMillan Rail Yard and Highway 400 interchange improvement) will not only provide additional vehicular capacity compared to other scenarios, but it's also expected to improve traffic operations within the study area as this corridor includes a higher share of commercial vehicles and number of commercial accesses.

As segments of Langstaff Road, between Highway 400 and Dufferin Street are designated as *Primary Arterial Goods Movement Corridor* in the 2016 York TMP, the proposed improvements in Scenario 5 will facilitate safe and efficient movement of goods to and from key origins and destinations including Provincial highways, intermodal rail yards and commercial and industrial employment areas.

Table 5-5: Comparison of Screenline Volumes

SCREENLINE	ROAD	EASTBOUND/NORTHBOUND VOLUMES						WESTBOUND/SOUTHBOUND VOLUMES					
		Existing (2016)	Scenario 1: Base Case	Scenario 2: East Improvements	Scenario 3: Widen for Transit/HOV and Build Connection	Scenario 4: Widen for Transit/HOV, Build Connection & Interchange Improvement	Scenario 5: Widen for Goods Movement, Build Connection & Interchange Improvement	Existing (2016)	Scenario 1: Base Case	Scenario 2: East Improvements	Scenario 3: Widen for Transit/HOV and Build Connection	Scenario 4: Widen for Transit/HOV, Build Connection & Interchange Improvement	Scenario 5: Widen for Goods Movement, Build Connection & Interchange Improvement
East of Weston Road	Rutherford Road	2051	2293	2290	2242	2185	2191	915	1086	1081	1025	1012	999
	Langstaff Road	1442	1886	1875	2318	2488	2628	436	424	418	669	754	818
	Highway 7	2388	2777	2795	2739	2787	2775	2696	2694	2698	2761	2743	2752
East of Weston Road Screenline Total		7189	5881	6956	6960	7299	7460	7594	4047	4204	4197	4455	4509
East of Highway 400	Rutherford Road	2292	3084	3093	3077	3070	3031	1902	1783	1799	1920	1828	1834
	Langstaff Road	2027	1922	1915	2518	2505	2735	913	999	1003	1530	1743	1818
	Highway 7	3575	3686	3687	3660	3647	3634	2595	3013	3009	3177	3144	3167
East of Highway 400 Screenline Total		7506	7894	8692	8695	9255	9222	9400	5410	5795	5811	6627	6715
At CN Rail Yard	Rutherford Road	1982	2458	2464	2146	2145	2111	1819	2815	2910	2457	2451	2431
	Langstaff Road	-	-	-	1598	1594	1769	-	-	-	2294	2311	2573
	Highway 7	2448	2662	2662	2368	2373	2353	2361	3258	3250	2906	2904	2852
At CN Rail Yard Screenline Total		3909	4430	5120	5126	6112	6112	6233	4180	6073	6160	7657	7666
West of Dufferin Street	Rutherford Road	1019	1348	1253	1312	1295	1306	1260	1675	1538	1683	1680	1674
	Langstaff Road	777	652	967	1322	1333	1446	995	1196	1900	2625	2640	2855
	Highway 7	1007	934	933	813	820	794	2040	2576	2505	2385	2381	2350
West of Dufferin Street Screenline Total		1658	2803	2934	3153	3447	3448	3546	4295	5447	5943	6693	6701
North of Langstaff Road	Jane Street	588	305	276	529	417	518	1383	1774	1747	1843	1860	1856
	Keele Street	578	827	1187	703	662	703	1786	2874	2976	2896	2883	2881
	Dufferin Street	1353	1433	1231	1103	1099	1050	2181	2847	2858	2874	2870	2866
North of Langstaff Road Screenline Total		3057	2519	2565	2694	2335	2178	2271	5350	7495	7581	7613	7613
South of Langstaff Road	Jane Street	492	329	305	178	171	166	1240	1750	1750	1864	1837	1856
	Keele Street	675	1033	995	800	821	816	1580	2540	2360	2345	2364	2331
	Dufferin Street	1643	1760	1923	2187	2198	2272	2572	2817	2858	2883	2894	2929
South of Langstaff Road Screenline Total		3099	2810	3122	3223	3165	3190	3254	5392	7107	6968	7092	7095

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## 5.4 FUTURE LANE CONFIGURATION RECOMMENDATIONS

Based on findings from the Screenline analysis (**Sections 4.4**), Scenario 5 which includes the widening of Langstaff Road to six general-purpose lanes, connecting Langstaff Road across CN MacMillan Rail Yard and the consideration of Highway 400 interchange improvement, will provide additional vehicular capacity and improve traffic operations within the study area.

Throughout the course of the Class EA Study, the consideration for the Highway 400 / Langstaff Road interchange improvements was reviewed in consultation with MTO and the City of Vaughan. Based on the review of various Highway 400 / Langstaff Road interchange alternatives and associated traffic analysis completed as part of the Class EA Study, it was acknowledged that the planning of the Highway 400 / Langstaff Road interchange will be a complex undertaking. The extent of the improvements associated with the Highway 400 / Langstaff Road interchange is expected to span well beyond the immediate area of Highway 400 / Langstaff Road, potentially include the consideration of a core/collector system. High level design concept and analysis completed during the Class EA Study are on file with York Region.

Per above, the planning for the Highway 400 / Langstaff Road interchange improvements is to be reviewed as part of a future corridor study to ensure a more thorough, comprehensive and holistic approach, and therefore, will not be included as part of the current Langstaff Road Class EA Study.

Therefore, for the purpose of the Langstaff Road Class EA Study, microsimulation modelling for the future traffic analysis was carried out to reflect two conditions:

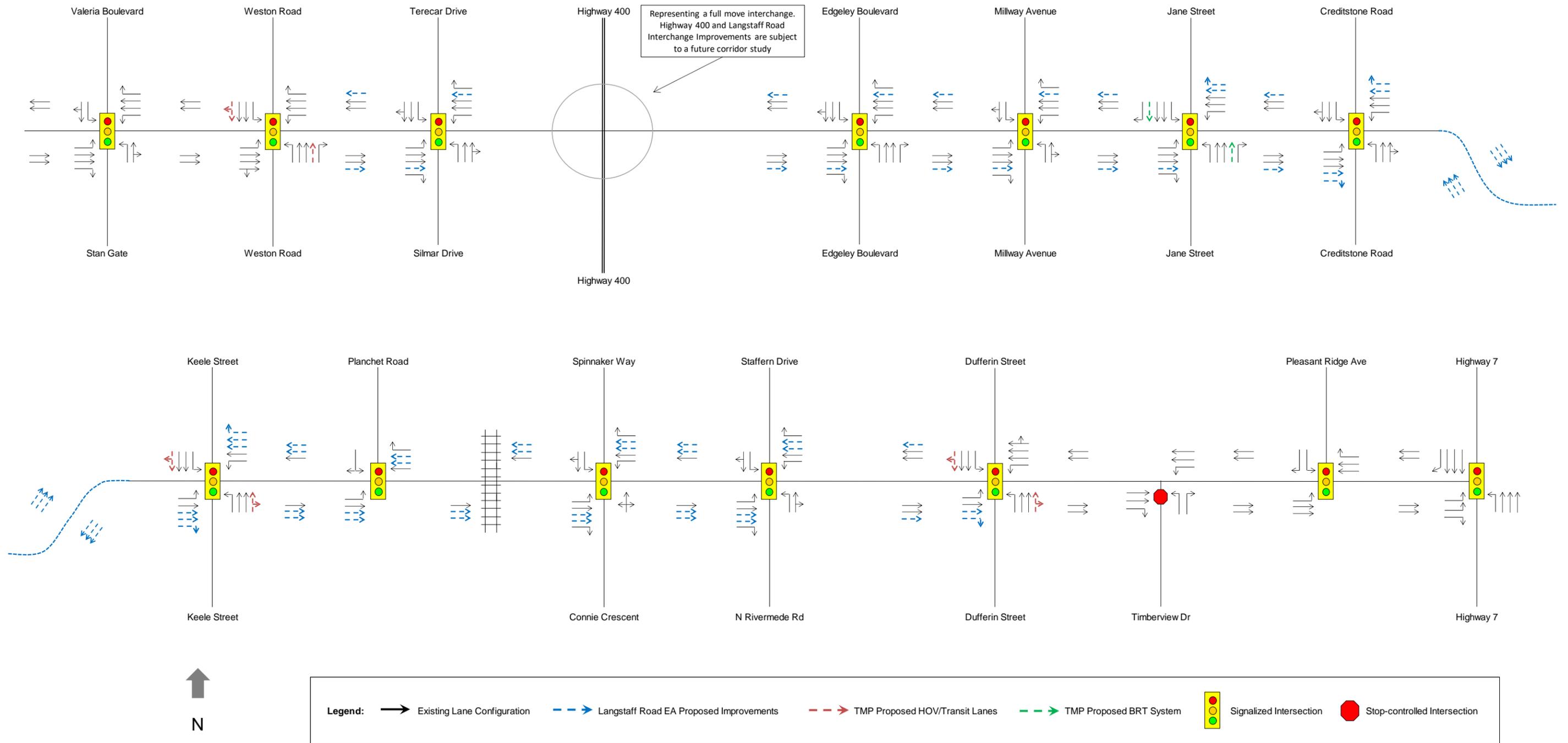
- **Section 4.5.1:** Langstaff Road widening to six general purpose lane, CN MacMillan Rail Yard crossing and Metrolinx GO Barrie Line grade separation, with Highway 400 / Langstaff Road improvements (i.e. full move interchange); and
- **Section 4.5.2:** Langstaff Road widening to six general purpose lane, CN MacMillan Rail Yard crossing and Metrolinx GO Barrie Line grade separation) without Highway 400 / Langstaff Road improvements (i.e. partial interchange per existing conditions).

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### 5.4.1 FUTURE INTERSECTION LANE CONFIGURATION – SIMULATION 1

The future intersection lane configuration and the control type for roadway intersections in the Langstaff Road EA study area are presented in Exhibit 5-19. The widening of Langstaff Road to six general purpose lanes, and the new connection across the CN Rail Yard are highlighted in blue, while the additional road improvements recommended in the York TMP outside of the study area are highlighted in red and green, respectively. A full interchange for Highway 400 with Langstaff Road is also considered in this proposed intersection lane configurations; further details of this interchange are presented in Section 5.5.1.

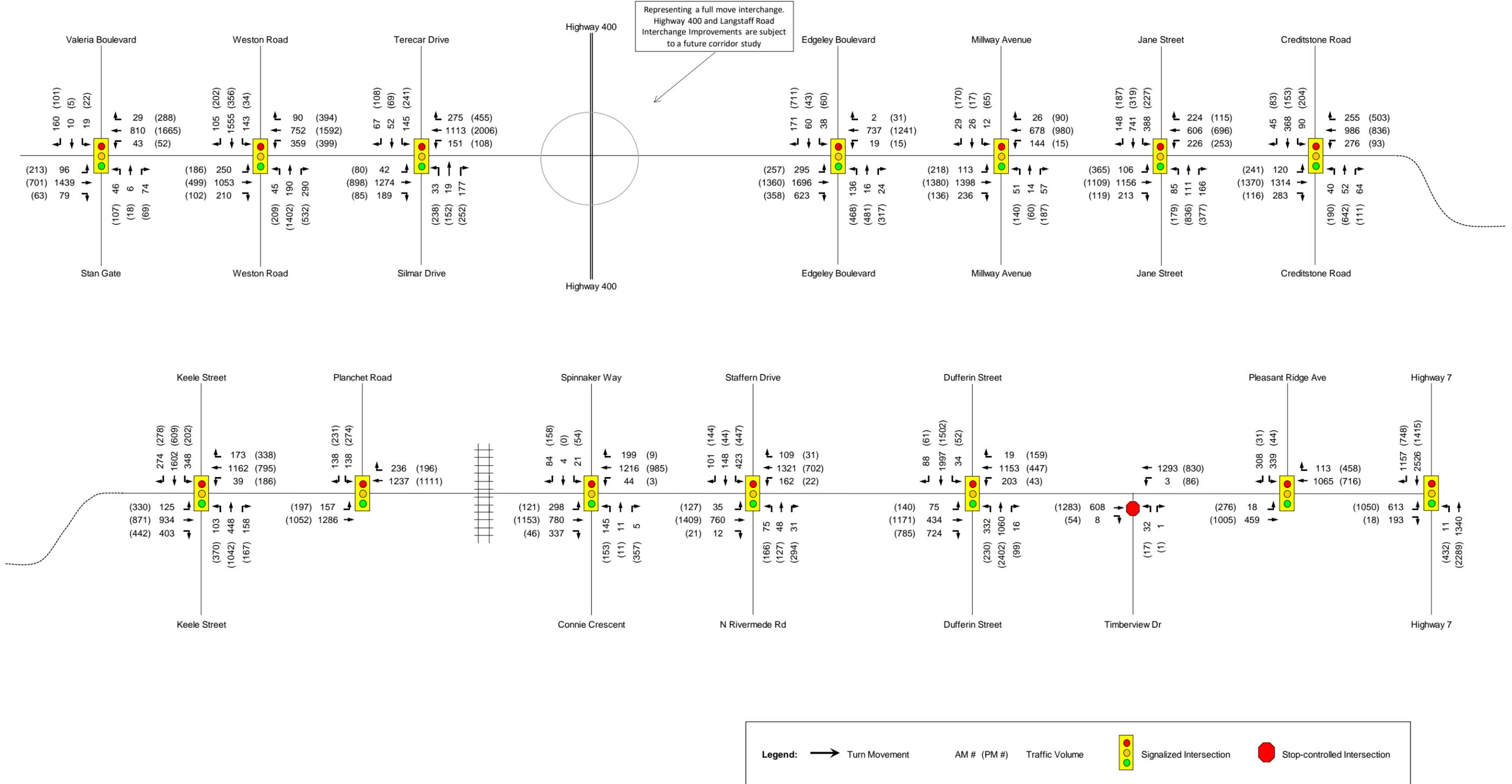
Exhibit 5-19: Langstaff Road Proposed Intersection Lane Configurations – Simulation 1



## **FUTURE 2041 TRAFFIC VOLUMES – SIMULATION 1**

The future simulated peak hour turning volumes are based on the Langstaff Road improvements previously presented in Exhibit 5-19. These future traffic volumes were produced using the Aimsun based micro-simulation model and are presented in Exhibit 5-20 below, representing a typical weekday condition in 2041. The morning and afternoon peak hours correspond to the hours of 8:00 am to 9:00 am and 5:00 pm to 6:00 pm, respectively.

Exhibit 5-20: Future (2041) Langstaff Road Peak Hour Turning Volumes – Simulation 1



## FUTURE 2041 INTERSECTION OPERATIONS – SIMULATION 1

The future (2041) evaluation for the Langstaff Road intersection operations was also performed using the *Aimsun*-based micro-simulation model.

Summaries of the weekday morning and afternoon peak hour intersection operations, for the ultimate future conditions, are presented in Table 5-6 and Table 5-7, respectively. It presents the overall intersection delays and LOS, as well as the delays, LOS and 95<sup>th</sup> percentile vehicular queue lengths for critical movements (i.e. operating at LOS *E* or *F*). These critical movements indicate operational issues resulting in long delays and potential congestion. A complete breakdown of delays, LOS and 95<sup>th</sup> percentile queue lengths by intersection for all turning movements in each peak hour is provided in Appendix G.

**Table 5-6: Future (2041) Langstaff Road Intersection LOS Summary and Critical Movements - Morning Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Stan Gate/Valeria Blvd	10 s	A	NBL	61 s	E	21 m
			NBTR	64/16 s	E/B	27 m
			SBL	57 s	E	16 m
			SBTR	65/21 s	E/C	39 m
Weston Rd at Langstaff Rd	40 s	D	EBL	62 s	E	95 m
			EBT	59 s	E	102 m
			WBL	79 s	E	153 m
			NBL	93 s	F	31 m
Langstaff Rd at Silmar Dr/Terecar Dr	18 s	B	NBL	61 s	E	58 m
			SBL	59 s	E	155 m
Hwy 400 West Ramp Terminal at Langstaff Rd	36 s	D	EBT	69 s	E	135 m
Hwy 400 East Ramp Terminal at Langstaff Rd	31 s	C	-	-	-	-
Langstaff Rd at Edgeley Blvd	16 s	B	-	-	-	-
Langstaff Rd at Millway Ave	8 s	A	NBL	64 s	E	33 m
			SBL	65 s	E	18 m
Jane St at Langstaff Rd	38 s	D	WBL	64 s	E	96 m
Langstaff Rd at Creditstone Rd	25 s	C	NBL	62 s	E	30 m
			SBL	62 s	E	48 m
			SBT	73 s	E	76 m
Keele St at Langstaff Rd	42 s	D	EBL	234 s	F	149 m
			WBL	58 s	E	23 m
			NBL	107 s	F	59 m
			SBL	58 s	F	126 m
Langstaff Rd at Planchet Rd	8 s	A	-	-	-	-
Langstaff Rd at Connie Cres/Spinnaker Way	10 s	B	NBL	57 s	E	48 m
			SBL	57 s	E	20 m
			SBT	60 s	E	34 m
Langstaff Rd at North Rivermede Rd/Staffern Dr	31 s	C	SBL	86 s	F	226 m

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Dufferin St at Langstaff Rd	98 s	F	SBTR	65/59 s	E/E	242 m
			EBL	79 s	E	49 m
			EBR	95 s	F	349 m
			WBL	205 s	F	209 m
			WBTR	79/71 s	E/E	230 m
			NBL	90 s	F	241 m
			SBL	185 s	F	41 m
			SBT	150 s	F	358 m
			SBR	123 s	F	132 m
Langstaff Rd at Timberview Dr (Stop-controlled)	26 s	D	-	-	-	-
Langstaff Rd at Pleasant Ridge Ave	20 s	B	-	-	-	-
Highway 7 at Langstaff Rd	11 s	B	EBL	67 s	E	12 m
			SBL	63 s	E	85 m

During the morning peak hour, all assessed intersections operate with an overall acceptable LOS (i.e. LOS D or better) with the exception of the Langstaff Road intersection with Dufferin Street, which operates at LOS F with an average vehicle delay of 98 seconds.

Critical movements operating at LOS E or F are generally observed at left turning movements due to higher left-turning volumes and higher opposing through volumes; these critical movements are located at the major Langstaff Road intersections with Weston Road, Silmar Drive/Terecar Drive, Jane Street and Keele Street, and have delays to 234 seconds for the eastbound-left turn at the Keele Street intersection, and 95<sup>th</sup> percentile queue length of 155 metres for the southbound-left turn at the Silmar Drive/Terecar Drive intersection.

For the Langstaff Road and Dufferin Street intersection, significant southbound traffic volumes combined with heavy turning movement volumes from the other approaches result in poor operations at this intersection, operating at LOS F. Simulated average delays of up to 205 seconds and 95<sup>th</sup> percentile queues of up to 358 metres cause congestion on the approaches leading up to the intersection. It is worth noting that this intersection has a substantial eastbound right turn demand of approximately 700 vehicles, and a southbound through and right turn demand of approximately 2,100 vehicles in the morning peak hour.

**Table 5-7: Future (2041) Langstaff Road Intersection LOS Summary and Critical Movements - Afternoon Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Stan Gate/Valeria Blvd	18 s	B	NBL	56 s	E	39 m
			NBT	55 s	E	23 m
			SBL	64 s	E	17 m
			SBT	77 s	E	29 m
Weston Rd at Langstaff Rd	49 s	D	EBL	162 s	F	146 m
			NBL	139 s	F	134 m
			NBT	64 s	E	173 m
			SBL	60 s	E	24 m
Langstaff Rd at Silmar Dr/Terecar Dr	30 s	C	EBL	339 s	F	84 m
			NBL	56 s	E	309 m
Hwy 400 West Ramp Terminal at Langstaff Rd	22 s	C	-	-	-	-
Hwy 400 East Ramp Terminal at Langstaff Rd	29 s	C	-	-	-	-
Langstaff Rd at Edgeley Blvd	37 s	C	EBL	150 s	F	312 m
			WBL	56 s	E	13 m
			SBL	61 s	E	32 m
Langstaff Rd at Millway Ave	19 s	B	WBL	64 s	E	10 m
			SBL	56 s	E	34 m
Jane St at Langstaff Rd	54 s	D	EBL	103 s	F	250 m
			EBT	68 s	E	215 m
			WBL	68 s	E	127 m
			SBL	60 s	E	93 m
Langstaff Rd at Creditstone Rd	60 s	E	EBL	161 s	F	189 m
			WBL	513 s	F	220 m
			NBT	91 s	F	172 m
			NBR	92 s	F	177 m
			SBL	56 s	E	73 m
Keele St at Langstaff Rd	76 s	E	EBL	198 s	F	329 m
			WBL	71 s	F	86 m
			NBL	216 s	E	294 m
			NBT	115 s	F	294 m
			NBR	90 s	F	95 m
			SBL	84 s	F	95 m
Langstaff Rd at Planchet Rd	18 s	B	EBL	59 s	E	96 m
			SBL	63 s	E	136 m
Langstaff Rd at Connie Cres/Spinnaker Way	13 s	B	NBT	59 s	E	106 m
Langstaff Rd at North Rivermede Rd/Staffern Dr	44 s	D	WBL	73 s	F	20 m
			NBL	95 s	F	85 m
			NBTR	88/84 s	F/F	192 m

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Dufferin St at Langstaff Rd	76 s	E	EBL	150 s	F	105 m
			EBT	132 s	F	287 m
			EBR	75 s	E	255 m
			WBL	85 s	F	36 m
			NBL	106 s	F	133 m
			NBTR	85/58 s	F/E	255 m
			SBL	84 s	F	28 m
Langstaff Rd at Timberview Dr (Stop-controlled)	9 s	C	-	-	-	-
Langstaff Rd at Pleasant Ridge Ave	9 s	A	SBL	63 s	E	24 m
Highway 7 at Langstaff Rd	30 s	C	EBL	119 s	F	224 m

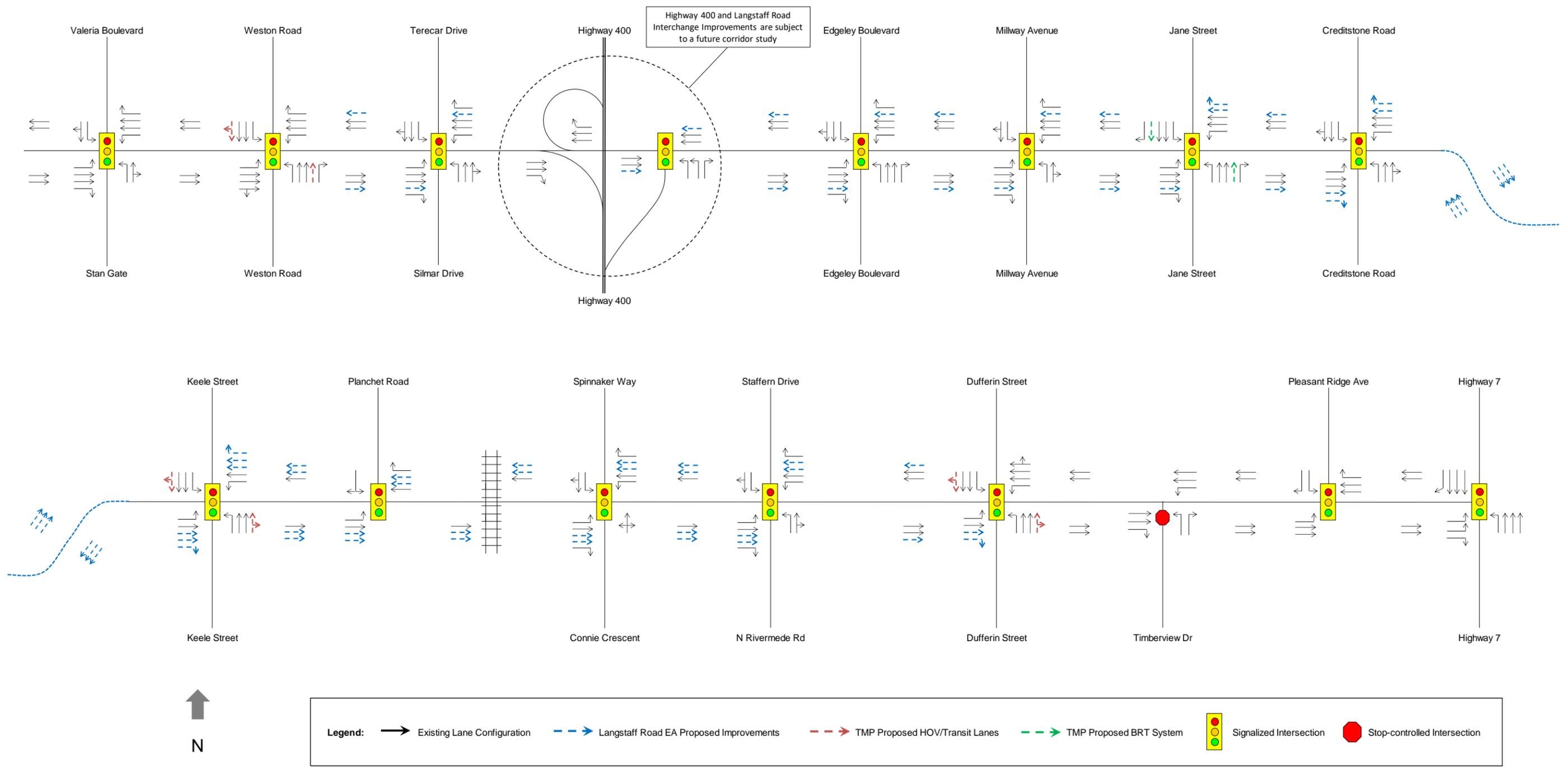
The overall LOS for the afternoon peak-hour conditions are acceptable (i.e. LOS D or better) for the majority of the Langstaff Road intersections. Intersections with LOS E include the Langstaff Road intersections with Creditstone Road, Keele Street and Dufferin Street. For the Langstaff Road intersections with an acceptable overall LOS, the critical movements are generally left turning movements with higher traffic demands; the average delays and 95<sup>th</sup> percentile queues at these intersections range up to approximately 513 seconds and 329 metres, respectively.

Traffic operational issues at the Langstaff Road intersections with Keele Street and Dufferin Street in the afternoon peak hour cause road congestion that extends past upstream intersections. To the east of the study area, heavy traffic volumes primarily on the west and south approaches of the Langstaff Road and Dufferin Street intersection, result in traffic congestion in the northbound direction from the Highway 407 ramps and in the eastbound direction from Langstaff Road at Staffern Drive/North Rivermede Road. The additional lane capacity at this intersection causes an increase in traffic volumes of approximately 600 vehicles for the eastbound movement, when compared to the 2041 No-Build Scenario.

#### 5.4.2 FUTURE INTERSECTION LANE CONFIGURATION – SIMULATION 2

The future intersection lane configuration and the control type for roadway intersections in the Langstaff Road Class EA study area are presented in Exhibit 5-21. The widening of Langstaff Road to six general-purpose lanes, and the new connection across the CN MacMillan Rail Yard are highlighted in blue, while the additional road improvements, recommended in the York Region TMP outside of the study area, are highlighted in red and green, respectively. A partial interchange for Highway 400 with Langstaff Road (i.e. existing conditions) is considered in this proposed intersection lane configurations.

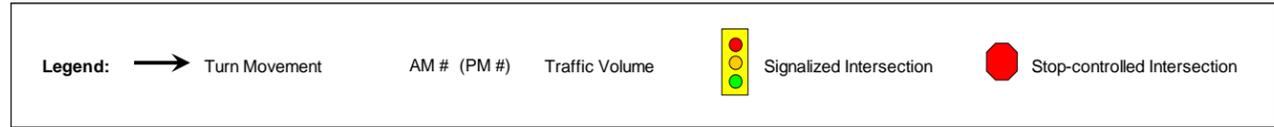
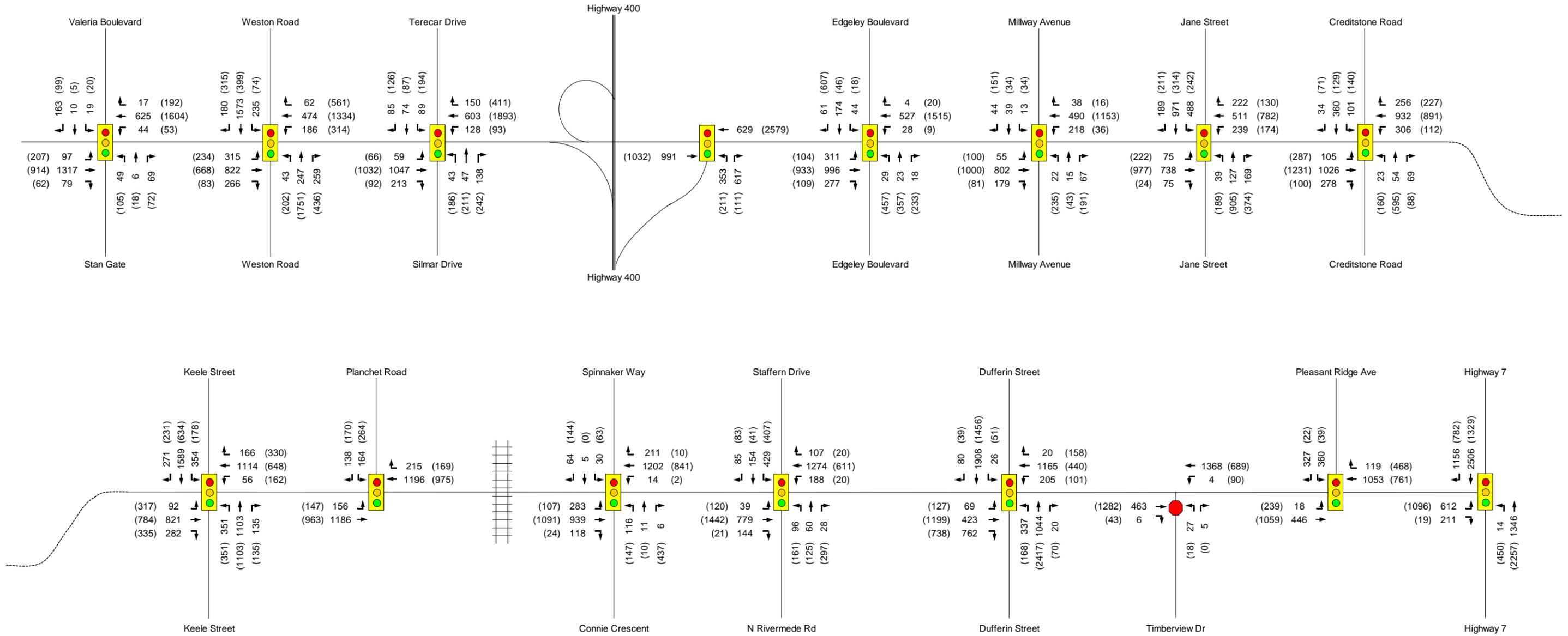
Exhibit 5-21: Langstaff Road Proposed Intersection Lane Configuration - Simulation 2



## **FUTURE (2041) TRAFFIC VOLUMES – SIMULATION 2**

The future simulated peak hour turning volumes are based on the Langstaff Road improvements previously presented in Exhibit 5-21. These future traffic volumes were produced using the Aimsun-based micro-simulation model and are presented in Exhibit 5-22 below, representing a typical weekday condition in 2041. The morning and afternoon peak hours correspond to the hours of 8:00am to 9:00 am and 5:00pm to 6:00 pm, respectively.

Exhibit 5-22: Future (2041) Langstaff Road Peak Hour Turning Volumes - Simulation 2



## FUTURE (2041) INTERSECTION OPERATIONS – SIMULATION 2

Similar to Simulation 1, the future (2041) evaluation for the Langstaff Road intersection operations was performed using the Aimsun-based micro-simulation model. The future traffic operating performance was also assessed based on delays, Level of Service (LOS) and queuing conditions.

Summaries of the future weekday morning and afternoon peak hour intersection operations, within the Langstaff Road Class EA study area, are presented in Table 5-8 and Table 5-9, respectively. It presents the overall intersection delays and LOS, as well as the delays, LOS and 95<sup>th</sup> percentile vehicular queue lengths for critical movements (i.e. operating at LOS E or F). These critical movements indicate operational issues resulting in long delays and potential congestion. A complete breakdown of delays, LOS and 95<sup>th</sup> percentile queue lengths by intersection for all turning movements in each peak hour is provided in Appendix H.

**Table 5-8: Future (2041) Langstaff Road Intersection LOS Summary and Critical Movements - Morning Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Stan Gate/Valeria Blvd	10 s	B	NBL	59 s	E	21m
			NBTR	63/16 s	E/B	26m
			SBL	56 s	E	17m
			SBTR	63/19 s	E/B	39m
Weston Rd at Langstaff Rd	39 s	D	EBL	71 s	E	130m
			NBL	102 s	F	36m
Langstaff Rd at Silmar Dr/Terecar Dr	19 s	B	NBL	62 s	E	221m
			SBL	57 s	E	252m
			SBTR	56/26 s	E/C	27m
Hwy 400 East Ramp Terminal at Langstaff Rd	86 s	F	EBT	148 s	F	260m
			WBT	97 s	F	147m
Langstaff Rd at Edgeley Blvd	15 s	B	NBL	70 s	E	22m
			NBT	55 s	E	10m
Langstaff Rd at Millway Ave	13 s	B	NBL	70 s	E	21m
			SBL	58 s	E	15m
			SBT	56 s	E	41m
Jane St at Langstaff Rd	38 s	D	WBL	70 s	E	115m
Langstaff Rd at Creditstone Rd	29 s	C	WBL	60 s	E	116m
			NBL	58 s	E	21m
			SBL	68 s	E	49m
			SBT	72 s	E	77m
Keele St at Langstaff Rd	54 s	D	EBL	131 s	F	105m
			NBL	96 s	F	51m
			SBL	80 s	F	156m
			SBT	82 s	F	269m
			SBR	83 s	F	122m
Langstaff Rd at Planchet Rd	9 s	A	-	-	-	-

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Connie Cres/Spinnaker Way	10 s	A	NBL	62 s	E	43m
			NBT	55 s	E	20m
			SBT	71 s	E	31m
Langstaff Rd at North Rivermede Rd/Staffern Dr	44 s	D	SBL	144 s	F	389m
			SBTR	113/97 s	F/F	459m
Dufferin St at Langstaff Rd	112 s	F	EBL	85 s	F	75m
			EBR	104 s	F	361m
			WBL	260 s	F	264m
			WBTR	84/71 s	F/E	299m
			NBL	83 s	F	196m
			SBL	208 s	F	24m
			SBT	183 s	F	417m
Langstaff Rd at Timberview Dr (Stop-controlled)	95 s	F	NBL	140 s	F	22m
			SBL	56 s	E	94m
Langstaff Rd at Pleasant Ridge Ave	28 s	C	SBL	56 s	E	94m
Highway 7 at Langstaff Rd	12 s	B	EBL	65 s	E	10m
			SBL	61 s	E	89m

During the morning peak hour, most assessed intersections operate with an overall acceptable LOS (i.e. LOS D or better) with the exception of the Langstaff Road intersection with Highway 400 East Ramp Terminal, Dufferin Street and Timberview Drive, which all operate at LOS F with an average vehicle delay of 86 seconds, 112 seconds and 95 seconds, respectively.

Critical movements operating at LOS E or F are generally observed at left turning movements due to high opposing through volumes. These critical left-turn movements are located at the major Langstaff Road intersections with Weston Road, Jane Street and Keele Street, and have the highest delay of 131 seconds for the eastbound-left turn at the Keele Street intersection, and 95<sup>th</sup> percentile queue length of 156 metres for the southbound-left turn at the Keele Street intersection.

At the Langstaff Road and Dufferin Street intersection, significant southbound traffic volumes combined with heavy turning movement volumes from the other approaches result in poor operations at this intersection, operating at LOS F. Simulated average delays of up to 260 seconds for the westbound-left turn, and 95<sup>th</sup> percentile queues of up to 417 metres for the southbound-through, are observed as the most critical and contribute towards the overall congestion at the intersection. It is worth noting that this intersection also has a substantial eastbound right turn demand of approximately 760 vehicles, and a southbound through and right turn demand of approximately 1,900 vehicles in the morning peak hour.

**Table 5-9: Future (2041) Langstaff Road Intersection LOS Summary and Critical Movements - Afternoon Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Langstaff Rd at Stan Gate/Valeria Blvd	14s	B	NBT	56s	E	36m
			SBL	63s	E	17m
			SBT	75s	E	29m

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Weston Rd at Langstaff Rd	88s	F	EBL	217s	F	277m
			NBL	184s	F	114m
			NBT	183s	F	369m
			NBR	134s	F	205m
			SBL	94s	F	40m
Langstaff Rd at Silmar Dr/Terecar Dr	28s	C	EBL	95s	F	39m
Hwy 400 East Ramp Terminal at Langstaff Rd	12s	B	NBL	58s	E	47m
Langstaff Rd at Edgeley Blvd	25s	C	EBL	78s	E	68m
Langstaff Rd at Millway Ave	24s	C	SBL	60s	E	22m
			SBT	57s	E	54m
Jane St at Langstaff Rd	40s	D	SBL	56s	E	92m
Langstaff Rd at Creditstone Rd	39s	D	EBL	62s	E	99m
			WBL	122s	F	72m
			NBT	62s	E	111m
			NBR	62s	E	114m
			SBL	57s	E	54m
Keele St at Langstaff Rd	70s	E	EBL	175s	F	254m
			WBL	60s	E	66m
			NBL	142s	F	199m
			NBT	108s	F	284m
			NBR	85s	F	83m
			SBL	61s	E	69m
Langstaff Rd at Planchet Rd	15s	B	SBL	60s	E	139m
Langstaff Rd at Connie Cres/Spinnaker Way	14s	B	NBT	56s	E	116m
Langstaff Rd at North Rivermede Rd/Staffern Dr	43s	D	NBL	96s	F	90m
			NBTR	90/80s	F/F	196m
Dufferin St at Langstaff Rd	83s	F	EBL	150s	F	95m
			EBT	147s	F	283m
			EBR	84s	F	227m
			WBL	223s	F	128m
			NBL	104s	F	129m
			NBTR	88/63s	F/E	271m
			SBL	96s	F	28m
Langstaff Rd at Timberview Dr (Stop-controlled)	18s	C	-			
Langstaff Rd at Pleasant Ridge Ave	9s	A	SBL	68s	E	25m
Highway 7 at Langstaff Rd	48s	D	EBL	183s	F	294m
			EBT	69s	E	309m

During the afternoon peak-hour, the overall LOS are acceptable (i.e. LOS D or better) for the majority of the Langstaff Road intersections. Intersections with LOS E or F include the Langstaff Road intersections with Weston

Road, Keele Street and Dufferin Street, with overall average vehicle delays of 88 seconds, 70 seconds and 83 seconds, respectively. These intersections cause road congestion that extends past upstream intersections.

To the west of the study area, heavy traffic demands in the northbound direction of the Langstaff Road and Weston Road intersection contribute to significant delays of 184 seconds and 95<sup>th</sup> percentile queue lengths of up to 369 metres. Significant delays of 217 seconds are also observed for the eastbound-left turn.

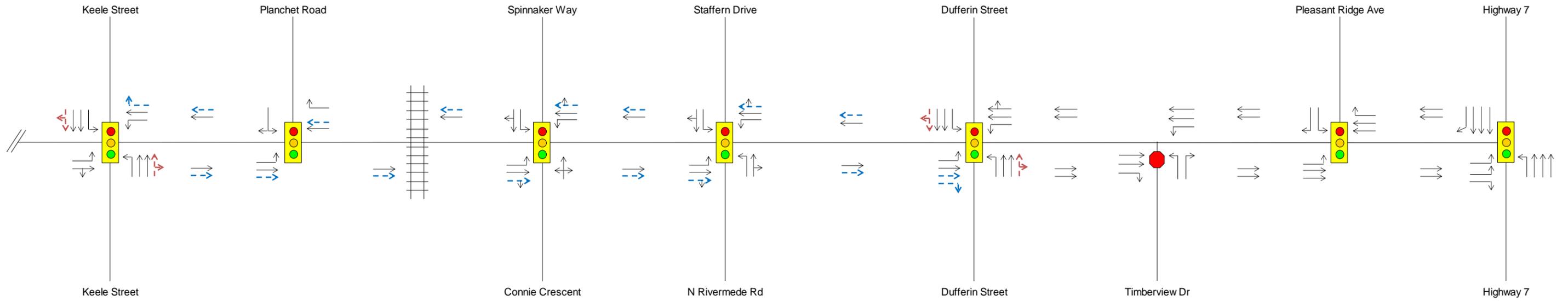
To the east of the study area, heavy traffic demands primarily on the northbound approaches to the Langstaff Road and Dufferin Street intersection, result in traffic congestion and 95<sup>th</sup> percentile queue lengths of up to 271 metres extending to the Highway 407 ramps. The heavy traffic demand at the eastbound approaches also contribute to significant 95<sup>th</sup> percentile queue lengths of up to 283 metres.

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## 5.5 INTERIM LANE CONFIGURATIONS RECOMMENDATIONS

In 2019, York Regional Council approved a Roads Capital Acceleration Reserve Fund, which will be used to accelerate priority road growth projects across the Region. The Langstaff Road widening from the existing 2-lane cross-section to a 4-lane cross-section, from Keele Street to Dufferin Street, was identified as one of the accelerated roads capital projects. The interim lane configurations and the control type for the roadway intersections are presented in Exhibit 5-23.

**Exhibit 5-23: Langstaff Road Interim Intersection Lane Configurations**



**Legend:**

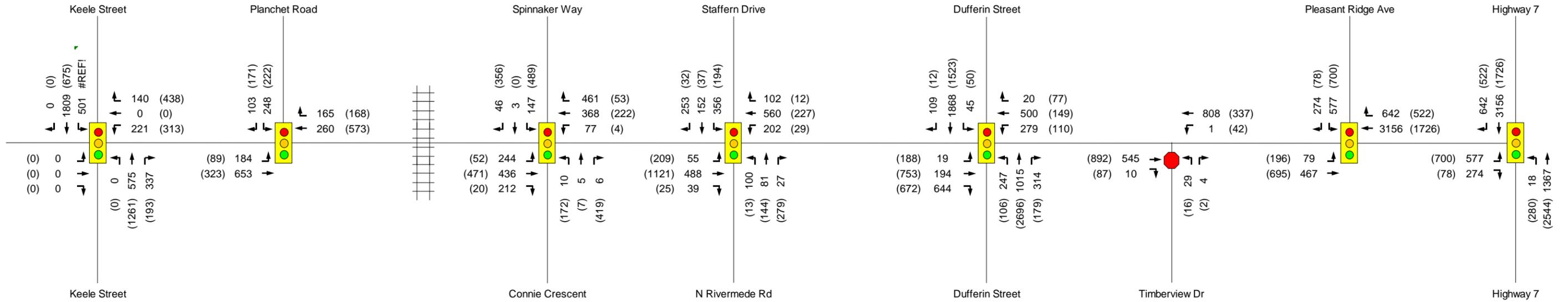
- Existing Lane Configuration
- Langstaff Road EA Proposed Improvements
- TMP Proposed HOV/Transit Lanes
- TMP Proposed BRT System
- Signalized Intersection
- Stop-controlled Intersection

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### *5.5.1 INTERIM (2041) TRAFFIC VOLUMES*

The future simulated peak hour turning volumes are based on the Langstaff Road improvements presented in Exhibit 5-23. These interim traffic volumes are presented in Exhibit 5-24 below, which represent typical weekday conditions in 2041. The morning and afternoon peak hours correspond to the hours ending at 9:00 and 18:00, respectively.

Exhibit 5-24: Interim (2041) Langstaff Road Peak Hour Turning Volumes



## 5.5.2 INTERIM (2041) INTERSECTION OPERATIONS

As detailed in Section 3.3, the future 2041 evaluation for the Langstaff Road intersection operations was performed using the *Aimsun*-based micro-simulation model. The future traffic operating performance was assessed based on delays, level of service (LOS) and queuing conditions; using the same LOS criteria presented previously in Table 3-4.

Summaries of the weekday morning and afternoon peak hour intersection operations, for the interim conditions within the Langstaff Road study area, are presented in Table 5-10 and Table 5-11, respectively. It presents the overall intersection delays and LOS, as well as the delays, LOS and 95<sup>th</sup> percentile vehicular queue lengths for critical movements (i.e. operating at LOS *E* or *F*). These critical movements indicate operational issues resulting in long delays and potential congestion. A complete breakdown of delays, LOS and 95<sup>th</sup> percentile queue lengths by intersection for all turning movements in each peak hour is provided in Appendix I.

**Table 5-10: Interim (2041) Langstaff Road Intersection LOS Summary and Critical Movements - Morning Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Keele St at Langstaff Rd	22s	C	WBL	56s	E	82m
			SBL	56s	E	169m
Langstaff Rd at Planchet Rd	19s	B	SBL	62s	E	115m
Langstaff Rd at Connie Cres/Spinnaker Way	13s	B	-	-	-	-
Langstaff Rd at North Rivermede Rd/Staffern Dr	65s	E	SBL	155s	F	274m
			SBT	163s	F	384m
			SBR	128s	F	156m
Dufferin St at Langstaff Rd	119s	F	EBL	71s	E	39m
			EBT	81s	F	78m
			EBR	103s	F	512m
			WBL	221s	F	277m
			WBT	102s	F	144m
			WBR	68s	E	244m
			NBL	161s	F	240m
			SBL	146s	F	35m
			SBT	176s	F	393m
Langstaff Rd at Timberview Dr (Stop-controlled)	62s	F	SBR	132s	F	163m
			NBL	91s	F	17m
Langstaff Rd at Pleasant Ridge Ave	25s	C	SBL	60s	E	110m
Highway 7 at Langstaff Rd	11s	B	EBL	67s	E	16m

During the morning peak hour, all assessed intersections operate with an overall acceptable LOS (*LOS D* or better) with the exception of the Langstaff Road intersection with North Rivermede Road / Staffern Drive, which operates at *LOS E*, and with Dufferin Street and with Timberview Drive, which both operate *LOS F*. These intersections operate with an overall average vehicle delay of 65 seconds, 119 seconds and 62 seconds, respectively.

For the Langstaff Road and Dufferin Street intersection, the highest average delay of 221 seconds is observed at the westbound-left movement resulting in a 95<sup>th</sup> percentile queue length of 277 metres. The highest 95<sup>th</sup> percentile queue lengths at the Dufferin Street intersection are observed at the eastbound-right movement with 512 metres and the southbound-left movement with 393 metres. The eastbound-right turn demand continues to have a substantial vehicle volume of approximately 600 vehicles, with similar travel patterns to the existing traffic conditions discussed in Section 3.3, which combined with a southbound-through vehicle volume of 1,900 vehicles results in significant congestion on these approaches leading to the intersection.

**Table 5-11: Interim (2041) Langstaff Road Intersection LOS Summary and Critical Movements - Afternoon Peak Hour**

INTERSECTION	INTERSECTION		CRITICAL MOVEMENTS			
	DELAY	LOS	MOVEMENT	DELAY	LOS	95 <sup>TH</sup> QUEUE
Keele St at Langstaff Rd	25s	C	-	-	-	-
Langstaff Rd at Planchet Rd	16s	B	SBL	58s	E	85m
Langstaff Rd at Connie Cres/Spinnaker Way	27s	C	-	-	-	-
Langstaff Rd at North Rivermede Rd/Staffern Dr	49s	D	NBL	131s	F	24m
			NBT	117s	F	235m
			NBR	114s	F	160m
Dufferin St at Langstaff Rd	76s	E	EBL	97s	F	197m
			EBT	104s	F	213m
			EBR	105s	F	303m
			WBL	173s	F	135m
			NBL	89s	F	84m
			NBT	70s	E	245m
			NBR	80s	E	69m
SBL	107s	F	33m			
Langstaff Rd at Timberview Dr (Stop-controlled)	8s	A	-	-	-	-
Langstaff Rd at Pleasant Ridge Ave	13s	B	SBL	64s	E	43m
Highway 7 at Langstaff Rd	17s	B	EBL	87s	F	131m

During the afternoon peak hour, the majority of the Langstaff Road intersections overall conditions are acceptable (*LOS D* or better), with the exception of the Langstaff Road intersection with Dufferin Street, which operates at *LOS E*. This intersection operates with an overall average vehicle delay of 76 seconds.

Excluding the Dufferin Street intersection, the critical movements operating at *LOS F* are generally observed at left-turning movements. These critical movements are located at the major Langstaff Road intersections with North Rivermede Road / Staffern Drive and Highway 7. The average vehicle delays at these intersections are 131 seconds for the northbound-left movement at North Rivermede Road / Staffern Drive and 87 seconds for the eastbound-left movement at Highway 7.

For the Langstaff Road and Dufferin Street intersection, the westbound-left movement operates with the highest average vehicle delay, similar to the morning peak hour, of 173 seconds resulting in a 95<sup>th</sup> percentile queue length of 135 metres. The highest 95<sup>th</sup> percentile queue lengths at the Dufferin Street intersection are observed at the eastbound-right movement with 303 metres and the northbound-through movement with 245 metres. The heavy vehicle volumes at these approaches of approximately 700 vehicles and 2,700 vehicles, respectively, resulting in significant congestion.

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## 5.6 NEEDS AND JUSTIFICATIONS

The provision of the Langstaff Road widening between Weston Road and Dufferin Street can significantly reduce the congestion and provide additional capacity within the study area. The following interim Langstaff Road improvements have been identified:

- Widening Langstaff Road to six general purpose lanes from Weston Road to Creditstone Road; and
- Widening Langstaff Road to four general purpose lanes from Keele Street to Dufferin Street.

Implementation of these proposed improvements is expected to provide the following benefits:

- Provide initial transportation capacity between Weston Road and Creditstone Road;
- Support initial growth in the City of Vaughan and growth in key employment areas; and
- Provide short-term improvements of traffic operations at the Highway 400 interchanges with Highway 7 and Rutherford Road.

The connection across CN Rail Yard could provide much needed transportation capacity within the study area by relieving capacity constrained conditions on Rutherford Road and Highway 7. The new connection will also provide opportunity for truck traffic to access area highways directly, thereby reducing truck traffic from other regional arterial roads.

In the context of the commercial and industrial land uses in the study area, the regional road network servicing the study area experiences greater amounts of commercial vehicles as compared to other such roads within the region. High commercial vehicle traffic levels may result in operational issues given that the proposed widening for transit/HOV lanes would not accommodate such vehicles on a curbed lane and combined with a high number of driveway accesses on Langstaff Road, this would require mixed traffic to use the HOV/Transit lanes for turns. Trucks entering/exiting from the adjacent industrial/commercial lands could pose a potential safety concern and significantly reduce the HOV/Transit benefits. The initial Scenario 5 (Ultimate Future Condition) addresses this concern by allocating the widening of Langstaff Road for six general purpose lanes.

The proposed improvements in the initial Scenario 5 are recommended based on the following:

- Travel demand modelling results shows that improvements under Scenario 5 would provide additional vehicular—in particular goods movement—capacity compared to Scenario 4, which would reduce congestion within the study area, leading to improved overall traffic operations;
- A relatively shorter distance of HOV network on Langstaff Road would not add overall benefits to the greater transportation network; and
- High number of accesses and proportion of commercial vehicles in the study area, which would be better served with six GPLs.

Based on the travel demand analysis findings for Scenario 5, two additional scenarios (Simulation 1 and Simulation 2) were considered for the microsimulation traffic operations analysis using Aimsun. Both simulations included the widening of Langstaff Road to six general purpose lanes, grade separation with the Metrolinx Barrie GO Line, and a new connection across the CN MacMillan Rail Yard; however, Simulation 1 included a full move interchange at Highway 400, while Simulation 2 included the existing partial interchange.

- Future 2041 traffic conditions under both simulations indicate that operations at the majority of the Langstaff Road intersections will operate with an overall acceptable LOS (i.e. LOS D or better) for both the morning and afternoon peaks with exception of Dufferin Street which operates at LOS E or F under both simulations. The overall delay at this intersection under Simulation 1 is expected to be approximately 98 seconds and

76 seconds during the morning and evening peak-hours, respectively. A slight deterioration to the delay at the intersection during Simulation 2, results in an overall delay of 112 seconds and 83 seconds during the morning and evening peak-hours, respectively.

- It should also be noted that under Simulation 2, the east ramp terminal during morning peak-hour has an overall delay of 86 seconds (LOS F), but an overall delay of 31 seconds (LOS C) under Simulation 1. However, based on the review of various Highway 400 / Langstaff Road interchange alternatives and associated traffic analysis completed as part of the Class EA Study, it was acknowledged that the planning of the Highway 400 / Langstaff Road interchange will be a complex undertaking. The extent of the improvements associated with the Highway 400 / Langstaff Road interchange is expected to span well beyond the immediate area of Highway 400 / Langstaff Road, potentially include the consideration of a core/collector system. The planning for the Highway 400 / Langstaff Road interchange improvements is to be further reviewed in the future and will not be included as part of the current Langstaff Road Class EA Study.

In summary, from a screenline and link analysis standpoint, the needs and justifications have been identified as the following preliminary Langstaff Road improvements:

- Widening Langstaff Road to six general-purpose lanes;
- Provision of a new connection on Langstaff Road across the CN MacMillan Rail Yard; and
- Consideration for improvements to the existing partial Highway 400 interchange in the future (providing highway access to and from the north).

Implementation of these proposed improvements is expected to provide the following benefits:

- A reduction of the congestion in surrounding east-west corridors (i.e. Rutherford Road and Highway 7);
- Support for Langstaff Road as a Primary Arterial Goods Movement Corridor;
- A direct access to area highways, which can reduce truck traffic on surrounding arterial roads; and
- Further improvement of traffic operations at the Highway 400 interchanges with Highway 7 and Rutherford Road.

# 6 HIGHWAY 400 AND LANGSTAFF ROAD INTERCHANGE

## 6.1 HIGHWAY 400 INTERCHANGE DESIGN ALTERNATIVES

As part of the Langstaff Road EA Study, improvements to the existing Highway 400 Interchange have been considered to improve the connectivity to and from Langstaff Road and improve the existing traffic operations of the Highway 400 core-collector system. As identified in York Region’s TMP (2016), the exiting partial interchange at Highway 400 and Langstaff Road was recommended to be converted to a full interchange providing ramps to-and-from the north. The following design alternatives, presented in Table 6-1, were assessed for the Ultimate (2041) traffic conditions, and relevant concept plans included in Appendix J.

**Table 6-1: Highway 400 Interchange Improvement Scenarios**

IMPROVEMENT ALTERNATIVES	EXISTING LANGSTAFF ROAD
Alternative 1: ‘Ramp-Off-Ramp’ Configuration	Langstaff Road Improvements and full Highway 400 interchange with free-flow connection from Rutherford Road to Langstaff Road
Alternative 2: Re-Route of Bass Pro Mills Ramps	Langstaff Road Improvements and full Highway 400 interchange and full closure of Base Pro Mills Drive
Alternative 3: Hybrid Interchange Configuration	Langstaff Road Improvements and Highway 400 interchange modification (combination of Alternative 1 and 2)
Alternative 4: Diverging Diamond Interchange Configuration	Langstaff Road Improvements and full Highway 400 interchange (Diverging Diamond Configuration)

Three initial design alternatives were developed, however, following a design workshop with MTO (October 4, 2018) WSP developed an additional conceptual design alternative for this interchange, therefore a Diverging Diamond configuration was proposed to be carried forward for further consideration. The concept for the Diverging Diamond configuration was provided to MTO for consideration in February 2019 and in response, MTO agreed in March 2019 that this concept may be reviewed in further detail (i.e. proceed with micro-simulation).

This interchange configuration includes the extension of the collector lane in the northbound direction providing additional capacity on Highway 400. This configuration is also expected to remove any potential weaving issues in the northbound direction on Highway 400 as short-distance trips travelling between Highway 7, Langstaff Road, and Bass Pro Mills Drive interchanges will not affect the mainline operations. The Diverging Diamond configuration allows traffic from Langstaff Road to merge onto the Highway 400 mainline, while traffic from Highway 7 travels on the collector and enters the mainline before Rutherford Road interchange.

## 6.2 FUTURE 2041 HIGHWAY 400 TRAFFIC CONDITIONS

The *Aimsun*-based model was used to evaluate all four of the design alternatives for the ultimate 2041 scenario for both the morning peak and afternoon peak periods, respectively. The average travel time results along Highway 400 are presented below in Table 6-2 and Table 6-3, while the average speed results are presented in Table 6-4 and Table 6-5 for the No-Build Scenario, the Langstaff Road Improvements only Scenario, and the four design alternatives – i) Ramp-Off-Ramp, ii) Re-route of Bass Pro Mills Ramps, iii) Hybrid Configuration, and iv) Diverging Diamond Interchange.

### 6.2.1 AVERAGE TRAVEL TIMES

The average travel times presented below represent approximately 13 km in length of Highway 400 from south of Steeles Avenue Interchange to north of Major Mackenzie Drive Interchange.

**Table 6-2: Future 2041 Morning Peak Periods - Average Travel Time**

SCENARIO	6AM – 7AM		7AM – 8AM		8AM – 9AM	
	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND
No-Build	8 min 9 sec	10 min 4 sec	8 min 35 sec	12 min 9 sec	8 min 18 sec	14 min 18 sec
Only Langstaff Road Improvements (i.e. without Hwy 400 Interchange Improvements)	8 min 4 sec	10 min 7 sec (no major change expected)	8 min 26 sec	11 min 59 sec (▼0:10 vs No Build)	8 min 10 sec	12 min 35 sec (▼ 1:43 vs No Build)
Alternative 1: Ramp-Off-Ramp	8 min 3 sec	10 min 8 sec (no major change expected)	8 min 22 sec	11 min 36 sec (▼0:33 vs No Build)	8 min 6 sec	11 min 43 sec (▼ 2:35 vs No Build)
Alternative 2: Re-Route of Bass Pro Mills Ramps	8 min 8 sec	10 min 5 sec (no major change expected)	8 min 22 sec	10 min 58 sec (▼1:11 vs No Build)	8 min 11 sec	11 min 02 sec (▼ 3:16 vs No Build)
Alternative 3: Hybrid	8 min 5 sec	9 min 58 sec (▼0:06 vs No Build)	8 min 28 sec	10 min 44 sec (▼ 1:25 vs No Build)	8 min 14 sec	10 min 22 sec (▼ 3:56 vs No Build)
Alternative 4: Diverging Diamond	8 minutes	9 min 59 sec (▼0:05 vs No Build)	8 min 13 sec	11 min 23 sec (▼0:46 vs No Build)	8 min 4 sec	12 min 41 sec (▼ 1:37 vs No Build)

During the morning peak periods, the average travel time on Highway 400 by 2041 is expected to improve or have no major change in both directions under all of the proposed design alternatives, when compared to the No-Build scenario. In the peak southbound direction, the average travel time between 8am and 9am is reduced for all scenarios, ranging from 1 minute and 37 seconds for Alternative 4 to 3 minutes and 56 seconds for Alternative 3.

**Table 6-3: Future 2041 Afternoon Peak Periods - Average Travel Time**

SCENARIO	3PM – 4PM		4PM – 5PM		5PM – 6PM	
	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND
No-Build	14 min 59 sec	9 min 8 sec	20 min 49 sec	9 min 12 sec	23 min 28 sec	9 min 10 sec
Only Langstaff Road Improvements (i.e. without Hwy 400 Interchange Improvements)	15 min 2 sec (no major change expected)	9 min 3 sec	21 min 31 sec (▲ 0:42 vs No Build)	9 min 12 sec	23 min 07 sec (▼ 0:21 vs No Build)	9 min 23 sec
Alternative 1: Ramp-Off-Ramp	16 min 39 sec (▲ 1:40 vs No Build)	9 min 15 sec	22 min 20 sec (▲ 1:31 vs No Build)	9 min 28 sec	21 min 53 sec (▼ 1:35 vs No Build)	9 min 22 sec
Alternative 2: Re-Route of Bass Pro Mills Ramps	15 min 31 sec (▲ 0:32 vs No Build)	9 min 19 sec	22 min 2 sec (▲ 1:13 vs No Build)	9 min 33 sec	28 min 1 sec (▼ 4:33 vs No Build)	9 min 24 sec
Alternative 3: Hybrid	15 min 24 sec (▲ 0:25 vs No Build)	9 min 20 sec	21 min 52 sec (▲ 1:03 vs No Build)	9 min 32 sec	25 min 53 sec (▲ 2:25 vs No Build)	9 min 24 sec
Alternative 4: Diverging Diamond	12 min 58 sec (▼ 2:01 vs No Build)	8 min 52 sec	19 min 38 sec (▼ 1:11 vs No Build)	9 min 3 sec	26 min 21 sec (▲ 2:53 vs No Build)	9 min 19 sec

During the afternoon peak periods, by 2041 the average travel time on Highway 400 is expected to increase under all the proposed design alternatives between 3pm and 5pm, except for Alternative 4, which reduces by 2 minutes and 11 seconds, respectively. In the peak northbound direction, the average travel time between 5pm and 6pm is reduced for the Langstaff Road Improvements Only, Alternative 1 and Alternative 2, and increased for Alternative 3 and Alternative 4. However, a greater overall travel time benefit is expected for Alternative 4 across a 24-hour period when compared to the No-Build scenario.

## 6.2.2 AVERAGE SPEEDS

**Table 6-4: Future 2041 Morning Peak Periods - Average Speed**

SCENARIO	6AM – 7AM		7AM – 8AM		8AM – 9AM	
	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND
No-Build	87.4 km/h	77.8 km/h	88.6 km/h	64.4 km/h	91.7 km/h	54.8 km/h
Only Langstaff Road Improvements (i.e. without Hwy 400 Interchange Improvements)	94.3 km/h	77.5 km/h (no major change expected)	90.3 km/h	65.4 km/h (▲ 1.0 vs No Build)	93.1 km/h	62.2 km/h (▲ 7.4 vs No-Build)
Alternative 1: Ramp-Off-Ramp	93.8 km/h	77.4 km/h (no major change expected)	90.2 km/h	67.6 km/h (▲ 3.2 vs No Build)	93.1 km/h	66.9 km/h (▲ 12.1 vs No-Build)
Alternative 2: Re-Route of Bass Pro Mills Ramps	93.6 km/h	77.7 km/h (no major change expected)	91.1 km/h	71.4 km/h (▲ 7.0 vs No Build)	93.0 km/h	71.0 km/h (▲ 16.2 vs No-Build)

SCENARIO	6AM – 7AM		7AM – 8AM		8AM – 9AM	
	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND
Alternative 3: Hybrid	94.1 km/h	78.4 km/h (▲0.6 vs No Build)	89.8 km/h	72.9 km/h (▲ 8.5 vs No Build)	92.4 km/h	75.4 km/h (▲ 20.6 vs No-Build)
Alternative 4: Diverging Diamond	95.3 km/h	78.4 km/h (▲0.6 vs No Build)	92.7 km/h	68.8 km/h (▲ 4.4 vs No Build)	94.5 km/h	61.7 km/h (▲ 6.9 vs No-Build)

During the morning peak periods, by 2041 the average speeds on Highway 400 are expected to increase or have no major change under all the proposed design alternatives when compared to the No-Build scenario. In the peak southbound direction, the average speed between the 8am and 9am peak-hour increases, ranging from 6.9 km/h for Alternative 4 to 20.6 km/h for Alternative 3.

**Table 6-5: Future 2041 Afternoon Peak Periods - Average Speed**

SCENARIO	3PM – 4PM		4PM – 5PM		5PM – 6PM	
	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND	NORTHBOUND	SOUTHBOUND
No-Build	50.8 km/h	85.8 km/h	37.0 km/h	85.2 km/h	32.4 km/h	85.5 km/h
Only Langstaff Road Improvements (i.e. without Hwy 400 Interchange Improvements)	50.6 km/h (no major change expected)	86.6 km/h	35.3 km/h (▼1.7 vs No Build)	85.1 km/h	32.9 km/h (▲ 0.5 vs No Build)	83.6 km/h
Alternative 1: Ramp-Off-Ramp	45.3 km/h (▼5.5 vs No Build)	84.8 km/h	33.8 km/h (▼3.2 vs No Build)	82.8 km/h	34.5 km/h (▲ 2.1 vs No Build)	83.7 km/h
Alternative 2: Re-Route of Bass Pro Mills Ramps	49.1 km/h (▼1.7 vs No Build)	84.1 km/h	34.6 km/h (▼2.4 vs No Build)	82.1 km/h	27.2 km/h (▼ 5.2 vs No Build)	83.3 km/h
Alternative 3: Hybrid	49.4 km/h (▼1.4 vs No Build)	83.8 km/h	34.8 km/h (▼2.2 vs No Build)	82.0 km/h	29.4 km/h (▼ 3.0 vs No Build)	83.3 km/h
Alternative 4: Diverging Diamond	58.8 km/h (▲ 8.0 vs No Build)	88.2 km/h	38.8 km/h (▲1.8 vs No Build)	86.5 km/h	28.9 km/h (▼ 3.5 vs No Build)	84.1 km/h

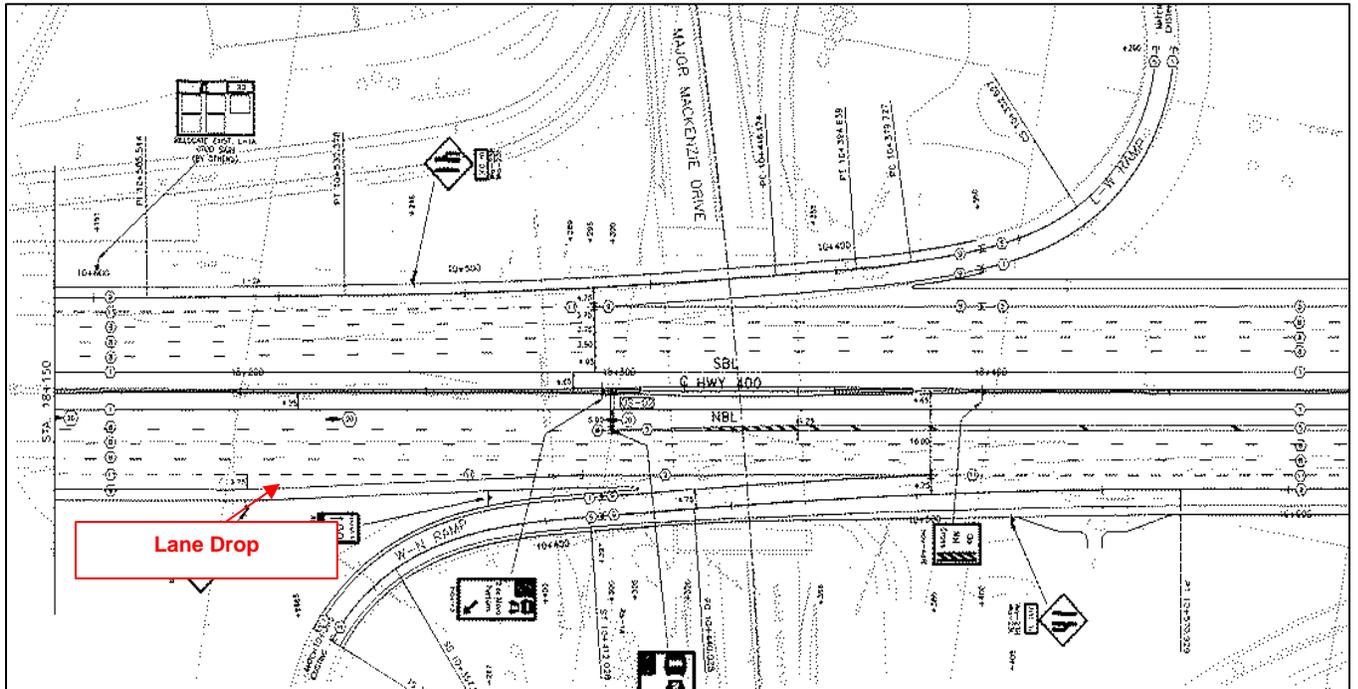
In a similar pattern to the average travel times in Table 6-3, during the afternoon peak periods by 2041 the average speeds on Highway 400 are expected to reduce under all the proposed design alternatives between 3pm and 5pm, except for Alternative 4, which increases by 8 km/h and 1.8 km/h, respectively. In the peak northbound direction, the average speed between 5pm and 6pm increases for the Alternative 1 scenario, and decreases for Alternative 2, Alternative 3 and Alternative 4.

Speed contour plots, included in Appendix K, illustrate the operational performance of Highway 400 and support the average travel time and average speed results, for both the future 2041 morning peak southbound direction and the afternoon peak northbound direction, for all design alternatives. These plots results represent the speed at which vehicles are travelling along the highway and do not represent the Highway 400 collector lane from Highway 7 interchange to Rutherford Road interchange, only representing the traffic located on the mainline.

## 6.3 HIGHWAY 400 ULTIMATE WIDENING

The Highway 400 EA Study (2003) – 1.0 km north of Major Mackenzie Drive to South Canal Bridge, recommended widening of Highway 400 from the existing 6-lane cross-section to an interim 8-lane cross-section (as presented in Exhibit 6-1) and ultimately a 10-lane cross-section. Highway 400 is currently being widened from 6 lanes to 8 lanes from Major Mackenzie Drive to King Road, therefore, the Highway 400 traffic operational analysis presented above considers the interim 8-lane on Highway 400.

**Exhibit 6-1: Highway 400 Lane Configuration at Major Mackenzie Drive**



To assess the potential benefits of Highway 400/Langstaff Road Interchange improvements (with a Diverging Diamond Interchange configuration) with the ultimate widening of Highway 400 to 10-lanes north of Major Mackenzie Drive, additional traffic modelling was undertaken. This additional scenario was conducted only for the 2041 PM peak period condition to assess traffic operation of the northbound direction. Similar to the above-mentioned scenario with the Diverging Diamond Interchange, the northbound collector lane configuration includes the extension of the collector in the northbound direction.

As the northbound outside GPL is being dropped just south of Major Mackenzie Drive, it is anticipated that this outside GPL will be extended when Highway 400 is ultimately widened to 10 lanes. Table 6-6 and Table 6-7 present the average travel time and average speeds for the northbound direction only for the three previous scenarios and Highway 400 ultimate widening scenario.

**Table 6-6: Future 2041 Afternoon Peak Periods - Average Travel Time Northbound**

SCENARIO	3PM – 4PM	4PM – 5PM	5PM – 6PM
No-Build	14 min 59 sec	20 min 49 sec	23 min 28 sec
Langstaff Road Improvements Only	15 min 2 sec (▲ 0:03 vs No Build)	21 min 31 sec (▲ 0:42 vs No Build)	23 min 07 sec (▼ 0:21 vs No Build)
Diverging Diamond Interchange	12 min 58 sec (▼ 2:01 vs No Build) (▼ 2:04 vs Langstaff Road Improvements)	19 min 38 sec (▼ 1:11 vs No Build) (▼ 1:53 vs Langstaff Road Improvements)	26 min 21 sec (▲ 2:53 vs No Build) (▲ 3:14 vs Langstaff Road Improvements)
Diverging Diamond Interchange & Mainline Widening at Major Mackenzie Dr.	10 min 08 sec (▼ 4:51 vs No Build) (▼ 4:54 vs Langstaff Road Improvements)	10 min 05 sec (▼ 10:44 vs No Build) (▼ 11:26 vs Langstaff Road Improvements)	9 min 43 sec (▼ 13:45 vs No Build) (▼ 13:24 vs Langstaff Road Improvements)

**Table 6-7: Future 2041 Afternoon Peak Periods - Average Speeds Northbound**

SCENARIO	3PM – 4PM	4PM – 5PM	5PM – 6PM
No-Build	50.8 km/h	37.0 km/h	32.4 km/h
Langstaff Road Improvements Only	50.6 km/h (▼ 0.2 v No Build)	35.3 km/h (▼ 1.7 vs No Build)	32.9 km/h (▲ 0.5 vs No Build)
Diverging Diamond Interchange	58.8 km/h (▲ 8.0 vs No Build) (▲ 8.2 vs Langstaff Road Improvements)	38.8 km/h (▲ 1.8 vs No Build) (▲ 3.5 vs Langstaff Road Improvements)	28.9 km/h (▼ 3.5 vs No Build) (▼ 4.0 vs Langstaff Road Improvements)
Diverging Diamond Interchange & Mainline Widening at Major Mackenzie Dr.	75.2 km/h (▲ 24.4 vs No Build) (▲ 24.6 vs Langstaff Road Improvements)	75.6 km/h (▲ 38.6 vs No Build) (▲ 40.3 vs Langstaff Road Improvements)	78.5 km/h (▲ 46.1 vs No Build) (▲ 45.6 vs Langstaff Road Improvements)

As presented in Table 6-7, with the ultimate widening of Highway 400, the proposed Langstaff Road interchange improvements and extension of collector lanes are expected to improve the average speed on Highway 400 significantly (24 to 46 km/h) compared to Langstaff Road improvements only.

Speed contour plots for the northbound direction with an ultimate 10-lane configuration of Highway 400 are included in Appendix K, for the 'Langstaff Road Improvements Only' scenario and the 'Diverging Diamond Interchange' scenario. These speed contour plots present the benefits of an additional lane on Highway 400 planned north of Major Mackenzie Drive interchange, indicating that the ultimate widening and the Diverging Diamond Interchange are both expected to improve the traffic operations of Highway 400.

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## 6.4 STUDY FINDINGS

By 2041, the operation of Highway 400 is forecast to deteriorate, with average travel times increasing and average speeds decreasing between Steeles Avenue and Major Mackenzie Drive in both directions, particularly for the PM Peak period. With the completion of the Langstaff Road Improvements only, this is expected to have a minimal impact to Highway 400 operation. Interchange improvements, which would provide a connection to and from the north from Langstaff Road to Highway 400, will provide additional capacity by extending the northbound collector lanes, which could reduce some of the congestion observed on the mainline compared to both the No-Build Scenario and Langstaff Road improvements Only Scenario.

Interchange improvements are expected to provide the following benefits for both the northbound and southbound trips on the Highway 400:

- During the 2041 morning peak period, congestion in the southbound direction (peak direction) between Major Mackenzie Drive Interchange and Rutherford Road Interchange is slightly improved, as traffic demand expected at the Rutherford Road off-ramp will be re-distributed following the addition of an off-ramp at Langstaff Road.
- During the 2041 afternoon peak period, congestion in the northbound direction (peak direction) on the Highway 400 mainline, south of Highway 7 noticeably improves, with the average speeds at the 407ETR ramps and the Highway 7 Interchange increasing. Although the average travel time in the northbound direction is expected to increase between 5 pm and 6 pm when compared with the Langstaff Only Scenario as noted in Table 6-3, a time saving of 43 seconds is still observed for the afternoon 3-hour peak period, which includes the 5pm to 6pm hour. Based on the traffic operational analysis results for the 3-hour morning and afternoon peak periods, the proposed improvement for Langstaff Road interchange, with an extension of the northbound collector lane that provides additional network capacity, could reduce the travel time for the morning and afternoon peak periods. Therefore, it is considered that with improvements, the overall average travel time and average speeds throughout a 24-hour period are expected to improve.

The additional traffic analysis that was conducted for an ultimate widening of Highway 400 with 10-lanes, confirms that the additional lanes on Highway 400 north of Major Mackenzie Drive have the potential to remove the future mainline bottleneck, and the afternoon peak hour congestion for the northbound direction. Furthermore, the traffic operations on the collector lanes are also expected to improve with an ultimate widening of Highway 400.

# 7 CONCLUSION

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## 7.1 LANGSTAFF ROAD IMPROVEMENTS

York Region initiated a Class EA Study to examine the future transportation needs for Langstaff Road between Weston Road and Highway 7, in the City of Vaughan. This EA Study examines the transportation network improvement needs within the study area to support the future planned growth, including a new connection across the CN MacMillan Rail Yard, road/rail grade separation on Langstaff Road east of Keele Street, improvements to the existing roadway and Highway 400/Langstaff Road Interchange improvements to accommodate additional access from and to the north. Langstaff Road is an important link between the industrial and employment areas in the City of Vaughan, many of which are located on either side of the CN MacMillan Yard. The link also provides a connection to many primary growth centres, which include Vaughan Metropolitan Centre, Vaughan Mills Centre, Concord GO Centre, Weston Road / Highway 7 Secondary Plan area and Carville Centre.

This report documents the existing (2016) traffic conditions, discusses the proposed Langstaff Road improvements and assesses the future (2041) traffic conditions for the Langstaff Road study area. The existing and future traffic analysis results are based on the re-calibrated Aimsun model, which was revised following the provision of more recent traffic count data for the Highway 400 and Langstaff Road Interchange ramps, and recent travel time data for the Highway 400.

The widening of Langstaff Road to six general purpose lanes (which includes the grade separation with the Metrolinx GO Barrie Line) and the crossing over the CN MacMillan Yard would provide the following benefits:

- Reduction in traffic congestion and truck volumes on adjacent east-west corridors and provide relief for parallel regional road such as Rutherford Road and Highway 7. In addition to improving the overall level of service for pedestrians, cyclists and transit users within the study area;
- Convenient and more efficient accesses to employment areas, which supports growth in the employment areas and growth in the City of Vaughan and York Region to 2041;
- Additional east-west capacity in the overall transportation network, which would also support and complement the proposed six-lane widening on other north-south arterial roads (including those that have potential for HOV lanes) improving continuity in the overall transportation network;
- A direct access to nearby highways, which reduces truck traffic on surrounding arterial roads by eliminating vehicle re-routing due to the missing connection on Langstaff Road at the CN MacMillan Yard;
- Improve the frequency and efficiency of the transit network as Langstaff Road is identified as part of the Frequent Transit Network in the York Region TMP and support efficient inter-regional transit services by providing the grade separation at the GO Barrie Line;
- Support active transportation use by implementing cycle track and sidewalk on Langstaff Road; and
- Support the Regional Policies that promote goods and people movement, as Langstaff Road is identified as a goods movement corridor in the York Region TMP.

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## 7.2 FUTURE CORRIDOR STUDY

Improvements to the existing Highway 400 Interchange have been considered and assessed as part of the Langstaff Road EA Study, in order to provide connectivity to and from Langstaff Road and improve the existing traffic operations of the Highway 400 core-collector system. Several initial concept plans have been identified and evaluated as part of this EA study.

The improvements at Highway 400 / Langstaff Road to a full interchange with core/collector system, in combination with MTO improvements on Highway 400 north of Major Mackenzie Drive, would provide the following benefits:

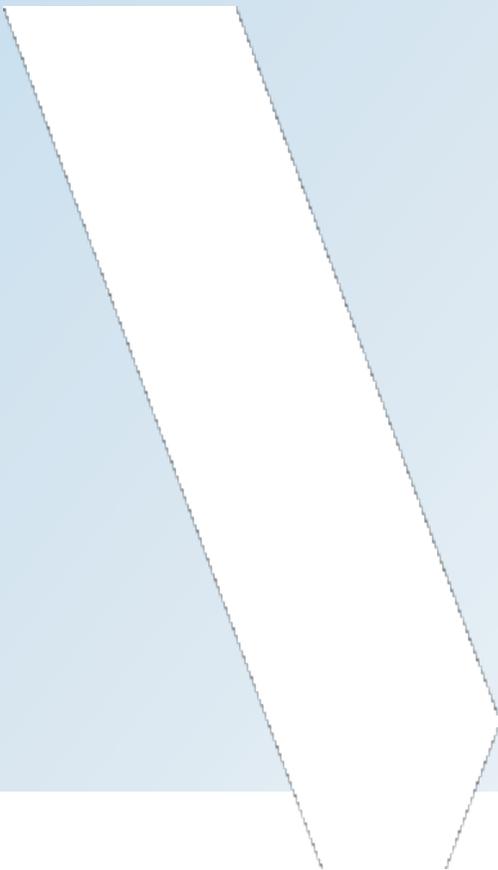
- Additional roadway capacity on Highway 400 and yield further benefits in addressing traffic congestion and connectivity in the overall transportation network;
- Further support Langstaff Road as a goods movement corridor through the provision of a full interchange;
- Reduce traffic demand and congestion at Highway 400 interchange ramp terminals at Highway 7 and Rutherford Road; and
- Improve the overall operation on Highway 400 between Highway 7 and Major Mackenzie Drive.

The Highway 400 and Langstaff Road Interchange will be further reviewed under a future Corridor Study and EA in order to undertake a detailed and comprehensive assessment of the full interchange considerations, which will recognise the total benefits associated with converting the existing interchange to a full interchange that provides a northbound access to the Highway from Langstaff Road.

# APPENDIX

# A

MODELLED HIGHWAY 400  
TRAFFIC VOLUMES

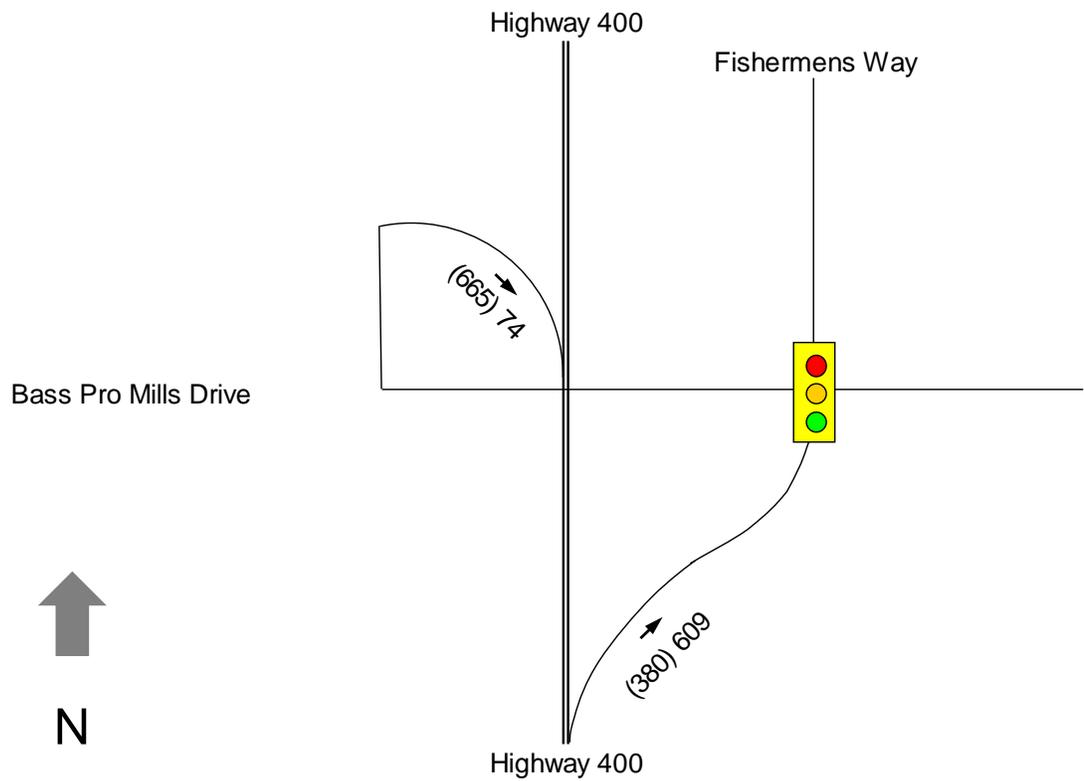
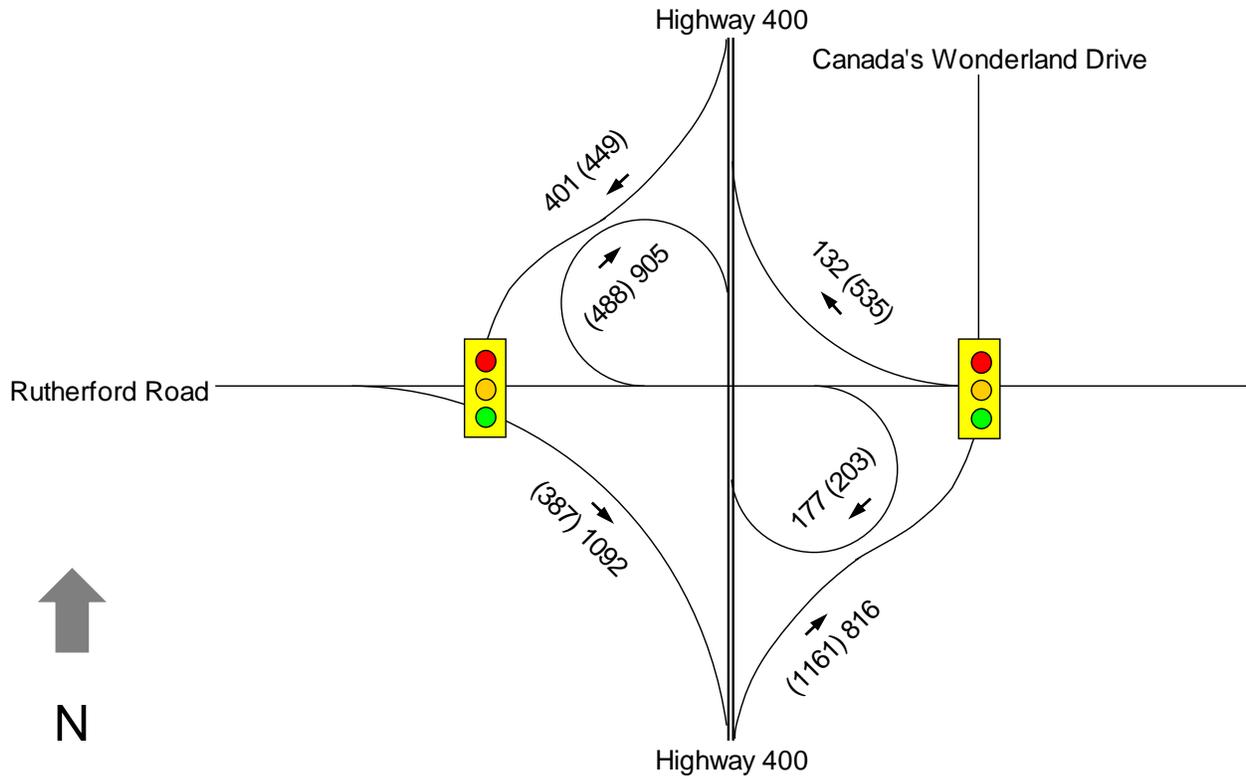


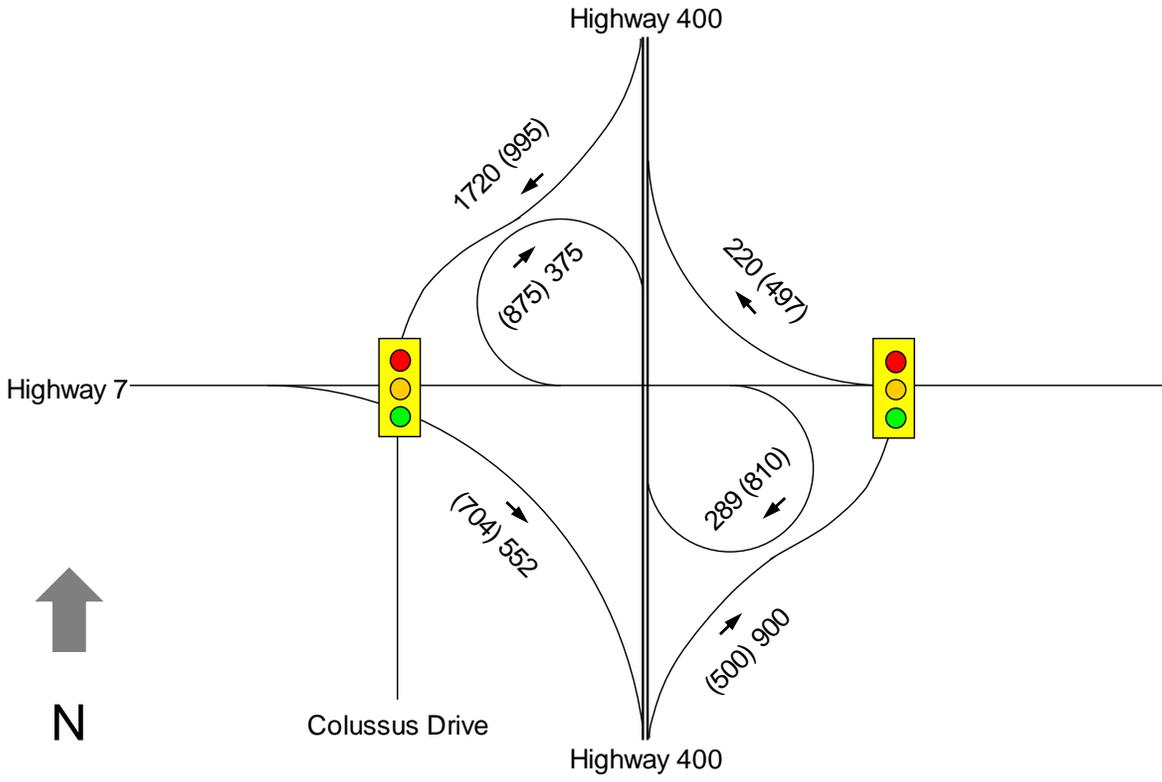
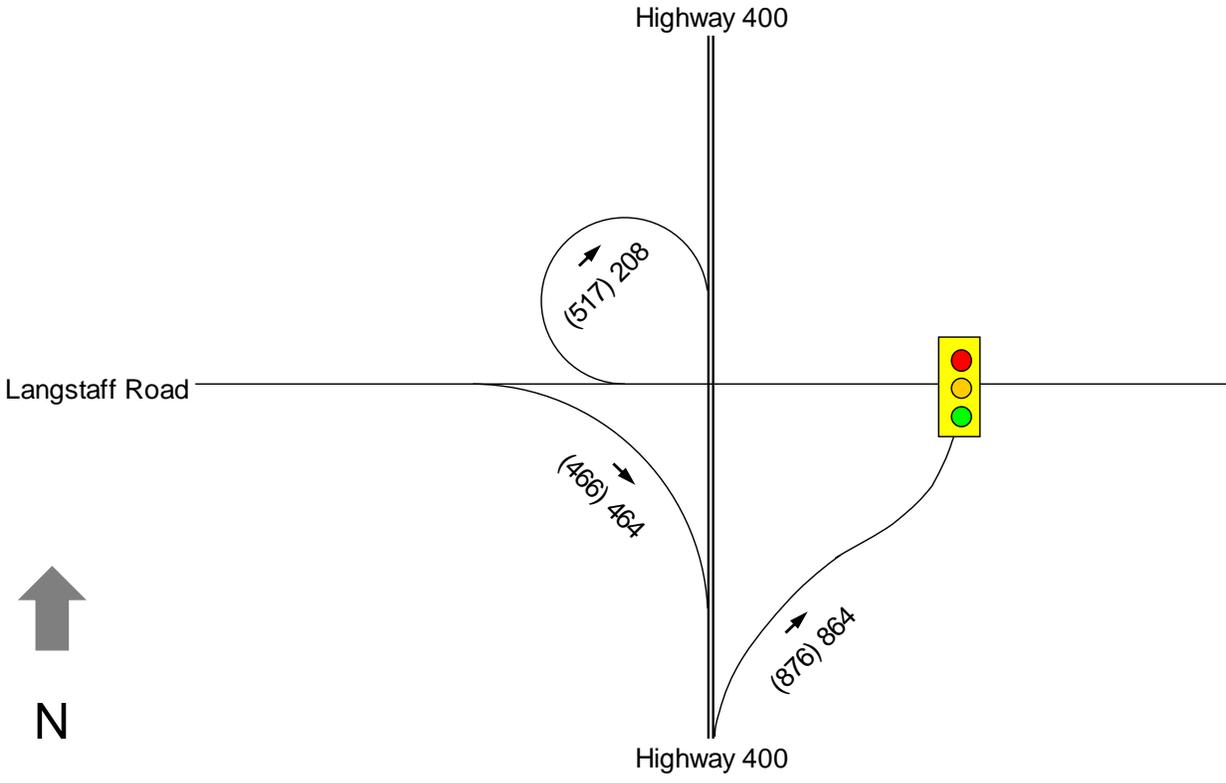
# MAINLINE VOLUMES

HIGHWAY 400 SEGMENT	LANE TYPE	AM PEAK HOUR		PM PEAK HOUR	
		SB	NB	SB	NB
North of Rutherford Rd	Express	7872	3250	4072	7646
Rutherford Road to Bass Pro Mills Dr	Express	9467	3934	4499	8242
Bass Pro Mills Dr to Langstaff Rd	Express	9541	4543	5164	8622
Langstaff Rd to Highway 7	Express	6524	3748	4463	6698
	Collector	3689	1660	1683	2803
South of Highway 7	Express	7327	4401	4874	6704

## INTERCHANGE RAMP VOLUMES

HIGHWAY 400 I/C	RAMP NUMBER	AM PEAK HOUR	PM PEAK HOUR
Rutherford Rd	24	816	1161
	34	401	449
	52	177	203
	53	1092	387
	62	132	535
	63	905	488
Bass Pro Mills	24	609	380
	63	74	665
Langstaff Rd	24	864	876
	53	464	466
	63	208	517
Highway 7	24	900	500
	34	1720	995
	52	289	810
	53	552	704
	62	220	497
	63	375	875





# APPENDIX

# B

SELECTED FIGURES FROM  
2015 YORK REGION  
TRANSPORTATION FACT BOOK

# Truck Volumes on Regional Roads

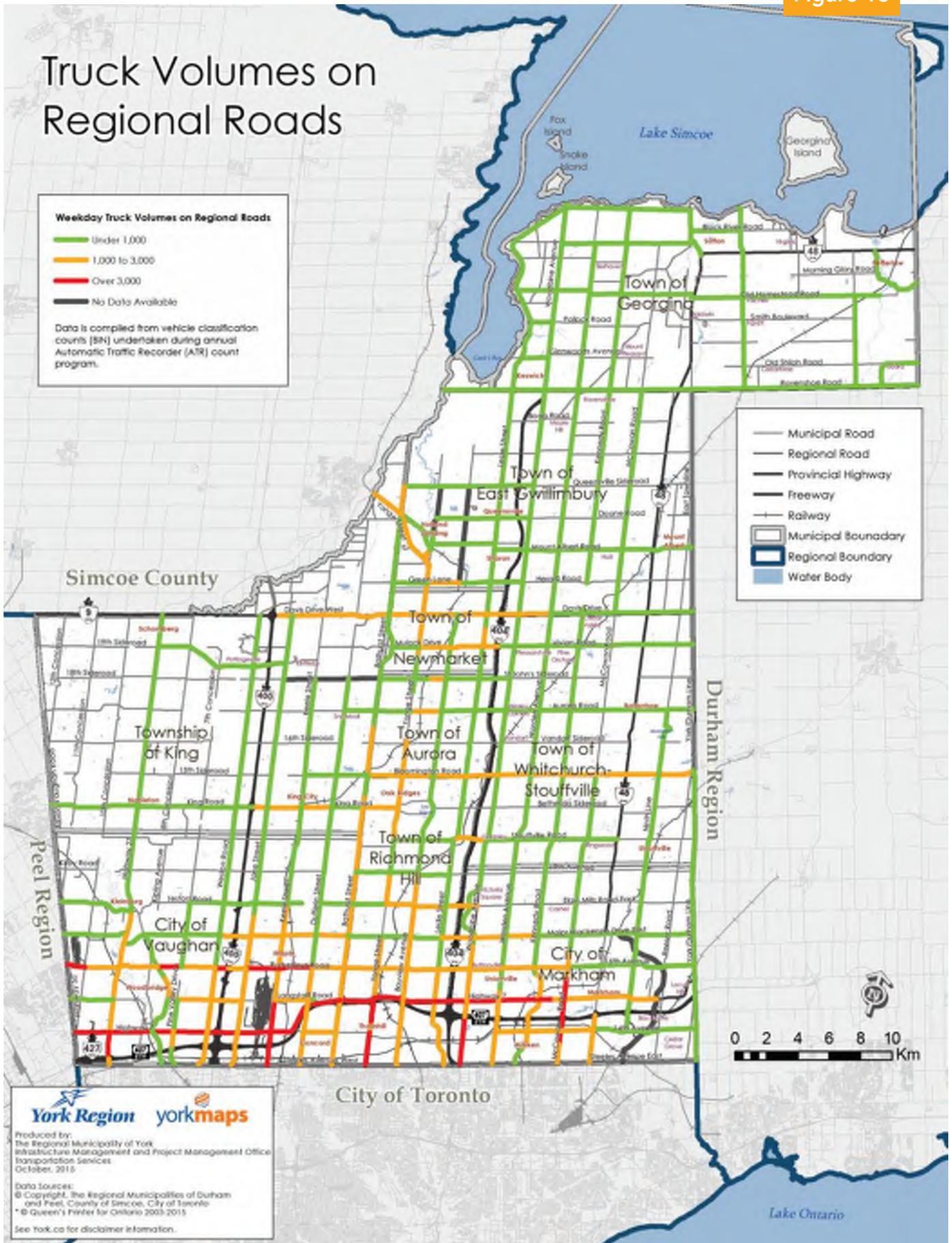


Figure 13 – Truck Volume on Regional Roads in 2014.

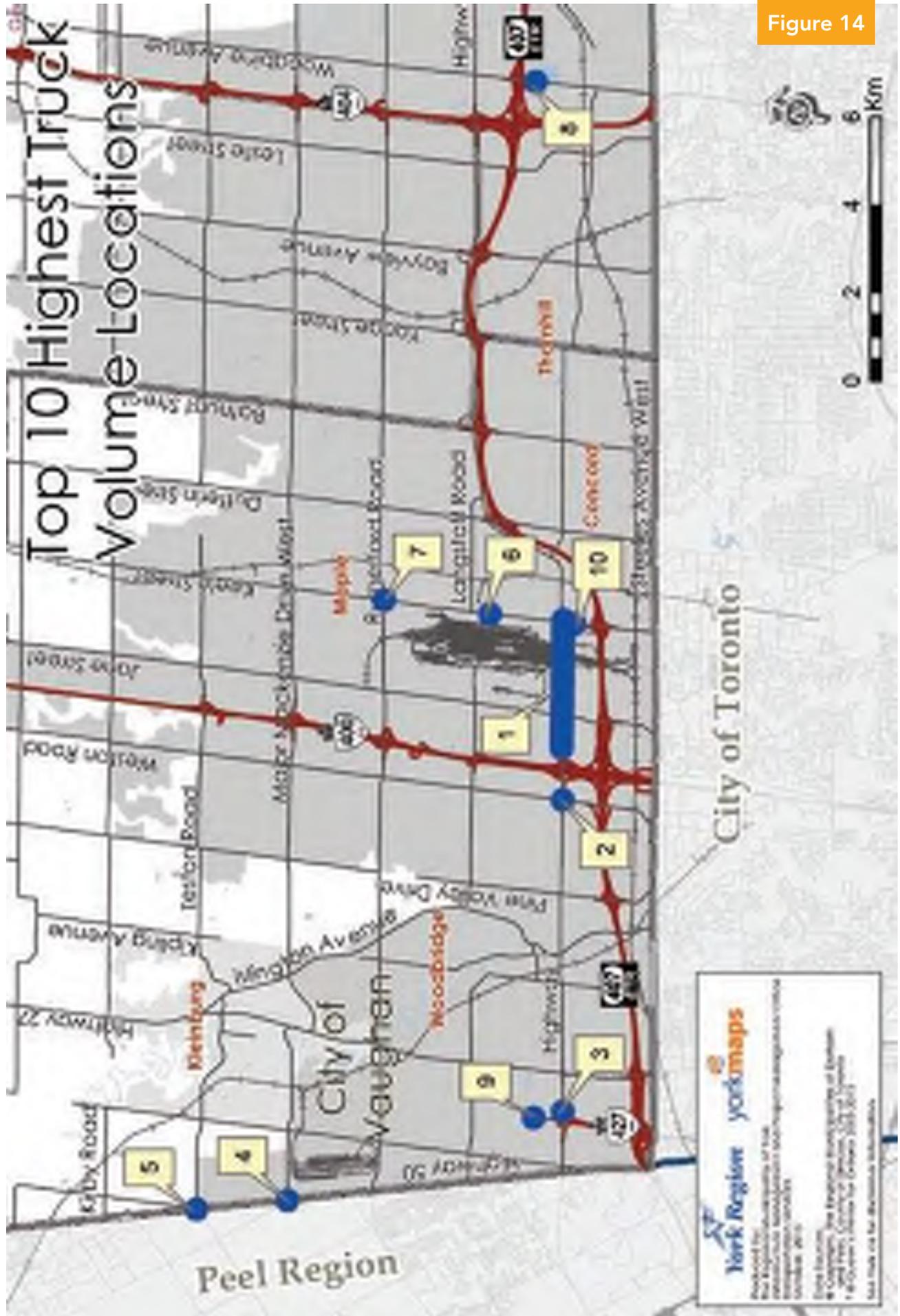


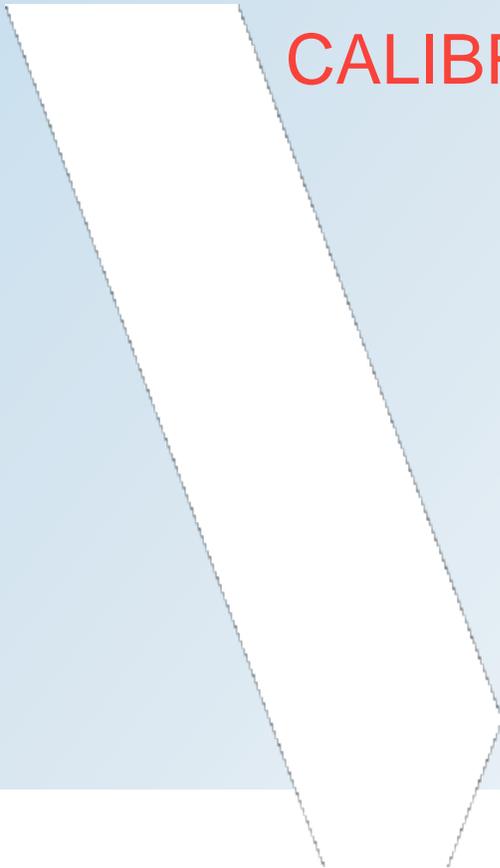
Figure 14

Figure 14 – Top 10 Highest Truck Volume Locations

# APPENDIX

## C

### AIMSUN MODEL DEVELOPMENT AND CALIBRATION





## MEMO TO FILE

**TO:** File

**FROM:** Brian Cheung, P. Eng.; Keyur Shah, P. Eng.

**OUR FILE:** 16M-01457-01 Langstaff Road EA Study, York Region

**SUBJECT:** **Langstaff Road EA - Revised Recalibration of an Aimsun-based Micro-Simulation Model for Traffic Operational Analysis -Version 3**

**DATE:** **August 09, 2018 (original calibration memo was submitted on June 20, 2017 and revised version on July 25, 2018)**

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## INTRODUCTION

The Regional Municipality of York (York Region) initiated a Class Environmental Assessment (EA) Study to examine future transportation needs for Langstaff Road between Weston Road and Highway 7 in the City of Vaughan. The EA study examines and reviews the need and justification of a new connection across the CN MacMillan Rail Yard, any associated road improvements, and Highway 400 interchange improvements to accommodate additional access (to and from the north) at Langstaff Road. WSP Canada Group Limited (formerly MMM Group Limited) has been retained by York Region to carry out the Preliminary Design and Class EA Study (Schedule C).

The traffic analysis for Langstaff Road EA Study requires micro-simulation to assess existing transportation conditions on Highway 400 and on the arterial road network and then to evaluate traffic conditions with road network improvement alternatives. Following the previous submission of the calibration memo in September 2017, MTO provided newer travel time data (collected in 2016) to WSP. Additionally, York Region and WSP have collected additional vehicle classification counts for on and off ramps at Highway 400 interchanges within the study area. Based on the newly available information, the Aimsun microsimulation model was recalibrated and this technical memorandum describes the process for developing the micro-simulation model, revised calibration and validation results, and next-steps for traffic operational analysis.

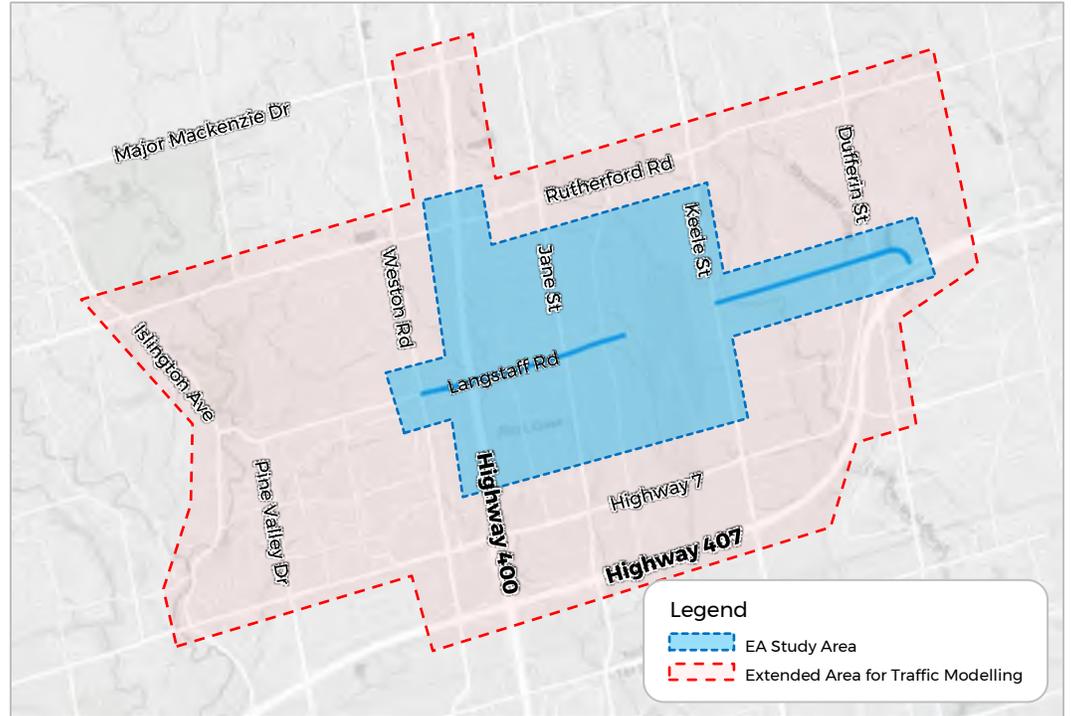
## STUDY AREA

The Langstaff Road EA study area is illustrated in Exhibit 1. It is approximately 7 kilometres in length and spans between Weston Road to the west and Highway 7 to the east. An extended area surrounding the Langstaff Road study area bounded by Rutherford Road to the north, Thornhill Woods Drive to the east, Highway 7 to the south and Islington Avenue to the west is included in the Aimsun model to provide a comprehensive travel demand analysis review of impacts associated with Langstaff Road future planning horizon improvement scenarios.

For assessment of highway interchange improvements at Langstaff Road, the segment of Highway 400 between Major Mackenzie and Steeles Avenue was included in the micro-simulation

model. Highway 407 between Weston Road and Dufferin Street was also included in the model as it is a crucial corridor near the study area.

*Exhibit 1: Langstaff Road EA Traffic Study Area*



## MODELLING APPROACH

### YRTDF DEMAND FORECASTING

The Langstaff EA micro-simulation model is built on origin-destination auto demand data extracted from the York Region Travel Demand Forecasting (YRTDF) model—an *Emme*-based model that estimates travel demand and patterns in the Greater Toronto and Hamilton Area for the morning peak hour with refinements to enhance travel demand forecasts within York Region. YRTDF modelling files for the 2011, 2016 and 2041 planning horizons were provided by York Region for this analysis.

To establish meaningful high occupancy vehicle (HOV) lane utilization estimates associated with future improvement strategies, the YRTDF model was modified to estimate automobile trips by vehicle occupancy. Based on the 2011 Transportation Tomorrow Survey (TTS) data, the ‘auto driver’ matrices were redistributed into single occupant vehicles (SOV), HOV with two persons (HOV2) and HOV with three or more persons (HOV3+). Mode share for each vehicle occupancy class was calculated and incorporated into the YRTDF demand matrices on a planning district basis to preserve original YRTDF travel demand totals. The 2011 TTS-derived vehicle occupancy proportions were maintained in the future planning horizons to provide conservative forecasts.

The demand forecasting process also included a review of the YRTDF-modelled transportation road network for each of the planning horizons near the Langstaff study area to confirm assumed

road network attributes as well as network improvements identified in the 2016 York Region Transportation Master Plan (TMP). Other proposed/planned network improvements for roadways under the jurisdictions of the Ontario Ministry of Transportation (MTO) and City of Vaughan were also included as part of the YRTDF model review. As well, adjustments to the modelled road network were incorporated to enhance road network resolution within the study area. A subarea corresponding to the Extended Area depicted in Exhibit 1 was extracted from the overall YRTDF model for the 2016 and 2041 planning horizons to develop the micro-simulation (Aimsun based) model.

## **AIMSUN MODEL DEVELOPMENT**

Aimsun is an integrated traffic modelling program that incorporates macro-scopic functionalities with meso-scopic and micro-scopic traffic simulation. It facilitates detailed assessment of traffic operations along Highway 400 and its interchanges, and Langstaff roadway segments and intersections combined with dynamic traffic route choice assignment options related to the local road network inclusive of the study area. The Aimsun model for this study builds on information and data extracted from the YRTDF subarea model. Refinements to Langstaff Road and the extended area (e.g. additions and modifications to modelled roadways and traffic analysis zone disaggregation) were implemented in Aimsun model to provide greater detail for micro-simulation analysis.

Existing conditions were assessed based on YRTDF-forecasted demand for the 2016 planning horizon. The demand was calibrated to 2016 traffic data consisting primarily of York Region-supplied turning movement counts (TMC) for the regional road intersections, and Highway 400 mainline and ramp traffic volumes provided by MTO. Traffic data was also obtained from the City of Vaughan and 407 ETR. Current signal timing plans were incorporated at all signalized intersections within the study area, between regional road intersections in the extended area and at highway ramp terminals. The morning and afternoon peak hours were identified from existing traffic counts to be the hours starting at 8:00 and 17:00, respectively.

Commercial vehicles (i.e. trucks) are an important consideration in the traffic analysis as the industrial areas surrounding the study area, along with the CN Rail yard, generate and attract high volumes of truck traffic. However, traffic demand obtained from the YRTDF model reflects automobile trips. Furthermore, vehicle classification data for Highway 400 (specifically on interchange ramps) was not available. As such, additional video counts were collected in May 2018 for the ramps at each of the Highway 400 interchanges between Highway 7 and Rutherford Road. The updated ramp volumes (with vehicle classification), combined with truck volumes given in the York Region-supplied TMCs, were applied in the calibration process to assess the commercial vehicle demand. Initial truck percentages (derived from study area counts) of approximately of 7% and 5% for the morning and afternoon peak hour, respectively, of the total peak hour auto traffic demand were used to generate seed traversal matrices for developing and calibrating commercial vehicle demand.

## MODEL CALIBRATION AND VALIDATION

The YRTDF-extracted 2016 morning peak hour travel demand (i.e. traversal matrices extracted from the YRTDF model) was calibrated to observed 2016 conditions within Aimsun model. The extracted travel demand from the YRTDF model was adjusted based on Highway 400 mainline counts, Highway 400 and Highway 407 ramp counts and balanced Langstaff Road study area turning movement volumes. This demand adjustment was conducted using the demand adjustment module available in Aimsun software. The adjustment was performed for two vehicle classes; passenger vehicles and commercial vehicles.

The model validation sought to ensure consistency between simulated travel time/speeds and observed travel time on Highway 400.

Assessment of afternoon conditions was also required for the EA study. Initial afternoon peak hour travel demand was estimated by transposing the morning peak hour travel demand matrices and adjusting based on automatic traffic recorder (ATR) counts for the regional road network. The initial afternoon peak hour demand was subsequently adjusted using the same process employed for the morning peak hour.

The nature of traffic patterns around the study area required the modelling of peak period traffic demands between 6:00 and 9:00 in the morning peak period, and between 15:00 and 18:00 in the afternoon peak period. The traffic demand for each of hours starting at 7:00, 15:00 and 16:00 were developed by adjusting the calibrated peak hour demand to corresponding traffic data. A complete traffic dataset was not available for the 6:00-7:00 hour; traffic demands for this hour was estimated by using scaling factors derived from highway mainline, ramp and arterial road counts.

## FACTORS AFFECTING MODEL CALIBRATION & VALIDATION

Calibration of the Aimsun model for the Langstaff EA study may be affected by the following factors:

- Estimation of Afternoon Peak Hour Travel Demand

The YRTDF model includes detailed land uses and road network for York Region, and provides travel demand forecasts exclusively for the morning peak hour. To evaluate the afternoon conditions, the morning peak hour traffic demand was transposed to establish initial afternoon peak hour demands. This initial afternoon peak hour travel demand was subsequently adjusted based on observed traffic volumes (i.e. ATR and turning movement counts) as an effort to reflect observed travel patterns. Given the available data resources and the study's purpose, this estimation process was considered appropriate for this study. Better representation of afternoon peak period travel demand can only be obtained through significant Region-wide changes to the YRTDF model and was beyond the scope of this study.

- Highway 407

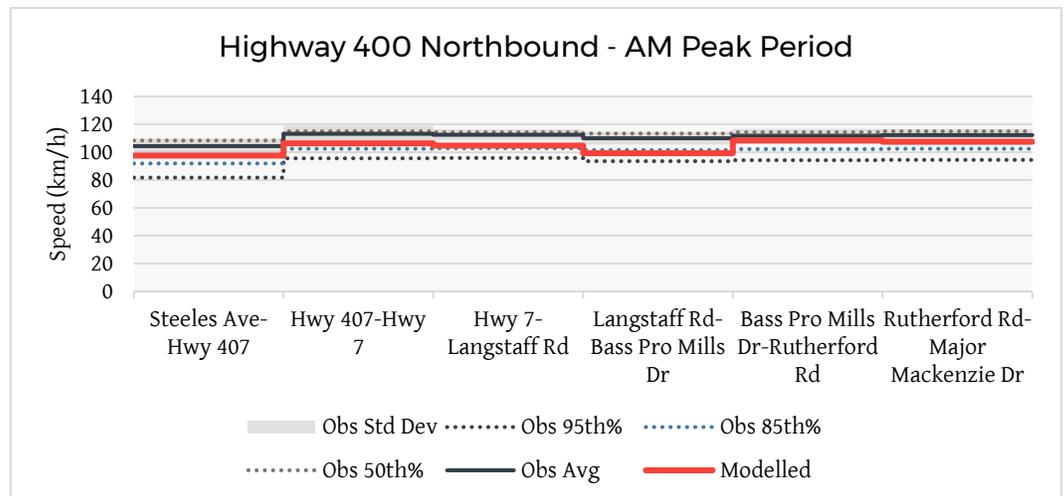
Travel time and roadway capacity are fundamental factors that affect route decision. In the case of Highway 407 traffic demand, route decision is also influenced by toll rates and congestion on parallel routes (e.g. Highway 401, Highway 7, etc.). The YRTDF takes a general approach in accounting for tolls by adding a time penalty component to the modelled facility's volume-delay function and is based on assumptions to value of time and toll rates calibrated to TTS and cordon count data.

HIGHWAY 400 TRAVEL TIMES (SEC)	DIR	OBSERVED		MODELLED	
		AVERAGE	STD. DEV.	AVERAGE	STD. DEV.
<b>Afternoon Peak Period</b>					
Rutherford Rd-Major Mackenzie	NB	156.7	23.6	219.7	3.6
	SB	67.7	2.5	72.8	0.1
Bass Pro Mills Dr-Rutherford Rd	NB	63.4	12.0	95.0	1.3
	SB	27.6	1.2	30.0	0.1
Langstaff Rd-Bass Pro Mills Dr	NB	97.7	16.6	104.7	1.2
	SB	41.4	2.3	43.3	0.0
Highway 7-Langstaff Rd	NB	208.9	47.3	197.5	2.2
	SB	64.0	2.5	66.3	0.0
Highway 407-Highway 7	NB	88.6	37.7	134.5	11.8
	SB	29.5	1.5	31.3	0.0
Steeles Ave-Highway 407	NB	69.9	12.6	67.0	2.3
	SB	40.3	1.9	37.9	0.1
<b>Total (Afternoon)</b>	<b>NB</b>	<b>685.1</b>	<b>69.3</b>	<b>818.3</b>	<b>12.9</b>
	<b>SB</b>	<b>270.5</b>	<b>5.0</b>	<b>281.6</b>	<b>0.2</b>

## OPERATING SPEEDS

Validation of the Langstaff Road EA study micro-simulation model also includes a comparison of simulated/modelled Highway 400 operating speeds to observed speeds (from Bluetooth detectors) provided by MTO. Exhibit 6 through Exhibit 9 show highway operating speeds between interchanges, by direction and peak period. The range of observed highway speeds is provided in the exhibits; a wider band between observed minimum and maximum operating speeds indicate the presence of traffic congestion on the highway.

*Exhibit 6: Modelled vs Observed Highway 400 Speeds - Northbound AM Peak*



- YRTDF Network Detail

The travel demand from the YRTDF model defines travel patterns in the Aimsun model. However, the YRTDF model like any other travel demand model, lacks detail in the road network, such as the collector and express system on Highway 400 and local roads that feed traffic onto the collector and arterial road network. This poses issues when assigning traffic demand at entrance and exit points (i.e. gateways) as well as between express and collector road segments on Highway 400.

- Model complexity

The Aimsun model contains a comprehensive road network with roadways of different functional classifications; these include highways, toll roads, and urban arterials and collector roads. Additionally, Highway 400 is a highly congested corridor with a local collector and express system between the Langstaff Road and Highway 7 interchanges. Calibrating a micro-simulation model for a grid-road network, becomes very complex when traffic data on parallel corridors is collected on different days/season/year and distributing traffic volumes on multiple corridors in a complex road network can affect the ability to achieve an ideal calibration.

- Data Quality

Field conditions show that highway and arterial roads included in the model are frequently congested, particularly in the afternoon peak period. As a result, traffic counts on these capacity-constrained roadways are likely to represent volume throughput rather than traffic demand. The demand adjustment process attempts to mitigate traffic demand underrepresentation by not penalizing traffic assignment volumes on identified congested roadway segments. Therefore, the model calibration focused on ramp volumes and arterial road network to avoid congestion-related impacts on Highway 400.

## **VOLUMES**

Traffic volumes used in the calibration process are provided in Appendix A. The volume data set consists of turning movement volumes at Langstaff Road intersections and Highway 400 mainline and ramp volumes—including Highway 407 ramps. In general, the control volumes represent December 2016 conditions.

Exhibit 2 and Exhibit 3 illustrate the relationship between the simulated and modelled volumes for the morning and afternoon peak hours, respectively. In most data comparison cases, the R-squared value is greater than 0.97, indicating a close fit between observed and simulated traffic volumes where 1.0 is a perfect match. The comparison for commercial vehicle volumes reflected a R-squared value ranging from 0.78 to 0.86; this is a result of low volumes (less than 100 vehicles per hour).

Exhibit 2: Observed vs Modelled Volumes - AM Peak Period

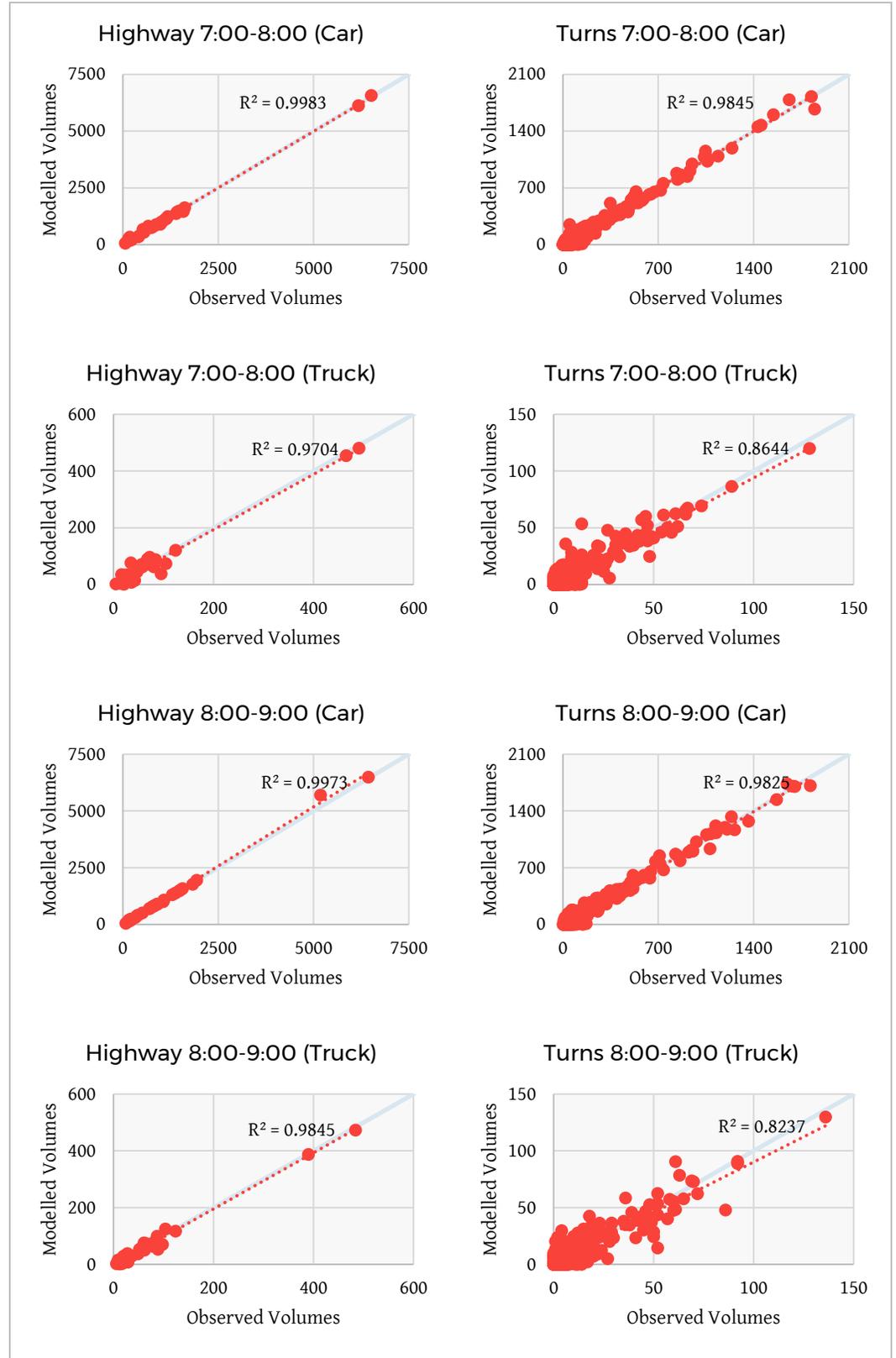


Exhibit 3: Observed vs Modelled Volumes - PM Peak Period

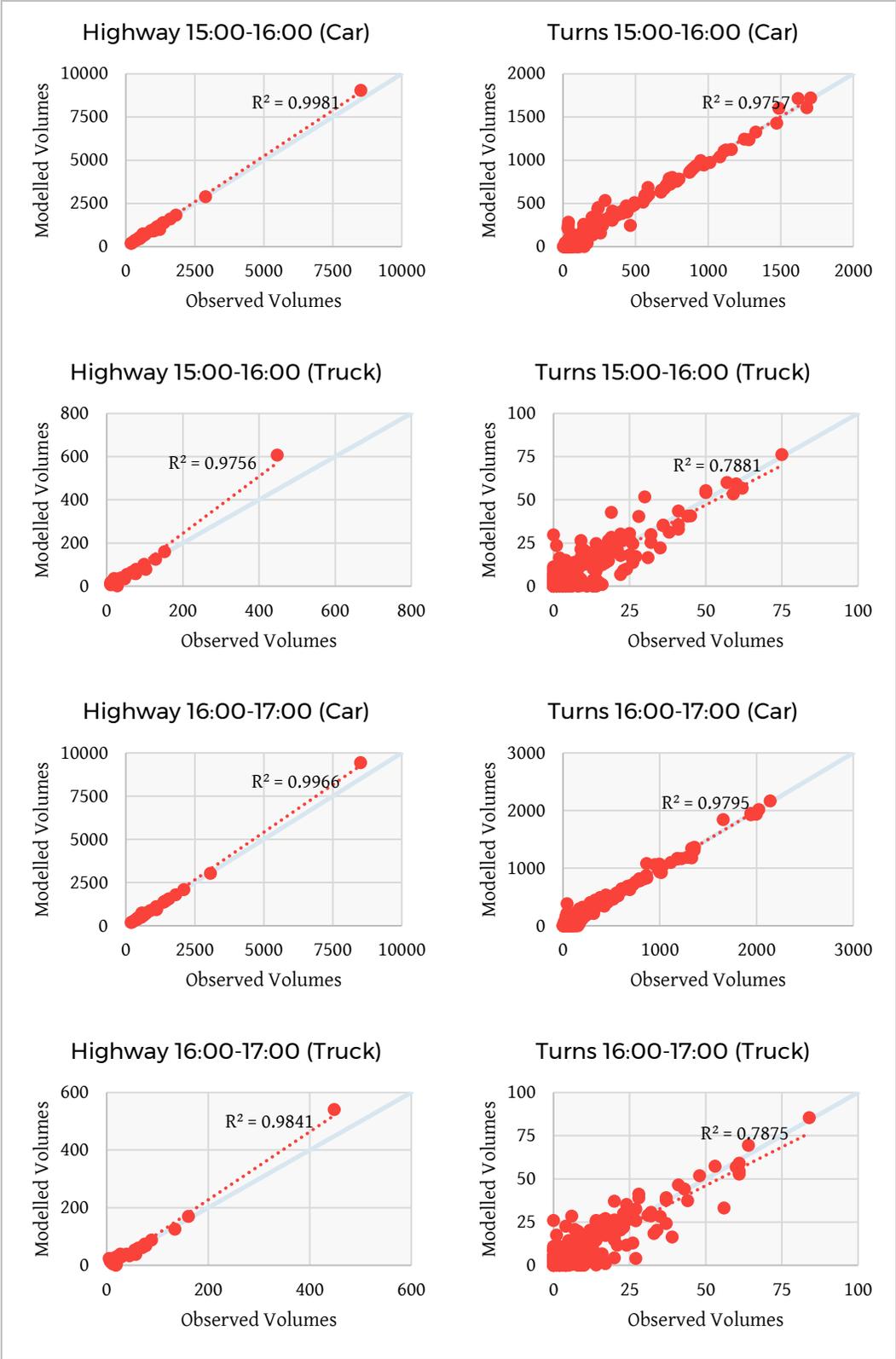
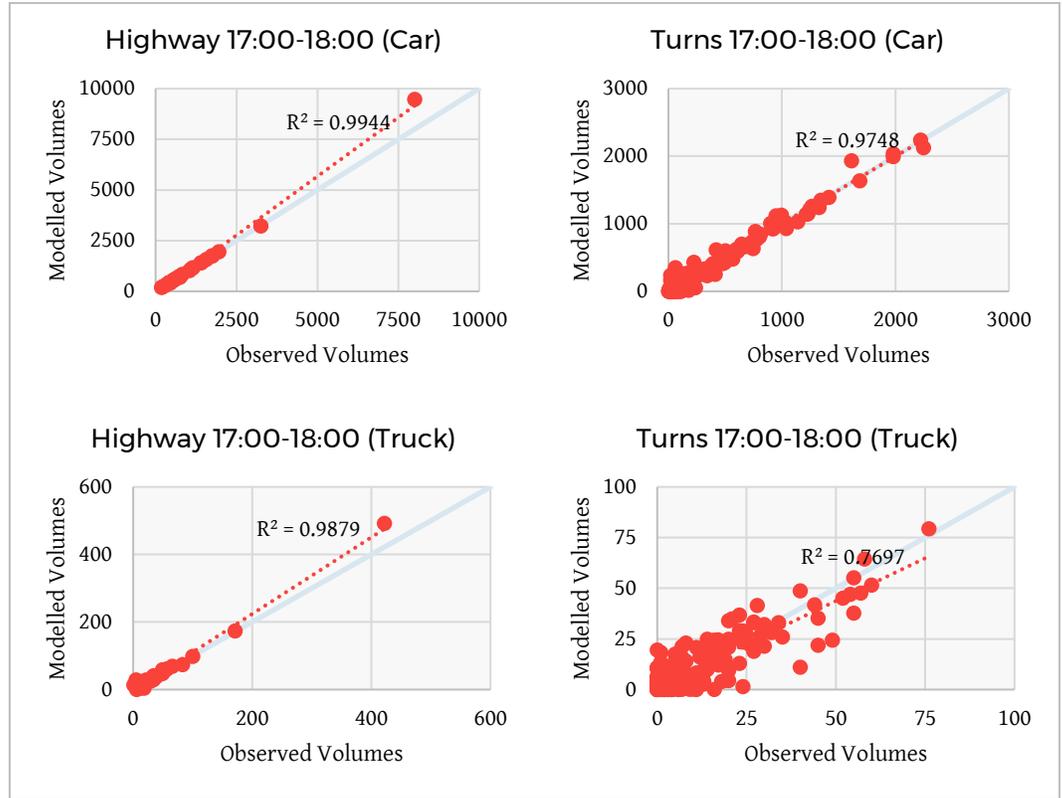


Exhibit 3: Observed vs Modelled Volumes – PM Peak Period (Continued)



The GEH statistic was evaluated for each control volume flow in the peak hours to assess differences between observed and modelled volumes. It is a formula used in traffic engineering to compare modelled traffic volumes to observed/counted volumes.

The formula is expressed as:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$$

where  $M$  is the modelled volume and  $C$  is the observed count.

Lower GEH values represent more reliable simulated traffic volumes. Exhibit 4 summarizes the GEH values for the flows based on thresholds and compares the results to model targets. The results exceed target thresholds, which indicates an acceptable match between simulated and observed conditions.

Exhibit 4: GEH Statistic Assessment of Observed vs Modelled Volumes

CRITERIA	TARGET	TYPE	MODEL RESULTS				
			7:00-8:00	8:00-9:00	15:00-16:00	16:00-17:00	17:00-18:00
<b>Highway 400 Link Flows (31 locations)</b>							
GEH < 5	75-80%	Car	87%	97%	90%	90%	97%
		Truck	81%	97%	94%	97%	97%
GEH < 10	95%	Car	100%	100%	100%	100%	97%
		Truck	100%	100%	100%	100%	100%
<b>Langstaff Study Area Turn Flows (239 turning movements)</b>							
GEH < 5	65-75%	Car	74%	67%	75%	74%	71%
		Truck	98%	97%	97%	97%	98%
GEH < 10	90%	Car	95%	93%	90%	92%	90%
		Truck	100%	100%	100%	100%	100%

## TRAVEL TIMES

The observed travel time data for Highway 400 was supplied by MTO to validate modelled highway operations to observed conditions. Exhibit 5 provides observed highway travel times between interchanges—average and standard deviation—sampled using GPS data for typical weekday morning and afternoon peak hour conditions, as well as a comparison to travel time outputs obtained from the Aimsun micro-simulation model corresponding to each highway segment and peak period. The data shows that simulated segments of Highway 400 are highly congested in the southbound and northbound directions during the morning and afternoon peak periods, respectively.

Exhibit 5: Comparison of Highway 400 Travel Time Results

HIGHWAY 400 TRAVEL TIMES (SEC)	DIR	OBSERVED		MODELLED	
		AVERAGE	STD. DEV.	AVERAGE	STD. DEV.
<b>Morning Peak Period</b>					
Rutherford Rd-Major Mackenzie	NB	67.3	2.7	70.6	0.1
	SB	123.6	15.0	131.2	1.0
Bass Pro Mills Dr-Rutherford Rd	NB	26.7	1.2	32.3	0.0
	SB	42.9	4.7	53.6	0.2
Langstaff Rd-Bass Pro Mills Dr	NB	41.8	1.7	47.0	0.1
	SB	44.4	2.4	47.9	0.0
Highway 7-Langstaff Rd	NB	64.9	2.2	67.8	0.2
	SB	67.9	3.2	92.6	2.5
Highway 407-Highway 7	NB	28.7	1.4	29.0	0.1
	SB	32.0	2.2	38.1	0.2
Steeles Ave-Highway 407	NB	39.6	2.0	41.2	0.1
	SB	43.2	2.7	41.0	0.1
<b>Total (Morning)</b>	<b>NB</b>	<b>269.0</b>	<b>4.8</b>	<b>287.8</b>	<b>0.3</b>
	<b>SB</b>	<b>354.0</b>	<b>16.5</b>	<b>404.5</b>	<b>2.7</b>

Exhibit 7: Modelled vs Observed Highway 400 Speeds - Southbound AM Peak

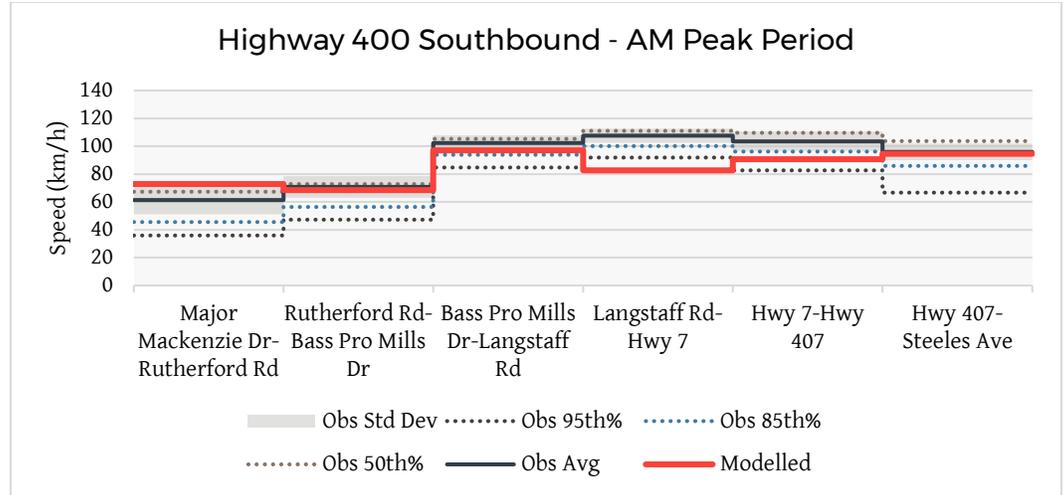


Exhibit 8: Modelled vs Observed Highway 400 Speeds - Northbound PM Peak

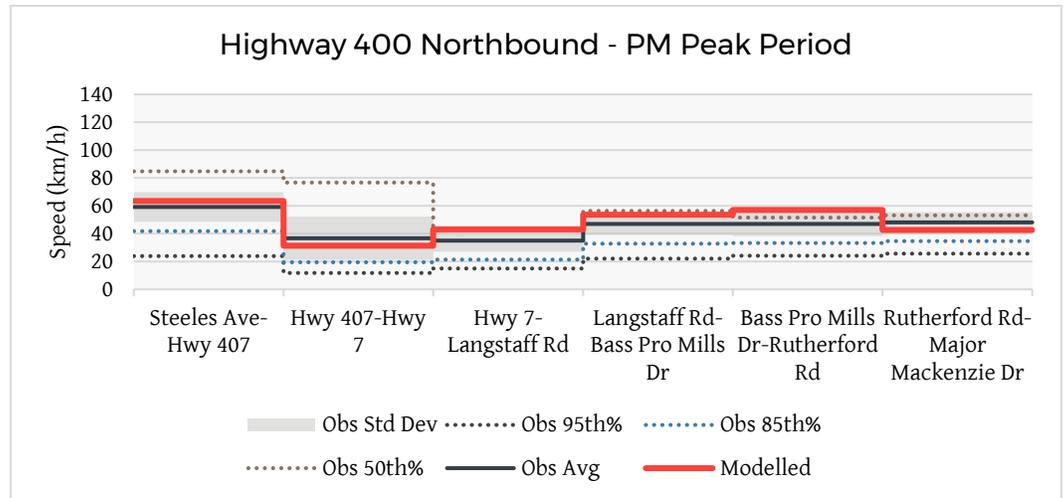
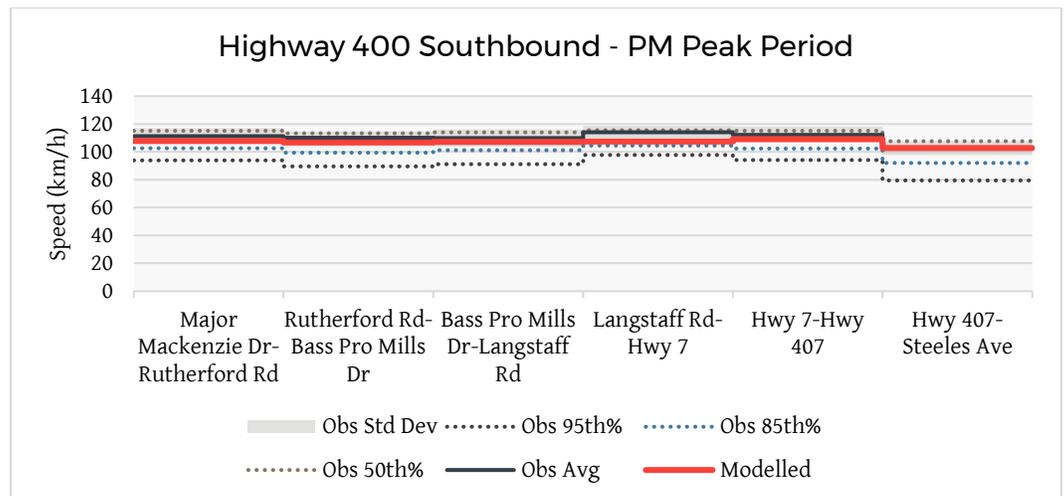


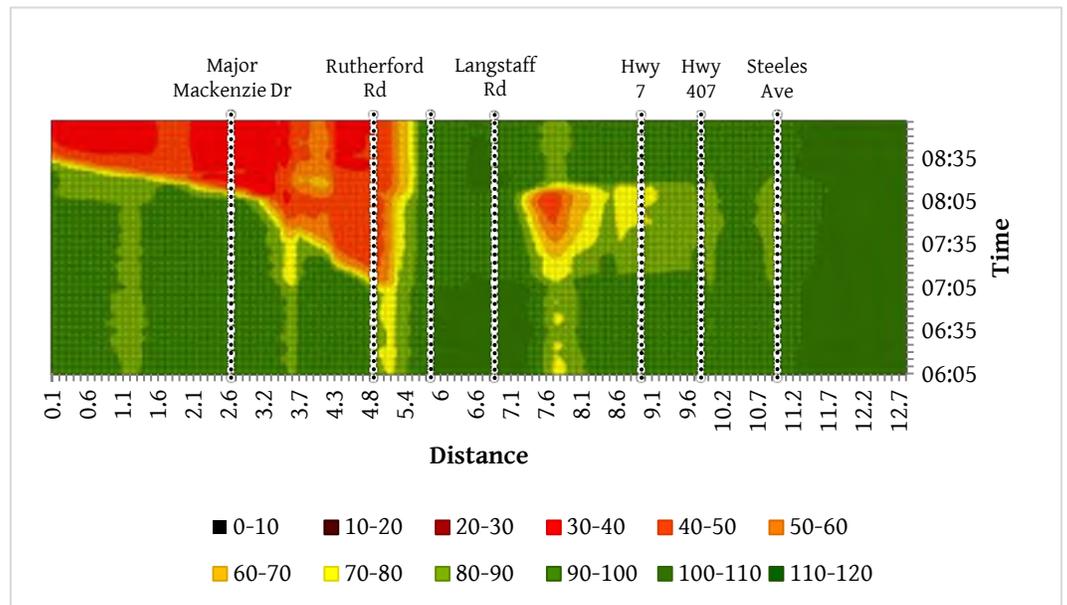
Exhibit 9: Modelled vs Observed Highway 400 Speeds - Southbound PM Peak



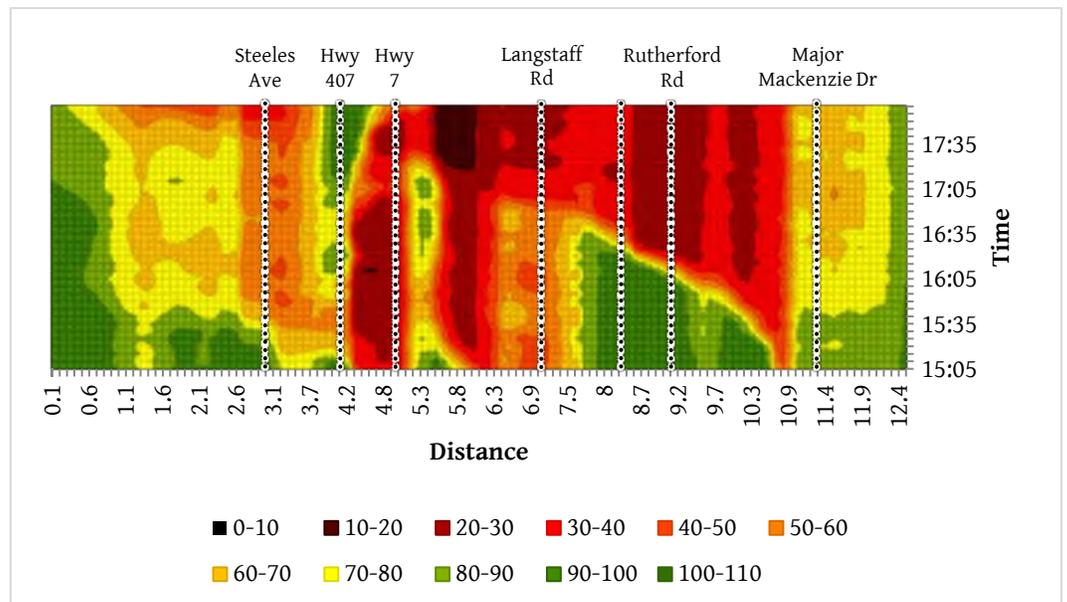
As presented in Exhibit 6 through Exhibit 9, the above exhibits show that simulated Highway 400 operating speeds generally match observed average speeds and are within the observed 50<sup>th</sup>, 85<sup>th</sup> and 95<sup>th</sup> percentile speeds; the southbound Highway 400 Express segment between Langstaff Road and Highway 7 during the morning peak period was an exception and was a result of lane changing behavioural issues with Aimsun upstream of the Highway 400-Highway 407 split.

Exhibit 10 and Exhibit 11 provide the speed contour illustrations generated from simulation model outputs for Highway 400 for the southbound AM and northbound PM peak directions, respectively. These illustrations demonstrate changes in modelled speeds over the peak periods.

*Exhibit 10: Highway 400 Speed Contour - Existing AM Southbound AM Peak*



*Exhibit 11: Highway 400 Speed Contour - Existing PM Northbound PM Peak*



## CONCLUSION

Based on the additional vehicle classification counts conducted for the Highway 400 ramps and updated travel time data for 2016 peak period, the Aimsun model was recalibrated. As presented in this memorandum, the updated micro-simulation (Aimsun) model for the Langstaff EA study is concluded to closely represent observed traffic conditions with minor deviations that are not anticipated to influence modelling of the EA study area. These deviations are likely a result of the calibration factors outlined and simulation software behaviours and have been mitigated within reason given the project scope. Therefore, the model is suitable for assessing Langstaff improvement scenarios for the future (2041) planning horizon year.

## NEXT STEPS

Detailed analysis of future (2041) conditions with alternative network improvement scenarios will be conducted based on the calibrated Aimsun-model discussed herein above. Modelling of future conditions will incorporate all proposed/planned changes (with respect to land use and road network) to the study area, including the surrounding extended study area in the model (i.e. regional roads, Highway 407 between Weston Road and Dufferin Street and Highway 400 between Major Mackenzie Drive and Steeles Avenue).

The specific elements being incorporated into the future (2041) conditions analysis are:

- Provision of HOV lanes on Highway 400
- YRTDF travel demand forecasts for the 2041 planning horizon year and other recommended road network improvements identified as per 2016 York Region TMP, and other planned improvements by City of Vaughan and MTO (e.g. road widenings, mid-block crossings, etc.)
- Langstaff Road study area improvement alternatives (e.g. road widening, provision of Langstaff Road connection across the CN MacMillan Yard)
- Highway 400/Langstaff Road Interchange configuration improvement alternatives

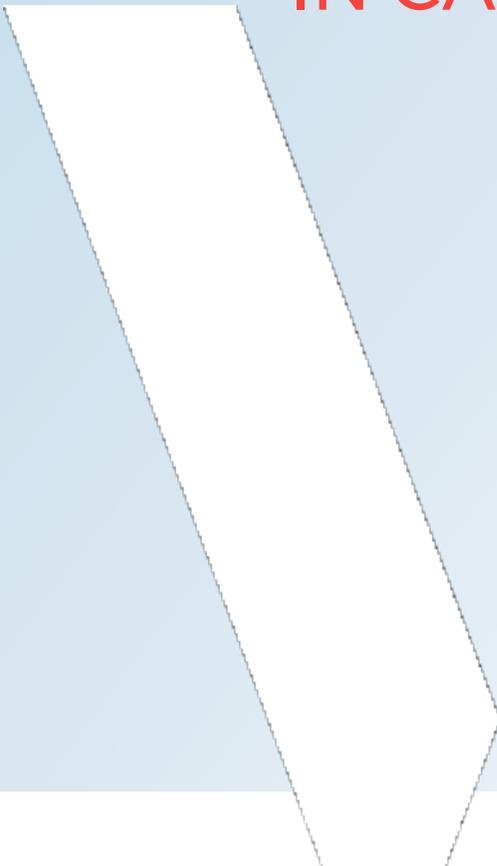
Demand calibration results from existing (2016) conditions will be carried forward for the assessment of future (2041) planning horizon using correction matrices developed from adjustments between the observed traffic demand and original travel demand. Travel demand forecasts extracted from the 2041 YRTDF model for the future (2041) conditions will be adjusted with the correction matrices to account for the model calibration for the existing conditions.

Traffic operations on Highway 400 will be analyzed comparing traffic operations (e.g. travel time, volume and speed, and assessing potential weaving and merging issues) with Highway 400 and Langstaff Road Interchange improvement alternatives. Highway 400 and Langstaff Road Interchange improvement alternatives will be evaluated with various criteria to identify a preferred interchange configuration from alternatives to be considered. In addition, the intersection lane configurations and traffic control requirements for Langstaff Road intersections will be identified based on the detailed traffic operational analysis.

# APPENDIX

# A

EXISTING VOLUMES USED  
IN CALIBRATION



## Existing AM 7-9 Hwy Inventory.csv

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Hwy 400 @ Major Mackenzie Ramp 24		7:00	774	58	832
Hwy 400 @ Major Mackenzie Ramp 34		7:00	232	17	249
Hwy 400 @ Major Mackenzie Ramp 52		7:00	177	13	190
Hwy 400 @ Major Mackenzie Ramp 53		7:00	1019	77	1096
Hwy 400 @ Major Mackenzie Ramp 62		7:00	63	5	68
Hwy 400 @ Major Mackenzie Ramp 63		7:00	1397	105	1502
Hwy 400 @ Rutherford Ramp 24		7:00	859	67	926
Hwy 400 @ Rutherford Ramp 34		7:00	664	35	699
Hwy 400 @ Rutherford Ramp 52		7:00	211	21	232
Hwy 400 @ Rutherford Ramp 53		7:00	1176	28	1204
Hwy 400 @ Rutherford Ramp 62		7:00	200	42	242
Hwy 400 @ Rutherford Ramp 63		7:00	1004	36	1040
Hwy 400 @ Bass Pro Mills Ramp 24		7:00	878	24	902
Hwy 400 @ Bass Pro Mills Ramp 63		7:00	145	21	166
Hwy 400 @ Langstaff Ramp 24		7:00	978	47	1025
Hwy 400 @ Langstaff Ramp 53		7:00	526	16	542
Hwy 400 @ Langstaff Ramp 63		7:00	182	81	263
Hwy 400 @ Hwy 7 Ramp 24		7:00	1422	68	1490
Hwy 400 @ Hwy 7 Ramp 34		7:00	1587	47	1634
Hwy 400 @ Hwy 7 Ramp 52		7:00	417	28	445
Hwy 400 @ Hwy 7 Ramp 53		7:00	552	22	574
Hwy 400 @ Hwy 7 Ramp 62		7:00	210	29	239
Hwy 400 @ Hwy 7 Ramp 63		7:00	406	95	501
Hwy 400 @ Hwy 7 Ramp 92		7:00	1162	88	1250
400 NB/SB to 407 WB Ramp		7:00	1622	84	1706
407 EB to 400 NB/SB Ramp		7:00	1480	124	1604
407 WB to 400 NB/SB Ramp		7:00	1144	72	1216
400 NB/SB to 407 EB Ramp		7:00	1098	61	1159
Hwy 400 @ Steeles Ramp 24		7:00	737	56	793
Hwy 400 @ Steeles Ramp 43		7:00	229	17	246
Hwy 400 @ Major Mackenzie Ramp 24		8:00	690	52	742
Hwy 400 @ Major Mackenzie Ramp 34		8:00	165	12	177
Hwy 400 @ Major Mackenzie Ramp 52		8:00	158	12	170
Hwy 400 @ Major Mackenzie Ramp 53		8:00	1075	81	1156
Hwy 400 @ Major Mackenzie Ramp 62		8:00	74	6	80
Hwy 400 @ Major Mackenzie Ramp 63		8:00	1296	98	1394
Hwy 400 @ Rutherford Ramp 24		8:00	895	63	958
Hwy 400 @ Rutherford Ramp 34		8:00	772	62	834
Hwy 400 @ Rutherford Ramp 52		8:00	202	13	215
Hwy 400 @ Rutherford Ramp 53		8:00	1057	25	1082
Hwy 400 @ Rutherford Ramp 62		8:00	172	29	201
Hwy 400 @ Rutherford Ramp 63		8:00	910	49	959
Hwy 400 @ Bass Pro Mills Ramp 24		8:00	707	28	735
Hwy 400 @ Bass Pro Mills Ramp 63		8:00	204	17	221
Hwy 400 @ Langstaff Ramp 24		8:00	818	59	877
Hwy 400 @ Langstaff Ramp 53		8:00	396	9	405

## Existing AM 7-9 Hwy Inventory.csv

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Hwy 400 @ Langstaff Ramp 63		8:00	155	79	234
Hwy 400 @ Hwy 7 Ramp 24		8:00	1470	104	1574
Hwy 400 @ Hwy 7 Ramp 34		8:00	1827	72	1899
Hwy 400 @ Hwy 7 Ramp 52		8:00	362	37	399
Hwy 400 @ Hwy 7 Ramp 53		8:00	512	26	538
Hwy 400 @ Hwy 7 Ramp 62		8:00	204	20	224
Hwy 400 @ Hwy 7 Ramp 63		8:00	331	89	420
Hwy 400 @ Hwy 7 Ramp 92		8:00	1243	96	1339
400 NB/SB to 407 WB Ramp		8:00	1936	87	2023
407 EB to 400 NB/SB Ramp		8:00	1517	124	1641
407 WB to 400 NB/SB Ramp		8:00	1370	66	1436
400 NB/SB to 407 EB Ramp		8:00	1563	61	1624
Hwy 400 @ Steeles Ramp 24		8:00	819	62	881
Hwy 400 @ Steeles Ramp 43		8:00	224	17	241
Hwy 400 North of Major Mackenzie	SB	7:00	6178	465	6643
Hwy 400 North of Finch Ave	NB	7:00	6518	491	7009
Hwy 400 North of Major Mackenzie	SB	8:00	5183	390	5573
Hwy 400 North of Finch Ave	NB	8:00	6437	484	6921

## Existing PM 3-6 Hwy Inventory.csv

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Hwy 400 @ Major Mackenzie Ramp 24		15:00	1388	73	1461
Hwy 400 @ Major Mackenzie Ramp 34		15:00	252	13	265
Hwy 400 @ Major Mackenzie Ramp 52		15:00	195	10	205
Hwy 400 @ Major Mackenzie Ramp 53		15:00	361	19	380
Hwy 400 @ Major Mackenzie Ramp 62		15:00	203	11	214
Hwy 400 @ Major Mackenzie Ramp 63		15:00	568	30	598
Hwy 400 @ Rutherford Ramp 24		15:00	1339	42	1381
Hwy 400 @ Rutherford Ramp 34		15:00	422	76	498
Hwy 400 @ Rutherford Ramp 52		15:00	558	28	586
Hwy 400 @ Rutherford Ramp 53		15:00	470	11	481
Hwy 400 @ Rutherford Ramp 62		15:00	519	13	532
Hwy 400 @ Rutherford Ramp 63		15:00	614	53	667
Hwy 400 @ Bass Pro Mills Ramp 24		15:00	505	27	532
Hwy 400 @ Bass Pro Mills Ramp 63		15:00	1024	15	1039
Hwy 400 @ Langstaff Ramp 24		15:00	1222	103	1325
Hwy 400 @ Langstaff Ramp 33		15:00	1014	77	1091
Hwy 400 @ Langstaff Ramp 53		15:00	335	12	347
Hwy 400 @ Langstaff Ramp 63		15:00	493	47	540
Hwy 400 @ Hwy 7 Ramp 24		15:00	1119	99	1218
Hwy 400 @ Hwy 7 Ramp 34		15:00	936	77	1013
Hwy 400 @ Hwy 7 Ramp 52		15:00	887	24	911
Hwy 400 @ Hwy 7 Ramp 53		15:00	625	21	646
Hwy 400 @ Hwy 7 Ramp 62		15:00	480	24	504
Hwy 400 @ Hwy 7 Ramp 63		15:00	608	70	678
Hwy 400 @ Hwy 7 Ramp 92		15:00	2150	127	2277
400 NB/SB to 407 WB Ramp		15:00	1608	128	1736
407 EB to 400 NB/SB Ramp		15:00	1815	98	1913
407 WB to 400 NB/SB Ramp		15:00	1150	65	1215
400 NB/SB to 407 EB Ramp		15:00	1217	74	1291
Hwy 400 @ Steeles Ramp 24		15:00	485	26	511
Hwy 400 @ Steeles Ramp 43		15:00	707	37	744
Hwy 400 @ Major Mackenzie Ramp 24		16:00	1454	77	1531
Hwy 400 @ Major Mackenzie Ramp 34		16:00	279	15	294
Hwy 400 @ Major Mackenzie Ramp 52		16:00	197	10	207
Hwy 400 @ Major Mackenzie Ramp 53		16:00	413	22	435
Hwy 400 @ Major Mackenzie Ramp 62		16:00	230	12	242
Hwy 400 @ Major Mackenzie Ramp 63		16:00	548	29	577
Hwy 400 @ Rutherford Ramp 24		16:00	1373	18	1441
Hwy 400 @ Rutherford Ramp 34		16:00	512	57	569
Hwy 400 @ Rutherford Ramp 52		16:00	646	18	664
Hwy 400 @ Rutherford Ramp 53		16:00	399	16	415
Hwy 400 @ Rutherford Ramp 62		16:00	616	11	627
Hwy 400 @ Rutherford Ramp 63		16:00	573	27	600
Hwy 400 @ Bass Pro Mills Ramp 24		16:00	481	18	499
Hwy 400 @ Bass Pro Mills Ramp 63		16:00	1122	16	1138
Hwy 400 @ Langstaff Ramp 24		16:00	1104	70	1174

## Existing PM 3-6 Hwy Inventory.csv

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Hwy 400 @ Langstaff Ramp 33		16:00	990	61	1051
Hwy 400 @ Langstaff Ramp 53		16:00	448	7	455
Hwy 400 @ Langstaff Ramp 63		16:00	558	45	603
Hwy 400 @ Hwy 7 Ramp 24		16:00	1095	88	1183
Hwy 400 @ Hwy 7 Ramp 34		16:00	1087	61	1148
Hwy 400 @ Hwy 7 Ramp 52		16:00	896	19	915
Hwy 400 @ Hwy 7 Ramp 53		16:00	664	17	681
Hwy 400 @ Hwy 7 Ramp 62		16:00	405	5	410
Hwy 400 @ Hwy 7 Ramp 63		16:00	731	55	786
Hwy 400 @ Hwy 7 Ramp 92		16:00	2451	129	2580
400 NB/SB to 407 WB Ramp		16:00	1810	134	1944
407 EB to 400 NB/SB Ramp		16:00	2098	75	2173
407 WB to 400 NB/SB Ramp		16:00	1387	57	1444
400 NB/SB to 407 EB Ramp		16:00	1565	63	1628
Hwy 400 @ Steeles Ramp 24		16:00	366	19	385
Hwy 400 @ Steeles Ramp 43		16:00	743	39	782
Hwy 400 @ Major Mackenzie Ramp 24		17:00	1568	83	1651
Hwy 400 @ Major Mackenzie Ramp 34		17:00	276	15	291
Hwy 400 @ Major Mackenzie Ramp 52		17:00	186	10	196
Hwy 400 @ Major Mackenzie Ramp 53		17:00	417	22	439
Hwy 400 @ Major Mackenzie Ramp 62		17:00	201	11	212
Hwy 400 @ Major Mackenzie Ramp 63		17:00	541	29	570
Hwy 400 @ Rutherford Ramp 24		17:00	1419	22	1441
Hwy 400 @ Rutherford Ramp 34		17:00	551	21	572
Hwy 400 @ Rutherford Ramp 52		17:00	753	6	759
Hwy 400 @ Rutherford Ramp 53		17:00	414	11	425
Hwy 400 @ Rutherford Ramp 62		17:00	606	4	610
Hwy 400 @ Rutherford Ramp 63		17:00	410	34	444
Hwy 400 @ Bass Pro Mills Ramp 24		17:00	420	9	429
Hwy 400 @ Bass Pro Mills Ramp 63		17:00	583	1	584
Hwy 400 @ Langstaff Ramp 24		17:00	1048	49	1097
Hwy 400 @ Langstaff Ramp 33		17:00	1077	57	1134
Hwy 400 @ Langstaff Ramp 53		17:00	417	4	421
Hwy 400 @ Langstaff Ramp 63		17:00	459	34	493
Hwy 400 @ Hwy 7 Ramp 24		17:00	1112	66	1178
Hwy 400 @ Hwy 7 Ramp 34		17:00	1157	54	1211
Hwy 400 @ Hwy 7 Ramp 52		17:00	826	20	846
Hwy 400 @ Hwy 7 Ramp 53		17:00	632	12	644
Hwy 400 @ Hwy 7 Ramp 62		17:00	399	5	404
Hwy 400 @ Hwy 7 Ramp 63		17:00	703	49	752
Hwy 400 @ Hwy 7 Ramp 92		17:00	2314	122	2436
400 NB/SB to 407 WB Ramp		17:00	1756	100	1856
407 EB to 400 NB/SB Ramp		17:00	1956	57	2013
407 WB to 400 NB/SB Ramp		17:00	1396	34	1430
400 NB/SB to 407 EB Ramp		17:00	1738	52	1790
Hwy 400 @ Steeles Ramp 24		17:00	338	18	356

## Existing PM 3-6 Hwy Inventory.csv

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Hwy 400 @ Steeles Ramp 43		17:00	763	40	803
Hwy 400 North of Major Mackenzie	SB	15:00	2887	152	3039
Hwy 400 North of Major Mackenzie	SB	16:00	3065	161	3226
Hwy 400 North of Major Mackenzie	SB	17:00	3250	171	3421
Hwy 400 North of Finch Ave	NB	15:00	9465	498	9963
Hwy 400 North of Finch Ave	NB	16:00	9452	498	9950
Hwy 400 North of Finch Ave	NB	17:00	8958	472	9430
Hwy 400 North of Major Mackenzie	NB	15:00	5422	285	5707
Hwy 400 North of Rutherford	NB	15:00	6456	340	6796
Hwy 400 North of Langstaff	NB	15:00	8151	429	8580
Hwy 400 North of Hwy 7 Express	NB	15:00	6513	343	6856
Hwy 400 North of Hwy 7 Collector	NB	15:00	2526	133	2659
Hwy 400 North of Hwy 407	NB	15:00	4572	241	4813
Hwy 400 North of Steeles Ave	NB	15:00	6946	366	7312
Hwy 400 North of Finch Ave	NB	15:00	8515	448	8963
Hwy 400 North of Major Mackenzie	NB	16:00	5396	284	5680
Hwy 400 North of Rutherford	NB	16:00	6225	328	6553
Hwy 400 North of Langstaff	NB	16:00	7666	404	8070
Hwy 400 North of Hwy 7 Express	NB	16:00	5939	313	6252
Hwy 400 North of Hwy 7 Collector	NB	16:00	2802	147	2949
Hwy 400 North of Hwy 407	NB	16:00	3732	196	3928
Hwy 400 North of Steeles Ave	NB	16:00	6489	342	6831
Hwy 400 North of Finch Ave	NB	16:00	8502	448	8950
Hwy 400 North of Major Mackenzie	NB	17:00	5489	289	5778
Hwy 400 North of Rutherford	NB	17:00	6498	342	6840
Hwy 400 North of Langstaff	NB	17:00	7609	400	8009
Hwy 400 North of Hwy 7 Express	NB	17:00	5850	308	6158
Hwy 400 North of Hwy 7 Collector	NB	17:00	2627	138	2765
Hwy 400 North of Hwy 407	NB	17:00	3413	180	3593
Hwy 400 North of Steeles Ave	NB	17:00	5943	313	6256
Hwy 400 North of Finch Ave	NB	17:00	8008	422	8430

Location	Dir	Start Time	Car Count	Truck Count	Total Count
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	EB	7:00	1400	113	1513
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	WB	7:00	377	15	392
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	EB	7:00	1634	119	1753
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	WB	7:00	445	44	489
Langstaff Road btwn Exit 30 & Edgeley Boulevard	EB	7:00	1079	87	1166
Langstaff Road btwn Exit 30 & Edgeley Boulevard	WB	7:00	783	43	826
Langstaff Road btwn Millway Avenue & Jane Street	EB	7:00	1053	81	1134
Langstaff Road btwn Millway Avenue & Jane Street	WB	7:00	806	52	858
Langstaff Road btwn Keele Street & Planchet Road	EB	7:00	757	35	792
Langstaff Road btwn Keele Street & Planchet Road	WB	7:00	427	44	471
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	EB	7:00	467	29	496
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	WB	7:00	1016	48	1064
Langstaff Road btwn Dufferin Street & Timberview Drive	EB	7:00	332	21	353
Langstaff Road btwn Dufferin Street & Timberview Drive	WB	7:00	640	30	670
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	NB	7:00	639	25	664
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	SB	7:00	974	20	994
Islington Avenue btwn Humberwood Gate & Rutherford Road	NB	7:00	521	12	533
Islington Avenue btwn Humberwood Gate & Rutherford Road	SB	7:00	1344	9	1353
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	NB	7:00	627	54	681
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	SB	7:00	1255	51	1306
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	NB	7:00	502	52	554
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	SB	7:00	956	93	1049
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	NB	7:00	411	23	434
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	SB	7:00	1362	19	1381
Jane Street btwn Highway 7 & Portage Parkway	NB	7:00	1228	67	1295
Jane Street btwn Highway 7 & Portage Parkway	SB	7:00	1066	15	1081
Keele Street btwn Alberta Drive & Sherwood Park Drive	NB	7:00	555	34	589
Keele Street btwn Alberta Drive & Sherwood Park Drive	SB	7:00	1376	71	1447
Keele Street btwn Highway 7 & Administration Road	NB	7:00	841	81	922
Keele Street btwn Highway 7 & Administration Road	SB	7:00	411	55	466
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	NB	7:00	816	52	868
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	SB	7:00	1655	83	1738
Dufferin Street btwn Exit 73 & Langstaff Road	NB	7:00	1021	49	1070
Dufferin Street btwn Exit 73 & Langstaff Road	SB	7:00	1399	61	1460
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	EB	7:00	1819	118	1937
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	WB	7:00	1433	105	1538
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	EB	7:00	1608	95	1703
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	WB	7:00	1273	80	1353
Highway 7 btwn Weston Road & Famous Ave.	EB	7:00	1896	185	2081
Highway 7 btwn Weston Road & Famous Ave.	WB	7:00	2081	174	2255
Highway 7 btwn Exit 29 & Commerce Street	EB	7:00	3062	355	3417
Highway 7 btwn Exit 29 & Commerce Street	WB	7:00	2182	197	2379
Highway 7 btwn Jane Street & Maplecrete Road	EB	7:00	2000	121	2121
Highway 7 btwn Jane Street & Maplecrete Road	WB	7:00	1474	169	1643
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	EB	7:00	1734	85	1819
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	WB	7:00	2092	124	2216
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	EB	7:00	1408	85	1493
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	WB	7:00	1943	107	2050
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	EB	7:00	1413	78	1491
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	WB	7:00	570	37	607
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	EB	7:00	1986	61	2047
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	WB	7:00	992	68	1060
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	EB	7:00	2450	118	2568
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	WB	7:00	1623	52	1675
Rutherford Road btwn Julliard Drive & Jane Street	EB	7:00	2325	128	2453
Rutherford Road btwn Julliard Drive & Jane Street	WB	7:00	1689	52	1741
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	EB	7:00	1635	142	1777
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	WB	7:00	1239	106	1345
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	EB	7:00	1699	148	1847
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	WB	7:00	1511	130	1641
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	EB	8:00	1716	98	1814
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	WB	8:00	674	28	702
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	EB	8:00	1649	85	1734
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	WB	8:00	503	62	565
Langstaff Road btwn Exit 30 & Edgeley Boulevard	EB	8:00	1130	110	1240
Langstaff Road btwn Exit 30 & Edgeley Boulevard	WB	8:00	967	74	1041

Location	Dir	Start Time	Car Count	Truck Count	Total Count
Langstaff Road btwn Millway Avenue & Jane Street	EB	8:00	1113	80	1193
Langstaff Road btwn Millway Avenue & Jane Street	WB	8:00	1002	54	1056
Langstaff Road btwn Keele Street & Planchet Road	EB	8:00	846	45	891
Langstaff Road btwn Keele Street & Planchet Road	WB	8:00	513	65	578
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	EB	8:00	658	51	709
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	WB	8:00	1052	76	1128
Langstaff Road btwn Dufferin Street & Timberview Drive	EB	8:00	511	40	551
Langstaff Road btwn Dufferin Street & Timberview Drive	WB	8:00	778	56	834
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	NB	8:00	836	25	861
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	SB	8:00	1125	7	1132
Islington Avenue btwn Humberwood Gate & Rutherford Road	NB	8:00	777	12	789
Islington Avenue btwn Humberwood Gate & Rutherford Road	SB	8:00	1601	24	1625
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	NB	8:00	845	62	907
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	SB	8:00	1516	53	1569
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	NB	8:00	617	93	710
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	SB	8:00	1370	157	1527
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	NB	8:00	500	23	523
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	SB	8:00	1750	62	1812
Jane Street btwn Highway 7 & Portage Parkway	NB	8:00	1358	62	1420
Jane Street btwn Highway 7 & Portage Parkway	SB	8:00	1195	42	1237
Keele Street btwn Alberta Drive & Sherwood Park Drive	NB	8:00	647	48	695
Keele Street btwn Alberta Drive & Sherwood Park Drive	SB	8:00	1641	92	1733
Keele Street btwn Highway 7 & Administration Road	NB	8:00	1363	138	1501
Keele Street btwn Highway 7 & Administration Road	SB	8:00	1163	102	1265
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	NB	8:00	1148	76	1224
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	SB	8:00	2076	128	2204
Dufferin Street btwn Exit 73 & Langstaff Road	NB	8:00	1252	78	1330
Dufferin Street btwn Exit 73 & Langstaff Road	SB	8:00	2266	97	2363
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	EB	8:00	1951	125	2076
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	WB	8:00	1602	130	1732
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	EB	8:00	1901	106	2007
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	WB	8:00	1543	102	1645
Highway 7 btwn Weston Road & Famous Ave.	EB	8:00	2104	284	2388
Highway 7 btwn Weston Road & Famous Ave.	WB	8:00	2451	245	2696
Highway 7 btwn Exit 29 & Commerce Street	EB	8:00	3164	411	3575
Highway 7 btwn Exit 29 & Commerce Street	WB	8:00	2356	239	2595
Highway 7 btwn Jane Street & Maplecrete Road	EB	8:00	2164	181	2345
Highway 7 btwn Jane Street & Maplecrete Road	WB	8:00	1863	219	2082
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	EB	8:00	1914	92	2006
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	WB	8:00	2369	146	2515
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	EB	8:00	1418	75	1493
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	WB	8:00	1929	121	2050
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	EB	8:00	1835	130	1965
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	WB	8:00	914	85	999
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	EB	8:00	2262	84	2346
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	WB	8:00	1172	90	1262
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	EB	8:00	2345	90	2435
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	WB	8:00	1815	68	1883
Rutherford Road btwn Julliard Drive & Jane Street	EB	8:00	2258	131	2389
Rutherford Road btwn Julliard Drive & Jane Street	WB	8:00	1901	69	1970
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	EB	8:00	2083	193	2276
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	WB	8:00	1660	160	1820
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	EB	8:00	1794	167	1961
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	WB	8:00	1632	158	1790

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	EB	15:00	798	98	896
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	WB	15:00	1047	93	1140
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	EB	15:00	1053	85	1138
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	WB	15:00	1379	88	1467
Langstaff Road btwn Exit 30 & Edgeley Boulevard	EB	15:00	1007	89	1096
Langstaff Road btwn Exit 30 & Edgeley Boulevard	WB	15:00	971	71	1042
Langstaff Road btwn Millway Avenue & Jane Street	EB	15:00	1015	92	1107
Langstaff Road btwn Millway Avenue & Jane Street	WB	15:00	999	61	1060
Langstaff Road btwn Keele Street & Planchet Road	EB	15:00	645	23	668
Langstaff Road btwn Keele Street & Planchet Road	WB	15:00	734	39	773
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	EB	15:00	994	44	1038
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	WB	15:00	776	61	837
Langstaff Road btwn Dufferin Street & Timberview Drive	EB	15:00	565	25	590
Langstaff Road btwn Dufferin Street & Timberview Drive	WB	15:00	480	38	518
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	NB	15:00	970	28	998
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	SB	15:00	1059	23	1082
Islington Avenue btwn Humberwood Gate & Rutherford Road	NB	15:00	1081	20	1101
Islington Avenue btwn Humberwood Gate & Rutherford Road	SB	15:00	887	12	899
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	NB	15:00	1519	50	1569
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	SB	15:00	1146	44	1190
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	NB	15:00	1269	116	1385
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	SB	15:00	1147	109	1256
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	NB	15:00	1445	71	1516
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	SB	15:00	1061	29	1090
Jane Street btwn Highway 7 & Portage Parkway	NB	15:00	1316	65	1381
Jane Street btwn Highway 7 & Portage Parkway	SB	15:00	1254	35	1289
Keele Street btwn Alberta Drive & Sherwood Park Drive	NB	15:00	1249	60	1309
Keele Street btwn Alberta Drive & Sherwood Park Drive	SB	15:00	997	50	1047
Keele Street btwn Highway 7 & Administration Road	NB	15:00	1428	162	1590
Keele Street btwn Highway 7 & Administration Road	SB	15:00	1408	114	1522
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	NB	15:00	1482	76	1558
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	SB	15:00	1288	76	1364
Dufferin Street btwn Exit 73 & Langstaff Road	NB	15:00	1691	61	1752
Dufferin Street btwn Exit 73 & Langstaff Road	SB	15:00	1428	85	1513
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	EB	15:00	1863	134	1997
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	WB	15:00	1902	148	2050
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	EB	15:00	1977	93	2070
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	WB	15:00	2047	87	2134
Highway 7 btwn Weston Road & Famous Ave.	EB	15:00	2760	266	3026
Highway 7 btwn Weston Road & Famous Ave.	WB	15:00	2816	268	3084
Highway 7 btwn Exit 29 & Commerce Street	EB	15:00	2562	304	2866
Highway 7 btwn Exit 29 & Commerce Street	WB	15:00	3110	315	3425
Highway 7 btwn Jane Street & Maplecrete Road	EB	15:00	2170	131	2301
Highway 7 btwn Jane Street & Maplecrete Road	WB	15:00	2079	211	2290
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	EB	15:00	2138	124	2262
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	WB	15:00	1888	127	2015
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	EB	15:00	1525	106	1631
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	WB	15:00	1385	111	1496
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	EB	15:00	1404	79	1483
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	WB	15:00	1596	77	1673
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	EB	15:00	1602	84	1686
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	WB	15:00	2087	96	2183
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	EB	15:00	2504	123	2627
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	WB	15:00	1940	79	2019
Rutherford Road btwn Julliard Drive & Jane Street	EB	15:00	2333	97	2430
Rutherford Road btwn Julliard Drive & Jane Street	WB	15:00	1903	83	1986
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	EB	15:00	1703	71	1774
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	WB	15:00	1854	81	1935
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	EB	15:00	1702	158	1860
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	WB	15:00	1742	168	1910
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	EB	16:00	850	83	933
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	WB	16:00	1541	107	1648
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	EB	16:00	1008	99	1107
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	WB	16:00	1459	96	1555
Langstaff Road btwn Exit 30 & Edgeley Boulevard	EB	16:00	1125	83	1208
Langstaff Road btwn Exit 30 & Edgeley Boulevard	WB	16:00	1074	69	1143

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Langstaff Road btwn Millway Avenue & Jane Street	EB	16:00	1155	87	1242
Langstaff Road btwn Millway Avenue & Jane Street	WB	16:00	1085	72	1157
Langstaff Road btwn Keele Street & Planchet Road	EB	16:00	689	32	721
Langstaff Road btwn Keele Street & Planchet Road	WB	16:00	755	52	807
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	EB	16:00	1236	61	1297
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	WB	16:00	661	54	715
Langstaff Road btwn Dufferin Street & Timberview Drive	EB	16:00	707	35	742
Langstaff Road btwn Dufferin Street & Timberview Drive	WB	16:00	524	42	566
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	NB	16:00	1137	23	1160
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	SB	16:00	1168	15	1183
Islington Avenue btwn Humberwood Gate & Rutherford Road	NB	16:00	1455	15	1470
Islington Avenue btwn Humberwood Gate & Rutherford Road	SB	16:00	935	14	949
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	NB	16:00	1703	88	1791
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	SB	16:00	1103	57	1160
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	NB	16:00	1442	110	1552
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	SB	16:00	1175	72	1247
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	NB	16:00	1833	97	1930
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverrock Gate	SB	16:00	979	23	1002
Jane Street btwn Highway 7 & Portage Parkway	NB	16:00	1333	70	1403
Jane Street btwn Highway 7 & Portage Parkway	SB	16:00	1416	33	1449
Keele Street btwn Alberta Drive & Sherwood Park Drive	NB	16:00	1625	61	1686
Keele Street btwn Alberta Drive & Sherwood Park Drive	SB	16:00	858	60	918
Keele Street btwn Highway 7 & Administration Road	NB	16:00	1380	183	1563
Keele Street btwn Highway 7 & Administration Road	SB	16:00	1524	101	1625
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	NB	16:00	1794	92	1886
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	SB	16:00	1368	70	1438
Dufferin Street btwn Exit 73 & Langstaff Road	NB	16:00	2044	92	2136
Dufferin Street btwn Exit 73 & Langstaff Road	SB	16:00	1804	95	1899
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	EB	16:00	2033	116	2149
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	WB	16:00	2047	164	2211
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	EB	16:00	1989	76	2065
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	WB	16:00	2237	103	2340
Highway 7 btwn Weston Road & Famous Ave.	EB	16:00	2768	321	3089
Highway 7 btwn Weston Road & Famous Ave.	WB	16:00	2797	314	3111
Highway 7 btwn Exit 29 & Commerce Street	EB	16:00	2699	330	3029
Highway 7 btwn Exit 29 & Commerce Street	WB	16:00	3373	383	3756
Highway 7 btwn Jane Street & Maplecrete Road	EB	16:00	2326	148	2474
Highway 7 btwn Jane Street & Maplecrete Road	WB	16:00	2149	244	2393
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	EB	16:00	2585	183	2768
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	WB	16:00	1986	124	2110
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	EB	16:00	1898	132	2030
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	WB	16:00	1438	113	1551
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	EB	16:00	1457	93	1550
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	WB	16:00	1836	103	1939
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	EB	16:00	1676	70	1746
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	WB	16:00	2326	130	2456
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	EB	16:00	2517	110	2627
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	WB	16:00	1946	73	2019
Rutherford Road btwn Julliard Drive & Jane Street	EB	16:00	2309	111	2420
Rutherford Road btwn Julliard Drive & Jane Street	WB	16:00	2079	84	2163
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	EB	16:00	1798	142	1940
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	WB	16:00	1995	169	2164
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	EB	16:00	1754	138	1892
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	WB	16:00	1862	158	2020
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	EB	17:00	843	64	907
Langstaff Road btwn Stan Gate/Valeria Boulevard & Weston Road	WB	17:00	1827	137	1964
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	EB	17:00	934	78	1012
Langstaff Road btwn Weston Road & Silmar Drive/Terecar Drive	WB	17:00	1398	107	1505
Langstaff Road btwn Exit 30 & Edgeley Boulevard	EB	17:00	1198	78	1276
Langstaff Road btwn Exit 30 & Edgeley Boulevard	WB	17:00	1005	72	1077
Langstaff Road btwn Millway Avenue & Jane Street	EB	17:00	1213	88	1301
Langstaff Road btwn Millway Avenue & Jane Street	WB	17:00	1000	79	1079
Langstaff Road btwn Keele Street & Planchet Road	EB	17:00	559	33	592
Langstaff Road btwn Keele Street & Planchet Road	WB	17:00	778	38	816
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	EB	17:00	1303	76	1379
Langstaff Road btwn Staffern Drive/North Rivermede Road & Dufferin Street	WB	17:00	577	30	607

## Existing AM 7-9 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Langstaff SBR	7:00	142	6	148
Dufferin at Langstaff SBT	7:00	1848	47	1895
Dufferin at Langstaff SBL	7:00	237	9	246
Dufferin at Langstaff EBR	7:00	312	40	352
Dufferin at Langstaff EBT	7:00	194	12	206
Dufferin at Langstaff EBL	7:00	57	6	63
Dufferin at Langstaff NBL	7:00	225	13	238
Dufferin at Langstaff NBR	7:00	138	2	140
Dufferin at Langstaff NBT	7:00	716	32	748
Dufferin at Langstaff WBT	7:00	537	9	546
Dufferin at Langstaff WBL	7:00	242	8	250
Dufferin at Langstaff WBR	7:00	107	2	109
Weston at Langstaff SBR	7:00	137	1	138
Weston at Langstaff SBL	7:00	348	6	354
Weston at Langstaff SBT	7:00	632	9	641
Weston at Langstaff EBL	7:00	147	2	149
Weston at Langstaff EBT	7:00	932	13	945
Weston at Langstaff EBR	7:00	75	0	75
Weston at Langstaff WBT	7:00	172	14	186
Weston at Langstaff WBR	7:00	65	2	67
Weston at Langstaff WBL	7:00	64	7	71
Weston at Langstaff NBL	7:00	14	0	14
Weston at Langstaff NBT	7:00	189	9	198
Weston at Langstaff NBR	7:00	127	10	137
Langstaff at Stan Gate SBR	7:00	116	0	116
Langstaff at Stan Gate SBL	7:00	27	1	28
Langstaff at Stan Gate SBT	7:00	12	0	12
Langstaff at Stan Gate WBT	7:00	293	17	310
Langstaff at Stan Gate WBR	7:00	3	0	3
Langstaff at Stan Gate WBL	7:00	25	0	25
Langstaff at Stan Gate NBL	7:00	8	0	8
Langstaff at Stan Gate NBT	7:00	7	0	7
Langstaff at Stan Gate NBR	7:00	82	0	82
Langstaff at Stan Gate EBL	7:00	41	0	41
Langstaff at Stan Gate EBT	7:00	1036	16	1052
Langstaff at Stan Gate EBR	7:00	15	0	15
Weston at Crestmount SBR	7:00	12	0	12
Weston at Crestmount EBR	7:00	48	1	49
Weston at Crestmount SBL	7:00	154	2	156
Weston at Crestmount EBL	7:00	28	0	28
Weston at Crestmount SBT	7:00	1046	14	1060
Weston at Crestmount EBT	7:00	11	0	11
Weston at Crestmount WBT	7:00	0	0	0
Weston at Crestmount WBR	7:00	22	4	26
Weston at Crestmount WBL	7:00	16	1	17
Weston at Crestmount NBL	7:00	7	0	7
Weston at Crestmount NBT	7:00	333	9	342
Weston at Crestmount NBR	7:00	42	4	46
Langstaff at Silmar SBR	7:00	13	2	15

Location	Dir	Start Hour	Car Count	Truck Count	Total Count
Langstaff Road btwn Dufferin Street & Timberview Drive	EB	17:00	908	53	961
Langstaff Road btwn Dufferin Street & Timberview Drive	WB	17:00	598	31	629
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	NB	17:00	1180	29	1209
Islington Avenue btwn Woodbridge Avenue & Thistlewood Avenue	SB	17:00	1103	18	1121
Islington Avenue btwn Humberwood Gate & Rutherford Road	NB	17:00	1668	22	1690
Islington Avenue btwn Humberwood Gate & Rutherford Road	SB	17:00	976	16	992
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	NB	17:00	1718	89	1807
Weston Road btwn Langstaff Road & Greenpark Boulevard/Crestmount Boulevard	SB	17:00	1113	51	1164
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	NB	17:00	1540	85	1625
Weston Road btwn Northview Boulevard & Fieldstone Drive/Chrislea Road	SB	17:00	1036	72	1108
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverock Gate	NB	17:00	1954	77	2031
Jane Street btwn Locke Street/Bass Pro Mills Drive & Riverock Gate	SB	17:00	860	23	883
Jane Street btwn Highway 7 & Portage Parkway	NB	17:00	1291	51	1342
Jane Street btwn Highway 7 & Portage Parkway	SB	17:00	1393	37	1430
Keele Street btwn Alberta Drive & Sherwood Park Drive	NB	17:00	1749	82	1831
Keele Street btwn Alberta Drive & Sherwood Park Drive	SB	17:00	732	59	791
Keele Street btwn Highway 7 & Administration Road	NB	17:00	1402	158	1560
Keele Street btwn Highway 7 & Administration Road	SB	17:00	1557	123	1680
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	NB	17:00	2004	112	2116
Dufferin Street btwn Fernstaff Court & Confederation Parkway/Summeridge Drive	SB	17:00	1435	69	1504
Dufferin Street btwn Exit 73 & Langstaff Road	NB	17:00	2198	108	2306
Dufferin Street btwn Exit 73 & Langstaff Road	SB	17:00	1804	95	1899
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	EB	17:00	2047	131	2178
Highway 7 btwn Bruce Street & Wigwoss Drive/Helen Street	WB	17:00	2039	158	2197
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	EB	17:00	2008	75	2083
Highway 7 btwn Pine Valley Drive & Marycroft Avenue/Aberdeen Avenue	WB	17:00	2319	104	2423
Highway 7 btwn Weston Road & Famous Ave.	EB	17:00	2767	381	3148
Highway 7 btwn Weston Road & Famous Ave.	WB	17:00	2759	352	3111
Highway 7 btwn Exit 29 & Commerce Street	EB	17:00	2730	334	3064
Highway 7 btwn Exit 29 & Commerce Street	WB	17:00	3192	359	3551
Highway 7 btwn Jane Street & Maplecrete Road	EB	17:00	2441	161	2602
Highway 7 btwn Jane Street & Maplecrete Road	WB	17:00	2102	252	2354
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	EB	17:00	2719	171	2890
Highway 7 btwn Hillside Avenue & Bowes Road/Baldwin Avenue	WB	17:00	1934	141	2075
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	EB	17:00	2042	117	2159
Highway 7 btwn North Rivermede Road/Centre Street & Rivermede Road	WB	17:00	1428	109	1537
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	EB	17:00	1517	71	1588
Rutherford Road btwn Fossil Hill Road & Rutherford Road @ Rutherford Road Plaza	WB	17:00	1931	99	2030
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	EB	17:00	1732	59	1791
Rutherford Road btwn Weston Road & Vellore Woods Boulevard	WB	17:00	2391	123	2514
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	EB	17:00	2461	74	2535
Rutherford Road btwn Exit 33 & Sweetriver Boulevard	WB	17:00	1987	85	2072
Rutherford Road btwn Julliard Drive & Jane Street	EB	17:00	2234	95	2329
Rutherford Road btwn Julliard Drive & Jane Street	WB	17:00	2017	82	2099
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	EB	17:00	1822	135	1957
Rutherford Road btwn Sherwood Park Drive & Wedgewood Place	WB	17:00	2028	155	2183
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	EB	17:00	1762	131	1893
Rutherford Road btwn Jacob Keffer Parkway & Barrhill Road/Westburne Drive	WB	17:00	1839	141	1980

## Existing AM 7-9 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Silmar SBT	7:00	66	3	69
Langstaff at Silmar SBL	7:00	183	8	191
Langstaff at Silmar EBR	7:00	122	5	127
Langstaff at Silmar EBT	7:00	1432	44	1476
Langstaff at Silmar EBL	7:00	26	2	28
Langstaff at Silmar NBL	7:00	46	2	48
Langstaff at Silmar NBR	7:00	158	11	169
Langstaff at Silmar NBT	7:00	30	2	32
Langstaff at Silmar WBT	7:00	386	49	435
Langstaff at Silmar WBL	7:00	205	14	219
Langstaff at Silmar WBR	7:00	177	8	185
Weston at Gregory WBR	7:00	28	2	30
Weston at Gregory WBT	7:00	5	0	5
Weston at Gregory WBL	7:00	23	3	26
Weston at Gregory SBL	7:00	114	5	119
Weston at Gregory SBR	7:00	18	0	18
Weston at Gregory SBT	7:00	713	35	748
Weston at Gregory EBT	7:00	46	0	46
Weston at Gregory EBL	7:00	54	0	54
Weston at Gregory EBR	7:00	45	2	47
Weston at Gregory NBR	7:00	58	2	60
Weston at Gregory NBT	7:00	344	23	367
Weston at Gregory NBL	7:00	4	1	5
Hwy 400 East Ramp Terminal at Langstaff EBT	7:00	1242	38	1280
Hwy 400 East Ramp Terminal at Langstaff WBT	7:00	671	128	799
Hwy 400 East Ramp Terminal at Langstaff NBL	7:00	306	9	315
Hwy 400 East Ramp Terminal at Langstaff NBR	7:00	579	50	629
Langstaff at Edgeley WBR	7:00	25	6	31
Langstaff at Edgeley WBT	7:00	439	74	513
Langstaff at Edgeley WBL	7:00	51	2	53
Langstaff at Edgeley SBR	7:00	107	27	134
Langstaff at Edgeley SBT	7:00	85	3	88
Langstaff at Edgeley SBL	7:00	15	5	20
Langstaff at Edgeley EBL	7:00	274	16	290
Langstaff at Edgeley EBR	7:00	424	6	430
Langstaff at Edgeley EBT	7:00	1061	61	1122
Langstaff at Edgeley NBT	7:00	38	8	46
Langstaff at Edgeley NBL	7:00	94	8	102
Langstaff at Edgeley NBR	7:00	30	5	35
Langstaff at Millway EBR	7:00	48	2	50
Langstaff at Millway EBT	7:00	536	31	567
Langstaff at Millway EBL	7:00	50	2	52
Langstaff at Millway WBL	7:00	33	0	33
Langstaff at Millway WBT	7:00	370	46	416
Langstaff at Millway WBR	7:00	6	0	6
Langstaff at Millway NBL	7:00	10	2	12
Langstaff at Millway NBR	7:00	5	1	6
Langstaff at Millway NBT	7:00	3	0	3
Langstaff at Millway SBT	7:00	9	0	9

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Millway SBR	7:00	5	0	5
Langstaff at Millway SBL	7:00	1	0	1
Jane at Langstaff WBR	7:00	16	2	18
Jane at Langstaff WBT	7:00	187	59	246
Jane at Langstaff WBL	7:00	39	4	43
Jane at Langstaff SBL	7:00	56	6	62
Jane at Langstaff SBR	7:00	238	15	253
Jane at Langstaff SBT	7:00	859	47	906
Jane at Langstaff EBT	7:00	477	48	525
Jane at Langstaff EBL	7:00	141	12	153
Jane at Langstaff EBR	7:00	181	8	189
Jane at Langstaff NBR	7:00	43	5	48
Jane at Langstaff NBT	7:00	311	43	354
Jane at Langstaff NBL	7:00	102	8	110
Jane at Courtland-Edilcan SBL	7:00	59	2	61
Jane at Courtland-Edilcan SBT	7:00	1066	55	1121
Jane at Courtland-Edilcan SBR	7:00	113	6	119
Jane at Courtland-Edilcan WBR	7:00	48	0	48
Jane at Courtland-Edilcan WBL	7:00	10	2	12
Jane at Courtland-Edilcan WBT	7:00	28	6	34
Jane at Courtland-Edilcan NBT	7:00	373	45	418
Jane at Courtland-Edilcan NBR	7:00	62	2	64
Jane at Courtland-Edilcan NBL	7:00	46	5	51
Jane at Courtland-Edilcan EBL	7:00	16	3	19
Jane at Courtland-Edilcan EBT	7:00	11	3	14
Jane at Courtland-Edilcan EBR	7:00	14	8	22
Jane at Applewood-Pippin SBR	7:00	102	3	105
Jane at Applewood-Pippin SBT	7:00	736	46	782
Jane at Applewood-Pippin SBL	7:00	110	5	115
Jane at Applewood-Pippin EBR	7:00	14	4	18
Jane at Applewood-Pippin EBT	7:00	14	3	17
Jane at Applewood-Pippin EBL	7:00	18	2	20
Jane at Applewood-Pippin NBL	7:00	24	4	28
Jane at Applewood-Pippin NBR	7:00	58	3	61
Jane at Applewood-Pippin NBT	7:00	370	38	408
Jane at Applewood-Pippin WBT	7:00	36	3	39
Jane at Applewood-Pippin WBL	7:00	30	14	44
Jane at Applewood-Pippin WBR	7:00	64	7	71
Langstaff at Creditstone EBL	7:00	204	25	229
Langstaff at Creditstone EBR	7:00	40	1	41
Langstaff at Creditstone EBT	7:00	165	26	191
Langstaff at Creditstone SBR	7:00	169	32	201
Langstaff at Creditstone SBT	7:00	299	33	332
Langstaff at Creditstone SBL	7:00	27	2	29
Langstaff at Creditstone NBL	7:00	73	11	84
Langstaff at Creditstone NBT	7:00	173	28	201
Langstaff at Creditstone NBR	7:00	20	3	23
Langstaff at Creditstone WBT	7:00	11	3	14
Langstaff at Creditstone WBR	7:00	19	0	19

## Existing AM 7-9 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Creditstone WBL	7:00	6	1	7
Keele at Langstaff SBL	7:00	428	23	451
Keele at Langstaff SBT	7:00	1139	67	1206
Keele at Langstaff WBR	7:00	155	12	167
Keele at Langstaff WBL	7:00	261	22	283
Keele at Langstaff NBT	7:00	340	57	397
Keele at Langstaff NBR	7:00	245	26	271
Keele at Bowes EBR	7:00	6	11	17
Keele at Bowes SBL	7:00	223	15	238
Keele at Bowes SBT	7:00	948	89	1037
Keele at Bowes SBR	7:00	17	3	20
Keele at Bowes WBR	7:00	89	11	100
Keele at Bowes WBL	7:00	11	14	25
Keele at Bowes WBT	7:00	2	3	5
Keele at Bowes NBT	7:00	473	66	539
Keele at Bowes NBR	7:00	35	4	39
Keele at Bowes NBL	7:00	10	6	16
Keele at Bowes EBL	7:00	11	3	14
Keele at Bowes EBT	7:00	2	2	4
Langstaff at Planchet SBR	7:00	68	12	80
Langstaff at Planchet SBL	7:00	174	13	187
Langstaff at Planchet WBT	7:00	354	31	385
Langstaff at Planchet WBR	7:00	236	13	249
Langstaff at Planchet EBL	7:00	90	13	103
Langstaff at Planchet EBT	7:00	592	54	646
Langstaff at Connie SBL	7:00	37	13	50
Langstaff at Connie SBT	7:00	12	2	14
Langstaff at Connie SBR	7:00	74	20	94
Langstaff at Connie WBR	7:00	94	5	99
Langstaff at Connie WBL	7:00	36	1	37
Langstaff at Connie WBT	7:00	464	22	486
Langstaff at Connie NBT	7:00	14	0	14
Langstaff at Connie NBR	7:00	37	7	44
Langstaff at Connie NBL	7:00	51	4	55
Langstaff at Connie EBL	7:00	186	15	201
Langstaff at Connie EBT	7:00	439	41	480
Langstaff at Connie EBR	7:00	119	8	127
Langstaff at Rivermede SBR	7:00	19	12	31
Langstaff at Rivermede SBT	7:00	132	6	138
Langstaff at Rivermede SBL	7:00	72	4	76
Langstaff at Rivermede EBL	7:00	29	10	39
Langstaff at Rivermede EBR	7:00	47	5	52
Langstaff at Rivermede EBT	7:00	416	42	458
Langstaff at Rivermede NBT	7:00	54	6	60
Langstaff at Rivermede NBL	7:00	44	7	51
Langstaff at Rivermede NBR	7:00	84	14	98
Langstaff at Rivermede WBR	7:00	143	5	148
Langstaff at Rivermede WBT	7:00	536	15	551
Langstaff at Rivermede WBL	7:00	154	8	162

## Existing AM 7-9 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Confederation EBR	7:00	142	8	150
Dufferin at Confederation EBL	7:00	25	3	28
Dufferin at Confederation EBT	7:00	27	1	28
Dufferin at Confederation SBT	7:00	1662	36	1698
Dufferin at Confederation SBL	7:00	35	0	35
Dufferin at Confederation SBR	7:00	166	6	172
Dufferin at Confederation WBL	7:00	161	4	165
Dufferin at Confederation WBR	7:00	33	1	34
Dufferin at Confederation WBT	7:00	70	0	70
Dufferin at Confederation NBT	7:00	522	21	543
Dufferin at Confederation NBR	7:00	13	0	13
Dufferin at Confederation NBL	7:00	148	7	155
Langstaff at Timberview EBR	7:00	14	1	15
Langstaff at Timberview EBT	7:00	552	27	579
Langstaff at Timberview NBR	7:00	31	1	32
Langstaff at Timberview NBL	7:00	58	1	59
Langstaff at Timberview WBL	7:00	11	2	13
Langstaff at Timberview WBT	7:00	840	15	855
Langstaff at Pleasant Ridge SBR	7:00	162	9	171
Langstaff at Pleasant Ridge SBL	7:00	150	1	151
Langstaff at Pleasant Ridge EBT	7:00	494	23	517
Langstaff at Pleasant Ridge EBL	7:00	36	3	39
Langstaff at Pleasant Ridge WBT	7:00	564	13	577
Langstaff at Pleasant Ridge WBR	7:00	25	2	27
Highway 7 at Langstaff WBT	7:00	1825	42	1867
Highway 7 at Langstaff SBR	7:00	143	6	149
Highway 7 at Langstaff SBL	7:00	552	20	572
Highway 7 at Langstaff EBT	7:00	865	62	927
407ETR North Ramp Terminal at Dufferin SBT	7:00	1545	66	1611
407ETR North Ramp Terminal at Dufferin WB (E-N/S Ramp)	7:00	421	30	451
407ETR North Ramp Terminal at Dufferin WBL	7:00	118	5	123
407ETR North Ramp Terminal at Dufferin WBR	7:00	183	8	191
407ETR North Ramp Terminal at Dufferin NBT	7:00	834	38	872
407ETR South Ramp Terminal at Dufferin SBR (N-E Ramp)	7:00	264	32	296
407ETR South Ramp Terminal at Dufferin SBT	7:00	1455	48	1503
407ETR South Ramp Terminal at Dufferin EB (W-N/S Ramp)	7:00	480	21	501
407ETR South Ramp Terminal at Dufferin EBL	7:00	241	14	255
407ETR South Ramp Terminal at Dufferin EBR	7:00	138	6	144
407ETR South Ramp Terminal at Dufferin NBT	7:00	913	43	956
407ETR South Ramp Terminal at Dufferin (S-E Ramp)	7:00	112	12	124
407ETR North Ramp Terminal at Dufferin (N-W Ramp)	7:00	501	18	519
Highway 7 at Langstaff EBL	7:00	20	1	21
Highway 7 at Langstaff WBR	7:00	646	11	657
407ETR North Ramp Terminal at Dufferin NBR (S-W Ramp)	7:00	258	4	262
Dufferin at Langstaff SBR	8:00	143	6	149
Dufferin at Langstaff SBT	8:00	1816	46	1862
Dufferin at Langstaff SBL	8:00	164	6	170
Dufferin at Langstaff EBR	8:00	395	50	445
Dufferin at Langstaff EBT	8:00	237	15	252

## Existing AM 7-9 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Langstaff EBL	8:00	72	8	80
Dufferin at Langstaff NBL	8:00	244	14	258
Dufferin at Langstaff NBR	8:00	253	3	256
Dufferin at Langstaff NBT	8:00	1081	48	1129
Dufferin at Langstaff WBT	8:00	578	10	588
Dufferin at Langstaff WBL	8:00	256	9	265
Dufferin at Langstaff WBR	8:00	141	3	144
Weston at Langstaff SBR	8:00	173	1	174
Weston at Langstaff SBL	8:00	314	5	319
Weston at Langstaff SBT	8:00	680	10	690
Weston at Langstaff EBL	8:00	184	3	187
Weston at Langstaff EBT	8:00	951	13	964
Weston at Langstaff EBR	8:00	95	0	95
Weston at Langstaff WBT	8:00	239	20	259
Weston at Langstaff WBR	8:00	82	3	85
Weston at Langstaff WBL	8:00	83	9	92
Weston at Langstaff NBL	8:00	17	0	17
Weston at Langstaff NBT	8:00	230	11	241
Weston at Langstaff NBR	8:00	147	12	159
Langstaff at Stan Gate SBR	8:00	170	0	170
Langstaff at Stan Gate SBL	8:00	46	1	47
Langstaff at Stan Gate SBT	8:00	40	0	40
Langstaff at Stan Gate WBT	8:00	343	20	363
Langstaff at Stan Gate WBR	8:00	20	0	20
Langstaff at Stan Gate WBL	8:00	51	1	52
Langstaff at Stan Gate NBL	8:00	23	0	23
Langstaff at Stan Gate NBT	8:00	26	0	26
Langstaff at Stan Gate NBR	8:00	104	0	104
Langstaff at Stan Gate EBL	8:00	81	0	81
Langstaff at Stan Gate EBT	8:00	1055	16	1071
Langstaff at Stan Gate EBR	8:00	38	0	38
Weston at Crestmount SBR	8:00	44	0	44
Weston at Crestmount EBR	8:00	65	1	66
Weston at Crestmount SBL	8:00	204	2	206
Weston at Crestmount EBL	8:00	61	0	61
Weston at Crestmount SBT	8:00	1086	15	1101
Weston at Crestmount EBT	8:00	27	0	27
Weston at Crestmount WBT	8:00	4	1	5
Weston at Crestmount WBR	8:00	32	6	38
Weston at Crestmount WBL	8:00	28	1	29
Weston at Crestmount NBL	8:00	13	0	13
Weston at Crestmount NBT	8:00	428	12	440
Weston at Crestmount NBR	8:00	38	4	42
Langstaff at Silmar SBR	8:00	31	5	36
Langstaff at Silmar SBT	8:00	131	6	137
Langstaff at Silmar SBL	8:00	198	9	207
Langstaff at Silmar EBR	8:00	191	8	199
Langstaff at Silmar EBT	8:00	1363	42	1405
Langstaff at Silmar EBL	8:00	50	4	54

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Silmar NBL	8:00	55	2	57
Langstaff at Silmar NBR	8:00	280	20	300
Langstaff at Silmar NBT	8:00	45	3	48
Langstaff at Silmar WBT	8:00	449	57	506
Langstaff at Silmar WBL	8:00	274	18	292
Langstaff at Silmar WBR	8:00	213	9	222
Weston at Gregory WBR	8:00	36	3	39
Weston at Gregory WBT	8:00	13	1	14
Weston at Gregory WBL	8:00	39	5	44
Weston at Gregory SBL	8:00	157	7	164
Weston at Gregory SBR	8:00	17	0	17
Weston at Gregory SBT	8:00	923	45	968
Weston at Gregory EBT	8:00	68	0	68
Weston at Gregory EBL	8:00	67	0	67
Weston at Gregory EBR	8:00	50	2	52
Weston at Gregory NBR	8:00	66	2	68
Weston at Gregory NBT	8:00	441	30	471
Weston at Gregory NBL	8:00	8	1	9
Hwy 400 East Ramp Terminal at Langstaff EBT	8:00	1238	38	1276
Hwy 400 East Ramp Terminal at Langstaff WBT	8:00	713	136	849
Hwy 400 East Ramp Terminal at Langstaff NBL	8:00	319	10	329
Hwy 400 East Ramp Terminal at Langstaff NBR	8:00	494	43	537
Langstaff at Edgeley WBR	8:00	26	6	32
Langstaff at Edgeley WBT	8:00	544	92	636
Langstaff at Edgeley WBL	8:00	53	2	55
Langstaff at Edgeley SBR	8:00	139	35	174
Langstaff at Edgeley SBT	8:00	127	5	132
Langstaff at Edgeley SBL	8:00	23	7	30
Langstaff at Edgeley EBL	8:00	318	19	337
Langstaff at Edgeley EBR	8:00	492	7	499
Langstaff at Edgeley EBT	8:00	1126	65	1191
Langstaff at Edgeley NBT	8:00	71	14	85
Langstaff at Edgeley NBL	8:00	95	8	103
Langstaff at Edgeley NBR	8:00	35	6	41
Langstaff at Millway EBR	8:00	129	5	134
Langstaff at Millway EBT	8:00	860	49	909
Langstaff at Millway EBL	8:00	72	3	75
Langstaff at Millway WBL	8:00	48	0	48
Langstaff at Millway WBT	8:00	505	63	568
Langstaff at Millway WBR	8:00	10	0	10
Langstaff at Millway NBL	8:00	18	4	22
Langstaff at Millway NBR	8:00	17	2	19
Langstaff at Millway NBT	8:00	6	0	6
Langstaff at Millway SBT	8:00	9	0	9
Langstaff at Millway SBR	8:00	18	1	19
Langstaff at Millway SBL	8:00	1	0	1
Jane at Langstaff WBR	8:00	28	3	31
Jane at Langstaff WBT	8:00	272	86	358
Jane at Langstaff WBL	8:00	52	6	58

Name	Start Hour	Car Count	Truck Count	Total Count
Jane at Langstaff SBL	8:00	55	6	61
Jane at Langstaff SBR	8:00	309	19	328
Jane at Langstaff SBT	8:00	942	52	994
Jane at Langstaff EBT	8:00	514	52	566
Jane at Langstaff EBL	8:00	174	15	189
Jane at Langstaff EBR	8:00	180	8	188
Jane at Langstaff NBR	8:00	39	5	44
Jane at Langstaff NBT	8:00	323	45	368
Jane at Langstaff NBL	8:00	74	6	80
Jane at Courtland-Edilcan SBL	8:00	68	2	70
Jane at Courtland-Edilcan SBT	8:00	1189	61	1250
Jane at Courtland-Edilcan SBR	8:00	88	4	92
Jane at Courtland-Edilcan WBR	8:00	30	0	30
Jane at Courtland-Edilcan WBL	8:00	18	4	22
Jane at Courtland-Edilcan WBT	8:00	26	6	32
Jane at Courtland-Edilcan NBT	8:00	394	48	442
Jane at Courtland-Edilcan NBR	8:00	58	2	60
Jane at Courtland-Edilcan NBL	8:00	36	4	40
Jane at Courtland-Edilcan EBL	8:00	15	3	18
Jane at Courtland-Edilcan EBT	8:00	17	5	22
Jane at Courtland-Edilcan EBR	8:00	21	13	34
Jane at Applewood-Pippin SBR	8:00	118	3	121
Jane at Applewood-Pippin SBT	8:00	826	52	878
Jane at Applewood-Pippin SBL	8:00	145	6	151
Jane at Applewood-Pippin EBR	8:00	13	4	17
Jane at Applewood-Pippin EBT	8:00	28	5	33
Jane at Applewood-Pippin EBL	8:00	15	2	17
Jane at Applewood-Pippin NBL	8:00	28	4	32
Jane at Applewood-Pippin NBR	8:00	44	2	46
Jane at Applewood-Pippin NBT	8:00	416	43	459
Jane at Applewood-Pippin WBT	8:00	41	3	44
Jane at Applewood-Pippin WBL	8:00	27	12	39
Jane at Applewood-Pippin WBR	8:00	34	4	38
Langstaff at Creditstone EBL	8:00	175	22	197
Langstaff at Creditstone EBR	8:00	16	0	16
Langstaff at Creditstone EBT	8:00	158	24	182
Langstaff at Creditstone SBR	8:00	259	50	309
Langstaff at Creditstone SBT	8:00	373	41	414
Langstaff at Creditstone SBL	8:00	20	1	21
Langstaff at Creditstone NBL	8:00	91	14	105
Langstaff at Creditstone NBT	8:00	163	27	190
Langstaff at Creditstone NBR	8:00	11	2	13
Langstaff at Creditstone WBT	8:00	18	4	22
Langstaff at Creditstone WBR	8:00	5	0	5
Langstaff at Creditstone WBL	8:00	5	1	6
Keele at Langstaff SBL	8:00	425	23	448
Keele at Langstaff SBT	8:00	1205	70	1275
Keele at Langstaff WBR	8:00	153	12	165
Keele at Langstaff WBL	8:00	220	19	239

## Existing AM 7-9 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Keele at Langstaff NBT	8:00	357	60	417
Keele at Langstaff NBR	8:00	246	27	273
Keele at Bowes EBR	8:00	3	7	10
Keele at Bowes SBL	8:00	235	16	251
Keele at Bowes SBT	8:00	980	92	1072
Keele at Bowes SBR	8:00	16	3	19
Keele at Bowes WBR	8:00	113	14	127
Keele at Bowes WBL	8:00	6	8	14
Keele at Bowes WBT	8:00	3	3	6
Keele at Bowes NBT	8:00	495	69	564
Keele at Bowes NBR	8:00	39	5	44
Keele at Bowes NBL	8:00	8	6	14
Keele at Bowes EBL	8:00	9	3	12
Keele at Bowes EBT	8:00	1	1	2
Langstaff at Planchet SBR	8:00	89	16	105
Langstaff at Planchet SBL	8:00	233	17	250
Langstaff at Planchet WBT	8:00	333	29	362
Langstaff at Planchet WBR	8:00	221	12	233
Langstaff at Planchet EBL	8:00	103	14	117
Langstaff at Planchet EBT	8:00	630	58	688
Langstaff at Connie SBL	8:00	31	11	42
Langstaff at Connie SBT	8:00	31	5	36
Langstaff at Connie SBR	8:00	77	21	98
Langstaff at Connie WBR	8:00	141	8	149
Langstaff at Connie WBL	8:00	39	1	40
Langstaff at Connie WBT	8:00	429	21	450
Langstaff at Connie NBT	8:00	21	0	21
Langstaff at Connie NBR	8:00	21	4	25
Langstaff at Connie NBL	8:00	34	2	36
Langstaff at Connie EBL	8:00	184	14	198
Langstaff at Connie EBT	8:00	507	47	554
Langstaff at Connie EBR	8:00	141	10	151
Langstaff at Rivermede SBR	8:00	15	9	24
Langstaff at Rivermede SBT	8:00	217	10	227
Langstaff at Rivermede SBL	8:00	127	7	134
Langstaff at Rivermede EBL	8:00	34	12	46
Langstaff at Rivermede EBR	8:00	73	7	80
Langstaff at Rivermede EBT	8:00	469	47	516
Langstaff at Rivermede NBT	8:00	54	6	60
Langstaff at Rivermede NBL	8:00	49	8	57
Langstaff at Rivermede NBR	8:00	101	17	118
Langstaff at Rivermede WBR	8:00	158	6	164
Langstaff at Rivermede WBT	8:00	541	15	556
Langstaff at Rivermede WBL	8:00	163	9	172
Dufferin at Confederation EBR	8:00	170	9	179
Dufferin at Confederation EBL	8:00	33	4	37
Dufferin at Confederation EBT	8:00	38	1	39
Dufferin at Confederation SBT	8:00	1646	36	1682
Dufferin at Confederation SBL	8:00	68	0	68

## Existing AM 7-9 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Confederation SBR	8:00	182	7	189
Dufferin at Confederation WBL	8:00	230	5	235
Dufferin at Confederation WBR	8:00	58	2	60
Dufferin at Confederation WBT	8:00	147	1	148
Dufferin at Confederation NBT	8:00	708	29	737
Dufferin at Confederation NBR	8:00	40	1	41
Dufferin at Confederation NBL	8:00	256	12	268
Langstaff at Timberview EBR	8:00	31	1	32
Langstaff at Timberview EBT	8:00	595	29	624
Langstaff at Timberview NBR	8:00	65	2	67
Langstaff at Timberview NBL	8:00	59	1	60
Langstaff at Timberview WBL	8:00	20	3	23
Langstaff at Timberview WBT	8:00	954	17	971
Langstaff at Pleasant Ridge SBR	8:00	267	14	281
Langstaff at Pleasant Ridge SBL	8:00	188	1	189
Langstaff at Pleasant Ridge EBT	8:00	539	25	564
Langstaff at Pleasant Ridge EBL	8:00	87	6	93
Langstaff at Pleasant Ridge WBT	8:00	515	12	527
Langstaff at Pleasant Ridge WBR	8:00	19	1	20
Highway 7 at Langstaff WBT	8:00	1703	39	1742
Highway 7 at Langstaff SBR	8:00	161	7	168
Highway 7 at Langstaff SBL	8:00	585	21	606
Highway 7 at Langstaff EBT	8:00	845	61	906
407ETR North Ramp Terminal at Dufferin SBT	8:00	1687	72	1759
407ETR North Ramp Terminal at Dufferin WB (E-N/S Ramp)	8:00	504	36	540
407ETR North Ramp Terminal at Dufferin WBL	8:00	207	9	216
407ETR North Ramp Terminal at Dufferin WBR	8:00	265	12	277
407ETR North Ramp Terminal at Dufferin NBT	8:00	1121	51	1172
407ETR South Ramp Terminal at Dufferin SBR (N-E Ramp)	8:00	344	42	386
407ETR South Ramp Terminal at Dufferin SBT	8:00	1569	52	1621
407ETR South Ramp Terminal at Dufferin EB (W-N/S Ramp)	8:00	639	28	667
407ETR South Ramp Terminal at Dufferin EBL	8:00	308	18	326
407ETR South Ramp Terminal at Dufferin EBR	8:00	199	9	208
407ETR South Ramp Terminal at Dufferin NBT	8:00	1261	60	1321
407ETR South Ramp Terminal at Dufferin (S-E Ramp)	8:00	155	17	172
407ETR North Ramp Terminal at Dufferin (N-W Ramp)	8:00	644	23	667
Highway 7 at Langstaff EBL	8:00	34	2	36
Highway 7 at Langstaff WBR	8:00	739	12	751
407ETR North Ramp Terminal at Dufferin NBR (S-W Ramp)	8:00	413	7	420

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Langstaff SBR	15:00	112	4	116
Dufferin at Langstaff SBT	15:00	1081	16	1097
Dufferin at Langstaff SBL	15:00	159	7	166
Dufferin at Langstaff EBR	15:00	435	9	444
Dufferin at Langstaff EBT	15:00	341	6	347
Dufferin at Langstaff EBL	15:00	167	1	168
Dufferin at Langstaff NBL	15:00	215	35	250
Dufferin at Langstaff NBR	15:00	330	8	338
Dufferin at Langstaff NBT	15:00	1472	14	1486
Dufferin at Langstaff WBT	15:00	211	16	227
Dufferin at Langstaff WBL	15:00	115	2	117
Dufferin at Langstaff WBR	15:00	259	4	263
Weston at Langstaff SBR	15:00	199	1	200
Weston at Langstaff SBL	15:00	163	4	167
Weston at Langstaff SBT	15:00	453	6	459
Weston at Langstaff EBL	15:00	191	2	193
Weston at Langstaff EBT	15:00	419	20	439
Weston at Langstaff EBR	15:00	58	0	58
Weston at Langstaff WBT	15:00	720	9	729
Weston at Langstaff WBR	15:00	239	1	240
Weston at Langstaff WBL	15:00	143	2	145
Weston at Langstaff NBL	15:00	149	0	149
Weston at Langstaff NBT	15:00	752	4	756
Weston at Langstaff NBR	15:00	130	13	143
Langstaff at Stan Gate SBR	15:00	98	0	98
Langstaff at Stan Gate SBL	15:00	29	0	29
Langstaff at Stan Gate SBT	15:00	27	0	27
Langstaff at Stan Gate WBT	15:00	915	10	925
Langstaff at Stan Gate WBR	15:00	58	0	58
Langstaff at Stan Gate WBL	15:00	108	0	108
Langstaff at Stan Gate NBL	15:00	14	0	14
Langstaff at Stan Gate NBT	15:00	46	0	46
Langstaff at Stan Gate NBR	15:00	62	0	62
Langstaff at Stan Gate EBL	15:00	139	0	139
Langstaff at Stan Gate EBT	15:00	591	21	612
Langstaff at Stan Gate EBR	15:00	21	0	21
Weston at Crestmount SBR	15:00	52	0	52
Weston at Crestmount EBR	15:00	37	0	37
Weston at Crestmount SBL	15:00	119	1	120
Weston at Crestmount EBL	15:00	44	0	44
Weston at Crestmount SBT	15:00	708	6	714
Weston at Crestmount EBT	15:00	12	0	12
Weston at Crestmount WBT	15:00	21	0	21
Weston at Crestmount WBR	15:00	139	0	139
Weston at Crestmount WBL	15:00	70	1	71
Weston at Crestmount NBL	15:00	38	0	38
Weston at Crestmount NBT	15:00	1110	7	1117
Weston at Crestmount NBR	15:00	47	3	50
Langstaff at Silmar SBR	15:00	68	1	69

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Silmar SBT	15:00	105	2	107
Langstaff at Silmar SBL	15:00	212	7	219
Langstaff at Silmar EBR	15:00	89	1	90
Langstaff at Silmar EBT	15:00	677	32	709
Langstaff at Silmar EBL	15:00	94	5	99
Langstaff at Silmar NBL	15:00	172	3	175
Langstaff at Silmar NBR	15:00	338	3	341
Langstaff at Silmar NBT	15:00	153	6	159
Langstaff at Silmar WBT	15:00	1282	19	1301
Langstaff at Silmar WBL	15:00	232	9	241
Langstaff at Silmar WBR	15:00	201	8	209
Weston at Gregory WBR	15:00	146	0	146
Weston at Gregory WBT	15:00	50	0	50
Weston at Gregory WBL	15:00	122	0	122
Weston at Gregory SBL	15:00	87	3	90
Weston at Gregory SBR	15:00	26	0	26
Weston at Gregory SBT	15:00	730	26	756
Weston at Gregory EBT	15:00	24	0	24
Weston at Gregory EBL	15:00	18	0	18
Weston at Gregory EBR	15:00	24	1	25
Weston at Gregory NBR	15:00	63	0	63
Weston at Gregory NBT	15:00	1160	13	1173
Weston at Gregory NBL	15:00	18	0	18
Hwy 400 East Ramp Terminal at Langstaff EBT	15:00	780	32	812
Hwy 400 East Ramp Terminal at Langstaff WBT	15:00	1620	50	1670
Hwy 400 East Ramp Terminal at Langstaff NBL	15:00	290	9	299
Hwy 400 East Ramp Terminal at Langstaff NBR	15:00	243	30	273
Langstaff at Edgeley WBR	15:00	31	6	37
Langstaff at Edgeley WBT	15:00	1011	28	1039
Langstaff at Edgeley WBL	15:00	26	0	26
Langstaff at Edgeley SBR	15:00	437	4	441
Langstaff at Edgeley SBT	15:00	124	2	126
Langstaff at Edgeley SBL	15:00	32	2	34
Langstaff at Edgeley EBL	15:00	180	11	191
Langstaff at Edgeley EBR	15:00	176	9	185
Langstaff at Edgeley EBT	15:00	732	50	782
Langstaff at Edgeley NBT	15:00	123	3	126
Langstaff at Edgeley NBL	15:00	287	3	290
Langstaff at Edgeley NBR	15:00	65	1	66
Langstaff at Millway EBR	15:00	60	6	66
Langstaff at Millway EBT	15:00	732	59	791
Langstaff at Millway EBL	15:00	52	4	56
Langstaff at Millway WBL	15:00	34	4	38
Langstaff at Millway WBT	15:00	585	38	623
Langstaff at Millway WBR	15:00	13	0	13
Langstaff at Millway NBL	15:00	51	3	54
Langstaff at Millway NBR	15:00	32	1	33
Langstaff at Millway NBT	15:00	14	3	17
Langstaff at Millway SBT	15:00	13	2	15

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Millway SBR	15:00	33	1	34
Langstaff at Millway SBL	15:00	4	1	5
Jane at Langstaff WBR	15:00	65	0	65
Jane at Langstaff WBT	15:00	464	23	487
Jane at Langstaff WBL	15:00	70	7	77
Jane at Langstaff SBL	15:00	35	6	41
Jane at Langstaff SBR	15:00	299	10	309
Jane at Langstaff SBT	15:00	577	23	600
Jane at Langstaff EBT	15:00	441	45	486
Jane at Langstaff EBL	15:00	233	5	238
Jane at Langstaff EBR	15:00	99	3	102
Jane at Langstaff NBR	15:00	52	9	61
Jane at Langstaff NBT	15:00	700	16	716
Jane at Langstaff NBL	15:00	168	1	169
Jane at Courtland-Edilcan SBL	15:00	45	5	50
Jane at Courtland-Edilcan SBT	15:00	871	44	915
Jane at Courtland-Edilcan SBR	15:00	39	4	43
Jane at Courtland-Edilcan WBR	15:00	46	3	49
Jane at Courtland-Edilcan WBL	15:00	38	1	39
Jane at Courtland-Edilcan WBT	15:00	36	5	41
Jane at Courtland-Edilcan NBT	15:00	971	19	990
Jane at Courtland-Edilcan NBR	15:00	28	11	39
Jane at Courtland-Edilcan NBL	15:00	20	4	24
Jane at Courtland-Edilcan EBL	15:00	100	0	100
Jane at Courtland-Edilcan EBT	15:00	31	2	33
Jane at Courtland-Edilcan EBR	15:00	53	6	59
Jane at Applewood-Pippin SBR	15:00	44	0	44
Jane at Applewood-Pippin SBT	15:00	748	25	773
Jane at Applewood-Pippin SBL	15:00	49	8	57
Jane at Applewood-Pippin EBR	15:00	35	0	35
Jane at Applewood-Pippin EBT	15:00	34	2	36
Jane at Applewood-Pippin EBL	15:00	80	1	81
Jane at Applewood-Pippin NBL	15:00	30	2	32
Jane at Applewood-Pippin NBR	15:00	45	0	45
Jane at Applewood-Pippin NBT	15:00	783	26	809
Jane at Applewood-Pippin WBT	15:00	25	1	26
Jane at Applewood-Pippin WBL	15:00	35	6	41
Jane at Applewood-Pippin WBR	15:00	116	3	119
Langstaff at Creditstone EBL	15:00	283	16	299
Langstaff at Creditstone EBR	15:00	27	4	31
Langstaff at Creditstone EBT	15:00	107	18	125
Langstaff at Creditstone SBR	15:00	204	22	226
Langstaff at Creditstone SBT	15:00	188	18	206
Langstaff at Creditstone SBL	15:00	7	3	10
Langstaff at Creditstone NBL	15:00	146	14	160
Langstaff at Creditstone NBT	15:00	338	27	365
Langstaff at Creditstone NBR	15:00	11	1	12
Langstaff at Creditstone WBT	15:00	35	1	36
Langstaff at Creditstone WBR	15:00	39	1	40

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Creditstone WBL	15:00	8	1	9
Keele at Langstaff SBL	15:00	214	15	229
Keele at Langstaff SBT	15:00	564	57	621
Keele at Langstaff WBR	15:00	247	14	261
Keele at Langstaff WBL	15:00	272	31	303
Keele at Langstaff NBT	15:00	960	41	1001
Keele at Langstaff NBR	15:00	205	41	246
Keele at Bowes EBR	15:00	25	0	25
Keele at Bowes SBL	15:00	121	24	145
Keele at Bowes SBT	15:00	739	60	799
Keele at Bowes SBR	15:00	16	2	18
Keele at Bowes WBR	15:00	213	15	228
Keele at Bowes WBL	15:00	51	12	63
Keele at Bowes WBT	15:00	3	0	3
Keele at Bowes NBT	15:00	895	75	970
Keele at Bowes NBR	15:00	36	4	40
Keele at Bowes NBL	15:00	6	13	19
Keele at Bowes EBL	15:00	20	2	22
Keele at Bowes EBT	15:00	14	0	14
Langstaff at Planchet SBR	15:00	150	13	163
Langstaff at Planchet SBL	15:00	223	13	236
Langstaff at Planchet WBT	15:00	418	22	440
Langstaff at Planchet WBR	15:00	163	14	177
Langstaff at Planchet EBL	15:00	73	12	85
Langstaff at Planchet EBT	15:00	405	36	441
Langstaff at Connie SBL	15:00	98	3	101
Langstaff at Connie SBT	15:00	22	0	22
Langstaff at Connie SBR	15:00	139	1	140
Langstaff at Connie WBR	15:00	34	13	47
Langstaff at Connie WBL	15:00	32	2	34
Langstaff at Connie WBT	15:00	320	41	361
Langstaff at Connie NBT	15:00	13	0	13
Langstaff at Connie NBR	15:00	51	1	52
Langstaff at Connie NBL	15:00	59	1	60
Langstaff at Connie EBL	15:00	95	14	109
Langstaff at Connie EBT	15:00	472	25	497
Langstaff at Connie EBR	15:00	53	6	59
Langstaff at Rivermede SBR	15:00	34	13	47
Langstaff at Rivermede SBT	15:00	112	5	117
Langstaff at Rivermede SBL	15:00	138	1	139
Langstaff at Rivermede EBL	15:00	33	16	49
Langstaff at Rivermede EBR	15:00	23	3	26
Langstaff at Rivermede EBT	15:00	574	11	585
Langstaff at Rivermede NBT	15:00	96	3	99
Langstaff at Rivermede NBL	15:00	71	3	74
Langstaff at Rivermede NBR	15:00	203	5	208
Langstaff at Rivermede WBR	15:00	121	9	130
Langstaff at Rivermede WBT	15:00	323	36	359
Langstaff at Rivermede WBL	15:00	105	3	108

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Confederation EBR	15:00	177	7	184
Dufferin at Confederation EBL	15:00	141	1	142
Dufferin at Confederation EBT	15:00	52	1	53
Dufferin at Confederation SBT	15:00	948	25	973
Dufferin at Confederation SBL	15:00	67	1	68
Dufferin at Confederation SBR	15:00	52	7	59
Dufferin at Confederation WBL	15:00	106	1	107
Dufferin at Confederation WBR	15:00	89	1	90
Dufferin at Confederation WBT	15:00	37	3	40
Dufferin at Confederation NBT	15:00	1487	19	1506
Dufferin at Confederation NBR	15:00	68	0	68
Dufferin at Confederation NBL	15:00	120	11	131
Langstaff at Timberview EBR	15:00	41	0	41
Langstaff at Timberview EBT	15:00	798	14	812
Langstaff at Timberview NBR	15:00	25	0	25
Langstaff at Timberview NBL	15:00	27	0	27
Langstaff at Timberview WBL	15:00	38	0	38
Langstaff at Timberview WBT	15:00	551	18	569
Langstaff at Pleasant Ridge SBR	15:00	61	2	63
Langstaff at Pleasant Ridge SBL	15:00	67	2	69
Langstaff at Pleasant Ridge EBT	15:00	562	17	579
Langstaff at Pleasant Ridge EBL	15:00	171	1	172
Langstaff at Pleasant Ridge WBT	15:00	492	11	503
Langstaff at Pleasant Ridge WBR	15:00	93	0	93
Highway 7 at Langstaff WBT	15:00	882	62	944
Highway 7 at Langstaff SBR	15:00	46	14	60
Highway 7 at Langstaff SBL	15:00	568	7	575
Highway 7 at Langstaff EBT	15:00	1328	19	1347
407ETR North Ramp Terminal at Dufferin SBT	15:00	1250	21	1271
407ETR North Ramp Terminal at Dufferin WB (E-N/S Ramp)	15:00	372	25	397
407ETR North Ramp Terminal at Dufferin WBL	15:00	96	8	104
407ETR North Ramp Terminal at Dufferin WBR	15:00	251	14	265
407ETR North Ramp Terminal at Dufferin NBT	15:00	1706	21	1727
407ETR South Ramp Terminal at Dufferin SBR (N-E Ramp)	15:00	238	10	248
407ETR South Ramp Terminal at Dufferin SBT	15:00	1123	22	1145
407ETR South Ramp Terminal at Dufferin EB (W-N/S Ramp)	15:00	675	15	690
407ETR South Ramp Terminal at Dufferin EBL	15:00	332	8	340
407ETR South Ramp Terminal at Dufferin EBR	15:00	252	4	256
407ETR South Ramp Terminal at Dufferin NBT	15:00	1680	17	1697
407ETR South Ramp Terminal at Dufferin (S-E Ramp)	15:00	146	4	150
407ETR North Ramp Terminal at Dufferin (N-W Ramp)	15:00	399	17	416
Highway 7 at Langstaff EBL	15:00	111	2	113
Highway 7 at Langstaff WBR	15:00	491	13	504
407ETR North Ramp Terminal at Dufferin NBR (S-W Ramp)	15:00	165	6	171
Dufferin at Langstaff SBR	16:00	92	3	95
Dufferin at Langstaff SBT	16:00	1223	18	1241
Dufferin at Langstaff SBL	16:00	166	8	174
Dufferin at Langstaff EBR	16:00	570	12	582
Dufferin at Langstaff EBT	16:00	444	7	451

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Langstaff EBL	16:00	230	1	231
Dufferin at Langstaff NBL	16:00	210	34	244
Dufferin at Langstaff NBR	16:00	439	10	449
Dufferin at Langstaff NBT	16:00	1655	16	1671
Dufferin at Langstaff WBT	16:00	176	13	189
Dufferin at Langstaff WBL	16:00	129	2	131
Dufferin at Langstaff WBR	16:00	316	5	321
Weston at Langstaff SBR	16:00	188	1	189
Weston at Langstaff SBL	16:00	136	3	139
Weston at Langstaff SBT	16:00	452	6	458
Weston at Langstaff EBL	16:00	169	2	171
Weston at Langstaff EBT	16:00	464	22	486
Weston at Langstaff EBR	16:00	43	0	43
Weston at Langstaff WBT	16:00	949	12	961
Weston at Langstaff WBR	16:00	280	1	281
Weston at Langstaff WBL	16:00	136	2	138
Weston at Langstaff NBL	16:00	197	0	197
Weston at Langstaff NBT	16:00	863	4	867
Weston at Langstaff NBR	16:00	120	12	132
Langstaff at Stan Gate SBR	16:00	84	0	84
Langstaff at Stan Gate SBL	16:00	20	0	20
Langstaff at Stan Gate SBT	16:00	24	0	24
Langstaff at Stan Gate WBT	16:00	1182	13	1195
Langstaff at Stan Gate WBR	16:00	71	0	71
Langstaff at Stan Gate WBL	16:00	82	0	82
Langstaff at Stan Gate NBL	16:00	36	1	37
Langstaff at Stan Gate NBT	16:00	61	0	61
Langstaff at Stan Gate NBR	16:00	60	0	60
Langstaff at Stan Gate EBL	16:00	186	0	186
Langstaff at Stan Gate EBT	16:00	606	21	627
Langstaff at Stan Gate EBR	16:00	29	0	29
Weston at Crestmount SBR	16:00	23	0	23
Weston at Crestmount EBR	16:00	18	0	18
Weston at Crestmount SBL	16:00	96	1	97
Weston at Crestmount EBL	16:00	27	0	27
Weston at Crestmount SBT	16:00	686	6	692
Weston at Crestmount EBT	16:00	12	0	12
Weston at Crestmount WBT	16:00	29	0	29
Weston at Crestmount WBR	16:00	206	0	206
Weston at Crestmount WBL	16:00	84	2	86
Weston at Crestmount NBL	16:00	42	0	42
Weston at Crestmount NBT	16:00	1330	8	1338
Weston at Crestmount NBR	16:00	39	2	41
Langstaff at Silmar SBR	16:00	91	2	93
Langstaff at Silmar SBT	16:00	108	2	110
Langstaff at Silmar SBL	16:00	250	9	259
Langstaff at Silmar EBR	16:00	76	1	77
Langstaff at Silmar EBT	16:00	660	31	691
Langstaff at Silmar EBL	16:00	85	4	89

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Silmar NBL	16:00	206	4	210
Langstaff at Silmar NBR	16:00	463	4	467
Langstaff at Silmar NBT	16:00	237	9	246
Langstaff at Silmar WBT	16:00	1330	20	1350
Langstaff at Silmar WBL	16:00	264	10	274
Langstaff at Silmar WBR	16:00	289	11	300
Weston at Gregory WBR	16:00	218	0	218
Weston at Gregory WBT	16:00	105	1	106
Weston at Gregory WBL	16:00	168	0	168
Weston at Gregory SBL	16:00	109	3	112
Weston at Gregory SBR	16:00	27	0	27
Weston at Gregory SBT	16:00	691	24	715
Weston at Gregory EBT	16:00	32	0	32
Weston at Gregory EBL	16:00	24	0	24
Weston at Gregory EBR	16:00	28	1	29
Weston at Gregory NBR	16:00	77	0	77
Weston at Gregory NBT	16:00	1284	14	1298
Weston at Gregory NBL	16:00	37	0	37
Hwy 400 East Ramp Terminal at Langstaff EBT	16:00	832	35	867
Hwy 400 East Ramp Terminal at Langstaff WBT	16:00	1942	60	2002
Hwy 400 East Ramp Terminal at Langstaff NBL	16:00	384	12	396
Hwy 400 East Ramp Terminal at Langstaff NBR	16:00	331	41	372
Langstaff at Edgeley WBR	16:00	16	3	19
Langstaff at Edgeley WBT	16:00	1027	28	1055
Langstaff at Edgeley WBL	16:00	21	0	21
Langstaff at Edgeley SBR	16:00	553	5	558
Langstaff at Edgeley SBT	16:00	110	2	112
Langstaff at Edgeley SBL	16:00	32	2	34
Langstaff at Edgeley EBL	16:00	226	14	240
Langstaff at Edgeley EBR	16:00	132	7	139
Langstaff at Edgeley EBT	16:00	788	53	841
Langstaff at Edgeley NBT	16:00	315	9	324
Langstaff at Edgeley NBL	16:00	338	3	341
Langstaff at Edgeley NBR	16:00	68	1	69
Langstaff at Millway EBR	16:00	37	3	40
Langstaff at Millway EBT	16:00	750	61	811
Langstaff at Millway EBL	16:00	58	5	63
Langstaff at Millway WBL	16:00	31	4	35
Langstaff at Millway WBT	16:00	866	56	922
Langstaff at Millway WBR	16:00	11	0	11
Langstaff at Millway NBL	16:00	91	4	95
Langstaff at Millway NBR	16:00	24	1	25
Langstaff at Millway NBT	16:00	12	3	15
Langstaff at Millway SBT	16:00	10	2	12
Langstaff at Millway SBR	16:00	47	1	48
Langstaff at Millway SBL	16:00	4	1	5
Jane at Langstaff WBR	16:00	58	0	58
Jane at Langstaff WBT	16:00	425	21	446
Jane at Langstaff WBL	16:00	44	4	48

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Jane at Langstaff SBL	16:00	29	5	34
Jane at Langstaff SBR	16:00	212	7	219
Jane at Langstaff SBT	16:00	497	20	517
Jane at Langstaff EBT	16:00	424	43	467
Jane at Langstaff EBL	16:00	222	4	226
Jane at Langstaff EBR	16:00	91	2	93
Jane at Langstaff NBR	16:00	36	6	42
Jane at Langstaff NBT	16:00	1013	23	1036
Jane at Langstaff NBL	16:00	158	1	159
Jane at Courtland-Edilcan SBL	16:00	26	3	29
Jane at Courtland-Edilcan SBT	16:00	726	37	763
Jane at Courtland-Edilcan SBR	16:00	33	4	37
Jane at Courtland-Edilcan WBR	16:00	92	5	97
Jane at Courtland-Edilcan WBL	16:00	49	2	51
Jane at Courtland-Edilcan WBT	16:00	61	9	70
Jane at Courtland-Edilcan NBT	16:00	1354	27	1381
Jane at Courtland-Edilcan NBR	16:00	18	8	26
Jane at Courtland-Edilcan NBL	16:00	19	3	22
Jane at Courtland-Edilcan EBL	16:00	236	1	237
Jane at Courtland-Edilcan EBT	16:00	47	2	49
Jane at Courtland-Edilcan EBR	16:00	41	5	46
Jane at Applewood-Pippin SBR	16:00	27	0	27
Jane at Applewood-Pippin SBT	16:00	636	21	657
Jane at Applewood-Pippin SBL	16:00	63	10	73
Jane at Applewood-Pippin EBR	16:00	43	0	43
Jane at Applewood-Pippin EBT	16:00	46	3	49
Jane at Applewood-Pippin EBL	16:00	152	1	153
Jane at Applewood-Pippin NBL	16:00	20	2	22
Jane at Applewood-Pippin NBR	16:00	28	0	28
Jane at Applewood-Pippin NBT	16:00	979	32	1011
Jane at Applewood-Pippin WBT	16:00	30	2	32
Jane at Applewood-Pippin WBL	16:00	32	5	37
Jane at Applewood-Pippin WBR	16:00	138	4	142
Langstaff at Creditstone EBL	16:00	357	20	377
Langstaff at Creditstone EBR	16:00	39	6	45
Langstaff at Creditstone EBT	16:00	100	17	117
Langstaff at Creditstone SBR	16:00	190	20	210
Langstaff at Creditstone SBT	16:00	211	20	231
Langstaff at Creditstone SBL	16:00	3	1	4
Langstaff at Creditstone NBL	16:00	184	17	201
Langstaff at Creditstone NBT	16:00	490	39	529
Langstaff at Creditstone NBR	16:00	10	1	11
Langstaff at Creditstone WBT	16:00	34	1	35
Langstaff at Creditstone WBR	16:00	55	1	56
Langstaff at Creditstone WBL	16:00	12	2	14
Keele at Langstaff SBL	16:00	192	13	205
Keele at Langstaff SBT	16:00	605	61	666
Keele at Langstaff WBR	16:00	260	15	275
Keele at Langstaff WBL	16:00	293	33	326

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Keele at Langstaff NBT	16:00	1114	48	1162
Keele at Langstaff NBR	16:00	217	44	261
Keele at Bowes EBR	16:00	17	0	17
Keele at Bowes SBL	16:00	131	27	158
Keele at Bowes SBT	16:00	792	64	856
Keele at Bowes SBR	16:00	20	3	23
Keele at Bowes WBR	16:00	239	17	256
Keele at Bowes WBL	16:00	36	8	44
Keele at Bowes WBT	16:00	2	0	2
Keele at Bowes NBT	16:00	1007	84	1091
Keele at Bowes NBR	16:00	51	6	57
Keele at Bowes NBL	16:00	1	2	3
Keele at Bowes EBL	16:00	30	2	32
Keele at Bowes EBT	16:00	7	0	7
Langstaff at Planchet SBR	16:00	135	11	146
Langstaff at Planchet SBL	16:00	278	16	294
Langstaff at Planchet WBT	16:00	455	24	479
Langstaff at Planchet WBR	16:00	180	15	195
Langstaff at Planchet EBL	16:00	75	13	88
Langstaff at Planchet EBT	16:00	415	37	452
Langstaff at Connie SBL	16:00	154	4	158
Langstaff at Connie SBT	16:00	40	1	41
Langstaff at Connie SBR	16:00	189	1	190
Langstaff at Connie WBR	16:00	26	11	37
Langstaff at Connie WBL	16:00	58	4	62
Langstaff at Connie WBT	16:00	290	37	327
Langstaff at Connie NBT	16:00	27	1	28
Langstaff at Connie NBR	16:00	71	1	72
Langstaff at Connie NBL	16:00	129	2	131
Langstaff at Connie EBL	16:00	117	16	133
Langstaff at Connie EBT	16:00	493	26	519
Langstaff at Connie EBR	16:00	78	10	88
Langstaff at Rivermede SBR	16:00	20	8	28
Langstaff at Rivermede SBT	16:00	106	5	111
Langstaff at Rivermede SBL	16:00	174	2	176
Langstaff at Rivermede EBL	16:00	27	14	41
Langstaff at Rivermede EBR	16:00	29	4	33
Langstaff at Rivermede EBT	16:00	681	13	694
Langstaff at Rivermede NBT	16:00	136	4	140
Langstaff at Rivermede NBL	16:00	86	4	90
Langstaff at Rivermede NBR	16:00	283	6	289
Langstaff at Rivermede WBR	16:00	72	5	77
Langstaff at Rivermede WBT	16:00	290	32	322
Langstaff at Rivermede WBL	16:00	82	3	85
Dufferin at Confederation EBR	16:00	204	8	212
Dufferin at Confederation EBL	16:00	221	2	223
Dufferin at Confederation EBT	16:00	107	2	109
Dufferin at Confederation SBT	16:00	995	26	1021
Dufferin at Confederation SBL	16:00	67	1	68

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Confederation SBR	16:00	48	6	54
Dufferin at Confederation WBL	16:00	120	1	121
Dufferin at Confederation WBR	16:00	75	1	76
Dufferin at Confederation WBT	16:00	43	3	46
Dufferin at Confederation NBT	16:00	2023	25	2048
Dufferin at Confederation NBR	16:00	75	0	75
Dufferin at Confederation NBL	16:00	95	9	104
Langstaff at Timberview EBR	16:00	65	0	65
Langstaff at Timberview EBT	16:00	998	17	1015
Langstaff at Timberview NBR	16:00	25	0	25
Langstaff at Timberview NBL	16:00	25	0	25
Langstaff at Timberview WBL	16:00	29	0	29
Langstaff at Timberview WBT	16:00	574	18	592
Langstaff at Pleasant Ridge SBR	16:00	87	4	91
Langstaff at Pleasant Ridge SBL	16:00	66	2	68
Langstaff at Pleasant Ridge EBT	16:00	666	20	686
Langstaff at Pleasant Ridge EBL	16:00	257	1	258
Langstaff at Pleasant Ridge WBT	16:00	552	12	564
Langstaff at Pleasant Ridge WBR	16:00	175	0	175
Highway 7 at Langstaff WBT	16:00	860	61	921
Highway 7 at Langstaff SBR	16:00	45	14	59
Highway 7 at Langstaff SBL	16:00	693	8	701
Highway 7 at Langstaff EBT	16:00	1941	28	1969
407ETR North Ramp Terminal at Dufferin SBT	16:00	1358	23	1381
407ETR North Ramp Terminal at Dufferin WB (E-N/S Ramp)	16:00	397	26	423
407ETR North Ramp Terminal at Dufferin WBL	16:00	115	9	124
407ETR North Ramp Terminal at Dufferin WBR	16:00	252	14	266
407ETR North Ramp Terminal at Dufferin NBT	16:00	2141	27	2168
407ETR South Ramp Terminal at Dufferin SBR (N-E Ramp)	16:00	333	14	347
407ETR South Ramp Terminal at Dufferin SBT	16:00	1184	23	1207
407ETR South Ramp Terminal at Dufferin EB (W-N/S Ramp)	16:00	1016	23	1039
407ETR South Ramp Terminal at Dufferin EBL	16:00	451	11	462
407ETR South Ramp Terminal at Dufferin EBR	16:00	328	5	333
407ETR South Ramp Terminal at Dufferin NBT	16:00	1999	21	2020
407ETR South Ramp Terminal at Dufferin (S-E Ramp)	16:00	235	7	242
407ETR North Ramp Terminal at Dufferin (N-W Ramp)	16:00	491	22	513
Highway 7 at Langstaff EBL	16:00	202	4	206
Highway 7 at Langstaff WBR	16:00	520	14	534
407ETR North Ramp Terminal at Dufferin NBR (S-W Ramp)	16:00	252	8	260
Dufferin at Langstaff SBR	17:00	88	3	91
Dufferin at Langstaff SBT	17:00	1215	18	1233
Dufferin at Langstaff SBL	17:00	150	7	157
Dufferin at Langstaff EBR	17:00	541	12	553
Dufferin at Langstaff EBT	17:00	421	7	428
Dufferin at Langstaff EBL	17:00	203	1	204
Dufferin at Langstaff NBL	17:00	166	27	193
Dufferin at Langstaff NBR	17:00	481	11	492
Dufferin at Langstaff NBT	17:00	1612	16	1628
Dufferin at Langstaff WBT	17:00	183	13	196

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Langstaff WBL	17:00	158	2	160
Dufferin at Langstaff WBR	17:00	319	6	325
Weston at Langstaff SBR	17:00	179	1	180
Weston at Langstaff SBL	17:00	138	3	141
Weston at Langstaff SBT	17:00	391	5	396
Weston at Langstaff EBL	17:00	177	2	179
Weston at Langstaff EBT	17:00	370	17	387
Weston at Langstaff EBR	17:00	62	0	62
Weston at Langstaff WBT	17:00	995	13	1008
Weston at Langstaff WBR	17:00	286	1	287
Weston at Langstaff WBL	17:00	133	2	135
Weston at Langstaff NBL	17:00	239	0	239
Weston at Langstaff NBT	17:00	948	5	953
Weston at Langstaff NBR	17:00	107	10	117
Langstaff at Stan Gate SBR	17:00	92	0	92
Langstaff at Stan Gate SBL	17:00	24	0	24
Langstaff at Stan Gate SBT	17:00	23	0	23
Langstaff at Stan Gate WBT	17:00	1264	14	1278
Langstaff at Stan Gate WBR	17:00	75	0	75
Langstaff at Stan Gate WBL	17:00	73	0	73
Langstaff at Stan Gate NBL	17:00	47	1	48
Langstaff at Stan Gate NBT	17:00	77	0	77
Langstaff at Stan Gate NBR	17:00	49	0	49
Langstaff at Stan Gate EBL	17:00	247	0	247
Langstaff at Stan Gate EBT	17:00	530	19	549
Langstaff at Stan Gate EBR	17:00	30	0	30
Weston at Crestmount SBR	17:00	32	0	32
Weston at Crestmount EBR	17:00	34	0	34
Weston at Crestmount SBL	17:00	103	1	104
Weston at Crestmount EBL	17:00	19	0	19
Weston at Crestmount SBT	17:00	606	5	611
Weston at Crestmount EBT	17:00	17	0	17
Weston at Crestmount WBT	17:00	53	0	53
Weston at Crestmount WBR	17:00	246	0	246
Weston at Crestmount WBL	17:00	81	2	83
Weston at Crestmount NBL	17:00	63	0	63
Weston at Crestmount NBT	17:00	1328	8	1336
Weston at Crestmount NBR	17:00	41	2	43
Langstaff at Silmar SBR	17:00	90	2	92
Langstaff at Silmar SBT	17:00	89	2	91
Langstaff at Silmar SBL	17:00	225	8	233
Langstaff at Silmar EBR	17:00	78	1	79
Langstaff at Silmar EBT	17:00	609	29	638
Langstaff at Silmar EBL	17:00	106	6	112
Langstaff at Silmar NBL	17:00	208	4	212
Langstaff at Silmar NBR	17:00	418	4	422
Langstaff at Silmar NBT	17:00	266	11	277
Langstaff at Silmar WBT	17:00	1345	20	1365
Langstaff at Silmar WBL	17:00	178	7	185

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Langstaff at Silmar WBR	17:00	322	12	334
Weston at Gregory WBR	17:00	215	0	215
Weston at Gregory WBT	17:00	143	1	144
Weston at Gregory WBL	17:00	144	0	144
Weston at Gregory SBL	17:00	54	2	56
Weston at Gregory SBR	17:00	33	0	33
Weston at Gregory SBT	17:00	570	20	590
Weston at Gregory EBT	17:00	11	0	11
Weston at Gregory EBL	17:00	26	0	26
Weston at Gregory EBR	17:00	15	1	16
Weston at Gregory NBR	17:00	56	0	56
Weston at Gregory NBT	17:00	1229	13	1242
Weston at Gregory NBL	17:00	61	0	61
Hwy 400 East Ramp Terminal at Langstaff EBT	17:00	778	32	810
Hwy 400 East Ramp Terminal at Langstaff WBT	17:00	1687	52	1739
Hwy 400 East Ramp Terminal at Langstaff NBL	17:00	559	17	576
Hwy 400 East Ramp Terminal at Langstaff NBR	17:00	447	55	502
Langstaff at Edgeley WBR	17:00	19	4	23
Langstaff at Edgeley WBT	17:00	765	21	786
Langstaff at Edgeley WBL	17:00	23	0	23
Langstaff at Edgeley SBR	17:00	496	4	500
Langstaff at Edgeley SBT	17:00	155	3	158
Langstaff at Edgeley SBL	17:00	31	2	33
Langstaff at Edgeley EBL	17:00	231	14	245
Langstaff at Edgeley EBR	17:00	84	5	89
Langstaff at Edgeley EBT	17:00	811	55	866
Langstaff at Edgeley NBT	17:00	339	9	348
Langstaff at Edgeley NBL	17:00	306	3	309
Langstaff at Edgeley NBR	17:00	82	1	83
Langstaff at Millway EBR	17:00	44	4	48
Langstaff at Millway EBT	17:00	746	60	806
Langstaff at Millway EBL	17:00	128	10	138
Langstaff at Millway WBL	17:00	27	4	31
Langstaff at Millway WBT	17:00	747	49	796
Langstaff at Millway WBR	17:00	11	0	11
Langstaff at Millway NBL	17:00	122	6	128
Langstaff at Millway NBR	17:00	22	1	23
Langstaff at Millway NBT	17:00	32	7	39
Langstaff at Millway SBT	17:00	12	2	14
Langstaff at Millway SBR	17:00	52	1	53
Langstaff at Millway SBL	17:00	2	1	3
Jane at Langstaff WBR	17:00	65	0	65
Jane at Langstaff WBT	17:00	411	20	431
Jane at Langstaff WBL	17:00	56	5	61
Jane at Langstaff SBL	17:00	30	5	35
Jane at Langstaff SBR	17:00	152	5	157
Jane at Langstaff SBT	17:00	471	19	490
Jane at Langstaff EBT	17:00	433	44	477
Jane at Langstaff EBL	17:00	265	5	270

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Jane at Langstaff EBR	17:00	72	2	74
Jane at Langstaff NBR	17:00	41	7	48
Jane at Langstaff NBT	17:00	1030	23	1053
Jane at Langstaff NBL	17:00	145	1	146
Jane at Courtland-Edilcan SBL	17:00	22	2	24
Jane at Courtland-Edilcan SBT	17:00	600	30	630
Jane at Courtland-Edilcan SBR	17:00	32	4	36
Jane at Courtland-Edilcan WBR	17:00	69	4	73
Jane at Courtland-Edilcan WBL	17:00	38	1	39
Jane at Courtland-Edilcan WBT	17:00	58	9	67
Jane at Courtland-Edilcan NBT	17:00	1331	27	1358
Jane at Courtland-Edilcan NBR	17:00	11	4	15
Jane at Courtland-Edilcan NBL	17:00	25	5	30
Jane at Courtland-Edilcan EBL	17:00	157	1	158
Jane at Courtland-Edilcan EBT	17:00	40	2	42
Jane at Courtland-Edilcan EBR	17:00	46	5	51
Jane at Applewood-Pippin SBR	17:00	28	0	28
Jane at Applewood-Pippin SBT	17:00	590	19	609
Jane at Applewood-Pippin SBL	17:00	23	4	27
Jane at Applewood-Pippin EBR	17:00	34	0	34
Jane at Applewood-Pippin EBT	17:00	62	4	66
Jane at Applewood-Pippin EBL	17:00	127	1	128
Jane at Applewood-Pippin NBL	17:00	30	2	32
Jane at Applewood-Pippin NBR	17:00	26	0	26
Jane at Applewood-Pippin NBT	17:00	935	31	966
Jane at Applewood-Pippin WBT	17:00	38	2	40
Jane at Applewood-Pippin WBL	17:00	32	5	37
Jane at Applewood-Pippin WBR	17:00	112	3	115
Langstaff at Creditstone EBL	17:00	353	20	373
Langstaff at Creditstone EBR	17:00	37	6	43
Langstaff at Creditstone EBT	17:00	97	17	114
Langstaff at Creditstone SBR	17:00	174	18	192
Langstaff at Creditstone SBT	17:00	153	14	167
Langstaff at Creditstone SBL	17:00	5	2	7
Langstaff at Creditstone NBL	17:00	179	16	195
Langstaff at Creditstone NBT	17:00	497	40	537
Langstaff at Creditstone NBR	17:00	8	1	9
Langstaff at Creditstone WBT	17:00	20	1	21
Langstaff at Creditstone WBR	17:00	41	1	42
Langstaff at Creditstone WBL	17:00	14	2	16
Keele at Langstaff SBL	17:00	194	13	207
Keele at Langstaff SBT	17:00	536	54	590
Keele at Langstaff WBR	17:00	219	13	232
Keele at Langstaff WBL	17:00	268	30	298
Keele at Langstaff NBT	17:00	923	40	963
Keele at Langstaff NBR	17:00	221	45	266
Keele at Bowes EBR	17:00	9	0	9
Keele at Bowes SBL	17:00	122	24	146
Keele at Bowes SBT	17:00	709	58	767

## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Keele at Bowes SBR	17:00	7	1	8
Keele at Bowes WBR	17:00	176	13	189
Keele at Bowes WBL	17:00	33	7	40
Keele at Bowes WBT	17:00	2	0	2
Keele at Bowes NBT	17:00	913	76	989
Keele at Bowes NBR	17:00	32	4	36
Keele at Bowes NBL	17:00	2	3	5
Keele at Bowes EBL	17:00	10	1	11
Keele at Bowes EBT	17:00	6	0	6
Langstaff at Planchet SBR	17:00	95	8	103
Langstaff at Planchet SBL	17:00	189	11	200
Langstaff at Planchet WBT	17:00	428	23	451
Langstaff at Planchet WBR	17:00	234	20	254
Langstaff at Planchet EBL	17:00	97	17	114
Langstaff at Planchet EBT	17:00	387	34	421
Langstaff at Connie SBL	17:00	164	4	168
Langstaff at Connie SBT	17:00	67	1	68
Langstaff at Connie SBR	17:00	145	1	146
Langstaff at Connie WBR	17:00	24	10	34
Langstaff at Connie WBL	17:00	52	4	56
Langstaff at Connie WBT	17:00	346	45	391
Langstaff at Connie NBT	17:00	32	1	33
Langstaff at Connie NBR	17:00	72	1	73
Langstaff at Connie NBL	17:00	93	1	94
Langstaff at Connie EBL	17:00	108	15	123
Langstaff at Connie EBT	17:00	445	23	468
Langstaff at Connie EBR	17:00	37	5	42
Langstaff at Rivermede SBR	17:00	29	10	39
Langstaff at Rivermede SBT	17:00	76	4	80
Langstaff at Rivermede SBL	17:00	157	2	159
Langstaff at Rivermede EBL	17:00	17	9	26
Langstaff at Rivermede EBR	17:00	23	3	26
Langstaff at Rivermede EBT	17:00	668	13	681
Langstaff at Rivermede NBT	17:00	136	4	140
Langstaff at Rivermede NBL	17:00	88	4	92
Langstaff at Rivermede NBR	17:00	229	5	234
Langstaff at Rivermede WBR	17:00	76	6	82
Langstaff at Rivermede WBT	17:00	322	35	357
Langstaff at Rivermede WBL	17:00	64	2	66
Dufferin at Confederation EBR	17:00	183	7	190
Dufferin at Confederation EBL	17:00	217	2	219
Dufferin at Confederation EBT	17:00	106	2	108
Dufferin at Confederation SBT	17:00	900	24	924
Dufferin at Confederation SBL	17:00	92	1	93
Dufferin at Confederation SBR	17:00	30	4	34
Dufferin at Confederation WBL	17:00	100	1	101
Dufferin at Confederation WBR	17:00	105	1	106
Dufferin at Confederation WBT	17:00	34	2	36
Dufferin at Confederation NBT	17:00	1980	25	2005

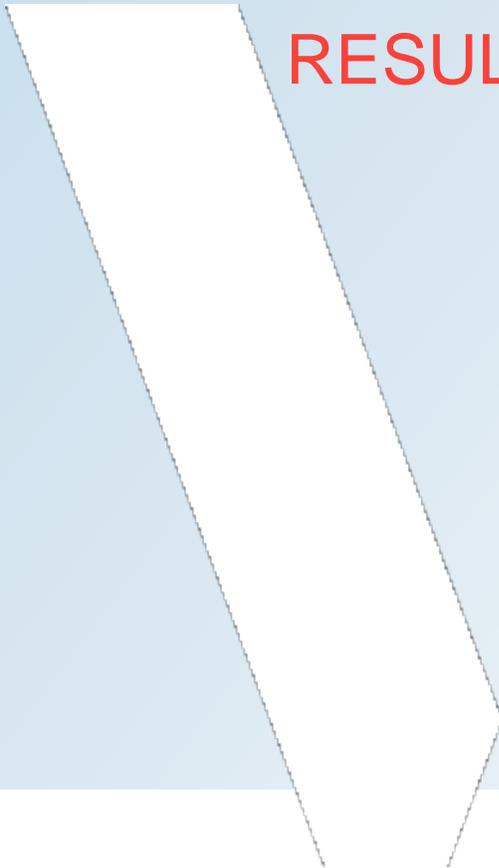
## Existing PM 3-6 Langstaff Turns.csv

Name	Start Hour	Car Count	Truck Count	Total Count
Dufferin at Confederation NBR	17:00	92	0	92
Dufferin at Confederation NBL	17:00	79	7	86
Langstaff at Timberview EBR	17:00	64	0	64
Langstaff at Timberview EBT	17:00	1039	18	1057
Langstaff at Timberview NBR	17:00	25	0	25
Langstaff at Timberview NBL	17:00	28	0	28
Langstaff at Timberview WBL	17:00	35	0	35
Langstaff at Timberview WBT	17:00	636	20	656
Langstaff at Pleasant Ridge SBR	17:00	85	3	88
Langstaff at Pleasant Ridge SBL	17:00	45	2	47
Langstaff at Pleasant Ridge EBT	17:00	646	19	665
Langstaff at Pleasant Ridge EBL	17:00	344	1	345
Langstaff at Pleasant Ridge WBT	17:00	501	11	512
Langstaff at Pleasant Ridge WBR	17:00	210	0	210
Highway 7 at Langstaff WBT	17:00	802	57	859
Highway 7 at Langstaff SBR	17:00	42	13	55
Highway 7 at Langstaff SBL	17:00	701	8	709
Highway 7 at Langstaff EBT	17:00	1982	28	2010
407ETR North Ramp Terminal at Dufferin SBT	17:00	1413	24	1437
407ETR North Ramp Terminal at Dufferin WB (E-N/S Ramp)	17:00	406	27	433
407ETR North Ramp Terminal at Dufferin WBL	17:00	134	11	145
407ETR North Ramp Terminal at Dufferin WBR	17:00	256	14	270
407ETR North Ramp Terminal at Dufferin NBT	17:00	2221	28	2249
407ETR South Ramp Terminal at Dufferin SBR (N-E Ramp)	17:00	338	14	352
407ETR South Ramp Terminal at Dufferin SBT	17:00	1245	24	1269
407ETR South Ramp Terminal at Dufferin EB (W-N/S Ramp)	17:00	1139	26	1165
407ETR South Ramp Terminal at Dufferin EBL	17:00	507	12	519
407ETR South Ramp Terminal at Dufferin EBR	17:00	470	7	477
407ETR South Ramp Terminal at Dufferin NBT	17:00	2246	23	2269
407ETR South Ramp Terminal at Dufferin (S-E Ramp)	17:00	232	7	239
407ETR North Ramp Terminal at Dufferin (N-W Ramp)	17:00	502	22	524
Highway 7 at Langstaff EBL	17:00	223	5	228
Highway 7 at Langstaff WBR	17:00	568	16	584
407ETR North Ramp Terminal at Dufferin NBR (S-W Ramp)	17:00	238	8	246

# APPENDIX

**D**

DETAILED SUMMARY OF  
MICROSIMULATION EXISTING  
RESULTS



## MICROSIMULATION RESULTS - EXISTING

INTERSECTION (TYPE) AND MOVEMENT	AM PEAK HOUR			PM PEAK HOUR		
	DELAY	LOS	95 <sup>TH</sup> QUEUE	DELAY	LOS	95 <sup>TH</sup> QUEUE
<b>Langstaff Rd at Stan Gate/ Valeria Blvd (Signalized)</b>	<b>11 s</b>	<b>B</b>		<b>19 s</b>	<b>B</b>	
Eastbound Left	10 s	A	17 m	77 s	E	76 m
Eastbound Through	8 s	A	81 m	9 s	A	36 m
Eastbound Right	11 s	B	14 m	7 s	A	13 m
Westbound Left	30 s	C	22 m	15 s	B	16 m
Westbound Through	12 s	B	30 m	10 s	A	50 m
Westbound Right	5 s	A	7 m	15 s	B	25 m
Northbound Left	58 s	E	23 m	59 s	E	38 m
Northbound Through/Right	70/16 s	E/B	23 m	51/17 s	D/B	22 m
Southbound Left	52 s	D	15 m	59 s	E	15 m
Southbound Through/Right	60/16 s	E/B	44 m	52/22 s	D/C	26 m
<b>Weston Rd at Langstaff Rd (Signalized)</b>	<b>35 s</b>	<b>C</b>		<b>59 s</b>	<b>E</b>	
Eastbound Left	33 s	C	47 m	187 s	F	105 m
Eastbound Through	41 s	D	109 m	53 s	D	52 m
Eastbound Right	26 s	C	46 m	16 s	B	25 m
Westbound Left	87 s	F	61 m	67 s	E	89 m
Westbound Through	24 s	C	25 m	64 s	E	158 m
Westbound Right	8 s	A	29 m	55 s	D	97 m
Northbound Left	27 s	C	29 m	90 s	F	114 m
Northbound Through	35 s	D	29 m	57 s	E	183 m
Northbound Right	19 s	B	76 m	43 s	D	71 m
Southbound Left	38 s	D	81 m	77 s	E	45 m
Southbound Through	36 s	D	68 m	27 s	C	43 m
Southbound Right	17 s	B	30 m	16 s	B	38 m
<b>Langstaff Rd at Silmar Dr/ Terecar Dr (Signalized)</b>	<b>18 s</b>	<b>B</b>		<b>36 s</b>	<b>D</b>	
Eastbound Left	20 s	C	14 m	64 s	E	18 m
Eastbound Through	17 s	B	99 m	6 s	A	22 m
Eastbound Right	19 s	B	37 m	8 s	A	16 m
Westbound Left	25 s	C	45 m	44 s	D	36 m
Westbound Through	5 s	C	25 m	43 s	D	242 m
Westbound Right	7 s	A	18 m	46 s	D	96 m
Northbound Left	60 s	E	133 m	53 s	D	45 m
Northbound Through/Right	54/18 s	D/B	32 m	55/13 s	D/B	53 m
Southbound Left	60 s	E	28 m	47 s	D	31 m
Southbound Through/Right	58/17 s	E/B	19 m	42/28 s	D/C	28 m

INTERSECTION (TYPE) AND MOVEMENT	AM PEAK HOUR			PM PEAK HOUR		
	DELAY	LOS	95 <sup>TH</sup> QUEUE	DELAY	LOS	95 <sup>TH</sup> QUEUE
<b>Hwy 400 East Ramp Terminal at Langstaff Rd (Signalized)</b>	<b>13 s</b>	<b>B</b>		<b>35 s</b>	<b>C</b>	
Eastbound Through	5 s	A	50 m	21 s	C	60 m
Westbound Through	8 s	A	44 m	17 s	B	89 m
Northbound Left	48 s	D	42 m	91 s	F	170 m
Northbound Right	33 s	C	87 m	35 s	D	104 m
<b>Langstaff Rd at Edgeley Blvd (Signalized)</b>	<b>14 s</b>	<b>B</b>		<b>28 s</b>	<b>C</b>	
Eastbound Left	15 s	B	47 m	70 s	E	52 m
Eastbound Through	9 s	A	40 m	13 s	B	39 m
Eastbound Right	12 s	B	46 m	9 s	A	20 m
Westbound Left	30 s	C	5 m	38 s	D	7 m
Westbound Through	14 s	B	37 m	23 s	C	90 m
Westbound Right	18 s	B	5 m	22 s	C	8 m
Northbound Left	56 s	E	39 m	45 s	D	75 m
Northbound Through	65 s	E	4 m	36 s	D	24 m
Northbound Right	59 s	E	9 m	33 s	C	22 m
Southbound Left	49 s	D	7 m	35 s	C	8 m
Southbound Through/Right	56/14 s	E/B	53 m	46/40 s	D/D	105 m
<b>Langstaff Rd at Millway Ave (Signalized)</b>	<b>8 s</b>	<b>A</b>		<b>14 s</b>	<b>B</b>	
Eastbound Left	9 s	A	21 m	37 s	D	42 m
Eastbound Through	5 s	A	34 m	10 s	A	49 m
Eastbound Right	8 s	A	29 m	7 s	A	16 m
Westbound Left	13 s	B	12 m	16 s	B	10 m
Westbound Through	3 s	A	14 m	7 s	A	38 m
Westbound Right	7 s	A	1 m	8 s	A	6 m
Northbound Left	59 s	E	33 m	60 s	E	37 m
Northbound Through/Right	63/26 s	E/C	12 m	58/27 s	E/C	21 m
Southbound Left	61 s	E	3 m	57 s	E	12 m
Southbound Through/Right	63/17 s	E/B	15 m	61/24 s	E/C	48 m
<b>Jane St at Langstaff Rd (Signalized)</b>	<b>24 s</b>	<b>C</b>		<b>32 s</b>	<b>C</b>	
Eastbound Left	70 s	E	55 m	75 s	E	90 m
Eastbound Through	56 s	E	37 m	46 s	D	41 m
Eastbound Right	22 s	C	86 m	12 s	B	36 m
Westbound Left	45 s	D	32 m	53 s	D	40 m
Westbound Through/Right	49/29 s	D/C	32 m	49/34 s	D/C	63 m
Northbound Left	24 s	C	28 m	32 s	C	65 m
Northbound Through	15 s	B	32 m	11 s	B	52 m
Northbound Right	9 s	A	2 m	9 s	A	5 m
Southbound Left	15 s	B	9 m	39 s	D	16 m

INTERSECTION (TYPE) AND MOVEMENT	AM PEAK HOUR			PM PEAK HOUR		
	DELAY	LOS	95 <sup>TH</sup> QUEUE	DELAY	LOS	95 <sup>TH</sup> QUEUE
Southbound Through	9 s	A	52 m	35 s	D	39 m
Southbound Right	9 s	A	29 m	25 s	C	65 m
<b>Langstaff Rd at Creditstone Rd (Signalized)</b>	<b>11 s</b>	<b>B</b>		<b>13 s</b>	<b>B</b>	
Eastbound Left	30 s	C	34 m	39 s	D	60 m
Eastbound Through/Right	27/14 s	C/B	24 m	24/10 s	C/B	23 m
Westbound Left	32 s	C	3 m	28 s	C	1 m
Westbound Through/Right	28/9 s	C/A	14 m	16/10 s	B/B	19 m
Northbound Left	9 s	A	11 m	13 s	B	26 m
Northbound Through/Right	3/0 s	A/A	14 m	9/0 s	A/A	38 m
Southbound Left	12 s	B	22 m	17 s	B	9 m
Southbound Through/Right	10/8 s	B/A	51 m	8/9 s	A/A	38 m
<b>Keele St at Langstaff Rd (Signalized)</b>	<b>18 s</b>	<b>B</b>		<b>13 s</b>	<b>B</b>	
Eastbound Left	0 s	A	0 m	0 s	A	0 m
Eastbound Through/Right	0/0 s	A/A	0 m	0/0 s	A/A	0 m
Westbound Left	59 s	E	64 m	46 s	D	75 m
Westbound Through/Right	0/15 s	A/B	40 m	0/18 s	A/B	36 m
Northbound Left	0 s	A	0 m	0 s	A	0 m
Northbound Through	6 s	A	16 m	7 s	A	47 m
Northbound Right	6 s	A	21 m	8 s	A	15 m
Southbound Left	27 s	C	97 m	28 s	C	47 m
Southbound Through	16 s	B	104 m	10 s	B	46 m
Southbound Right	0 s	A	0 m	0 s	A	0 m
<b>Langstaff Rd at Planchet Rd (Signalized)</b>	<b>11 s</b>	<b>B</b>		<b>21 s</b>	<b>C</b>	
Eastbound Left	11 s	B	15 m	21 s	C	14 m
Eastbound Through	8 s	A	60 m	9 s	A	35 m
Westbound Through	9 s	A	45 m	11 s	B	56 m
Westbound Right	9 s	A	76 m	11 s	B	92 m
Southbound Left/Right	56/26 s	E/C	36 m	56/50 s	E/D	52 m
<b>Langstaff Rd at Connie Cres/ Spinnaker Way (Signalized)</b>	<b>20 s</b>	<b>C</b>		<b>235 s</b>	<b>F</b>	
Eastbound Left	28 s	C	51 m	15 s	B	20 m
Eastbound Through	10 s	B	48 m	15 s	B	60 m
Eastbound Right	9 s	A	51 m	11 s	B	97 m
Westbound Left	16 s	B	7 m	25 s	C	11 m
Westbound Through	19 s	B	89 m	10 s	A	45 m
Westbound Right	14 s	B	30 m	8 s	A	12 m
Northbound Left	58 s	E	19 m	46 s	D	13 m
Northbound Through/Right	55/9 s	E/A	16 m	49/14 s	D/B	40 m
Southbound Left	62 s	E	65 m	624 s	F	79 m

INTERSECTION (TYPE) AND MOVEMENT	AM PEAK HOUR			PM PEAK HOUR		
	DELAY	LOS	95 <sup>TH</sup> QUEUE	DELAY	LOS	95 <sup>TH</sup> QUEUE
Southbound Through/Right	62/15 s	E/B	28 m	0/581 s	A/F	630 m
<b>Langstaff Rd at North Rivermede Rd/ Staffern Dr (Signalized)</b>	<b>31 s</b>	<b>C</b>		<b>27 s</b>	<b>C</b>	
Eastbound Left	30 s	C	14 m	24 s	C	24 m
Eastbound Through	17 s	B	78 m	20 s	C	109 m
Eastbound Right	19 s	B	19 m	18 s	B	25 m
Westbound Left	28 s	C	32 m	16 s	B	10 m
Westbound Through	24 s	C	133 m	12 s	B	36 m
Westbound Right	21 s	C	21 m	8 s	A	8 m
Northbound Left	95 s	F	66 m	62 s	E	58 m
Northbound Through/Right	55/33 s	E/C	74 m	63/45 s	E/D	102 m
Southbound Left	47 s	D	41 m	50 s	D	23 m
Southbound Through/Right	51/41 s	D/D	91 m	41/17 s	D/B	30 m
<b>Dufferin St at Langstaff Rd (Signalized)</b>	<b>72 s</b>	<b>E</b>		<b>63 s</b>	<b>E</b>	
Eastbound Left	56 s	E	27 m	60 s	E	101 m
Eastbound Through/Right	49/50 s	D/D	115 m	53/49 s	D/D	96 m
Westbound Left	134 s	F	165 m	73 s	E	69 m
Westbound Through/Right	54/49 s	D/D	82 m	40/44 s	D/D	40 m
Northbound Left	151 s	F	194 m	119 s	F	84 m
Northbound Through	27 s	C	90 m	98 s	F	296 m
Northbound Right	9 s	A	19 m	47 s	D	129 m
Southbound Left	100 s	F	34 m	105 s	F	22 m
Southbound Through/Right	101/88 s	F/F	281 m	25/19 s	C/B	82 m
<b>Langstaff Rd at Timberview Dr (Stop-controlled)</b>	<b>10 s</b>	<b>B</b>		<b>9 s</b>	<b>A</b>	
Westbound Left	7 s	A	2 m	19 s	C	9 m
Northbound Left	14 s	B	17 m	20 s	C	14 m
Northbound Right	10 s	A	23 m	13 s	B	6 m
<b>Langstaff Rd at Pleasant Ridge Ave (Signalized)</b>	<b>15 s</b>	<b>B</b>		<b>10 s</b>	<b>B</b>	
Eastbound Left	13 s	B	21 m	18 s	B	56 m
Eastbound Through	9 s	A	45 m	7 s	A	57 m
Westbound Through	7 s	A	22 m	4 s	A	20 m
Westbound Right	5 s	A	12 m	5 s	A	23 m
Southbound Left	47 s	D	62 m	48 s	D	24 m
Southbound Right	12 s	B	43 m	8 s	A	6 m
<b>Highway 7 at Langstaff Rd (Signalized)</b>	<b>12 s</b>	<b>B</b>		<b>16 s</b>	<b>B</b>	
Eastbound Left	40 s	D	9 m	30 s	C	36 m
Eastbound Through	11 s	B	38 m	10 s	A	55 m
Westbound Through	5 s	A	72 m	9 s	A	37 m

INTERSECTION (TYPE) AND MOVEMENT	AM PEAK HOUR			PM PEAK HOUR		
	DELAY	LOS	95 <sup>TH</sup> QUEUE	DELAY	LOS	95 <sup>TH</sup> QUEUE
Westbound Right	0 s	A	3 m	0 s	A	4 m
Southbound Left	51 s	D	72 m	50 s	D	79 m
Southbound Right	27 s	C	33 m	19 s	B	20 m

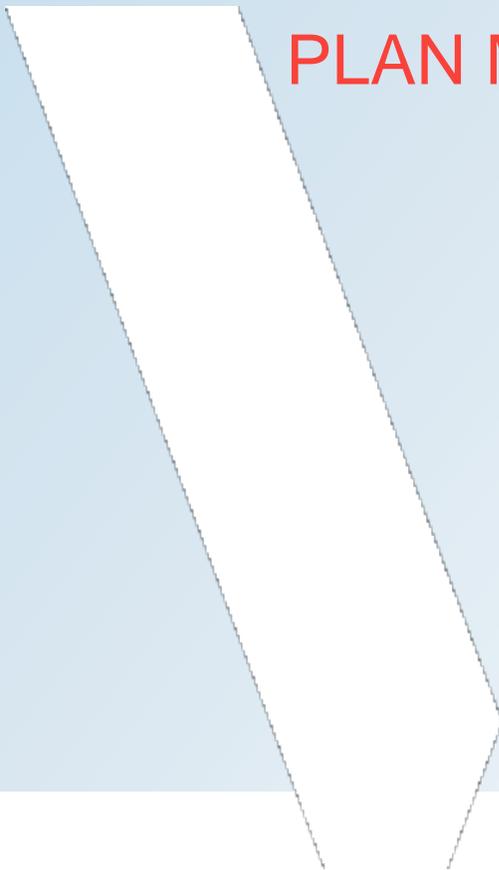
## RAMP TERMINAL INTERSECTIONS

INTERSECTION (TYPE) AND MOVEMENT	AM PEAK HOUR			PM PEAK HOUR		
	DELAY	LOS	95 <sup>TH</sup> QUEUE	DELAY	LOS	95 <sup>TH</sup> QUEUE
<b>Highway 400/Highway 7 Interchange West Ramp Terminal (Signalized)</b>	<b>34 s</b>	<b>C</b>		<b>29 s</b>	<b>C</b>	
Eastbound Through	16 s	B	78 m	24 s	C	93 m
Westbound Through	13 s	B	65 m	17 s	B	75 m
Northbound Right	70 s	E	31 m	104 s	F	64 m
Southbound Left/Through/Right	59/75/46 s	E/E/D	141 m	54/50/30 s	D/D/C	106 m
<b>Highway 400/Highway 7 Interchange East Ramp Terminal (Signalized)</b>	<b>15 s</b>	<b>B</b>		<b>18 s</b>	<b>B</b>	
Eastbound Through	9 s	A	54 m	9 s	A	37 m
Westbound Through	5 s	A	28 m	4 s	A	27 m
Northbound Left	49 s	D	76 m	55 s	D	106 m
Northbound Right	20 s	B	50 m	14 s	B	27 m
<b>Highway 400/Rutherford Rd Interchange West Ramp Terminal (Signalized)</b>	<b>15 s</b>	<b>B</b>		<b>16 s</b>	<b>B</b>	
Eastbound Through	8 s	A	67 m	11 s	B	88 m
Westbound Through	7 s	A	51 m	6 s	A	47 m
Southbound Left	59 s	E	70 m	60 s	E	64 m
Southbound Right	12 s	B	14 m	16 s	B	7 m
<b>Highway 400/Rutherford Rd Interchange East Ramp Terminal (Signalized)</b>	<b>29 s</b>	<b>C</b>		<b>57 s</b>	<b>E</b>	
Eastbound Left	88 s	F	22 m	202 s	F	11 m
Eastbound Through	20 s	C	86 m	25 s	C	93 m
Westbound Through	22 s	C	74 m	25 s	C	98 m
Westbound Right	2 s	A	30 m	18 s	B	31 m
Northbound Left/Through/Right	55/57/38 s	D/E/D	87 m	177/106/61 s	F/F/E	282 m
Southbound Left	78 s	E	20 m	46 s	D	5 m
Southbound Right	23 s	C	97 m	47 s	D	88 m

# APPENDIX

# E

2016 YORK REGION  
TRANSPORTATION MASTER  
PLAN MAPS

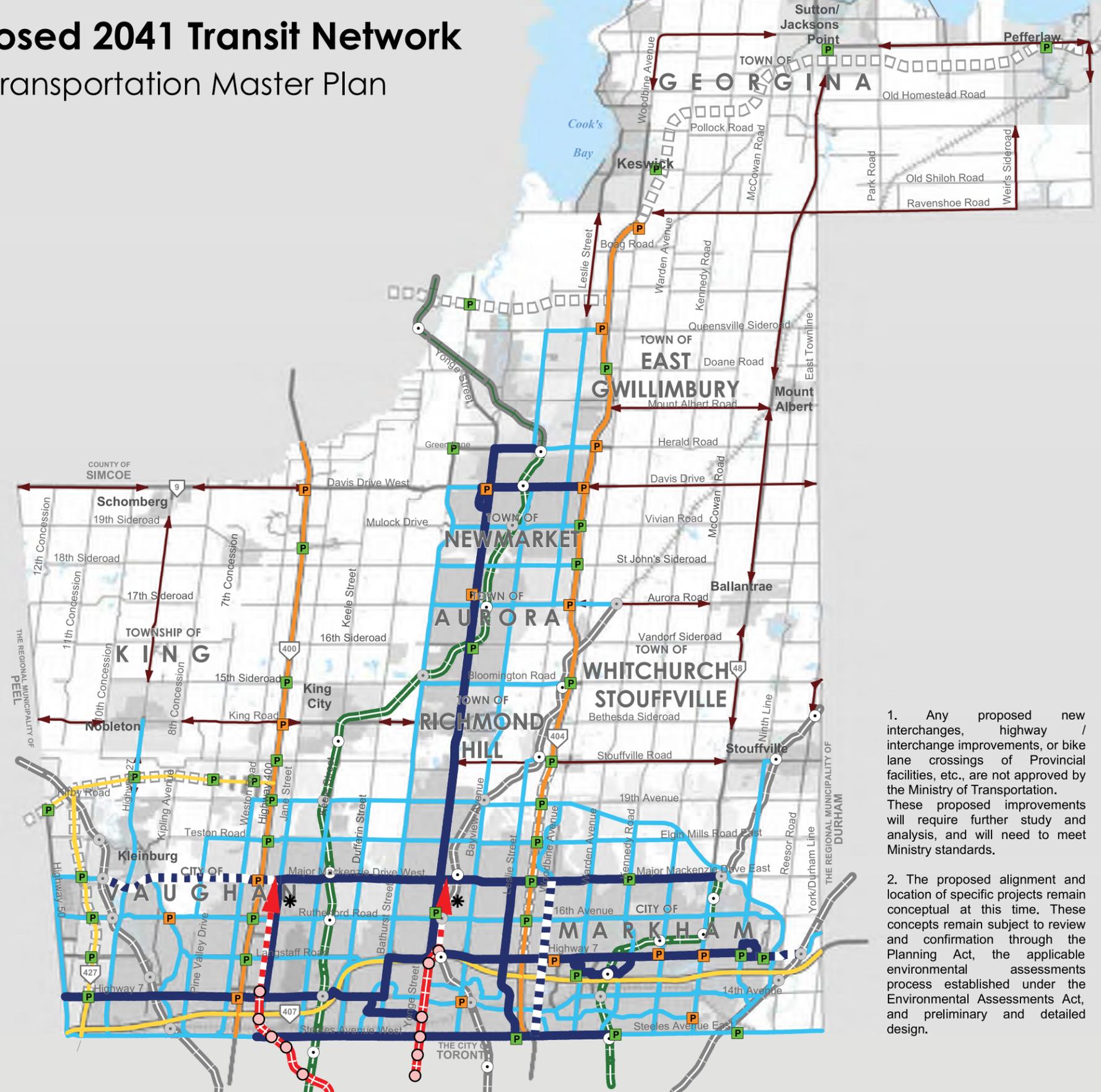


# Proposed 2041 Transit Network

## Transportation Master Plan

# MAP 7

Thursday, May 12, 2016



- Rapid Transit Corridor
- Rapid Transit Subject to Further Study
- Frequent Transit Network
- Highway Bus Service (YRT/Viva, GO)
- Transitway
- Rural Bus Connections
- Subway Extension
- Potential Subway Extension to be Determined by Future Study
- Future Subway Station
- GO Train, 15-min Two Way All Day Service
- GO Train, Two Way All Day Service
- GO Train, Rush Hour Service
- Existing GO Station
- Potential GO Station
- Existing Commuter Lots
- Potential Commuter Lots

**Note:**

- Special Study Area

**BASE MAP INFORMATION**

- Provincial Freeway
- Provincial Highway
- Road
- Railway



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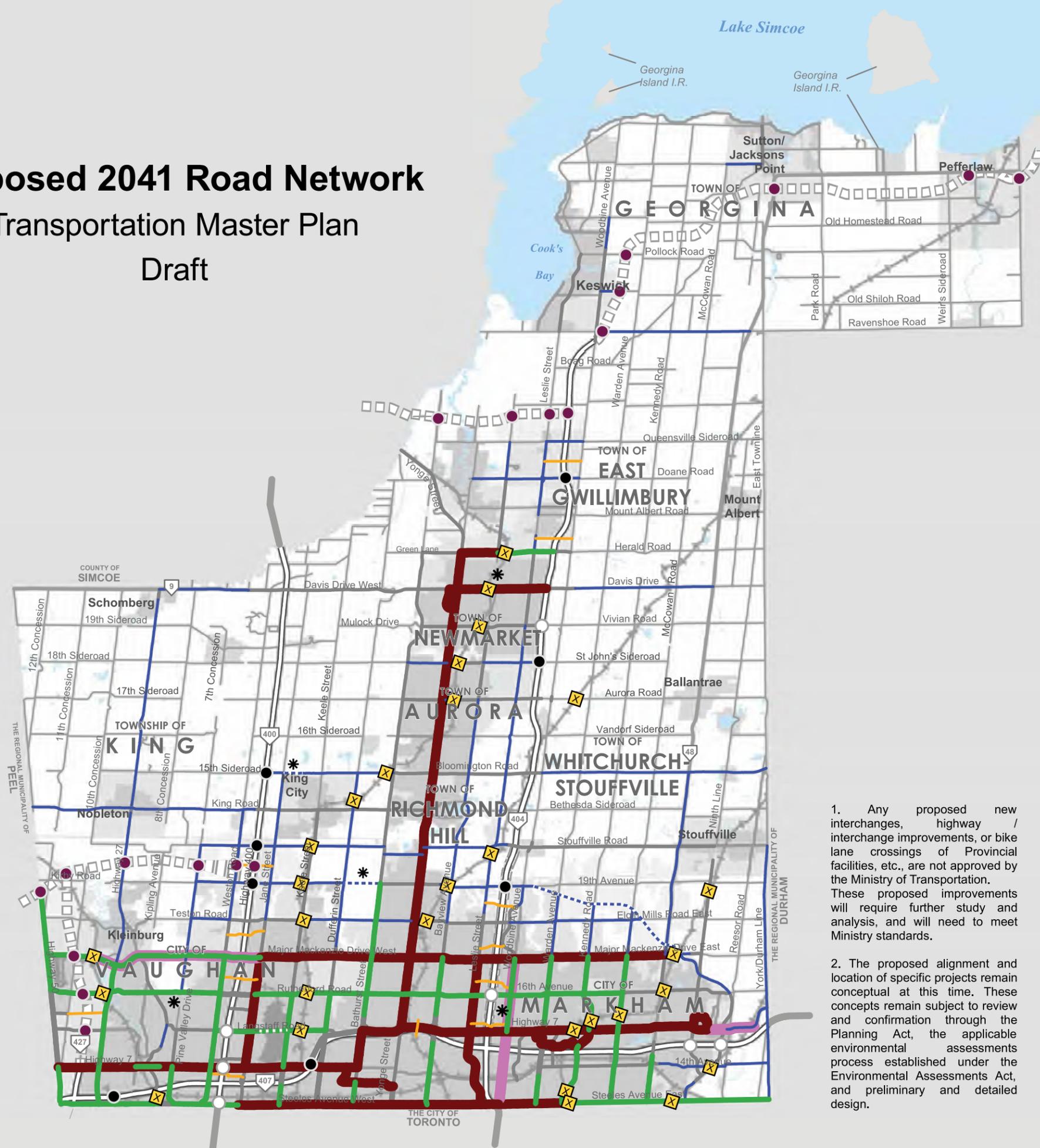
1. Any proposed new interchanges, highway / interchange improvements, or bike lane crossings of Provincial facilities, etc., are not approved by the Ministry of Transportation. These proposed improvements will require further study and analysis, and will need to meet Ministry standards.

2. The proposed alignment and location of specific projects remain conceptual at this time. These concepts remain subject to review and confirmation through the Planning Act, the applicable environmental assessments process established under the Environmental Assessments Act, and preliminary and detailed design.

# Proposed 2041 Road Network

## Transportation Master Plan

### Draft



# MAP 8

Thursday, May 12, 2016

## 4 Lane Network

- Proposed Future 4 Lane Widening
- Existing 4 Lane Road
- Proposed New 4 Lane Road

## 6 Lane Network

- Proposed Future 6 Lane Widening
- Existing 6 Lane Road
- Proposed New 6 Lane Road

## Note:

- \* Special Study Area

## Interchange Improvements (to be confirmed by MTO)

- Future Interchange on Existing Freeway
- Future Interchange on Future Freeway
- Other Interchange Improvement

## Other Improvements

- Rapid Transit
- Rapid Transit Subject to Further Study
- Midblock Crossing
- Proposed Grade Separation (Road Classification Study to identify grade separations on collector roads)

## BASE MAP INFORMATION

- Provincial Freeway
- Provincial Highway
- Road
- Railway



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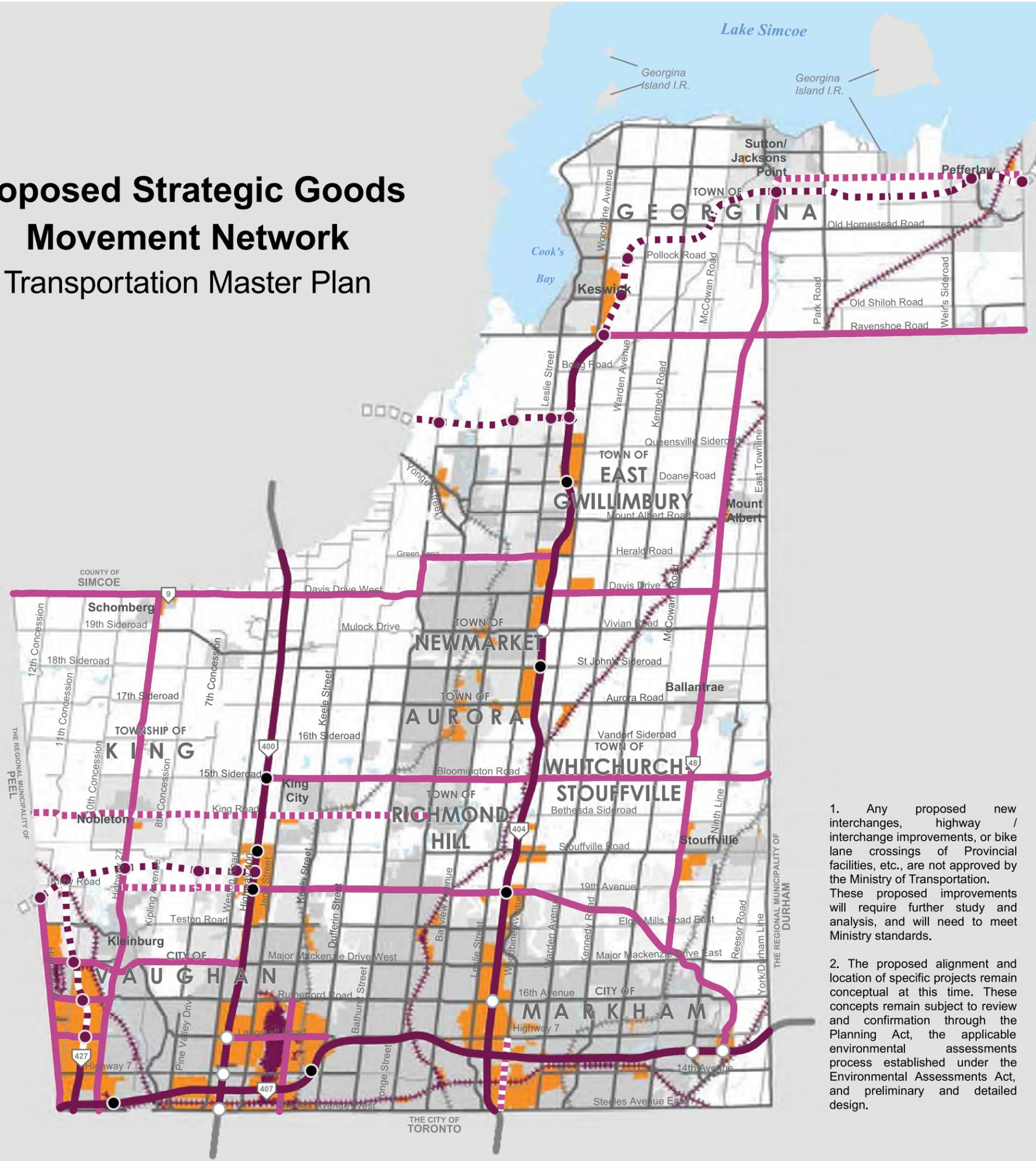
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# Proposed Strategic Goods Movement Network

## Transportation Master Plan



# MAP 11

Thursday, May 12, 2016

### Strategic Goods Movement Corridors

#### Tier 1

- Highway Goods Movement Corridor
- Future Highway Goods Movement Corridor
- Railway

#### Tier 2

- Interim Primary Arterial Goods Movement Corridor
- Primary Arterial Goods Movement Corridor

#### Tier 3

- Secondary Goods Movement Corridor

### Interchange Improvements (to be confirmed by MTO)

- Future Interchange on Existing Freeway
- Future Interchange on Future Freeway
- Other Interchange Improvement
- Employment Areas (as of mid-2013)

### BASE MAP INFORMATION

- Provincial Freeway
- Provincial Highway
- Road
- Railway



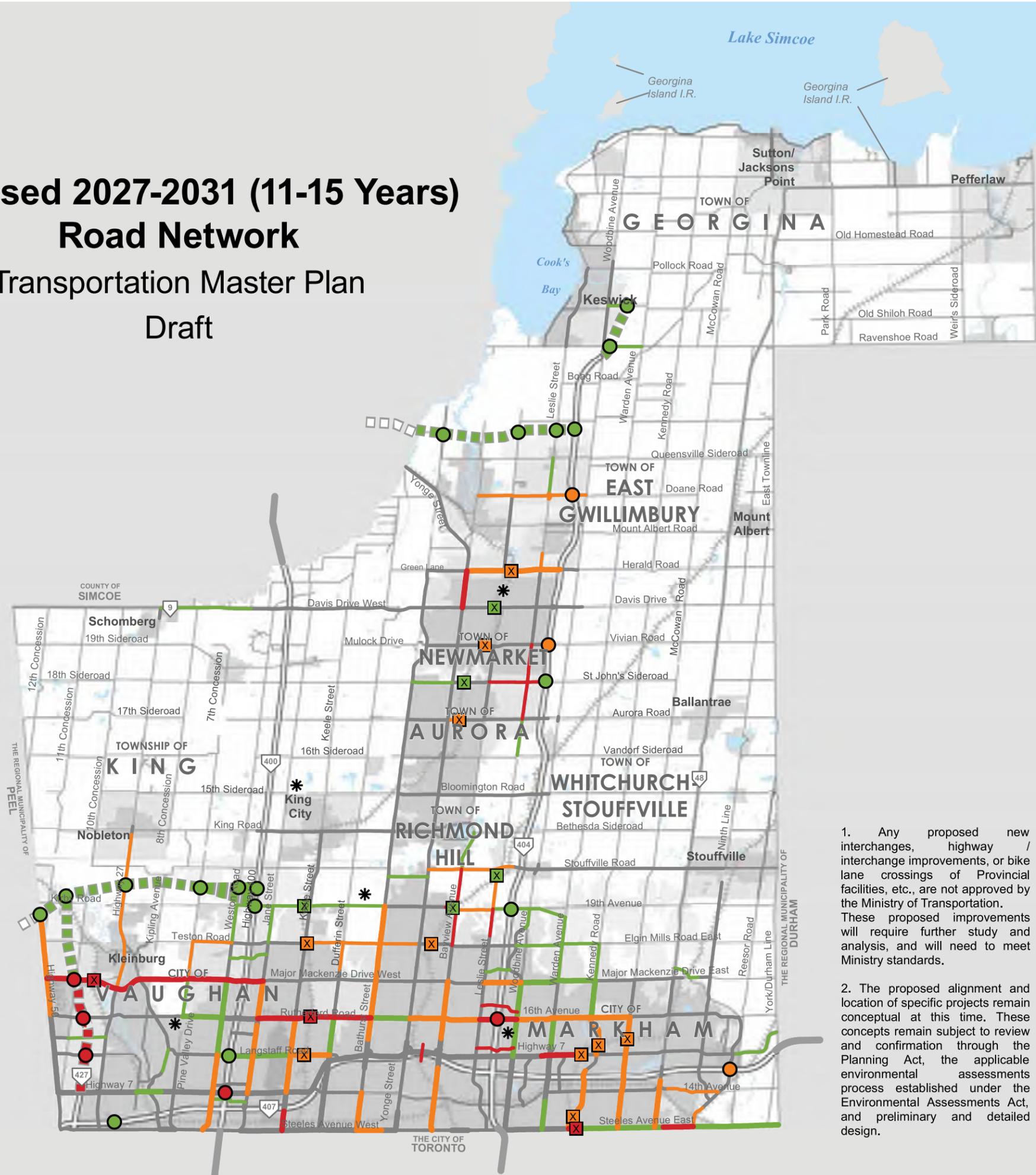
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# Proposed 2027-2031 (11-15 Years) Road Network Transportation Master Plan Draft



## MAP 18

Thursday, May 12, 2016

### Road Phasing

- 2017 - 2021
- 2022 - 2026
- 2027 - 2031
- 2032 - 2041

### Grade Separations Phasing

- X 2017 - 2021
- X 2022 - 2026
- X 2027 - 2031
- X 2032 - 2041

### Interchange Improvements Phasing (to be confirmed by MTO)

- 2017 - 2021
- 2022 - 2026
- 2027 - 2031
- 2032 - 2041

### Note:

- \* Special Study Area

### BASE MAP INFORMATION

- Provincial Freeway
- Provincial Highway
- Road
- Railway



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