



Quarter Town Line Corridor Management Study

Town of Tillsonburg

Paradigm Transportation Solutions Limited

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Quarter Town Line Corridor Management Study

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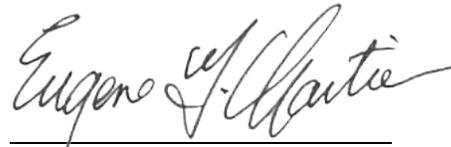
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Signatures



Signature

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Executive Summary

Scope

The Town of Tillsonburg retained Paradigm Transportation Solutions Limited (Paradigm) to conduct a Corridor Management Study for Quarter Town Line. The purpose of this study was to develop economically feasible countermeasures to existing and anticipated traffic operations and safety concerns within the corridor.

Findings and Conclusions

The operational analysis concluded that all intersections within the Quarter Town Line corridor currently operate at acceptable levels of service during the AM and PM peak hours. However, speed surveys found that high operating speeds were observed along the subject road corridor.

A field investigation conducted on September 26, 2017 identified the following safety and operational issues along the study corridor:

- ▶ High operating speeds in school zones and on the road segment immediately north of Baldwin Street. One of the reasons for the high operating speed is the absence of distinctive street features to break up the corridor;
- ▶ Lack of protected/controlled crossings near Monsignor O’Neil School, Westfield Public School and at the midblock trail crossing north of Baldwin Street, which expose vulnerable road users to conflicts with motorists;
- ▶ Visibility issues at South Ridge Road and Concession Street North, which restrict sight distances and increase the risk of collisions; and
- ▶ Discontinuity of the Truck Routes as heavy vehicles entering the study corridor from the south are prohibited access to Quarter Town Line and Baldwin Street, and are thus required to turn onto a local residential street to exit the area.

Recommendations

To address the above issues, treatments that would reduce vehicle speeds and provide additional protection to vulnerable road users were identified. The key remedial actions recommended for the subject corridor consist of the following:

- ▶ Install Pedestrian Crossover (PXO) Level 2 Type C crossings at the following locations:
 - North leg of South Ridge Road and Quarter Town Line;
 - South leg of Glendale Drive and Quarter Town Line;



- South leg of Dereham Drive and Quarter Town Line; and
- Midblock location where Veterans Memorial Walkway trail intersects with Quarter Town Line.
- ▶ Replace the existing SCHOOL AREA sign (Wc-1) with SCHOOL ZONE MAXIMUM SPEED 40 KILOMETRES PER HOUR WHEN FLASHING signs and associated School Zone Flasher Systems (RB-6A) at the three school areas.
- ▶ Install on-road bike lanes on Quarter Town Line from Baldwin Street to North Street West. The proposed bike lanes would connect the east-west trails intersecting Quarter Town Line and provide access to the main generators of bike traffic along the corridor including Monsignor O'Neil Catholic Elementary School, Westfield Public School and Tillsonburg Minor Soccer facility.

Several site specific remedial actions are recommended to address issues related to traffic control devices, visibility, and surface condition.



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1 Introduction

1.1 Scope

The Town of Tillsonburg retained Paradigm Transportation Solutions Limited (Paradigm) to conduct a Corridor Management Study for Quarter Town Line. The purpose of this study was to develop economically feasible countermeasures to existing and anticipated traffic operations and safety concerns within the corridor. The main project objectives were to:

- ▶ Develop a plan to create a safe and efficient roadway corridor, while mitigating conflicts and removing barriers;
- ▶ Improve opportunities for active transportation while minimizing conflicts between vehicles and vulnerable road users;
- ▶ Provide additional safe opportunities for pedestrian and bicycle crossings;
- ▶ Integrate and coordinate with overarching Town plans and objectives;
- ▶ Identify countermeasure improvements for study zone priority locations (schools, trails, etc.); and
- ▶ Develop an implementation plan.

1.2 Study Area

Quarter Town Line is located on the west side of the Town of Tillsonburg, Ontario. The subject corridor is a four (4) kilometre, north-south, arterial roadway that spans from Baldwin Street in the south, to its terminus at Broadway Street and Highway 19 in the north, which lies just beyond the north limit of the Town. Over this section, Quarter Town Line intersects with the following four (4) arterial roadways at stop controlled intersections (from north to south):

- ▶ Broadway Street/Highway 19 (two-way stop controlled);
- ▶ North Street West (all-way stop controlled);
- ▶ Concession Street West (all-way stop controlled); and
- ▶ Baldwin Street (two-way stop controlled).

The posted speed limit along the corridor varies between 40 and 50 kilometres per hour. The 40 kilometres per hour zones are posted along sections where the following three (3) schools are located:

- ▶ South Ridge Public School, which is located on South Ridge Road approximately 400 metres south of the intersection of Quarter Town Line and Broadway Street;



- ▶ Monsignor J. H. O’Neil School, which is located on Quarter Town Line approximately 650 metres south of the intersection of Quarter Town Line and North Street West; and
- ▶ Westfield Public School, which is located south of the intersection of Dereham Drive and Quarter Town Line and west of Quarter Town Line.

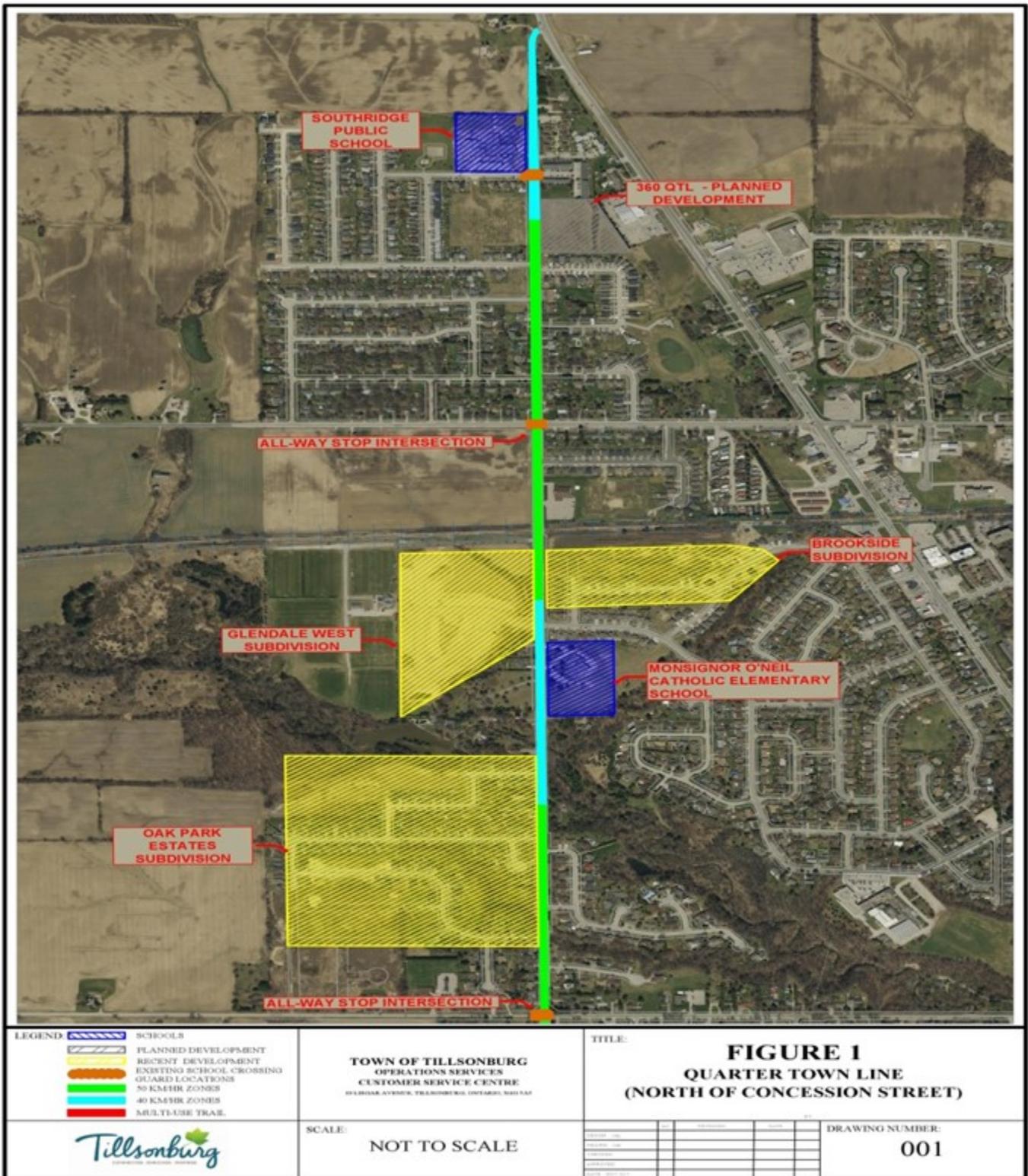
School crossing guards are present during school arrival and departure periods at the crosswalks located on the following approaches to assist students crossing the major roadways:

- ▶ Southbound approach (north leg) of the Southridge Road and Quarter Town Line intersection;
- ▶ Eastbound approach (west leg) of the North Street West and Quarter Town Line intersection;
- ▶ Westbound approach (east leg) of the Concession Road and Quarter Town Line intersection; and
- ▶ Southbound approach (north leg) of the Esseltine Road and Quarter Town Line intersection.

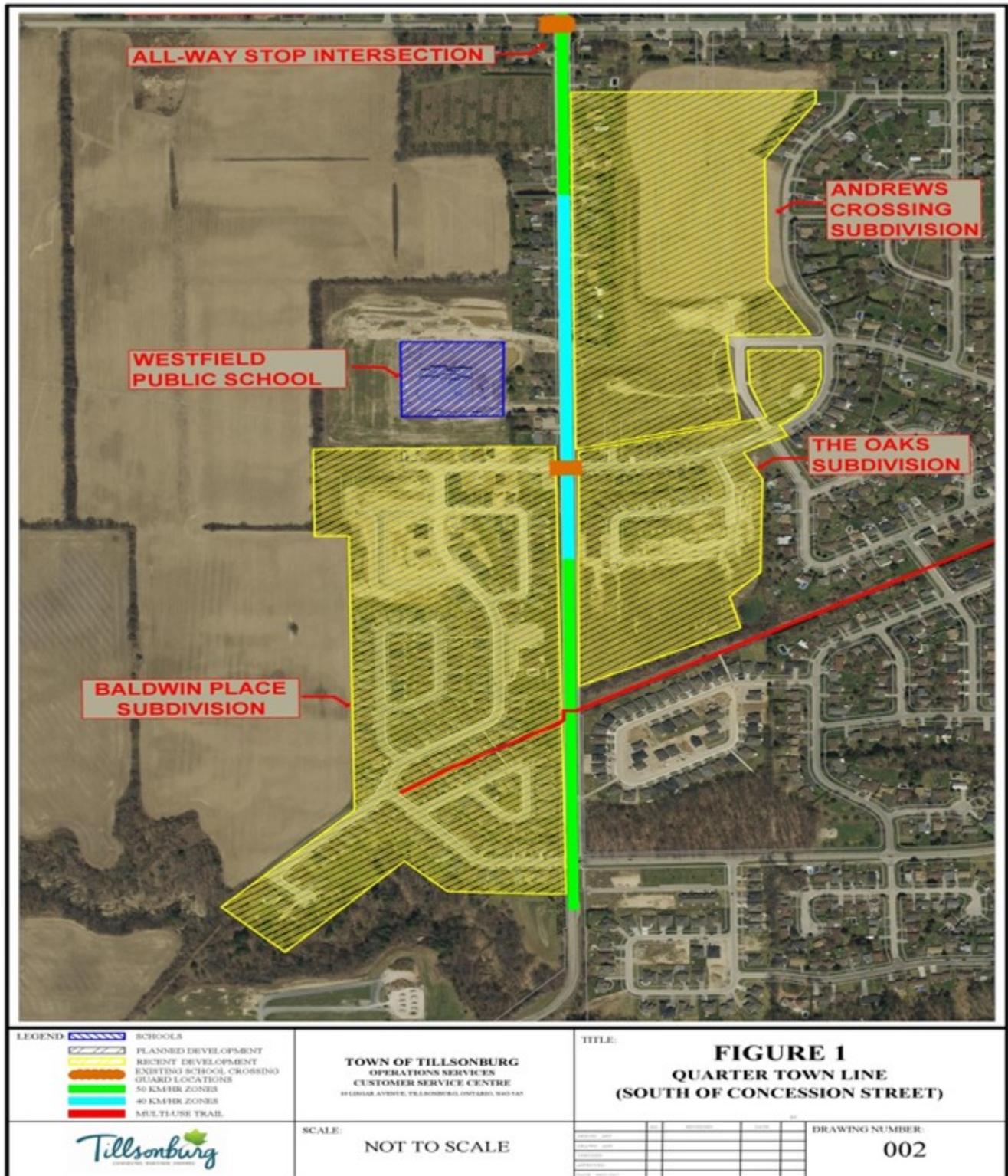
The corridor is also experiencing land development and resulting traffic growth. A 64 unit townhouse development is being proposed at 360 Quarter Town Line, which is located on the east side of the roadway between South Ridge Road and Trillium Drive. Another development, known as the Andrews Crossing Subdivision (no specifics yet), is anticipated on the east side of Quarter Town Line just south of North Street West.

Figures 1.1 and 1.2 illustrate the traffic controls and posted speed limits currently in place on Quarter Town Line, as well as the location of the schools and planned developments within the study area.





Study Area



Study Area

2 Existing Conditions Analysis

2.1 Speed Survey

Speed surveys were conducted along Quarter Town Line on September 26, 2017 for two 4-hour periods (7:00 to 11:00 AM and 3:00 to 7:00 PM). Data were collected for both the southbound and northbound directions at the following four locations within the corridor:

- ▶ At South Ridge Road;
- ▶ At a point approximately 180 metres south of Glendale Drive;
- ▶ Between Grandview Drive and Dereham Drive; and
- ▶ At a point approximately 245 metres north of Baldwin Street.

At each location, the 85th percentile speed and standard deviation were calculated for both directions. The 85th percentile speed is a common value used by road authorities to establish regulatory speed zones, while the standard deviation is a measure of dispersion of a set of data from the central value. The higher the standard deviation, the more spread out the speeds. This statistic is of relevance as speed differential is an important criterion in road safety. In an ideal scenario, vehicle operating speeds would be identical, reducing the likelihood of conflicts among road users.

Table 2.1 summarizes the speed survey results. The table indicates that:

- ▶ The 85th percentile speed consistently exceeds the posted limit by 11 to 13 kilometres per hour at each location, except between Grandview Drive and Dereham Drive. At this location, the 85th percentile speeds were above the posted limit by 6 kilometres per hour in the southbound direction and 4 kilometres per hour in the northbound direction. It is noted that Quarter Town Line from Grandview Drive to Dereham Drive is the only segment without undeveloped lands abutting the roadside. In this section, the roadside consists of a mature residential neighbourhood with houses and tree lines on both sides.
- ▶ There is minimal variation between the speeds recorded in the northbound and southbound directions. The largest difference (2 kilometres per hour) was noted between Grandview Drive and Dereham Drive.
- ▶ The standard deviation at each location is 11 or 12, except at South Ridge Road where the statistic is substantially higher at 15. This indicates that motorists traveling through this area operate their vehicles at speeds further away from the central value, increasing the risk of conflicts among road users. The transition from urban to rural environment just north of South Ridge Road is one potential explanation for the larger standard deviation.



TABLE 2.1: SPEED SURVEY RESULTS

Location on QTL	Posted Speed (km/h)	85th Percentile Speed (km/h)		Standard Deviation	
		NB	SB	NB	SB
South Ridge Road	40	53	52	15	16
180 m south of Glendale Drive	40	53	52	11	11
Between Grandview Drive & Dereham Drive	50	54	56	11	11
245 m north of Baldwin Street	50	62	61	11	12

2.2 Traffic Volumes

Paradigm collected intersection turning movement counts at the study area intersections on September 26, 2017 using Miovision Scout video data collection units. The counts were used to assess intersection traffic operations on Quarter Town Line during the peak morning and afternoon travel periods, which represent worst-case operating conditions.

Figure 2.1 illustrates existing AM and PM peak hour traffic volumes on Quarter Town Line at the key intersections within the corridor. It should be noted that the traffic volumes between intersections have not been balanced due to frequent driveways between intersections. **Appendix A** provides the detailed count data.

Traffic operations analysis for the Glendale Drive and Quarter Town Line intersection will be completed once turning movement counts are received from the Town.

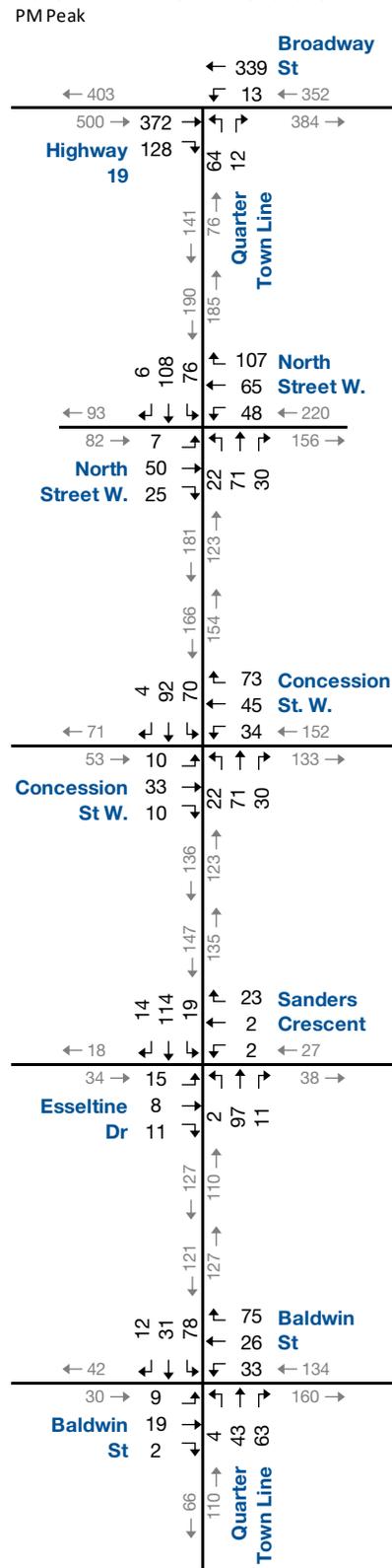
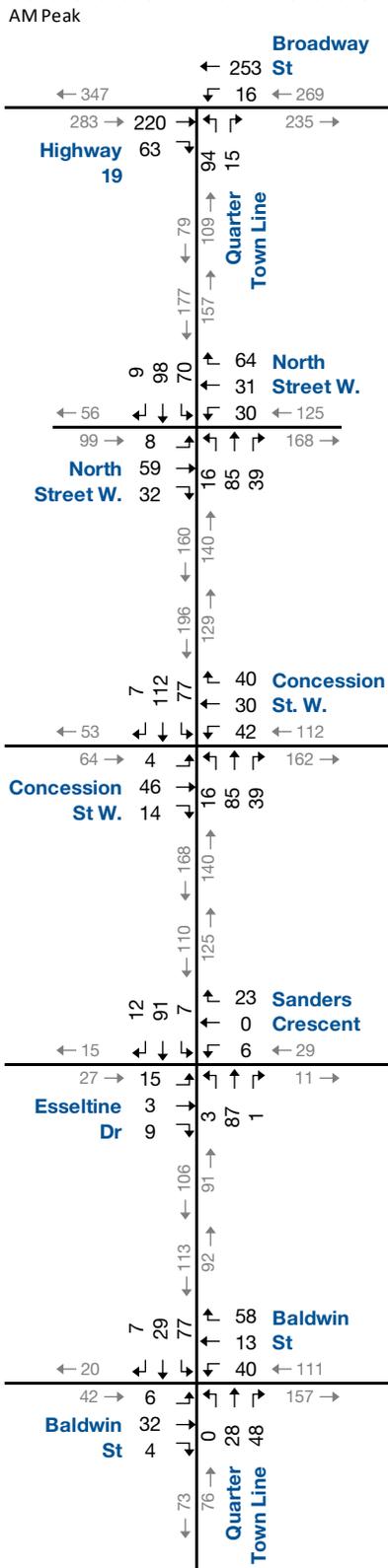
2.3 Traffic Operations

The operation and capacity of the study area intersections were analyzed with Synchro 9 software using existing traffic volumes and lane geometry. The intersection analysis considered three separate measures of performance:

- ▶ The LOS for each turning movement;
- ▶ The volume to capacity (v/c) ratio for each turning movement; and
- ▶ The 95th percentile queue lengths.

Intersection Level of Service (LOS) is a recognized method of quantifying the efficiency of traffic flow at intersections. It is based on the delay experienced by individual vehicles executing the various movements. The delay is related to the number of vehicles that desire to make a certain movement compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flow. The highest possible rating is LOS A, under which the average total delay is equal to or less than 10 seconds per vehicle. When the average delay exceeds 50 seconds for unsignalized intersections, the movement is classified as LOS F and remedial measures are typically implemented, if they are feasible.





Existing Peak Hour Traffic Volumes

Figure 2.1

Table 2.2 summarizes the existing peak hour traffic operations at the study area intersections. All intersections currently operate at acceptable levels of service during the AM and PM peak hours. **Appendix B** provides the detailed operational analysis reports.

2.4 All-way Stop Analysis

An all-way stop warrant analysis was carried out for the following five intersections within the corridor:

- ▶ Glendale Drive and Quarter Town Line
- ▶ Baldwin Street and Quarter Town Line
- ▶ Sanders Crescent/Esseltine Drive and Quarter Town Line
- ▶ Concession Street and Quarter Town Line
- ▶ North Street West and Quarter Town Line

The justification set out in *Ontario Traffic Manual (OTM) Book 5 – Regulatory Signs* was applied to determine if the conditions for the installation of STOP signs on all approaches were met at the subject intersections. The warrant indicates that all-way stop control may be considered on minor roads where:

- ▶ Total vehicle volume on all intersection approaches exceeds 350 for the highest hour recorded; and
- ▶ Volume split does not exceed 75/25 for three-way control or 65/35 for four-way control. Volume is defined as vehicles only.

The eight-hour turning movement counts collected by Paradigm on September 26, 2017 were used for this analysis, except for the intersection of Glendale Drive and Quarter Town Line. The Town provided a two-day count collected on October 6 and 7, 2015 for this location.

The warrant analysis indicates that all-way stop controls are justified for the following intersections:

- ▶ Baldwin Street and Quarter Town Line
- ▶ Concession Street and Quarter Town Line
- ▶ North Street West and Quarter Town Line

Tables 2.3 to 2.7 provide the warrant analysis results for the intersections.

2.5 Collision Analysis

Insufficient historical collision data was available for a detailed collision analysis to be completed.



TABLE 2.3: ALL-WAY STOP WARRANT ANALYSIS – GLENDALE DRIVE AND QUARTER TOWN LINE INTERSECTION

Condition	Threshold	Observed	Minimum Threshold Satisfied ? (Yes/No)
Condition 1 - Minimum volume	350 veh/h	427 veh/h	Yes
Condition 2 - Traffic split	75% maj/25% min	82%/18%	No
All-way stop justified?			No

TABLE 2.4: ALL-WAY STOP WARRANT ANALYSIS – BALDWIN STREET AND QUARTER TOWN LINE INTERSECTION

Condition	Threshold	Observed	Minimum Threshold Satisfied ? (Yes/No)
Condition 1 - Minimum volume	350 veh/h	397 veh/h	Yes
Condition 2 - Traffic split	65% maj/35% min	57%/43%	Yes
All-way stop justified?			Yes

TABLE 2.5: ALL-WAY STOP WARRANT ANALYSIS – SANDERS CRESCENT/ ESSELTINE DRIVE AND QUARTER TOWN LINE INTERSECTION

Condition	Threshold	Observed	Minimum Threshold Satisfied ? (Yes/No)
Condition 1 - Minimum volume	350 veh/h	316 veh/h	No
Condition 2 - Traffic split	65% maj/35% min	82%/18%	No
All-way stop justified?			No

TABLE 2.6: ALL-WAY STOP WARRANT ANALYSIS – CONCESSION STREET AND QUARTER TOWN LINE INTERSECTION

Condition	Threshold	Observed	Minimum Threshold Satisfied ? (Yes/No)
Condition 1 - Minimum volume	350 veh/h	548 veh/h	Yes
Condition 2 - Traffic split	65% maj/35% min	61%/39%	Yes
All-way stop justified?			Yes

TABLE 2.7: ALL-WAY STOP WARRANT ANALYSIS – NORTH STREET WEST AND QUARTER TOWN LINE INTERSECTION

Condition	Threshold	Observed	Minimum Threshold Satisfied ? (Yes/No)
Condition 1 - Minimum volume	350 veh/h	607 veh/h	Yes
Condition 2 - Traffic split	65% maj/35% min	57%/43%	Yes
All-way stop justified?			Yes



3 Identification of Safety and Operational Issues

3.1 Overview

The following details the geometric characteristics of Quarter Town Line, as well as the safety and operational issues identified along the corridor at key intersections and within specific road segments.

3.2 Broadway Street and Quarter Town Line Intersection

Highway 19/Plank Line/Broadway Street (referred to as Broadway Street herein) and Quarter Town Line is a skewed, stop controlled intersection with three approaches.

Within this section of the corridors, Quarter Town Line has a rural cross-section and curves sharply eastward as it intersects with Broadway Street. The Quarter Town Line approach at the intersection is stop controlled. There is one travel lane in each direction. There are no sidewalks on either side of the roadway and the posted speed limit is 40 kilometres per hour.

Broadway Street is assumed to run east-west near the intersection. This roadway has a rural cross-section that curves eastward as it reaches Tillsonburg from the west. As it curves, it turns into Broadway Street and cuts diagonally through the Town. At this curve it intersects with Quarter Town Line. The flow on this roadway is uncontrolled (i.e. no STOP signs). The posted speed limit is 80 kilometres per hour west of Quarter Town Line and 60 kilometres per hour east of Quarter Town Line.

Table 3.1 summarizes the key issues identified at the intersection.



TABLE 3.1: KEY ISSUES AT BROADWAY STREET AND QUARTER TOWN LINE INTERSECTION

Observation	Description	Photo
Lack of delineation of the right-turn taper	On the eastbound approach of the intersection, there is a right-turn taper provided to reduce conflicts between through and right-turning traffic. The length of the right-turn taper is approximately 60 metres. <i>OTM Book 11 – Pavement, Hazard and Delineation Markings</i> indicates that right-turn tapers are to be delineated using a white edge line and white dashed line. At the subject intersection, no white dashed lines were installed to clearly delineate the right-turn taper. The absence of white dashed lines does not guide motorists on the appropriate path of travel. This issue would be emphasized during nighttime visibility.	
Inadequate CURVE sign (Wa-3L) installed on the eastbound approach	On the westbound approach, a CURVE sign with an additional black line to indicate the presence of the intersection at Quarter Town Line along the curve is used. The use of the black line warns westbound motorists of the potential conflicts with turning vehicles at Quarter Town Line. However, on the eastbound approach, only the CURVE sign (Wa-3L) without the black line is used. Therefore, eastbound motorists are not warned of potential conflicts with turning vehicles at Quarter Town Line.	
Faded pavement marking on the northbound approach	The northbound stop bar and yellow dividing line are faded and obscured. Pavement markings at intersections provide visual cues of potential conflicts and clearly indicate where motorists should stop at the intersection. <i>OTM Book 11 – Pavement, Hazard and Delineation Marking</i> indicates that the dividing line should be installed a minimum of 60 metres from the stop bar. On the northbound approach, the faded dividing line was painted 25 metres from the stop bar.	



TABLE 3.1: KEY ISSUES AT BROADWAY STREET AND QUARTER TOWN LINE INTERSECTION

Observation	Description	Photo
Lack of warning on the northbound approach of the abrupt change in direction	The presence of one CHECKERBOARD sign suggests that the Town recognized that additional guidance to road users was required due to hazardous conditions created by the horizontal curves present on the approach to the intersection. However, no roadway alignment sign to warn motorists of the abrupt change in direction is provided in advance of the curve.	
Restricted visibility on the northbound approach of the intersection	The STOP sign on the northbound approach of the intersection is not visible within the stopping sight distance primarily due to abrupt horizontal curve located in advance of the intersection. An unfamiliar motorist would be provided with limited visual cues of the presence of an intersection.	



3.3 South Ridge Road and Quarter Town Line Intersection (South Ridge Public School)

South Ridge Road and Quarter Town Line is a stop controlled T-intersection located adjacent to South Ridge Public School (approximately 380 metres south of Quarter Town Line and Broadway Street) with the STOP sign installed on the eastbound approach of the intersection. The posted speed limit on both roadways is 40 kilometres per hour.

A school crossing is provided on the southbound approach. A crossing guard is present at the intersection during school arrival and departure periods to assist children crossing Quarter Town Line. There is only one crosswalk, which is provided on the eastbound approach of the intersection. Sidewalks are provided on the north side of South Ridge Road, and on both sides of Quarter Town Line. The west sidewalk discontinues approximately 45 metres north of South Ridge Road.

Along the south side of South Ridge Road, NO STOPPING signs are installed to prohibit stopping between 8:00 and 9:00 AM, and 3:00 and 4:00 PM (Monday to Friday). Parking is permitted on the north side of South Ridge Road, and was observed to be used by parents as a pick-up/drop-off area. On Quarter Town Line, parking is prohibited north of South Ridge Road, and approximately 20 metres in advance of the school crossing on the east side of Quarter Town Line.

South Ridge Public School is located on the northwest corner of South Ridge Road and Quarter Town Line, with property frontage on both roads. Primary vehicular and pedestrian access to the site is provided via South Ridge Road. The Quarter Town Line property boundary adjacent to the playing fields at the school has a continuous high chain link fence. Approximately 50 metres north of South Ridge Road, a walkway connects the school property to the west sidewalk. A gate provides access to the walkway from the school. At the time of the field investigation, the gate was locked. At the location where the walkway from the school connects to the sidewalk, an informal and uncontrolled crossing is present on Quarter Town Line.

Table 3.2 summarizes the key issues identified at this intersection.



TABLE 3.2: KEY ISSUES AT SOUTH RIDGE ROAD AND QUARTER TOWN LINE INTERSECTION (SOUTH RIDGE PUBLIC SCHOOL)

Observation	Description	Photo
<p>Limited visibility at the school crossing</p>	<p>A hydro pole is located on the curb ramp that provides access to the school crossing from the northwest corner of the intersection. This condition prevents pedestrians attempting to cross the intersection from having clear visibility of oncoming vehicles. This photo shows the view of a pedestrian when looking for oncoming vehicles from the curb ramp provided on the west side of the school crossing.</p>	
<p>Driveway that comes out directly onto the school crosswalk</p>	<p>The driveway east of the intersection comes out directly onto the school crosswalk, which has the potential to create conflicts between pedestrians and motorists travelling in and out the driveway.</p>	
<p>Marked crossing installed at an uncontrolled midblock location</p>	<p>Pedestrian ramps exist at the uncontrolled midblock crossing located approximately 50 metres north of the stop-controlled intersection of Quarter Town Line and South Ridge Road. These conditions promote midblock crossing. Given the proximity of the intersection, the informal midblock crossing is not a location where motorists would expect pedestrians to cross. There is also a walkway that connects the school property to the subject uncontrolled midblock crossing, which further promotes midblock crossing.</p>	



TABLE 3.2: KEY ISSUES AT SOUTH RIDGE ROAD AND QUARTER TOWN LINE INTERSECTION (SOUTH RIDGE PUBLIC SCHOOL)

Observation	Description	Photo
<p>Marked crossing installed on the northbound approach of the intersection</p>	<p>Pedestrian ramps exist at the uncontrolled crossing of the intersection northbound approach. Given the presence of the supervised school crossing at the intersection southbound approach and because there is no sidewalk on the south side of South Ridge Road, pedestrians should not be encouraged to cross the intersection using the crosswalk located on the northbound approach.</p>	
<p>SCHOOL CROSSING sign not installed at the painted crosswalk</p>	<p>The SCHOOL CROSSING signs (Wc-2 and Wc-2t) provided on the east side of Quarter Town Line are installed approximately 10 metres south of the supervised school crossing. The SCHOOL CROSSING signs are located closer to the unmarked crossing, which can create confusion with motorists as to where students are expected to cross the street. <i>OTM Book 6 – Warning Signs</i> indicates that SCHOOL CROSSING signs must be installed directly at the painted crosswalk, one on each side of the roadway, for both directions of travel.</p>	
<p>Tripping hazard</p>	<p>An uneven walking surface is present on the south side of the eastbound crosswalk. The height differential represents a tripping hazard that exceeds the Minimum Maintenance Standards for Municipal Roadways¹ (MMS), and the Standard Practice for Safe Walking Surface² (ASTM F1637).</p>	

¹ O. Reg. 239/02: Minimum Maintenance Standards for Municipal Highways

² ASTM Standard Practice for Safe Walking Surfaces, American Society for Testing Materials



3.4 North Street West and Quarter Town Line Intersection

North Street West and Quarter Town Line is an all-way stop controlled intersection with a marked crosswalk on each approach, including one school crossing on the eastbound approach of the intersection. A crossing guard is present at the intersection during school arrival and departure periods to assist children crossing North Street West. Sidewalks are provided on both sides of both roadways except west of the intersection where there is no sidewalk provided on the south side of North Street West. The posted speed limit on both roadways is 50 kilometres per hour.

North Street West has one travel lane in each direction with delineated parking lanes on both sides of the roadway. Parking on Quarter Town Line is permitted on both sides. Near the intersection, NO HEAVY TRUCK signs (Rb-62) are installed to restrict access of heavy trucks to Quarter Town Line.

Table 3.3 summarizes the key issues identified at this intersection.

3.5 Glendale Drive and Quarter Town Line Intersection (Monsignor O'Neil Catholic Elementary School)

Glendale Drive and Quarter Town Line is a minor street stop controlled intersection located approximately 50 metres north of Monsignor O'Neil Catholic Elementary School. Marked crosswalks are provided on the eastbound and westbound approaches of the intersection. Near Monsignor O'Neil School, the posted speed limit on Quarter Town Line is 40 kilometres per hour. There are SCHOOL AREA signs (Wc-1) installed in advance of the school in both directions, and a no parking restriction on Quarter Town Line.

The school fronts onto Quarter Town Line and has two driveways. Primary vehicle and pedestrian access to the site is provided via Quarter Town Line, but there is no pedestrian facility that connects the school entrance to the municipal sidewalk on the road. There are no traffic signals or controlled pedestrian crossings on Quarter Town Line near the school. The nearest controlled crossings are located at the stop controlled intersections with North Street West (500 metres north of Glendale Drive) and Concession Street (1 kilometre south of Glendale Drive).

Table 3.4 summarizes the key issues identified at this intersection.

3.6 Quarter Town Line from Glendale Drive to Concession Street West

This road segment runs through a residential area, where there are no schools. The posted speed limit is 50 kilometres per hour. **Table 3.5** summarizes the key issues identified along this section.



TABLE 3.3: KEY ISSUES AT NORTH STREET WEST AND QUARTER TOWN LINE INTERSECTION

Observation	Description	Photo
<p>Obstructed STOP sign</p>	<p>The northbound STOP sign is obstructed by a hydro pole. The pole reduces the advance visibility of the STOP sign and reduces the likelihood of northbound motorists observing the sign well in advance of the intersection. Drivers may find it difficult to safely come to a stop prior entering the intersection.</p>	
<p>Faded crosswalks</p>	<p>Obscured and faded crosswalk lines exist at the intersection. The pavement markings of the pedestrian crosswalks increase the visibility of pedestrians.</p>	
<p>No yellow dividing lines</p>	<p>No yellow dividing lines are provided on the southbound and northbound approaches of the intersection. Yellow dividing lines are one of the cues used to warn road users that an intersection is approaching. <i>OTM Book 11 – Pavement, Hazard and Delineation Markings</i> indicates that dividing lines are to be provided on the approach of an intersection.</p>	
<p>Tripping hazard</p>	<p>An uneven walking surface is present at the curb ramps located on the northwest corner of the intersection. The height differential represents a tripping hazard that exceeds the MMS and ASTM F1637.</p>	



TABLE 3.4: KEY ISSUES AT GLENDALE DRIVE AND QUARTER TOWN LINE INTERSECTION (MONSIGNOR O'NEIL CATHOLIC ELEMENTARY SCHOOL)

Observation	Description	Photo
<p>No controlled crossing located near the school</p>	<p>During school arrival and departure periods, students were observed crossing Quarter Town Line at uncontrolled and undesignated locations. The students that came from the residential neighbourhood northwest of the intersection were observed crossing Quarter Town Line at the uncontrolled intersection of Glendale Drive and Quarter Town Line. Students from the neighbourhood southwest of the school were observed crossing at uncontrolled midblock locations. There are no controlled pedestrian crossings located within 500 metres of the school. Crossing at uncontrolled locations exposes students to potential conflicts with the high speed traffic on Quarter Town Line and the turning vehicles entering/exiting the school driveways.</p>	

TABLE 3.5: KEY ISSUES ON QUARTER TOWN LINE FROM GLENDALE DRIVE TO CONCESSION STREET WEST

Observation	Description	Photo
<p>Tripping hazards</p>	<p>A height differential between the sidewalk and the curb that exceeds the MMS and ASTM F1637 was observed on the west sidewalk located on Quarter Town Line north of Fairway Hills.</p>	



TABLE 3.5: KEY ISSUES ON QUARTER TOWN LINE FROM GLENDALE DRIVE TO CONCESSION STREET WEST

Observation	Description	Photo
<p>Accessibility issues on the bridge sidewalks located near Beech Boulevard</p>	<p>The following accessibility issues were observed along the east sidewalk of the bridge located on Quarter Town Line near Beech Boulevard:</p> <ul style="list-style-type: none"> ▶ Substantial height differential due to cracked asphalt and surface depressions. ▶ Opening of approximately 40 millimetres between the sidewalk and the curb in which a cane or a wheel could get lodged. 	



3.7 Concession Street West and Quarter Town Line Intersection

Concession Street West and Quarter Town Line is an all-way stop controlled intersection with red flashing beacon installed on the eastbound and westbound STOP signs. Marked crosswalks are provided on each approach, including one school crossing on the westbound approach of the intersection. A crossing guard is present at the intersection during school arrival and departure periods to assist children crossing Concession Street West. Sidewalks are provided on both sides of Quarter Town Line and on the south side of Concession Street West east of Quarter Town Line. The posted speed limit on both roadways is 50 kilometres per hour.

Near the intersection, there are no parking restrictions and NO HEAVY TRUCK signs (Rb-62) are installed to restrict access of heavy trucks to Quarter Town Line.

Table 3.6 summarizes the key issues identified at this intersection.



TABLE 3.6: KEY ISSUES AT CONCESSION STREET WEST AND QUARTER TOWN LINE INTERSECTION

Observation	Description	Picture
<p>Visibility issues on the northeast corner of the intersection</p>	<p>Given the presence of a series of mature trees along the north side of Concession Street West east of Quarter Town Line, there is an approach sight distance issue on the northeast corner of the intersection.</p> <p>For a design speed of 60 kilometre per hour, an unobstructed sight triangle of 25 metres on the minor road approach and 50 metres on the major road should be provided. At the subject intersection, from 25 metres on the southbound approach, a visibility of 35 metres along the westbound approach is provided.</p> <p>Significant departure sight distance issues exist on the southbound and northbound approaches due to the presence of mature trees along the Concession Street West, and the substantial setback of the southbound/northbound stop bars. On both approaches, the stop bars are approximately 9 metres behind the edge of the east/west travel lanes. The minimum visibility requirements from the stopped position are 150 metres, while the available visibility is approximately 50 metres.</p>	
<p>Conflicting crosswalk lines</p>	<p>The crosswalk lines are not expected to continue when crosswalks intersect each other.</p>	



3.8 Dereham Drive and Quarter Town Line Intersection (Westfield Public School)

Dereham Drive and Quarter Town Line is a stop controlled intersection that currently operates as three legs. At the time of the field investigation, the westbound approach of the intersection was under construction and was not open to traffic. A marked crosswalk is provided on the eastbound approach of the intersection.

Westfield Public School is located on the southwest corner of the intersection of Dereham Drive and Quarter Town Line. Two driveways connect the school to the municipal road network – one onto Dereham Drive and one onto Quarter Town Line approximately 100 metres south of Dereham Drive.

The nearest controlled crossing is at the stop controlled intersection of Quarter Town Line and Concession Street West, approximately 500 metres north of Dereham Drive. A supervised school crossing is provided at the intersection of Esseltine Drive/Sanders Crescent and Quarter Town Line, which is approximately 85 metres south of the school driveway that connects to Quarter Town Line.

Near Westfield Public School, the posted speed limit on Quarter Town Line is 40 kilometres per hour. There are no parking restrictions on Dereham Drive. On Quarter Town Line the parking restrictions are the following:

- ▶ NO STOPPING signs that prohibit stopping between 8:00 and 9:00 AM, and 3:00 and 4:00 PM (Monday to Friday). These signs are installed on the west side of Quarter Town Line from Esseltine Drive to the school driveway that connects to Quarter Town Line.
- ▶ NO STOPPING signs are installed just north of the school crossing at Esseltine Drive. These signs are located at intervals of approximately 30 metres.

Table 3.7 summarizes the key issues identified at this intersection.



TABLE 3.7: KEY ISSUES AT DEREHAM DRIVE AND QUARTER TOWN LINE INTERSECTION (WESTFIELD PUBLIC SCHOOL)

Observation	Description	Photo
<p>Parking on the east side of Quarter Town Line</p>	<p>On-street parking is permitted on the east side of Quarter Town Line. Vehicles were observed parking on the road here to drop-off and pick-up school child(ren). Since there is no controlled crossing at Dereham Drive, parents are crossing with their child(ren) at uncontrolled and unprotected midblock locations. Although not observed during the field investigation, these conditions could lead to situations where students cross QUARTER TOWN LINE without assistance.</p>	
<p>Location of the school crossing guard</p>	<p>Most pedestrians from the residential neighbourhood located south of the school were observed crossing Quarter Town Line at the supervised school crossing of Esseltine Drive/Sanders Crescent. However, several pedestrians that came from the residential neighbourhood north of the school were observed crossing at uncontrolled midblock locations because of the major distance with nearest controlled crossing (500 metres). Students coming from a property located between Concession Road and Dereham Drive do not have a controlled crossing along their route to school, and would most likely cross at high-risk and high-conflict locations.</p>	
<p>Accessibility issue on Dereham Drive</p>	<p>A pedestrian walking along Dereham Drive and travelling to Westfield Public School is not provided with a continuous pedestrian route due to the absence of curb ramps on Dereham Drive west of Quarter Town Line.</p>	



3.9 Quarter Town Line from Dereham Drive to Baldwin Street

From Esseltine Drive to Baldwin Street, Quarter Town Line is a 650 metres uninterrupted road segment without driveways and intersecting roads. There are no parking restrictions on this road segment and the posted speed is 50 kilometres per hour. There are two east-west multi-use trails that connect to Quarter Town Line on this road segment, being:

- ▶ The Veterans Memorial Walkway trail that connects the residential neighbourhood west of Quarter Town Line to the downtown of Tillsonburg to the east. This trail intersects with Quarter Town Line approximately 225 metres north of Baldwin Street; and
- ▶ A short connecting link provides access from Colin Avenue to the east sidewalk of Quarter Town Line. This trail does not continue west of Quarter Town Line and intersects with the east sidewalk of the road approximately 100 metres north of Baldwin Street.

Table 3.8 summarizes the key issues identified along this section.

3.10 Baldwin Street and Quarter Town Line Intersection

Baldwin Street and Quarter Town Line is a stop controlled intersection. There are no marked crosswalks at the intersection, and NO HEAVY TRUCK signs are installed on the southbound and westbound approaches of the intersection to restrict access of heavy trucks. The posted speed on both roadways is 50 kilometres per hour.

Table 3.9 summarizes the key issues identified at this intersection.



TABLE 3.8: KEY ISSUES ON QUARTER TOWN LINE FROM DEREHAM DRIVE TO BALDWIN STREET

Observation	Description	Photo
<p>Midblock crossing at uncontrolled locations</p>	<p>Approximately 225 metres north of Baldwin Street, an east-west multi-use trail intersects Quarter Town Line at an uncontrolled midblock location where pedestrian ramps are installed on each side of the roadway. These conditions expose pedestrians and cyclists to conflicts with motorists who may have been ill-prepared to stop for pedestrian crossings at a location where there are no major activity centres on either side other than residential neighbourhoods.</p>	
	<p>Approximately 100 metres north of Baldwin Street, a trail connects to the east sidewalk of Quarter Town Line from Colin Avenue. Although this trail does not continue west of Quarter Town Line and there are no curb ramps provided at this location, several pedestrians were observed crossing midblock. These conditions expose pedestrians and cyclists to conflicts with vehicles.</p>	

TABLE 3.9: KEY ISSUES AT BALDWIN STREET AND QUARTER TOWN LINE INTERSECTION

Observation	Description	Photo
<p>Visibility issues on the northeast corner of the intersection</p>	<p>The presence of a sign within the southwest corner sight triangle is obstructing the departure sight distance of eastbound motorists. The sign is installed to inform people about the reconstruction work on Newell Road.</p>	



TABLE 3.9: KEY ISSUES AT BALDWIN STREET AND QUARTER TOWN LINE INTERSECTION

Observation	Description	Photo
No marked crosswalks	Although there are curb ramps on each corner of the intersection, there are no marked crosswalks installed on the minor street approaches. Marked crosswalks increase the visibility of pedestrians and reduces the likelihood of vehicle-pedestrian collisions.	 <p>The photograph shows a street intersection with a clear asphalt road surface. There are no white painted crosswalks visible on the road. A street lamp stands on the left side of the road, and residential houses and trees are visible in the background under a clear blue sky.</p>



3.11 Quarter Town Line South of Baldwin Street

Approximately 175 metres south of Baldwin Street on Newell Street (Quarter Town Line becomes Newell Street south of Baldwin Street), there are substantial horizontal and vertical curves. The Town requested a review of the warning signs and advisory speed provided prior to the curves.

There is a CURVE sign (Wa-3) installed in advance of the subject curve in each direction. There are no ADVISORY SPEED signs provided and no CHEVRON ALIGNMENT signs are used to guide motorists through the subject curve.

Ball bank field measurements carried out by Paradigm indicated that the maximum safe speed of the curve in the northbound and southbound directions was approximately 40 and 45 kilometres per hour, respectively. Typically, SHARP CURVE signs (Wa-2) should be used instead of CURVE Signs (Wa-3). ADVISORY SPEED tab signs or CHEVRON ALIGNMENT signs are not required, though. ADVISORY SPEED tab signs are only needed when the maximum safe speed is at least 20 kilometres per hour less than the posted speed, and CHEVRON ALIGNMENT signs must be used when ADVISORY SPEED tab signs are provided.



4 Potential Remedial Measures and Solutions

4.1 Key Issues and General Measures

As identified from the office data analysis and the field investigation, the main safety and operational issues to address within the Quarter Town Line corridor include:

- ▶ **High operating speeds in school zones and on the road segment immediately north of Baldwin Street.** One of the reasons for the high operating speed is the absence of distinctive street features to break up the corridor. Currently, Quarter Town Line consists of three long stretches of roadway (Broadway Street to North Street West, North Street West to Concession Street West, and Concession Street West to Baldwin Street) with uninterrupted conditions, open roadside environment, and wide travel lanes;
- ▶ **Lack of protected/controlled crossings near Monsignor O’Neil School, Westfield Public School and at the midblock trail crossing north of Baldwin Street,** which expose vulnerable road users to conflicts with motorists;
- ▶ **Visibility issues at South Ridge Road and Concession Street North,** which restrict sight distances and increase the risk of collisions; and
- ▶ **Discontinuity of the Truck Routes** as heavy vehicles entering the study corridor from the south are prohibited access to Quarter Town Line and Baldwin Street, and are thus required to turn onto a local residential street to exit the area.

Traditional neighbourhood traffic calming measures, such as bumps, humps, raised crosswalks, chicane, and curb extensions, could be used to reduce operating speeds on the roadway. However, their use would be inconsistent with the arterial road function of Quarter Town Line. As well, few measures would be able to create a sufficiently distinctive road environment that leads to speed reduction. A combination of less intrusive traffic calming measures and protective devices should be implemented to effectively reduce speeds and improve the perceived and actual level of safety on Quarter Town Line.

In identifying measures that have the potential to achieve the greatest safety benefits, one must consider the physical characteristics and nature of the corridor on which the treatments are to be implemented. Unique to the Quarter Town Line corridor is the presence of three schools and a multi-use trail, which generate substantial pedestrian and cyclist volumes. Treatments that reduce operating speeds and provide additional protection to vulnerable road users are preferred.



To achieve predictable driver behaviour and high compliance rates with posted speed limits, it is important to apply treatments that are intuitive for motorists and are consistent along the corridor, which include:

- ▶ **Controlled Crossings:** Install Pedestrian Crossover (PXO) Level 2 Type C crossings at several locations along at the corridor, including:
 - North leg of South Ridge Road and Quarter Town Line;
 - South leg of Glendale Drive and Quarter Town Line;
 - South leg of Dereham Drive and Quarter Town Line; and
 - Midblock location where Veterans Memorial Walkway trail intersects with Quarter Town Line.
- ▶ **Warning Signs within School Areas:** Replace the existing SCHOOL AREA sign (Wc-1) with School Zone Maximum Speed 40 Kilometres per Hour When Flashing signs and associated School Zone Flasher Systems (RB-6A) at the three school areas.
- ▶ **Bicycle Facilities:** Install on-road bike lanes on Quarter Town Line from Baldwin Street to North Street West. The 2014 Oxford County Trail Master Plan identifies the possibility of converting the abandoned rail line crossing Quarter Town Line to a multi-use trail. The abandoned rail corridor runs east-west and is located approximately 275 metres south of North Street West. This plan also proposed implementing a Signed Bike Route on Glendale Drive. As a result, bike lanes between Baldwin Street and North Street West would connect the east-west trails intersecting Quarter Town Line and provide access to the main generators of bike traffic including Monsignor O’Neil Catholic Elementary School, Westfield Public School and Tillsonburg Minor Soccer facility.

The following subsections provide further details about the specific treatments proposed at the various locations within the Quarter Town Line corridor.

4.2 Broadway Street and Quarter Town Line Intersection

Broadway Street and Quarter Town Line is a skewed intersection with visibility issues on the northbound approach of the intersection and inadequate traffic control devices (pavement markings and warning signs) in advance of the intersection. The following proposed remedial measures are intended to address the visibility issues and provide consistent and adequate traffic control devices:

- ▶ Replace the existing oversize STOP sign (Ra-101) with a special oversize STOP sign (Ra-1101) on the northbound approach of the intersection to increase the visibility of the STOP sign within the stopping sight distance.



- ▶ Install white dashed lines that delineate the right-turn taper on Broadway Street for Quarter Town Line, as indicated in OTM Book 11 page 74).
- ▶ Replace the existing CURVE sign (Wa-3L) installed on the eastbound approach of the intersection with a warning sign with a black line to indicate the presence of the intersection along the horizontal curve on Broadway Street at Quarter Town Line. The curve warning sign should be identical to the sign used on the westbound approach of the intersection.
- ▶ Install white edge lines and a yellow dividing line on the northbound approach that extends approximately 60 metres from the stop bar. Such pavement marking will provide additional cues to motorists of the presence of the intersection.
- ▶ Install a TURN Sign (Wa-1R) on Quarter Town Line approximately 100 metres from the curve to warn motorists of the abrupt change in direction of the roadway.

4.3 South Ridge Road and Quarter Town Line Intersection (South Ridge Public School)

At this intersection, uncontrolled pedestrian crossings, visibility concerns and high operating speeds on Quarter Town Line near South Ridge Public School were observed. To increase the level of safety of vulnerable road users at the intersection, the Town should consider the following measures:

- ▶ Move the school crossing approximately 5 metres further north to eliminate conflicts with the driveway located on the east side of the roadway and reduce visibility issues due to the presence of a hydro pole on the curb ramp on the northwest corner of the intersection.
- ▶ Relocate the SCHOOL CROSSING sign on the east side of the roadway immediately adjacent to the school crossing, which is located on the southbound approach.
- ▶ Remove the curb ramps of the uncontrolled midblock crossing located approximately 50 metres north of South Ridge Road, as they currently promote uncontrolled midblock crossings.
- ▶ Remove the curb ramp installed on the southeast corner of the intersection to discourage pedestrians from crossing at an unmarked location and where there is school crossing provided on the southbound approach.
- ▶ Assess the surface conditions of the pedestrian areas on the southwest corner of the intersection and identify where marking, grinding, or ramping the height differentials is required to meet MMS and ASTM F1635 standards.
- ▶ Implement a Pedestrian Crossover (PXO) Level 2 Type C controlled crossing on the northbound approach. Traffic volumes on Quarter



Town Line do not warrant the installation of a PXO Level 2 Type B device. The main advantage of a controlled crossing would be to provide protection for pedestrians crossing the intersection outside the school arrival and departure periods.

- ▶ Replace the existing SCHOOL AREA sign (Wc-1) with SCHOOL ZONE MAXIMUM SPEED WHEN FLASHING signs (RB-6A) to better convey that the speed reduction is due to the presence of a school and potential conflicts with children. Note that installation of the RB-6A signs would require a municipal by-law to be adopted by Town Council.
- ▶ Install curb extensions (bulb-outs) on the northeast and northwest corners of the intersection, which would reduce the effective roadway width and encourage pedestrians to cross at a designated location. The restricted street width would provide a visual cue to motorists to slow down through the intersection. This measure would also eliminate the visibility issue present on the northwest corner of the intersection, as the location where a pedestrian could stop before entering the roadway would be moved further into the physical area of the intersection.

4.4 North Street West and Quarter Town Line Intersection

The safety issues identified at the intersection of Quarter Town Line and North Street West were primarily related to deficiencies with traffic control devices (pavement markings, regulatory and warning signs). The following remedial measures are intended to better warn and inform motorists of the potential conflicts at the intersection:

- ▶ Relocate the northbound STOP sign onto the hydro pole located immediately south to provide a clear and unobstructed view of the sign.
- ▶ Repaint the obscured and faded crosswalk lines at the intersection.
- ▶ Install yellow dividing lines on the northbound and southbound approaches of the intersection. The yellow lines should be installed a minimum distance of 60 metres in advance of the intersection.
- ▶ Assess the surface conditions of the pedestrian areas on the northwest corner of the intersection and identify where marking, grinding, or ramping the height differentials is required to meet MMS and ASTM F16375 standards.

4.5 Glendale Drive and Quarter Town Line Intersection (Monsignor O'Neil Catholic Elementary School)

Quarter Town Line near Monsignor O'Neil Catholic Elementary School was identified as a road segment with high operating speeds. It is also a location where the nearest controlled and/or supervised crossing is located more



than 500 metres from the school. Therefore, the following remedial measures should be considered by the Town to improve the level of safety of all road users, with an emphasis on the safety of vulnerable road users:

- ▶ Provide a supervised school crossing on the northbound approach of Quarter Town Line and Glendale Drive intersection. The nearest school crossing is located more than 500 metres from this intersection and numerous students were observed crossing Quarter Town Line at uncontrolled and unprotected midblock locations during the school arrival and departure periods.
- ▶ Implement a Pedestrian Crossover (PXO) Level 2 Type C controlled crossing on the northbound approach of the intersection. Traffic volumes on Quarter Town Line do not warrant the installation of a PXO Level 2 Type B device.
- ▶ Install curb extensions (bulb-outs) on the southeast and southwest corners of the intersections, which would reduce the effective roadway width and encourage pedestrians to cross at a designated location. The restricted street width would provide a visual cue to motorists and encourage drivers to slow down through the intersection.
- ▶ Replace the existing SCHOOL AREA sign (Wc-1) with SCHOOL ZONE MAXIMUM SPEED WHEN FLASHING signs (RB-6A) to better convey that the speed reduction is due to the presence of a school and potential conflicts with children. Note that installation of the RB-6A signs would require a municipal by-law to be adopted by Town Council.

4.6 Quarter Town Line from Glendale Drive to Concession Street West

Accessibility issues with the sidewalks present on Quarter Town Line between North Street West and Concession Street West were identified. The following remedial measures are intended to improve the walking surface of the sidewalks provided on this road segment:

- ▶ Assess the surface conditions of the following sidewalks to identify where marking, grinding, or ramping is required to meet MMS and ASTM F1635 standards:
 - West sidewalk on Quarter Town Line north of Fairway Hills; and
 - East sidewalk of the bridge on Quarter Town Line near Beech Boulevard.
- ▶ Address the longitudinal gap of approximately 40 millimetres between the sidewalk and the curb of the east sidewalk located on the bridge near Beech Boulevard, by filling it with asphalt or by inserting a rubber filling.



- ▶ Install bike lanes. Currently, the road is approximately 10 metres wide. This allows the implementation of 1.7 metre bike lanes with 3.3 metre travel lanes in each direction.

4.7 Concession Street West and Quarter Town Line Intersection

Visibility issues were identified at the intersection of Quarter Town Line and Concession Street West, as well as deficiencies with pavement markings. The potential treatments described below are presented from the least to the most disruptive:

- ▶ Repaint the crosswalk lines to clearly delineate where pedestrians are expected to cross the intersection.
- ▶ Install NO PARKING signs on each corner of the intersection to ensure clear sightlines are provided. The parking restrictions should extend approximately 30 metres.
- ▶ Relocate the northbound and southbound stop bars closer to the edge of the opposite direction travel lanes, at a location where adequate departure sight distances are provided.
- ▶ Install STOP AHEAD signs on the northbound and southbound approaches to increase the likelihood of motorists stopping at the intersection given the reduced approach sight distances. The Town may consider installing red flashing beacons at the northbound and southbound STOP signs. Note that red flashing beacons are provided on the eastbound and westbound approaches to increase the visibility of the STOP signs.
- ▶ Reduce the intersection corners radii to better delineate the physical area of the intersection, reduce the pedestrian crossing distance, and decrease turning traffic speed.
- ▶ Convert the stop controlled intersection to a roundabout to minimize the impacts of the reduced visibility at the intersection and reduce the likelihood of experiencing collision types that tend to result in severe collisions such as angle and turning movement collisions.

4.8 Dereham Drive and Quarter Town Line Intersection (Westfield Public School)

The primary safety issue identified near Westfield Public School consisted of pedestrians crossing Quarter Town Line at uncontrolled and unprotected midblock locations due the distance between the nearest controlled intersection. To improve the level of safety of pedestrians near the Westfield Public School, the following remedial measures should be considered:

- ▶ Implement a supervised school crossing on the northbound approach of the Quarter Town Line and Dereham Drive intersection



to provide a continuous protected route for students travelling to the school from the residential area located north of Dereham Drive. The Town should also monitor traffic volumes at the Quarter Town Line and Dereham Drive intersection once the westbound approach opens, as the traffic volume increase may justify changes to the traffic control devices.

- ▶ Implement a Pedestrian Crossover (PXO) Level 2 Type C controlled crossing on the northbound approach. Traffic volumes on Quarter Town Line do not warrant the implementation a PXO Level 2 Type B.
- ▶ Install NO STOPPING signs during the school arrival and departure periods (between 8:00 and 9:00 AM, and 3:00 and 4:00 PM (Monday to Friday)) on both sides of Quarter Town Line from Esseltine Drive to Dereham Drive to encourage parents to use the pick-up/drop-off area located on the school property.
- ▶ Replace the existing SCHOOL AREA sign (Wc-1) with SCHOOL ZONE MAXIMUM SPEED WHEN FLASHING signs (RB-6A) to better convey that the speed reduction is due to the presence of a school and potential conflicts with children. Note that installation of the RB-6A signs would require a municipal by-law to be adopted by Town Council.
- ▶ Provide curb ramps on Dereham Drive near the school driveway to provide an accessible route for people with reduced mobility.
- ▶ Install curb extensions (bulb-outs) on the southeast and southwest corners of Quarter Town Line and Dereham Drive intersection.

4.9 Quarter Town Line from Dereham Drive to Baldwin Street

Quarter Town Line, especially between Esseltine Drive and Baldwin Street, experiences high operating speeds, mainly because of the open roadside environment conditions, the wide travel lanes, and the uninterrupted conditions on more than a kilometre road segment. There are no driveways on this section of the road.

To reduce operating speeds and better protect vulnerable road users crossing Quarter Town Line at midblock locations, the Town should consider the following remedial measures:

- ▶ Install Pedestrian Crossover Level 2 Type C – Mid-block (2-lane, 2-way) Treatments at the midblock Veterans Memorial Walkway trail crossing as outlined in the *OTM Book 15 – Pedestrian Crossing*. The installation of a midblock controlled crossing would encourage pedestrians to cross at a designated location and potentially reduce the likelihood of pedestrians jaywalking where the trail from Colin Avenue connects to the east sidewalk of Quarter Town Line.



- ▶ Install curb extensions at the midblock Veterans Memorial Walkway trail crossing, which would reduce the effective roadway width and provide a visual cue to motorists of potential conflicts with pedestrians/cyclists.
- ▶ Install bike lanes. Currently, the road is approximately 10 metres wide. This allows the implementation of 1.7 metre bike lanes with 3.3 metre travel lanes in each direction.

4.10 Baldwin Street and Quarter Town Line Intersection

Visibility issues and deficiencies with pavement markings were identified at the intersection of Quarter Town Line and Baldwin Street. Potential treatments include:

- ▶ Relocate the sign providing information about the reconstruction work on Newell Road outside the southwest sight triangle to improve the eastbound departure sight distance.
- ▶ Mark the eastbound and westbound crosswalks to clearly delineate where pedestrians are expected to cross the intersection.

In addition, under current conditions, a truck travelling northbound at the intersection is prohibited to make a right-turn onto Baldwin Street or to continue straight on Quarter Town Line. These vehicles are required to make a left-turn and enter a residential subdivision to depart the area. The Town should consider permitting heavy vehicle access to Baldwin Street east of Quarter Town Line, providing a connection to Broadway Street. Heavy vehicles making this manoeuvre are not expected to experience any issues with making turns at the Baldwin Street and Broadway Street intersection.

4.11 Quarter Town Line South of Baldwin Street

The Town should replace the two CURVE signs (Wa-3) on Newell Road with SHARP CURVE signs (Wa-2), consistent with the findings of the field investigation.



5 Implementation Phasing Strategy

5.1 Recommended Plan and Indicative Costs

Tables 5.1 to 5.9 provide the recommended implementation plan for improvements to the Quarter Town Line corridor. The proposed remedial measures have been divided in two phases. Phase 1 represents measures that should be prioritized by the Town and implemented in the near term. Phase 2 are remedial measures that the Town should consider if the Phase 1 treatments do not achieve the expected speed reduction and safety improvement.

The tables also provide indicative costs for the different measures, separated into three categories:

- ▶ Low: Less than \$500
- ▶ Medium: \$500 to \$5,000
- ▶ High: More than \$5,000



TABLE 5.1: PROPOSED REMEDIAL MEASURES AT BROADWAY STREET AND QUARTER TOWN LINE INTERSECTION

Remedial Measures	Cost
Phase 1	
Install white dashed lines to delineate the right-turn taper on Highway 19/ Broadway Street for Quarter Town Line	Low
Replace the existing CURVE sign (Wa-3L) on the eastbound approach with a warning sign with a black line to denote the presence of the intersection	Low
Install white edge lines and a yellow dividing line on the northbound approach	Low
Install a TURN sign (Wa-1R) approximately 100 metres from the curve	Low
Install a special oversize STOP sign (Ra-1101) on the northbound approach	Low

TABLE 5.2: PROPOSED REMEDIAL MEASURES AT SOUTH RIDGE ROAD AND QUARTER TOWN LINE INTERSECTION

Remedial Measures	Cost
Phase 1	
Move the school crossing further north by approximately 5 metres	Medium
Relocate the SCHOOL CROSSING sign on the east side of the roadway immediately adjacent to the school crossing	Low
Remove the curb ramps at the uncontrolled midblock crossing approximately 50 metres north of South Ridge Road	Medium
Remove the curb ramp on the southeast corner	Medium
Assess the surface conditions of the pedestrian areas on the southwest corner and identify where marking, grinding, or ramping the height is required	Low to Medium
Implement a Pedestrian Crossover (PXO) Level 2 Type C on the southbound approach	High Approximately \$25,000
Replace the existing SCHOOL AREA signs (Wc-1) with SCHOOL ZONE MAXIMUM SPEED WHEN FLASHING signs (RB-6A)	High Approximately \$5,000
Phase 2	
Install curb extensions (bulb-outs) on the southeast and southwest corners	High Approximately \$10,000



TABLE 5.3: PROPOSED REMEDIAL MEASURES AT NORTH STREET WEST AND QUARTER TOWN LINE INTERSECTION

Remedial Measures	Cost
Phase 1	
Relocate the northbound STOP sign onto the hydro pole immediately south	Low
Remark the obscured and faded crosswalk lines	Low
Install yellow dividing lines on the northbound and southbound approaches	Low
Assess the surface conditions of the pedestrian areas on the northwest corner and identify where marking, grinding, or ramping is required	Low to Medium

TABLE 5.4: PROPOSED REMEDIAL MEASURES AT GLENDALE DRIVE AND QUARTER TOWN LINE INTERSECTION (MONSIGNOR O'NEIL CATHOLIC ELEMENTARY SCHOOL)

Remedial Measures	Cost
Phase 1	
Provide a supervised school crossing on the northbound approach	High
Implement a Pedestrian Crossover (PXO) Level 2 Type C on the northbound approach	High Approximately \$25,000
Replace the existing SCHOOL AREA sign (Wc-1) with SCHOOL ZONE MAXIMUM SPEED WHEN FLASHING signs (RB-6A)	High Approximately \$5,000
Phase 2	
Install curb extensions (bulb-outs) on the southeast and southwest corners	High Approximately \$10,000



TABLE 5.5: PROPOSED REMEDIAL MEASURES ON QUARTER TOWN LINE FROM NORTH STREET WEST TO CONCESSION STREET WEST

Remedial Measures	Cost
Phase 1	
Assess the surface conditions of the sidewalks to identify where marking, grinding, or ramping is required	Low to Medium
Address the longitudinal gap of approximately 40 millimetres between the sidewalk and the curb of the east sidewalk on the bridge near Beech Boulevard by filling it with asphalt or by inserting a rubber filling	Low to Medium
Phase 2	
Install bike lanes	High

TABLE 5.6: PROPOSED REMEDIAL MEASURES AT CONCESSION STREET WEST AND QUARTER TOWN LINE INTERSECTION

Remedial Measures	Cost
Phase 1	
Remark the crosswalk lines	Low
Install NO PARKING signs on each corner to ensure clear sightlines are provided	Medium
Relocate the northbound and southbound stop bars closer to the edge of the opposite direction travel lanes	Low
Install stop ahead signs on the northbound and southbound approaches	Low
Reduce the corners radii	High Approximately \$10,000
Phase 2	
Convert the stop controlled intersection to a roundabout	High More than \$100,000



TABLE 5.7: PROPOSED REMEDIAL MEASURES AT DEREHAM DRIVE AND QUARTER TOWN LINE INTERSECTION (WESTFIELD PUBLIC SCHOOL)

Remedial Measures	Cost
Phase 1	
Implement a supervised school crossing on the northbound approach	High
Implement a Pedestrian Crossover (PXO) Level 2 Type C on the northbound approach	High Approximately \$25,000
Install NO STOPPING signs during the school arrival and departure periods on both sides of Quarter Town Line from Esseltine Drive to Dereham Drive	Medium
Replace the existing SCHOOL AREA sign (Wc-1) by SCHOOL ZONE MAXIMUM SPEED WHEN FLASHING signs (RB-6A)	High Approximately \$5,000
Provide curb ramps on Dereham Drive near the school driveway	Medium
Phase 2	
Install curb extensions (bulb-outs) on the southeast and southwest corners	High Approximately \$10,000

TABLE 5.8: PROPOSED REMEDIAL MEASURES ON QUARTER TOWN LINE FROM DEREHAM DRIVE TO BALDWIN STREET

Remedial Measures	Cost
Phase 1	
Implement a Pedestrian Crossover (PXO) Level 2 Type C at the midblock Veterans Memorial Walkway trail crossing	High Approximately \$25,000
Phase 2	
Install curb extensions (bulb-outs) at the midblock Veterans Memorial Walkway trail crossing	High Approximately \$10,000



TABLE 5.9: PROPOSED REMEDIAL MEASURES AT BALDWIN STREET AND QUARTER TOWN LINE INTERSECTION

Remedial Measures	Cost
Phase 1	
Relocate the sign providing information about the reconstruction work on Newell Road outside the southwest sight triangle	Low
Mark the eastbound and westbound crosswalks	Low
Designate Baldwin Street as a truck route	Low



6 Conclusions and Recommendations

6.1 Conclusions

The purpose of this study is to identify economically feasible remedial actions to existing and anticipated traffic operations and safety concerns within the Quarter Town Line corridor. The operational analysis concluded that all intersections currently operate at acceptable levels of service during the AM and PM peak hours. However, speed surveys found that high operating speeds were observed along the subject road corridor.

A field investigation conducted on September 26, 2017 identified the following safety and operational issues along the study corridor:

- ▶ High operating speeds in school zones and on the road segment immediately north of Baldwin Street. One of the reasons for the high operating speed is the absence of distinctive street features to break up the corridor;
- ▶ Lack of protected/controlled crossings near Monsignor O’Neil School, Westfield Public School and at the midblock trail crossing north of Baldwin Street, which expose vulnerable road users to conflicts with motorists;
- ▶ Visibility issues at South Ridge Road and Concession Street North, which restrict sight distances and increase the risk of collisions; and
- ▶ Discontinuity of the Truck Routes as heavy vehicles entering the study corridor from the south are prohibited access to Quarter Town Line and Baldwin Street, and are thus required to turn onto a local residential street to exit the area.

6.2 Recommendations

To address the above issues, treatments that would reduce vehicle speeds and provide additional protection to vulnerable road users were identified. The key remedial actions recommended for the subject corridor consist of the following:

- ▶ Install Pedestrian Crossover (PXO) Level 2 Type C crossings at the following locations:
 - North leg of South Ridge Road and Quarter Town Line;
 - South leg of Glendale Drive and Quarter Town Line;
 - South leg of Dereham Drive and Quarter Town Line; and
 - Midblock location where Veterans Memorial Walkway trail intersects with Quarter Town Line.



- ▶ Replace the existing SCHOOL AREA sign (Wc-1) with SCHOOL ZONE MAXIMUM SPEED 40 KILOMETRES PER HOUR WHEN FLASHING signs and associated School Zone Flasher Systems (RB-6A) at the three school areas.
- ▶ Install on-road bike lanes on Quarter Town Line from Baldwin Street to North Street West. The proposed bike lanes would connect the east-west trails intersecting Quarter Town Line and provide access to the main generators of bike traffic along the corridor including Monsignor O'Neil Catholic Elementary School, Westfield Public School and Tillsonburg Minor Soccer facility.

Several site specific remedial actions are recommended to address issues related to traffic control devices, visibility, and surface condition.



Appendix A

Detailed Count Data





Paradigm Transportation Solutions Limited
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Waterloo, Ontario, Canada N2J 1N8
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Count Name: North Street West & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 1

Turning Movement Data

Start Time	North Street West Eastbound						North Street West Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	12	3	0	2	15	3	9	12	0	2	24	5	15	6	0	0	26	13	9	1	0	0	23	88
7:15 AM	3	8	3	0	0	14	2	9	13	0	2	24	2	12	4	0	0	18	17	10	1	0	0	28	84
7:30 AM	0	13	3	0	0	16	3	8	10	0	9	21	5	25	6	0	0	36	13	28	1	0	0	42	115
7:45 AM	2	12	7	0	2	21	10	8	5	0	0	23	4	15	11	0	1	30	20	38	0	0	0	58	132
Hourly Total	5	45	16	0	4	66	18	34	40	0	13	92	16	67	27	0	1	110	63	85	3	0	0	151	419
8:00 AM	3	9	14	0	2	26	4	5	13	0	5	22	8	29	12	0	0	49	12	34	3	0	1	49	146
8:15 AM	0	14	7	0	0	21	11	8	9	0	0	28	3	21	14	0	0	38	16	23	1	0	0	40	127
8:30 AM	0	15	3	0	0	18	10	10	20	0	1	40	3	17	7	0	0	27	14	15	2	0	0	31	116
8:45 AM	5	21	8	0	0	34	5	8	22	0	1	35	2	18	6	0	0	26	28	26	3	0	1	57	152
Hourly Total	8	59	32	0	2	99	30	31	64	0	7	125	16	85	39	0	0	140	70	98	9	0	2	177	541
9:00 AM	1	7	0	0	0	8	11	13	6	0	0	30	5	12	9	0	0	26	23	14	3	0	0	40	104
9:15 AM	1	18	4	0	0	23	5	8	7	0	0	20	4	5	8	0	0	17	11	24	2	0	2	37	97
9:30 AM	1	7	3	0	0	11	8	9	6	0	1	23	0	17	10	0	0	27	14	17	4	0	0	35	96
9:45 AM	3	13	1	0	0	17	4	10	6	0	1	20	4	14	11	0	0	29	14	12	4	0	0	30	96
Hourly Total	6	45	8	0	0	59	28	40	25	0	2	93	13	48	38	0	0	99	62	67	13	0	2	142	393
10:00 AM	1	9	4	0	0	14	9	9	6	0	0	24	3	9	9	0	0	21	8	9	1	0	0	18	77
10:15 AM	1	6	4	0	0	11	7	8	9	0	1	24	4	9	5	0	0	18	11	15	0	0	0	26	79
10:30 AM	0	11	1	0	0	12	4	7	12	0	0	23	3	10	6	0	0	19	9	13	1	0	0	23	77
10:45 AM	2	12	4	0	0	18	3	13	11	0	0	27	3	18	7	0	0	28	8	15	1	0	0	24	97
Hourly Total	4	38	13	0	0	55	23	37	38	0	1	98	13	46	27	0	0	86	36	52	3	0	0	91	330
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	1	17	4	0	0	22	4	10	20	0	0	34	5	23	12	0	0	40	10	27	1	0	1	38	134
3:15 PM	1	10	11	0	0	22	8	10	26	0	4	44	11	26	9	0	0	46	6	24	1	0	0	31	143
3:30 PM	1	17	9	0	0	27	3	15	12	0	1	30	14	22	10	0	0	46	28	32	6	0	1	66	169
3:45 PM	2	13	6	0	0	21	5	17	12	0	2	34	4	24	11	0	0	39	14	25	1	0	1	40	134
Hourly Total	5	57	30	0	0	92	20	52	70	0	7	142	34	95	42	0	0	171	58	108	9	0	3	175	580
4:00 PM	0	3	5	0	0	8	8	14	19	0	1	41	6	20	11	0	0	37	13	23	5	0	0	41	127
4:15 PM	1	15	8	0	0	24	9	12	27	0	0	48	5	19	12	0	0	36	11	22	3	0	0	36	144
4:30 PM	2	13	5	0	1	20	6	10	15	0	0	31	8	23	10	0	0	41	18	33	3	0	0	54	146
4:45 PM	0	7	3	0	0	10	20	13	25	0	0	58	7	15	10	0	0	32	8	31	3	0	0	42	142
Hourly Total	3	38	21	0	1	62	43	49	86	0	1	178	26	77	43	0	0	146	50	109	14	0	0	173	559
5:00 PM	3	16	4	0	0	23	7	20	31	0	0	58	3	22	8	0	0	33	24	24	2	0	0	50	164
5:15 PM	3	18	10	0	0	31	14	19	22	0	0	55	3	14	7	0	0	24	19	25	0	0	0	44	154
5:30 PM	1	9	8	0	0	18	7	13	29	0	2	49	9	20	5	0	0	34	25	28	1	0	0	54	155
5:45 PM	2	14	6	0	0	22	9	10	31	0	0	50	3	15	8	0	0	26	13	21	2	0	0	36	134
Hourly Total	9	57	28	0	0	94	37	62	113	0	2	212	18	71	28	0	0	117	81	98	5	0	0	184	607
6:00 PM	0	8	6	0	0	14	5	6	13	0	0	24	3	12	9	0	1	24	15	13	2	0	0	30	92

6:15 PM	1	5	1	0	0	7	12	10	9	0	1	31	7	15	5	0	0	27	14	33	2	0	0	49	114
6:30 PM	2	14	5	0	0	21	6	10	14	0	0	30	0	16	8	0	0	24	15	12	1	0	3	28	103
6:45 PM	2	12	8	0	1	22	11	13	8	0	1	32	4	4	9	0	1	17	17	25	0	0	0	42	113
Hourly Total	5	39	20	0	1	64	34	39	44	0	2	117	14	47	31	0	2	92	61	83	5	0	3	149	422
Grand Total	45	378	168	0	8	591	233	344	480	0	35	1057	150	536	275	0	3	961	481	700	61	0	10	1242	3851
Approach %	7.6	64.0	28.4	0.0	-	-	22.0	32.5	45.4	0.0	-	-	15.6	55.8	28.6	0.0	-	-	38.7	56.4	4.9	0.0	-	-	-
Total %	1.2	9.8	4.4	0.0	-	15.3	6.1	8.9	12.5	0.0	-	27.4	3.9	13.9	7.1	0.0	-	25.0	12.5	18.2	1.6	0.0	-	32.3	-
Lights	44	358	165	0	-	567	225	325	473	0	-	1023	144	525	267	0	-	936	469	674	61	0	-	1204	3730
% Lights	97.8	94.7	98.2	-	-	95.9	96.6	94.5	98.5	-	-	96.8	96.0	97.9	97.1	-	-	97.4	97.5	96.3	100.0	-	-	96.9	96.9
Mediums	1	18	2	0	-	21	8	18	7	0	-	33	5	9	5	0	-	19	11	24	0	0	-	35	108
% Mediums	2.2	4.8	1.2	-	-	3.6	3.4	5.2	1.5	-	-	3.1	3.3	1.7	1.8	-	-	2.0	2.3	3.4	0.0	-	-	2.8	2.8
Articulated Trucks	0	2	1	0	-	3	0	1	0	0	-	1	1	2	3	0	-	6	1	2	0	0	-	3	13
% Articulated Trucks	0.0	0.5	0.6	-	-	0.5	0.0	0.3	0.0	-	-	0.1	0.7	0.4	1.1	-	-	0.6	0.2	0.3	0.0	-	-	0.2	0.3
Pedestrians	-	-	-	-	8	-	-	-	-	-	35	-	-	-	-	-	3	-	-	-	-	-	10	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



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Count Name: North Street West & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

Start Time	North Street West Eastbound						North Street West Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	3	9	14	0	2	26	4	5	13	0	5	22	8	29	12	0	0	49	12	34	3	0	1	49	146
8:15 AM	0	14	7	0	0	21	11	8	9	0	0	28	3	21	14	0	0	38	16	23	1	0	0	40	127
8:30 AM	0	15	3	0	0	18	10	10	20	0	1	40	3	17	7	0	0	27	14	15	2	0	0	31	116
8:45 AM	5	21	8	0	0	34	5	8	22	0	1	35	2	18	6	0	0	26	28	26	3	0	1	57	152
Total	8	59	32	0	2	99	30	31	64	0	7	125	16	85	39	0	0	140	70	98	9	0	2	177	541
Approach %	8.1	59.6	32.3	0.0	-	-	24.0	24.8	51.2	0.0	-	-	11.4	60.7	27.9	0.0	-	-	39.5	55.4	5.1	0.0	-	-	-
Total %	1.5	10.9	5.9	0.0	-	18.3	5.5	5.7	11.8	0.0	-	23.1	3.0	15.7	7.2	0.0	-	25.9	12.9	18.1	1.7	0.0	-	32.7	-
PHF	0.400	0.702	0.571	0.000	-	0.728	0.682	0.775	0.727	0.000	-	0.781	0.500	0.733	0.696	0.000	-	0.714	0.625	0.721	0.750	0.000	-	0.776	0.890
Lights	8	55	30	0	-	93	27	26	62	0	-	115	15	82	38	0	-	135	67	94	9	0	-	170	513
% Lights	100.0	93.2	93.8	-	-	93.9	90.0	83.9	96.9	-	-	92.0	93.8	96.5	97.4	-	-	96.4	95.7	95.9	100.0	-	-	96.0	94.8
Mediums	0	4	2	0	-	6	3	5	2	0	-	10	1	3	1	0	-	5	3	3	0	0	-	6	27
% Mediums	0.0	6.8	6.3	-	-	6.1	10.0	16.1	3.1	-	-	8.0	6.3	3.5	2.6	-	-	3.6	4.3	3.1	0.0	-	-	3.4	5.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.0	0.0	-	-	0.6	0.2
Pedestrians	-	-	-	-	2	-	-	-	-	-	7	-	-	-	-	-	0	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
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Count Name: North Street West & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 6

Turning Movement Peak Hour Data (4:45 PM)

Start Time	North Street West Eastbound						North Street West Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:45 PM	0	7	3	0	0	10	20	13	25	0	0	58	7	15	10	0	0	32	8	31	3	0	0	42	142
5:00 PM	3	16	4	0	0	23	7	20	31	0	0	58	3	22	8	0	0	33	24	24	2	0	0	50	164
5:15 PM	3	18	10	0	0	31	14	19	22	0	0	55	3	14	7	0	0	24	19	25	0	0	0	44	154
5:30 PM	1	9	8	0	0	18	7	13	29	0	2	49	9	20	5	0	0	34	25	28	1	0	0	54	155
Total	7	50	25	0	0	82	48	65	107	0	2	220	22	71	30	0	0	123	76	108	6	0	0	190	615
Approach %	8.5	61.0	30.5	0.0	-	-	21.8	29.5	48.6	0.0	-	-	17.9	57.7	24.4	0.0	-	-	40.0	56.8	3.2	0.0	-	-	-
Total %	1.1	8.1	4.1	0.0	-	13.3	7.8	10.6	17.4	0.0	-	35.8	3.6	11.5	4.9	0.0	-	20.0	12.4	17.6	1.0	0.0	-	30.9	-
PHF	0.583	0.694	0.625	0.000	-	0.661	0.600	0.813	0.863	0.000	-	0.948	0.611	0.807	0.750	0.000	-	0.904	0.760	0.871	0.500	0.000	-	0.880	0.938
Lights	7	49	25	0	-	81	48	63	105	0	-	216	22	71	30	0	-	123	75	107	6	0	-	188	608
% Lights	100.0	98.0	100.0	-	-	98.8	100.0	96.9	98.1	-	-	98.2	100.0	100.0	100.0	-	-	100.0	98.7	99.1	100.0	-	-	98.9	98.9
Mediums	0	1	0	0	-	1	0	2	2	0	-	4	0	0	0	0	-	0	0	1	0	0	-	1	6
% Mediums	0.0	2.0	0.0	-	-	1.2	0.0	3.1	1.9	-	-	1.8	0.0	0.0	0.0	-	-	0.0	0.0	0.9	0.0	-	-	0.5	1.0
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	1.3	0.0	0.0	-	-	0.5	0.2
Pedestrians	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
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Count Name: Baldwin Street & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 1

Turning Movement Data

Start Time	Baldwin Street Eastbound						Baldwin Street Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	0	1	0	0	1	6	1	12	0	0	19	0	14	11	0	0	25	12	7	1	0	0	20	65
7:15 AM	1	1	0	0	1	2	12	0	5	0	0	17	1	3	8	0	1	12	11	7	1	0	0	19	50
7:30 AM	1	5	1	0	0	7	11	4	11	0	0	26	0	10	6	0	0	16	22	6	3	0	0	31	80
7:45 AM	2	10	0	0	0	12	8	2	8	0	3	18	0	11	11	0	0	22	25	8	0	0	1	33	85
Hourly Total	4	16	2	0	1	22	37	7	36	0	3	80	1	38	36	0	1	75	70	28	5	0	1	103	280
8:00 AM	5	5	0	0	1	10	10	0	14	0	0	24	0	5	11	0	2	16	16	6	0	0	0	22	72
8:15 AM	2	8	2	0	2	12	11	2	13	0	0	26	0	14	9	0	2	23	16	9	2	0	1	27	88
8:30 AM	1	10	2	0	0	13	5	2	15	0	1	22	0	2	16	0	0	18	11	4	1	0	0	16	69
8:45 AM	0	4	0	0	0	4	13	4	16	0	3	33	0	5	14	0	1	19	33	6	2	0	1	41	97
Hourly Total	8	27	4	0	3	39	39	8	58	0	4	105	0	26	50	0	5	76	76	25	5	0	2	106	326
9:00 AM	3	10	0	0	0	13	11	5	14	0	0	30	0	7	9	0	1	16	17	10	2	1	0	30	89
9:15 AM	0	8	0	0	0	8	11	3	7	0	4	21	0	4	9	0	0	13	11	3	1	0	1	15	57
9:30 AM	5	5	2	0	0	12	8	2	10	0	2	20	0	8	8	0	0	16	13	8	1	0	1	22	70
9:45 AM	1	5	0	0	0	6	4	2	6	0	0	12	0	6	6	0	1	12	9	3	4	0	1	16	46
Hourly Total	9	28	2	0	0	39	34	12	37	0	6	83	0	25	32	0	2	57	50	24	8	1	3	83	262
10:00 AM	3	9	1	0	2	13	8	3	10	0	1	21	0	4	9	0	0	13	7	1	2	0	0	10	57
10:15 AM	3	7	1	0	0	11	8	9	13	0	0	30	1	7	7	0	0	15	7	10	1	0	0	18	74
10:30 AM	4	9	4	0	1	17	12	5	7	0	2	24	5	5	15	0	0	25	10	10	1	0	0	21	87
10:45 AM	0	5	0	0	0	5	5	5	13	0	0	23	1	10	14	0	0	25	16	8	4	0	0	28	81
Hourly Total	10	30	6	0	3	46	33	22	43	0	3	98	7	26	45	0	0	78	40	29	8	0	0	77	299
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	2	5	1	0	0	8	13	5	25	0	0	43	2	18	25	0	0	45	9	7	2	0	0	18	114
3:15 PM	3	6	0	0	0	9	6	10	29	0	0	45	2	9	9	0	0	20	17	6	5	0	0	28	102
3:30 PM	0	7	0	0	0	7	6	5	15	0	0	26	0	8	14	0	0	22	24	4	4	1	0	33	88
3:45 PM	4	1	1	1	0	7	8	6	6	0	0	20	0	8	15	0	0	23	28	14	1	0	1	43	93
Hourly Total	9	19	2	1	0	31	33	26	75	0	0	134	4	43	63	0	0	110	78	31	12	1	1	122	397
4:00 PM	0	1	0	0	0	1	11	5	11	0	0	27	1	14	19	0	2	34	7	13	2	0	0	22	84
4:15 PM	0	4	0	0	0	4	8	8	12	0	0	28	0	17	17	0	0	34	7	7	2	0	0	16	82
4:30 PM	1	4	0	0	0	5	20	3	16	0	0	39	4	8	10	0	0	22	18	7	0	0	1	25	91
4:45 PM	0	5	0	0	0	5	14	5	15	0	0	34	0	11	16	0	0	27	16	12	2	0	0	30	96
Hourly Total	1	14	0	0	0	15	53	21	54	0	0	128	5	50	62	0	2	117	48	39	6	0	1	93	353
5:00 PM	1	6	0	0	0	7	17	4	15	0	0	36	1	11	12	0	0	24	17	9	1	0	0	27	94
5:15 PM	0	1	1	0	0	2	11	1	7	0	0	19	0	10	10	0	0	20	20	11	1	1	0	33	74
5:30 PM	0	1	0	0	0	1	13	4	19	0	0	36	0	10	14	0	0	24	15	5	1	0	0	21	82
5:45 PM	1	4	0	0	0	5	5	5	13	0	0	23	0	8	10	0	0	18	11	7	1	0	0	19	65
Hourly Total	2	12	1	0	0	15	46	14	54	0	0	114	1	39	46	0	0	86	63	32	4	1	0	100	315
6:00 PM	1	1	1	0	0	3	5	3	10	0	3	18	2	7	2	0	0	11	10	1	1	0	0	12	44

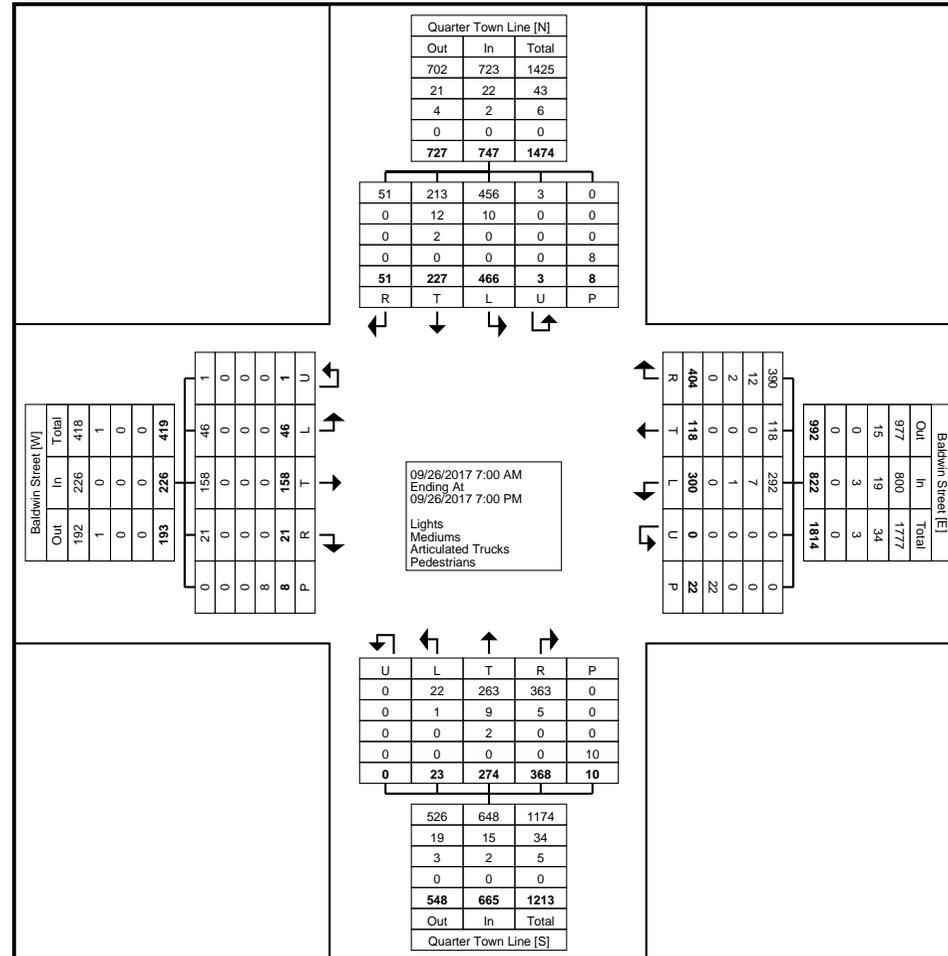
6:15 PM	0	4	2	0	1	6	12	1	10	0	2	23	0	7	6	0	0	13	6	6	1	0	0	13	55
6:30 PM	2	5	0	0	0	7	4	1	12	0	0	17	2	7	10	0	0	19	17	5	0	0	0	22	65
6:45 PM	0	2	1	0	0	3	4	3	15	0	1	22	1	6	16	0	0	23	8	7	1	0	0	16	64
Hourly Total	3	12	4	0	1	19	25	8	47	0	6	80	5	27	34	0	0	66	41	19	3	0	0	63	228
Grand Total	46	158	21	1	8	226	300	118	404	0	22	822	23	274	368	0	10	665	466	227	51	3	8	747	2460
Approach %	20.4	69.9	9.3	0.4	-	-	36.5	14.4	49.1	0.0	-	-	3.5	41.2	55.3	0.0	-	-	62.4	30.4	6.8	0.4	-	-	-
Total %	1.9	6.4	0.9	0.0	-	9.2	12.2	4.8	16.4	0.0	-	33.4	0.9	11.1	15.0	0.0	-	27.0	18.9	9.2	2.1	0.1	-	30.4	-
Lights	46	158	21	1	-	226	292	118	390	0	-	800	22	263	363	0	-	648	456	213	51	3	-	723	2397
% Lights	100.0	100.0	100.0	100.0	-	100.0	97.3	100.0	96.5	-	-	97.3	95.7	96.0	98.6	-	-	97.4	97.9	93.8	100.0	100.0	-	96.8	97.4
Mediums	0	0	0	0	-	0	7	0	12	0	-	19	1	9	5	0	-	15	10	12	0	0	-	22	56
% Mediums	0.0	0.0	0.0	0.0	-	0.0	2.3	0.0	3.0	-	-	2.3	4.3	3.3	1.4	-	-	2.3	2.1	5.3	0.0	0.0	-	2.9	2.3
Articulated Trucks	0	0	0	0	-	0	1	0	2	0	-	3	0	2	0	0	-	2	0	2	0	0	-	2	7
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.3	0.0	0.5	-	-	0.4	0.0	0.7	0.0	-	-	0.3	0.0	0.9	0.0	0.0	-	0.3	0.3
Pedestrians	-	-	-	-	8	-	-	-	-	-	22	-	-	-	-	-	10	-	-	-	-	-	8	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
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Count Name: Baldwin Street & Quarter Town Line
Site Code:
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Turning Movement Data Plot



Paradigm Transportation Solutions Limited
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Count Name: Baldwin Street & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 4

Turning Movement Peak Hour Data (8:15 AM)

Start Time	Baldwin Street Eastbound						Baldwin Street Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:15 AM	2	8	2	0	2	12	11	2	13	0	0	26	0	14	9	0	2	23	16	9	2	0	1	27	88
8:30 AM	1	10	2	0	0	13	5	2	15	0	1	22	0	2	16	0	0	18	11	4	1	0	0	16	69
8:45 AM	0	4	0	0	0	4	13	4	16	0	3	33	0	5	14	0	1	19	33	6	2	0	1	41	97
9:00 AM	3	10	0	0	0	13	11	5	14	0	0	30	0	7	9	0	1	16	17	10	2	1	0	30	89
Total	6	32	4	0	2	42	40	13	58	0	4	111	0	28	48	0	4	76	77	29	7	1	2	114	343
Approach %	14.3	76.2	9.5	0.0	-	-	36.0	11.7	52.3	0.0	-	-	0.0	36.8	63.2	0.0	-	-	67.5	25.4	6.1	0.9	-	-	-
Total %	1.7	9.3	1.2	0.0	-	12.2	11.7	3.8	16.9	0.0	-	32.4	0.0	8.2	14.0	0.0	-	22.2	22.4	8.5	2.0	0.3	-	33.2	-
PHF	0.500	0.800	0.500	0.000	-	0.808	0.769	0.650	0.906	0.000	-	0.841	0.000	0.500	0.750	0.000	-	0.826	0.583	0.725	0.875	0.250	-	0.695	0.884
Lights	6	32	4	0	-	42	39	13	57	0	-	109	0	27	47	0	-	74	75	28	7	1	-	111	336
% Lights	100.0	100.0	100.0	-	-	100.0	97.5	100.0	98.3	-	-	98.2	-	96.4	97.9	-	-	97.4	97.4	96.6	100.0	100.0	-	97.4	98.0
Mediums	0	0	0	0	-	0	1	0	1	0	-	2	0	1	1	0	-	2	2	0	0	0	-	2	6
% Mediums	0.0	0.0	0.0	-	-	0.0	2.5	0.0	1.7	-	-	1.8	-	3.6	2.1	-	-	2.6	2.6	0.0	0.0	0.0	-	1.8	1.7
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	-	0.0	0.0	-	-	0.0	0.0	3.4	0.0	0.0	-	0.9	0.3
Pedestrians	-	-	-	-	2	-	-	-	-	-	4	-	-	-	-	-	4	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



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Count Name: Baldwin Street & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 6

Turning Movement Peak Hour Data (3:00 PM)

Start Time	Baldwin Street Eastbound						Baldwin Street Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:00 PM	2	5	1	0	0	8	13	5	25	0	0	43	2	18	25	0	0	45	9	7	2	0	0	18	114
3:15 PM	3	6	0	0	0	9	6	10	29	0	0	45	2	9	9	0	0	20	17	6	5	0	0	28	102
3:30 PM	0	7	0	0	0	7	6	5	15	0	0	26	0	8	14	0	0	22	24	4	4	1	0	33	88
3:45 PM	4	1	1	1	0	7	8	6	6	0	0	20	0	8	15	0	0	23	28	14	1	0	1	43	93
Total	9	19	2	1	0	31	33	26	75	0	0	134	4	43	63	0	0	110	78	31	12	1	1	122	397
Approach %	29.0	61.3	6.5	3.2	-	-	24.6	19.4	56.0	0.0	-	-	3.6	39.1	57.3	0.0	-	-	63.9	25.4	9.8	0.8	-	-	-
Total %	2.3	4.8	0.5	0.3	-	7.8	8.3	6.5	18.9	0.0	-	33.8	1.0	10.8	15.9	0.0	-	27.7	19.6	7.8	3.0	0.3	-	30.7	-
PHF	0.563	0.679	0.500	0.250	-	0.861	0.635	0.650	0.647	0.000	-	0.744	0.500	0.597	0.630	0.000	-	0.611	0.696	0.554	0.600	0.250	-	0.709	0.871
Lights	9	19	2	1	-	31	32	26	73	0	-	131	4	42	62	0	-	108	75	29	12	1	-	117	387
% Lights	100.0	100.0	100.0	100.0	-	100.0	97.0	100.0	97.3	-	-	97.8	100.0	97.7	98.4	-	-	98.2	96.2	93.5	100.0	100.0	-	95.9	97.5
Mediums	0	0	0	0	-	0	1	0	2	0	-	3	0	1	1	0	-	2	3	2	0	0	-	5	10
% Mediums	0.0	0.0	0.0	0.0	-	0.0	3.0	0.0	2.7	-	-	2.2	0.0	2.3	1.6	-	-	1.8	3.8	6.5	0.0	0.0	-	4.1	2.5
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Articulated Trucks	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	1	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



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Count Name: Concession Street & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 1

Turning Movement Data

Start Time	Concession Street Eastbound						Concession Street Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	0	6	1	0	4	7	5	7	1	0	0	13	3	17	6	0	0	26	4	20	0	0	0	24	70
7:15 AM	1	5	2	0	0	8	6	11	7	0	0	24	4	7	9	0	1	20	4	13	4	0	0	21	73
7:30 AM	2	8	1	0	0	11	5	9	9	0	0	23	3	21	3	0	0	27	12	25	4	0	1	41	102
7:45 AM	1	14	3	0	1	18	8	8	7	0	0	23	4	16	7	0	1	27	22	32	2	0	0	56	124
Hourly Total	4	33	7	0	5	44	24	35	24	0	0	83	14	61	25	0	2	100	42	90	10	0	1	142	369
8:00 AM	2	8	1	0	1	11	3	6	4	0	2	13	4	21	10	0	0	35	14	28	2	0	0	44	103
8:15 AM	1	11	0	0	0	12	7	11	10	0	1	28	3	15	8	0	0	26	25	21	2	0	0	48	114
8:30 AM	1	9	5	0	11	15	16	7	11	0	8	34	4	11	10	0	0	25	11	29	2	0	7	42	116
8:45 AM	0	18	8	0	2	26	16	6	15	0	2	37	1	20	25	0	4	46	27	34	1	0	2	62	171
Hourly Total	4	46	14	0	14	64	42	30	40	0	13	112	12	67	53	0	4	132	77	112	7	0	9	196	504
9:00 AM	0	9	2	0	1	11	8	4	5	0	3	17	6	22	14	0	1	42	13	15	0	0	0	28	98
9:15 AM	0	8	1	0	0	9	5	5	13	0	2	23	1	6	10	0	0	17	21	13	0	0	0	34	83
9:30 AM	1	16	1	0	0	18	8	7	11	0	0	26	4	13	11	0	0	28	13	13	2	0	0	28	100
9:45 AM	0	10	3	0	0	13	4	8	9	0	0	21	0	13	13	0	0	26	10	10	1	0	0	21	81
Hourly Total	1	43	7	0	1	51	25	24	38	0	5	87	11	54	48	0	1	113	57	51	3	0	0	111	362
10:00 AM	0	2	1	0	0	3	2	4	11	0	1	17	2	11	6	0	0	19	12	12	1	0	0	25	64
10:15 AM	0	6	0	0	0	6	6	11	11	0	1	28	2	13	9	0	0	24	20	17	1	0	0	38	96
10:30 AM	0	5	2	0	0	7	10	10	14	0	0	34	0	14	6	0	0	20	12	14	1	0	0	27	88
10:45 AM	1	6	1	0	0	8	6	11	25	0	0	42	1	16	18	0	0	35	14	14	2	0	0	30	115
Hourly Total	1	19	4	0	0	24	24	36	61	0	2	121	5	54	39	0	0	98	58	57	5	0	0	120	363
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	1	6	1	0	0	8	8	10	20	0	0	38	1	20	15	0	0	36	22	19	1	0	0	42	124
3:15 PM	3	5	3	0	0	11	13	8	20	0	0	41	1	26	6	0	0	33	19	29	1	0	0	49	134
3:30 PM	4	8	1	0	6	13	4	12	16	0	0	32	4	45	27	0	1	76	13	24	1	0	0	38	159
3:45 PM	2	14	5	0	3	21	9	15	17	0	0	41	1	20	11	0	3	32	16	20	1	0	0	37	131
Hourly Total	10	33	10	0	9	53	34	45	73	0	0	152	7	111	59	0	4	177	70	92	4	0	0	166	548
4:00 PM	1	9	3	0	0	13	6	13	14	0	0	33	1	25	9	0	0	35	13	21	2	0	0	36	117
4:15 PM	1	13	1	0	1	15	8	11	13	0	0	32	0	25	13	0	0	38	9	16	2	0	0	27	112
4:30 PM	1	12	3	0	0	16	8	10	23	0	0	41	4	21	6	0	0	31	13	20	2	0	0	35	123
4:45 PM	0	11	1	0	0	12	10	12	26	0	1	48	2	20	15	0	0	37	7	31	2	0	0	40	137
Hourly Total	3	45	8	0	1	56	32	46	76	0	1	154	7	91	43	0	0	141	42	88	8	0	0	138	489
5:00 PM	0	8	2	0	1	10	7	9	23	0	0	39	2	25	12	0	0	39	9	20	2	0	0	31	119
5:15 PM	4	9	6	0	0	19	6	16	19	0	0	41	1	17	4	0	0	22	22	28	1	0	0	51	133
5:30 PM	2	16	0	0	0	18	2	11	15	0	0	28	0	14	16	0	0	30	21	17	0	0	0	38	114
5:45 PM	0	12	4	0	0	16	8	9	15	0	1	32	1	15	6	0	0	22	15	20	0	0	0	35	105
Hourly Total	6	45	12	0	1	63	23	45	72	0	1	140	4	71	38	0	0	113	67	85	3	0	0	155	471
6:00 PM	1	9	1	0	0	11	3	3	13	0	0	19	0	17	6	0	0	23	13	13	1	0	0	27	80

6:15 PM	2	9	1	0	0	12	6	5	12	0	0	23	2	22	2	0	0	26	23	11	2	0	0	36	97
6:30 PM	3	3	3	0	0	9	2	4	17	0	5	23	1	11	7	0	0	19	15	13	2	0	0	30	81
6:45 PM	2	8	1	0	1	11	7	10	23	0	0	40	1	18	2	0	0	21	22	12	2	0	0	36	108
Hourly Total	8	29	6	0	1	43	18	22	65	0	5	105	4	68	17	0	0	89	73	49	7	0	0	129	366
Grand Total	37	293	68	0	32	398	222	283	449	0	27	954	64	577	322	0	11	963	486	624	47	0	10	1157	3472
Approach %	9.3	73.6	17.1	0.0	-	-	23.3	29.7	47.1	0.0	-	-	6.6	59.9	33.4	0.0	-	-	42.0	53.9	4.1	0.0	-	-	-
Total %	1.1	8.4	2.0	0.0	-	11.5	6.4	8.2	12.9	0.0	-	27.5	1.8	16.6	9.3	0.0	-	27.7	14.0	18.0	1.4	0.0	-	33.3	-
Lights	34	284	66	0	-	384	196	272	437	0	-	905	63	559	288	0	-	910	470	597	44	0	-	1111	3310
% Lights	91.9	96.9	97.1	-	-	96.5	88.3	96.1	97.3	-	-	94.9	98.4	96.9	89.4	-	-	94.5	96.7	95.7	93.6	-	-	96.0	95.3
Mediums	3	9	2	0	-	14	26	11	12	0	-	49	1	13	34	0	-	48	16	23	2	0	-	41	152
% Mediums	8.1	3.1	2.9	-	-	3.5	11.7	3.9	2.7	-	-	5.1	1.6	2.3	10.6	-	-	5.0	3.3	3.7	4.3	-	-	3.5	4.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	5	0	0	-	5	0	4	1	0	-	5	10
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.9	0.0	-	-	0.5	0.0	0.6	2.1	-	-	0.4	0.3
Pedestrians	-	-	-	-	32	-	-	-	-	-	27	-	-	-	-	-	11	-	-	-	-	-	10	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
22 King Street South, Suite 300

Waterloo, Ontario, Canada N2J 1N8
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Count Name: Concession Street & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 4

Turning Movement Peak Hour Data (8:00 AM)

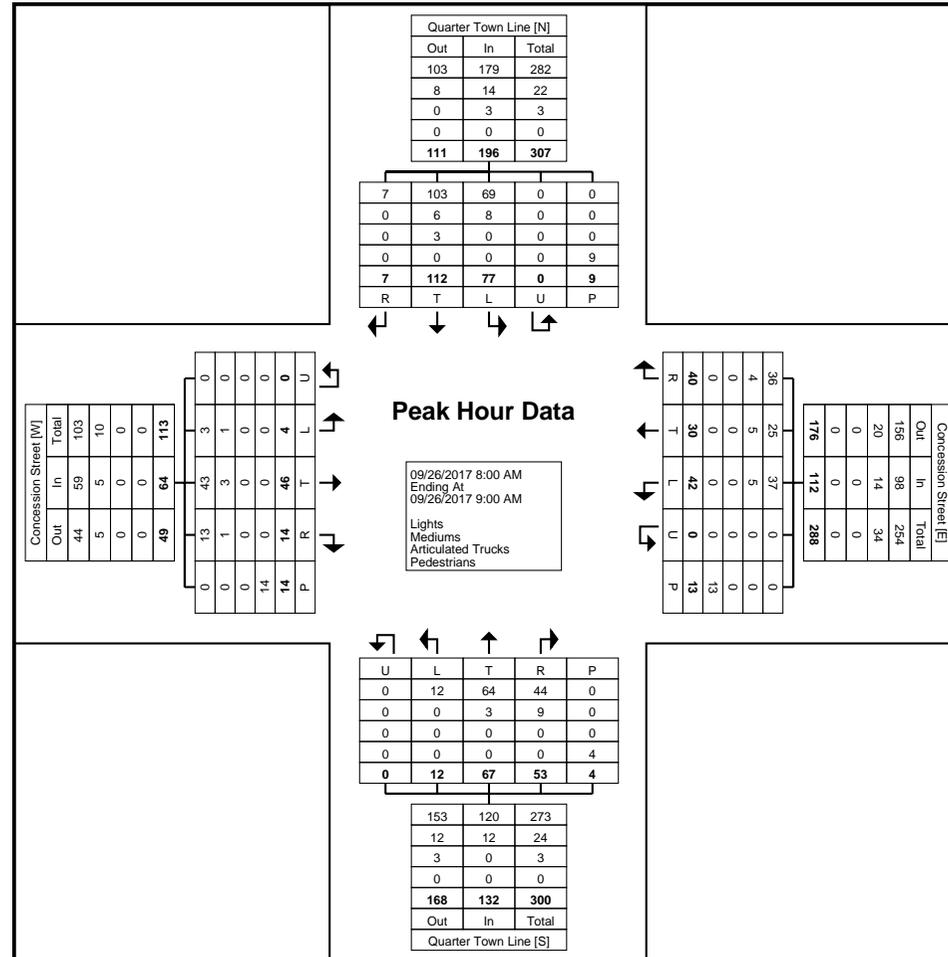
Start Time	Concession Street Eastbound						Concession Street Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	2	8	1	0	1	11	3	6	4	0	2	13	4	21	10	0	0	35	14	28	2	0	0	44	103
8:15 AM	1	11	0	0	0	12	7	11	10	0	1	28	3	15	8	0	0	26	25	21	2	0	0	48	114
8:30 AM	1	9	5	0	11	15	16	7	11	0	8	34	4	11	10	0	0	25	11	29	2	0	7	42	116
8:45 AM	0	18	8	0	2	26	16	6	15	0	2	37	1	20	25	0	4	46	27	34	1	0	2	62	171
Total	4	46	14	0	14	64	42	30	40	0	13	112	12	67	53	0	4	132	77	112	7	0	9	196	504
Approach %	6.3	71.9	21.9	0.0	-	-	37.5	26.8	35.7	0.0	-	-	9.1	50.8	40.2	0.0	-	-	39.3	57.1	3.6	0.0	-	-	-
Total %	0.8	9.1	2.8	0.0	-	12.7	8.3	6.0	7.9	0.0	-	22.2	2.4	13.3	10.5	0.0	-	26.2	15.3	22.2	1.4	0.0	-	38.9	-
PHF	0.500	0.639	0.438	0.000	-	0.615	0.656	0.682	0.667	0.000	-	0.757	0.750	0.798	0.530	0.000	-	0.717	0.713	0.824	0.875	0.000	-	0.790	0.737
Lights	3	43	13	0	-	59	37	25	36	0	-	98	12	64	44	0	-	120	69	103	7	0	-	179	456
% Lights	75.0	93.5	92.9	-	-	92.2	88.1	83.3	90.0	-	-	87.5	100.0	95.5	83.0	-	-	90.9	89.6	92.0	100.0	-	-	91.3	90.5
Mediums	1	3	1	0	-	5	5	5	4	0	-	14	0	3	9	0	-	12	8	6	0	0	-	14	45
% Mediums	25.0	6.5	7.1	-	-	7.8	11.9	16.7	10.0	-	-	12.5	0.0	4.5	17.0	-	-	9.1	10.4	5.4	0.0	-	-	7.1	8.9
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	3	0	0	-	3	3
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	2.7	0.0	-	-	1.5	0.6
Pedestrians	-	-	-	-	14	-	-	-	-	-	13	-	-	-	-	-	4	-	-	-	-	-	9	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
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Count Name: Concession Street & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 5



Turning Movement Peak Hour Data Plot (8:00 AM)



Paradigm Transportation Solutions Limited
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Count Name: Concession Street & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 6

Turning Movement Peak Hour Data (3:00 PM)

Start Time	Concession Street Eastbound						Concession Street Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:00 PM	1	6	1	0	0	8	8	10	20	0	0	38	1	20	15	0	0	36	22	19	1	0	0	42	124
3:15 PM	3	5	3	0	0	11	13	8	20	0	0	41	1	26	6	0	0	33	19	29	1	0	0	49	134
3:30 PM	4	8	1	0	6	13	4	12	16	0	0	32	4	45	27	0	1	76	13	24	1	0	0	38	159
3:45 PM	2	14	5	0	3	21	9	15	17	0	0	41	1	20	11	0	3	32	16	20	1	0	0	37	131
Total	10	33	10	0	9	53	34	45	73	0	0	152	7	111	59	0	4	177	70	92	4	0	0	166	548
Approach %	18.9	62.3	18.9	0.0	-	-	22.4	29.6	48.0	0.0	-	-	4.0	62.7	33.3	0.0	-	-	42.2	55.4	2.4	0.0	-	-	-
Total %	1.8	6.0	1.8	0.0	-	9.7	6.2	8.2	13.3	0.0	-	27.7	1.3	20.3	10.8	0.0	-	32.3	12.8	16.8	0.7	0.0	-	30.3	-
PHF	0.625	0.589	0.500	0.000	-	0.631	0.654	0.750	0.913	0.000	-	0.927	0.438	0.617	0.546	0.000	-	0.582	0.795	0.793	1.000	0.000	-	0.847	0.862
Lights	10	32	9	0	-	51	30	43	67	0	-	140	6	107	54	0	-	167	62	88	3	0	-	153	511
% Lights	100.0	97.0	90.0	-	-	96.2	88.2	95.6	91.8	-	-	92.1	85.7	96.4	91.5	-	-	94.4	88.6	95.7	75.0	-	-	92.2	93.2
Mediums	0	1	1	0	-	2	4	2	6	0	-	12	1	2	5	0	-	8	8	4	1	0	-	13	35
% Mediums	0.0	3.0	10.0	-	-	3.8	11.8	4.4	8.2	-	-	7.9	14.3	1.8	8.5	-	-	4.5	11.4	4.3	25.0	-	-	7.8	6.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	0	0	0	0	-	0	2
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.8	0.0	-	-	1.1	0.0	0.0	0.0	-	-	0.0	0.4
Pedestrians	-	-	-	-	9	-	-	-	-	-	0	-	-	-	-	-	4	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-



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Count Name: Highway19 & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 1

Turning Movement Data

Start Time	Highway 19 Westbound					Quarter Town Line Northbound					Highway 19 Southbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	
7:00 AM	3	61	0	0	64	23	0	0	0	23	30	6	0	0	36	123
7:15 AM	0	65	0	0	65	17	1	0	0	18	53	8	0	0	61	144
7:30 AM	4	67	0	0	71	30	6	1	0	37	54	13	0	0	67	175
7:45 AM	4	75	0	0	79	24	4	0	0	28	62	12	0	0	74	181
Hourly Total	11	268	0	0	279	94	11	1	0	106	199	39	0	0	238	623
8:00 AM	4	59	0	0	63	19	1	0	0	20	47	21	0	0	68	151
8:15 AM	4	52	0	0	56	21	4	0	0	25	57	17	0	0	74	155
8:30 AM	0	53	0	0	53	17	0	0	0	17	48	9	0	0	57	127
8:45 AM	2	62	0	0	64	17	3	0	0	20	75	16	0	0	91	175
Hourly Total	10	226	0	0	236	74	8	0	0	82	227	63	0	0	290	608
9:00 AM	2	60	0	0	62	11	5	0	0	16	66	8	0	0	74	152
9:15 AM	0	61	0	0	61	9	2	0	0	11	55	10	0	0	65	137
9:30 AM	0	65	0	0	65	13	2	0	0	15	52	7	0	0	59	139
9:45 AM	3	52	0	0	55	8	4	0	0	12	42	5	0	0	47	114
Hourly Total	5	238	0	0	243	41	13	0	0	54	215	30	0	0	245	542
10:00 AM	2	57	0	0	59	8	2	0	0	10	55	7	0	0	62	131
10:15 AM	0	47	0	0	47	6	3	0	0	9	53	13	0	0	66	122
10:30 AM	3	71	0	0	74	6	0	0	0	6	52	20	0	0	72	152
10:45 AM	2	59	0	0	61	22	2	0	0	24	51	8	0	0	59	144
Hourly Total	7	234	0	0	241	42	7	0	0	49	211	48	0	0	259	549
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	4	74	0	0	78	7	1	0	0	8	69	22	0	0	91	177
3:15 PM	2	74	0	0	76	12	1	0	0	13	80	28	0	0	108	197
3:30 PM	4	75	0	0	79	15	5	0	0	20	63	21	0	0	84	183
3:45 PM	4	69	0	0	73	19	1	0	0	20	101	21	0	0	122	215
Hourly Total	14	292	0	0	306	53	8	0	0	61	313	92	0	0	405	772
4:00 PM	3	81	1	0	85	15	1	0	0	16	72	24	0	0	96	197
4:15 PM	2	76	0	0	78	22	1	0	0	23	104	38	0	0	142	243
4:30 PM	0	86	0	0	86	13	4	0	1	17	97	29	0	0	126	229
4:45 PM	6	86	0	0	92	17	3	0	0	20	82	37	0	0	119	231
Hourly Total	11	329	1	0	341	67	9	0	1	76	355	128	0	0	483	900
5:00 PM	5	91	0	0	96	12	4	0	0	16	89	24	0	0	113	225
5:15 PM	9	77	0	0	86	4	3	0	0	7	108	24	0	0	132	225
5:30 PM	5	62	0	0	67	13	1	0	0	14	77	32	0	0	109	190
5:45 PM	2	52	0	0	54	12	3	0	0	15	67	17	0	0	84	153
Hourly Total	21	282	0	0	303	41	11	0	0	52	341	97	0	0	438	793
6:00 PM	3	54	0	0	57	15	3	0	0	18	78	12	0	0	90	165
6:15 PM	2	42	0	0	44	9	2	0	0	11	47	25	0	0	72	127

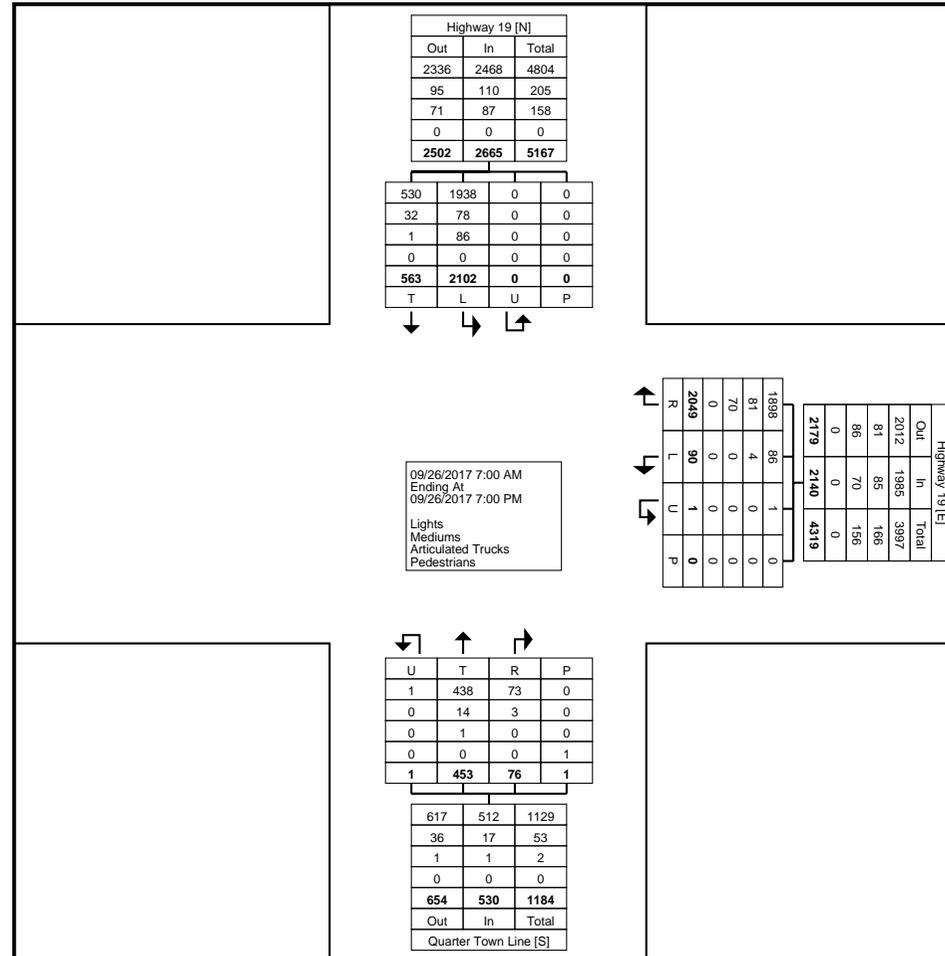
6:30 PM	2	52	0	0	54	14	2	0	0	16	65	11	0	0	76	146
6:45 PM	4	32	0	0	36	3	2	0	0	5	51	18	0	0	69	110
Hourly Total	11	180	0	0	191	41	9	0	0	50	241	66	0	0	307	548
Grand Total	90	2049	1	0	2140	453	76	1	1	530	2102	563	0	0	2665	5335
Approach %	4.2	95.7	0.0	-	-	85.5	14.3	0.2	-	-	78.9	21.1	0.0	-	-	-
Total %	1.7	38.4	0.0	-	40.1	8.5	1.4	0.0	-	9.9	39.4	10.6	0.0	-	50.0	-
Lights	86	1898	1	-	1985	438	73	1	-	512	1938	530	0	-	2468	4965
% Lights	95.6	92.6	100.0	-	92.8	96.7	96.1	100.0	-	96.6	92.2	94.1	-	-	92.6	93.1
Mediums	4	81	0	-	85	14	3	0	-	17	78	32	0	-	110	212
% Mediums	4.4	4.0	0.0	-	4.0	3.1	3.9	0.0	-	3.2	3.7	5.7	-	-	4.1	4.0
Articulated Trucks	0	70	0	-	70	1	0	0	-	1	86	1	0	-	87	158
% Articulated Trucks	0.0	3.4	0.0	-	3.3	0.2	0.0	0.0	-	0.2	4.1	0.2	-	-	3.3	3.0
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
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Count Name: Highway19 & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 3



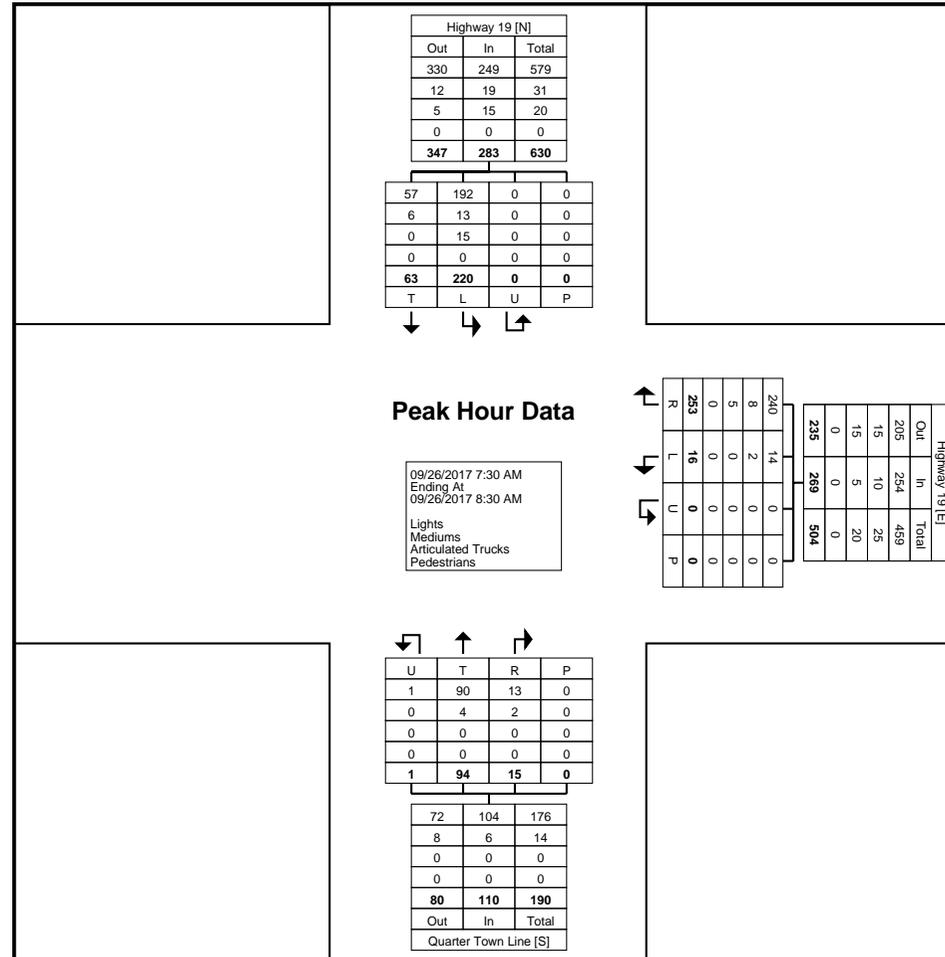
Turning Movement Data Plot



Paradigm Transportation Solutions Limited
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Count Name: Highway19 & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 5



Turning Movement Peak Hour Data Plot (7:30 AM)



Paradigm Transportation Solutions Limited
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Count Name: Highway19 & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 6

Turning Movement Peak Hour Data (4:15 PM)

Start Time	Highway 19 Westbound					Quarter Town Line Northbound					Highway 19 Southbound					Int. Total
	Left	Right	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	U-Turn	Peds	App. Total	
4:15 PM	2	76	0	0	78	22	1	0	0	23	104	38	0	0	142	243
4:30 PM	0	86	0	0	86	13	4	0	1	17	97	29	0	0	126	229
4:45 PM	6	86	0	0	92	17	3	0	0	20	82	37	0	0	119	231
5:00 PM	5	91	0	0	96	12	4	0	0	16	89	24	0	0	113	225
Total	13	339	0	0	352	64	12	0	1	76	372	128	0	0	500	928
Approach %	3.7	96.3	0.0	-	-	84.2	15.8	0.0	-	-	74.4	25.6	0.0	-	-	-
Total %	1.4	36.5	0.0	-	37.9	6.9	1.3	0.0	-	8.2	40.1	13.8	0.0	-	53.9	-
PHF	0.542	0.931	0.000	-	0.917	0.727	0.750	0.000	-	0.826	0.894	0.842	0.000	-	0.880	0.955
Lights	13	325	0	-	338	62	12	0	-	74	355	128	0	-	483	895
% Lights	100.0	95.9	-	-	96.0	96.9	100.0	-	-	97.4	95.4	100.0	-	-	96.6	96.4
Mediums	0	7	0	-	7	2	0	0	-	2	9	0	0	-	9	18
% Mediums	0.0	2.1	-	-	2.0	3.1	0.0	-	-	2.6	2.4	0.0	-	-	1.8	1.9
Articulated Trucks	0	7	0	-	7	0	0	0	-	0	8	0	0	-	8	15
% Articulated Trucks	0.0	2.1	-	-	2.0	0.0	0.0	-	-	0.0	2.2	0.0	-	-	1.6	1.6
Pedestrians	-	-	-	0	-	-	-	-	1	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	-	-



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Count Name: Esseltine Drive & Quarter Town Line
Site Code:
Start Date: 09/26/2017
Page No: 1

Turning Movement Data

Start Time	Esseltine Drive Eastbound						Sanders Crescent Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	2	0	1	0	0	3	1	0	5	0	1	6	4	19	1	0	1	24	0	19	3	0	0	22	55
7:15 AM	2	0	0	1	0	3	3	0	4	0	0	7	2	8	1	0	0	11	1	16	4	0	0	21	42
7:30 AM	2	0	3	0	0	5	4	0	3	0	0	7	1	21	1	0	0	23	0	25	2	0	0	27	62
7:45 AM	0	0	2	0	2	2	2	0	5	0	3	7	3	19	0	0	0	22	1	30	5	0	1	36	67
Hourly Total	6	0	6	1	2	13	10	0	17	0	4	27	10	67	3	0	1	80	2	90	14	0	1	106	226
8:00 AM	7	0	3	0	1	10	1	0	7	0	1	8	0	22	0	0	0	22	4	16	7	0	2	27	67
8:15 AM	0	0	4	0	1	4	3	0	2	0	4	5	1	28	0	0	2	29	0	20	2	0	1	22	60
8:30 AM	5	1	0	0	2	6	1	0	6	0	4	7	2	18	0	0	0	20	2	17	3	0	11	22	55
8:45 AM	3	2	2	0	1	7	1	0	8	0	22	9	0	19	1	0	0	20	1	38	0	0	15	39	75
Hourly Total	15	3	9	0	5	27	6	0	23	0	31	29	3	87	1	0	2	91	7	91	12	0	29	110	257
9:00 AM	2	0	2	0	1	4	3	0	0	0	2	3	0	21	3	0	0	24	6	24	2	0	7	32	63
9:15 AM	3	1	1	0	0	5	1	0	1	0	6	2	0	11	0	0	0	11	3	13	6	0	5	22	40
9:30 AM	3	0	3	0	0	6	2	0	1	0	1	3	0	21	1	0	0	22	1	18	3	0	0	22	53
9:45 AM	6	0	2	0	0	8	1	0	5	0	0	6	1	12	3	0	0	16	2	11	3	0	4	16	46
Hourly Total	14	1	8	0	1	23	7	0	7	0	9	14	1	65	7	0	0	73	12	66	14	0	16	92	202
10:00 AM	1	0	2	0	0	3	1	0	2	0	0	3	3	13	1	0	0	17	3	9	1	0	0	13	36
10:15 AM	2	0	2	0	0	4	1	1	3	0	0	5	3	19	0	0	0	22	1	13	3	0	0	17	48
10:30 AM	1	0	2	0	0	3	2	0	3	0	0	5	2	13	1	0	0	16	3	18	4	0	0	25	49
10:45 AM	6	0	4	0	0	10	2	0	1	0	0	3	3	17	0	0	0	20	0	21	3	0	0	24	57
Hourly Total	10	0	10	0	0	20	6	1	9	0	0	16	11	62	2	0	0	75	7	61	11	0	0	79	190
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	1	0	0	0	1	1	2	0	3	0	0	5	1	39	4	0	0	44	1	13	1	0	2	15	65
3:15 PM	2	2	1	0	0	5	0	0	9	0	3	9	0	36	5	1	0	42	3	26	2	0	10	31	87
3:30 PM	3	2	6	0	1	11	0	1	8	0	4	9	2	23	3	0	0	28	6	30	3	0	9	39	87
3:45 PM	5	2	4	0	0	11	2	0	3	0	1	5	0	13	2	0	0	15	3	37	6	0	4	46	77
Hourly Total	11	6	11	0	2	28	4	1	23	0	8	28	3	111	14	1	0	129	13	106	12	0	25	131	316
4:00 PM	5	2	0	0	0	7	0	1	3	0	0	4	0	25	1	0	0	26	7	21	3	0	2	31	68
4:15 PM	3	0	0	1	2	4	0	0	5	0	0	5	0	26	4	0	0	30	3	14	4	0	0	21	60
4:30 PM	3	0	2	0	0	5	1	0	5	0	0	6	0	21	3	0	0	24	3	24	2	0	0	29	64
4:45 PM	2	0	0	0	0	2	1	0	4	0	0	5	0	22	5	0	0	27	6	30	3	0	0	39	73
Hourly Total	13	2	2	1	2	18	2	1	17	0	0	20	0	94	13	0	0	107	19	89	12	0	2	120	265
5:00 PM	4	0	0	0	0	4	2	1	3	0	0	6	0	23	2	0	0	25	0	19	1	0	0	20	55
5:15 PM	4	0	0	0	0	4	1	0	5	0	0	6	0	13	4	0	0	17	2	31	4	0	0	37	64
5:30 PM	1	0	0	0	0	1	2	0	1	0	0	3	1	25	2	0	0	28	4	15	3	0	0	22	54
5:45 PM	3	2	0	0	0	5	2	0	2	0	2	4	0	16	3	0	0	19	5	16	1	0	1	22	50
Hourly Total	12	2	0	0	0	14	7	1	11	0	2	19	1	77	11	0	0	89	11	81	9	0	1	101	223
6:00 PM	0	0	1	0	1	1	4	0	2	0	3	6	0	18	2	0	0	20	4	7	2	1	0	14	41

6:15 PM	1	0	0	0	4	1	2	0	6	0	2	8	1	16	1	0	0	18	6	12	2	0	2	20	47
6:30 PM	1	1	0	0	0	2	4	1	1	0	2	6	1	16	2	0	2	19	0	18	0	0	0	18	45
6:45 PM	0	1	0	0	0	1	4	0	3	0	3	7	0	19	3	0	0	22	3	13	1	0	0	17	47
Hourly Total	2	2	1	0	5	5	14	1	12	0	10	27	2	69	8	0	2	79	13	50	5	1	2	69	180
Grand Total	83	16	47	2	17	148	56	5	119	0	64	180	31	632	59	1	5	723	84	634	89	1	76	808	1859
Approach %	56.1	10.8	31.8	1.4	-	-	31.1	2.8	66.1	0.0	-	-	4.3	87.4	8.2	0.1	-	-	10.4	78.5	11.0	0.1	-	-	-
Total %	4.5	0.9	2.5	0.1	-	8.0	3.0	0.3	6.4	0.0	-	9.7	1.7	34.0	3.2	0.1	-	38.9	4.5	34.1	4.8	0.1	-	43.5	-
Lights	67	10	41	1	-	119	55	4	114	0	-	173	21	612	59	1	-	693	81	616	66	1	-	764	1749
% Lights	80.7	62.5	87.2	50.0	-	80.4	98.2	80.0	95.8	-	-	96.1	67.7	96.8	100.0	100.0	-	95.9	96.4	97.2	74.2	100.0	-	94.6	94.1
Mediums	16	6	5	1	-	28	1	0	1	0	-	2	9	18	0	0	-	27	2	17	23	0	-	42	99
% Mediums	19.3	37.5	10.6	50.0	-	18.9	1.8	0.0	0.8	-	-	1.1	29.0	2.8	0.0	0.0	-	3.7	2.4	2.7	25.8	0.0	-	5.2	5.3
Articulated Trucks	0	0	1	0	-	1	0	1	4	0	-	5	1	2	0	0	-	3	1	1	0	0	-	2	11
% Articulated Trucks	0.0	0.0	2.1	0.0	-	0.7	0.0	20.0	3.4	-	-	2.8	3.2	0.3	0.0	0.0	-	0.4	1.2	0.2	0.0	0.0	-	0.2	0.6
Pedestrians	-	-	-	-	17	-	-	-	-	-	64	-	-	-	-	-	5	-	-	-	-	-	76	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



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Turning Movement Peak Hour Data (8:00 AM)

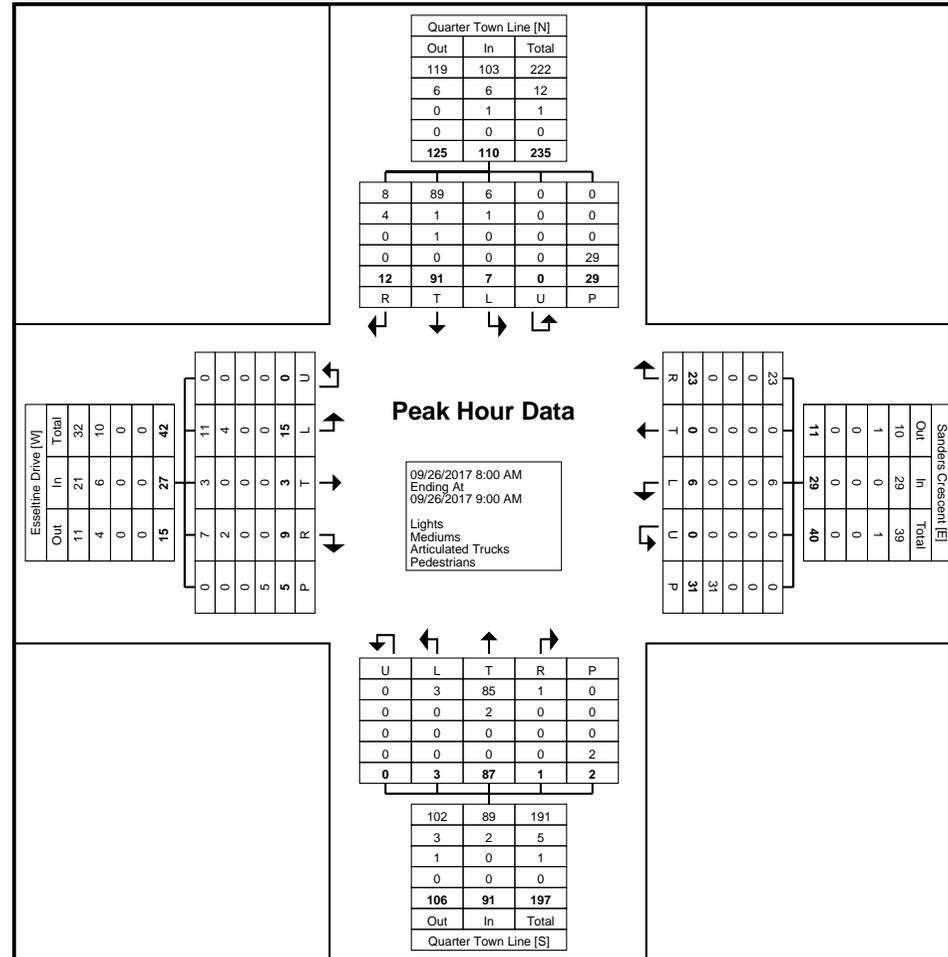
Start Time	Esseltine Drive Eastbound						Sanders Crescent Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	7	0	3	0	1	10	1	0	7	0	1	8	0	22	0	0	0	22	4	16	7	0	2	27	67
8:15 AM	0	0	4	0	1	4	3	0	2	0	4	5	1	28	0	0	2	29	0	20	2	0	1	22	60
8:30 AM	5	1	0	0	2	6	1	0	6	0	4	7	2	18	0	0	0	20	2	17	3	0	11	22	55
8:45 AM	3	2	2	0	1	7	1	0	8	0	22	9	0	19	1	0	0	20	1	38	0	0	15	39	75
Total	15	3	9	0	5	27	6	0	23	0	31	29	3	87	1	0	2	91	7	91	12	0	29	110	257
Approach %	55.6	11.1	33.3	0.0	-	-	20.7	0.0	79.3	0.0	-	-	3.3	95.6	1.1	0.0	-	-	6.4	82.7	10.9	0.0	-	-	-
Total %	5.8	1.2	3.5	0.0	-	10.5	2.3	0.0	8.9	0.0	-	11.3	1.2	33.9	0.4	0.0	-	35.4	2.7	35.4	4.7	0.0	-	42.8	-
PHF	0.536	0.375	0.563	0.000	-	0.675	0.500	0.000	0.719	0.000	-	0.806	0.375	0.777	0.250	0.000	-	0.784	0.438	0.599	0.429	0.000	-	0.705	0.857
Lights	11	3	7	0	-	21	6	0	23	0	-	29	3	85	1	0	-	89	6	89	8	0	-	103	242
% Lights	73.3	100.0	77.8	-	-	77.8	100.0	-	100.0	-	-	100.0	100.0	97.7	100.0	-	-	97.8	85.7	97.8	66.7	-	-	93.6	94.2
Mediums	4	0	2	0	-	6	0	0	0	0	-	0	0	2	0	0	-	2	1	1	4	0	-	6	14
% Mediums	26.7	0.0	22.2	-	-	22.2	0.0	-	0.0	-	-	0.0	0.0	2.3	0.0	-	-	2.2	14.3	1.1	33.3	-	-	5.5	5.4
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	1
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	-	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.1	0.0	-	-	0.9	0.4
Pedestrians	-	-	-	-	5	-	-	-	-	-	31	-	-	-	-	-	2	-	-	-	-	-	29	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



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Turning Movement Peak Hour Data Plot (8:00 AM)



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Turning Movement Peak Hour Data (3:15 PM)

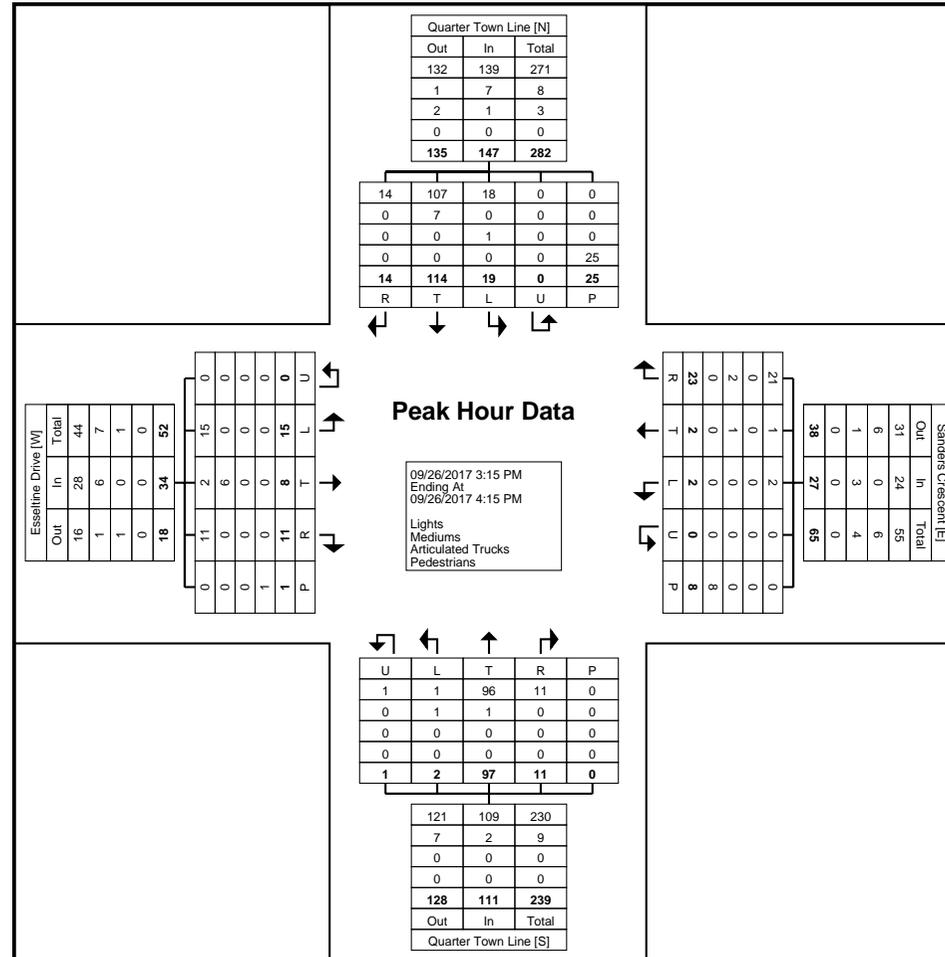
Start Time	Esseltine Drive Eastbound						Sanders Crescent Westbound						Quarter Town Line Northbound						Quarter Town Line Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
3:15 PM	2	2	1	0	0	5	0	0	9	0	3	9	0	36	5	1	0	42	3	26	2	0	10	31	87
3:30 PM	3	2	6	0	1	11	0	1	8	0	4	9	2	23	3	0	0	28	6	30	3	0	9	39	87
3:45 PM	5	2	4	0	0	11	2	0	3	0	1	5	0	13	2	0	0	15	3	37	6	0	4	46	77
4:00 PM	5	2	0	0	0	7	0	1	3	0	0	4	0	25	1	0	0	26	7	21	3	0	2	31	68
Total	15	8	11	0	1	34	2	2	23	0	8	27	2	97	11	1	0	111	19	114	14	0	25	147	319
Approach %	44.1	23.5	32.4	0.0	-	-	7.4	7.4	85.2	0.0	-	-	1.8	87.4	9.9	0.9	-	-	12.9	77.6	9.5	0.0	-	-	-
Total %	4.7	2.5	3.4	0.0	-	10.7	0.6	0.6	7.2	0.0	-	8.5	0.6	30.4	3.4	0.3	-	34.8	6.0	35.7	4.4	0.0	-	46.1	-
PHF	0.750	1.000	0.458	0.000	-	0.773	0.250	0.500	0.639	0.000	-	0.750	0.250	0.674	0.550	0.250	-	0.661	0.679	0.770	0.583	0.000	-	0.799	0.917
Lights	15	2	11	0	-	28	2	1	21	0	-	24	1	96	11	1	-	109	18	107	14	0	-	139	300
% Lights	100.0	25.0	100.0	-	-	82.4	100.0	50.0	91.3	-	-	88.9	50.0	99.0	100.0	100.0	-	98.2	94.7	93.9	100.0	-	-	94.6	94.0
Mediums	0	6	0	0	-	6	0	0	0	0	-	0	1	1	0	0	-	2	0	7	0	0	-	7	15
% Mediums	0.0	75.0	0.0	-	-	17.6	0.0	0.0	0.0	-	-	0.0	50.0	1.0	0.0	0.0	-	1.8	0.0	6.1	0.0	-	-	4.8	4.7
Articulated Trucks	0	0	0	0	-	0	0	1	2	0	-	3	0	0	0	0	-	0	1	0	0	0	-	1	4
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	50.0	8.7	-	-	11.1	0.0	0.0	0.0	0.0	-	0.0	5.3	0.0	0.0	-	-	0.7	1.3
Pedestrians	-	-	-	-	1	-	-	-	-	-	8	-	-	-	-	-	0	-	-	-	-	-	25	-	-
% Pedestrians	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



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Turning Movement Peak Hour Data Plot (3:15 PM)

Appendix B

Detailed Synchro Results



HCM Unsignalized Intersection Capacity Analysis
1: Quarter Town Line & Highway 19/Broadway Street

2017 Baseline AM Peak
170219 Tillsonburg Quarter Town Line



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↕	↕	
Traffic Volume (veh/h)	220	63	16	253	94	15
Future Volume (Veh/h)	220	63	16	253	94	15
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	239	68	17	275	102	16
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			307		444	273
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			307		444	273
tC, single (s)			4.4		6.9	7.2
tC, 2 stage (s)						
tF (s)			2.3		3.5	3.4
p0 queue free %			99		81	98
cM capacity (veh/h)			1175		529	693
Direction, Lane #	EB 1	WB 1	WB 2	NB 1		
Volume Total	307	109	183	118		
Volume Left	0	17	0	102		
Volume Right	68	0	0	16		
cSH	1700	1175	1700	547		
Volume to Capacity	0.18	0.01	0.11	0.22		
Queue Length 95th (m)	0.0	0.4	0.0	6.5		
Control Delay (s)	0.0	1.4	0.0	13.4		
Lane LOS		A		B		
Approach Delay (s)	0.0	0.5		13.4		
Approach LOS				B		
Intersection Summary						
Average Delay			2.4			
Intersection Capacity Utilization			31.8%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Unsignalized Intersection Capacity Analysis
2: Quarter Town Line & North Street W.

2017 Baseline AM Peak
170219 Tillsonburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	8	59	32	30	31	64	16	85	39	70	98	9
Future Volume (vph)	8	59	32	30	31	64	16	85	39	70	98	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	64	35	33	34	70	17	92	42	76	107	10
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	108	137	151	193								
Volume Left (vph)	9	33	17	76								
Volume Right (vph)	35	70	42	10								
Hadj (s)	-0.07	-0.12	-0.08	0.11								
Departure Headway (s)	4.9	4.8	4.7	4.8								
Degree Utilization, x	0.15	0.18	0.20	0.26								
Capacity (veh/h)	679	695	720	703								
Control Delay (s)	8.7	8.8	8.8	9.5								
Approach Delay (s)	8.7	8.8	8.8	9.5								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay			9.0									
Level of Service			A									
Intersection Capacity Utilization			42.9%		ICU Level of Service					A		
Analysis Period (min)			15									

HCM 2010 AWSC
2: Quarter Town Line & North Street W.

2017 Baseline AM Peak
170219 Tillsburg Quarter Town Line

Intersection	
Intersection Delay, s/veh	9
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	8	59	32	30	31	64	16	85	39	70	98	9
Future Vol, veh/h	8	59	32	30	31	64	16	85	39	70	98	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	7	6	10	16	3	6	4	3	4	4	0
Mvmt Flow	9	64	35	33	34	70	17	92	42	76	107	10
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.5	8.9	8.9	9.5
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	11%	8%	24%	40%
Vol Thru, %	61%	60%	25%	55%
Vol Right, %	28%	32%	51%	5%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	140	99	125	177
LT Vol	16	8	30	70
Through Vol	85	59	31	98
RT Vol	39	32	64	9
Lane Flow Rate	152	108	136	192
Geometry Grp	1	1	1	1
Degree of Util (X)	0.197	0.141	0.18	0.255
Departure Headway (Hd)	4.672	4.714	4.764	4.776
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	764	756	750	748
Service Time	2.723	2.766	2.813	2.826
HCM Lane V/C Ratio	0.199	0.143	0.181	0.257
HCM Control Delay	8.9	8.5	8.9	9.5
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.7	0.5	0.7	1

HCM Unsignalized Intersection Capacity Analysis
3: Quarter Town Line & Concession Street W.

2017 Baseline AM Peak
170219 Tillsburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	4	46	14	42	30	40	12	67	53	77	112	7
Future Volume (vph)	4	46	14	42	30	40	12	67	53	77	112	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	4	50	15	46	33	43	13	73	58	84	122	8

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	69	122	144	214
Volume Left (vph)	4	46	13	84
Volume Right (vph)	15	43	58	8
Hadj (s)	0.02	0.08	-0.06	0.20
Departure Headway (s)	5.0	4.9	4.6	4.8
Degree Utilization, x	0.10	0.17	0.18	0.28
Capacity (veh/h)	660	672	740	717
Control Delay (s)	8.5	8.9	8.6	9.6
Approach Delay (s)	8.5	8.9	8.6	9.6
Approach LOS	A	A	A	A

Intersection Summary	
Delay	9.1
Level of Service	A
Intersection Capacity Utilization	37.0%
ICU Level of Service	A
Analysis Period (min)	15

HCM 2010 AWSC
3: Quarter Town Line & Concession Street W.

2017 Baseline AM Peak
170219 Tillsonburg Quarter Town Line

Intersection												
Intersection Delay, s/veh	9.1											
Intersection LOS	A											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	4	46	14	42	30	40	12	67	53	77	112	7
Future Vol, veh/h	4	46	14	42	30	40	12	67	53	77	112	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	25	7	7	12	17	10	0	5	17	10	8	0
Mvmt Flow	4	50	15	46	33	43	13	73	58	84	122	8
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.8	8.9	8.4	9.7
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	9%	6%	38%	39%
Vol Thru, %	51%	72%	27%	57%
Vol Right, %	40%	22%	36%	4%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	132	64	112	196
LT Vol	12	4	42	77
Through Vol	67	46	30	112
RT Vol	53	14	40	7
Lane Flow Rate	143	70	122	213
Geometry Grp	1	1	1	1
Degree of Util (X)	0.176	0.101	0.165	0.282
Departure Headway (Hd)	4.419	5.202	4.892	4.771
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	809	687	730	752
Service Time	2.457	3.251	2.938	2.808
HCM Lane V/C Ratio	0.177	0.102	0.167	0.283
HCM Control Delay	8.4	8.8	8.9	9.7
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.3	0.6	1.2

HCM Unsignalized Intersection Capacity Analysis
4: Quarter Town Line & Esseltine Drive/Sanders Crescent

2017 Baseline AM Peak
170219 Tillsonburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Traffic Volume (veh/h)	15	3	9	6	0	23	3	87	1	7	91	12	
Future Volume (Veh/h)	15	3	9	6	0	23	3	87	1	7	91	12	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	16	3	10	7	0	25	3	95	1	8	99	13	
Pedestrians	5			31			2			29			
Lane Width (m)	3.6			3.6			3.6			3.6			
Walking Speed (m/s)	1.2			1.2			1.2			1.2			
Percent Blockage	0			3			0			2			
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	282	260	112	268	266	156	117						127
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	282	260	112	268	266	156	117						127
tC, single (s)	7.4	6.5	6.4	7.1	6.5	6.2	4.1						4.2
tC, 2 stage (s)													
tF (s)	3.7	4.0	3.5	3.5	4.0	3.3	2.2						2.3
p0 queue free %	97	100	99	99	100	97	100						99
cM capacity (veh/h)	571	624	884	641	619	851	1478						1352

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	29	32	99	120
Volume Left	16	7	3	8
Volume Right	10	25	1	13
cSH	657	794	1478	1352
Volume to Capacity	0.04	0.04	0.00	0.01
Queue Length 95th (m)	1.1	1.0	0.0	0.1
Control Delay (s)	10.7	9.7	0.2	0.6
Lane LOS	B	A	A	A
Approach Delay (s)	10.7	9.7	0.2	0.6
Approach LOS	B	A		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	27.0%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
 5: Quarter Town Line & Baldwin Street

2017 Baseline AM Peak
 170219 Tillsburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Traffic Volume (veh/h)	6	32	4	40	13	58	0	28	48	77	29	7
Future Volume (Veh/h)	6	32	4	40	13	58	0	28	48	77	29	7
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	7	35	4	43	14	63	0	30	52	84	32	8
Pedestrians	2			4			4			2		
Lane Width (m)	3.6			3.6			3.6			3.6		
Walking Speed (m/s)	1.2			1.2			1.2			1.2		
Percent Blockage	0			0			0			0		
Right turn flare (veh)												
Median type	None						None					
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	334	292	42	290	270	62	42					86
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	334	292	42	290	270	62	42					86
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1					4.1
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2					2.2
p0 queue free %	99	94	100	93	98	94	100					94
cM capacity (veh/h)	545	584	1029	595	601	998	1577					1499
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	46	120	82	124								
Volume Left	7	43	0	84								
Volume Right	4	63	52	8								
cSH	600	756	1577	1499								
Volume to Capacity	0.08	0.16	0.00	0.06								
Queue Length 95th (m)	2.0	4.5	0.0	1.4								
Control Delay (s)	11.5	10.7	0.0	5.3								
Lane LOS	B	B		A								
Approach Delay (s)	11.5	10.7	0.0	5.3								
Approach LOS	B	B										
Intersection Summary												
Average Delay			6.6									
Intersection Capacity Utilization			32.8%	ICU Level of Service	A							
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis
1: Quarter Town Line & Highway 19/Broadway Street

2017 Baseline PM Peak
170219 Tillsonburg Quarter Town Line



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↕↕	↕↕	
Traffic Volume (veh/h)	372	128	13	339	64	12
Future Volume (Veh/h)	372	128	13	339	64	12
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	404	139	14	368	70	13
Pedestrians					1	
Lane Width (m)					3.6	
Walking Speed (m/s)					1.2	
Percent Blockage					0	
Right turn flare (veh)						
Median type	None			None		
Median storage (veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume			544		686	474
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			544		686	474
tC, single (s)			4.1		6.9	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		81	98
cM capacity (veh/h)			1034		373	541

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	543	137	245	83
Volume Left	0	14	0	70
Volume Right	139	0	0	13
cSH	1700	1034	1700	392
Volume to Capacity	0.32	0.01	0.14	0.21
Queue Length 95th (m)	0.0	0.3	0.0	6.3
Control Delay (s)	0.0	1.0	0.0	16.6
Lane LOS		A		C
Approach Delay (s)	0.0	0.4		16.6
Approach LOS				C

Intersection Summary			
Average Delay		1.5	
Intersection Capacity Utilization		38.3%	ICU Level of Service A
Analysis Period (min)		15	

HCM Unsignalized Intersection Capacity Analysis
2: Quarter Town Line & North Street W.

2017 Baseline PM Peak
170219 Tillsonburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕↕			↕↕			↕↕			↕↕	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	7	50	25	48	65	107	22	71	30	76	108	6
Future Volume (vph)	7	50	25	48	65	107	22	71	30	76	108	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	8	54	27	52	71	116	24	77	33	83	117	7
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	89	239	134	207								
Volume Left (vph)	8	52	24	83								
Volume Right (vph)	27	116	33	7								
Hadj (s)	-0.14	-0.22	-0.11	0.08								
Departure Headway (s)	4.9	4.7	4.9	5.0								
Degree Utilization, x	0.12	0.31	0.18	0.29								
Capacity (veh/h)	657	718	677	676								
Control Delay (s)	8.6	9.8	9.0	9.9								
Approach Delay (s)	8.6	9.8	9.0	9.9								
Approach LOS	A	A	A	A								

Intersection Summary			
Delay		9.5	
Level of Service		A	
Intersection Capacity Utilization		42.9%	ICU Level of Service A
Analysis Period (min)		15	

HCM 2010 AWSC
2: Quarter Town Line & North Street W.

2017 Baseline PM Peak
170219 Tillsburg Quarter Town Line

Intersection	
Intersection Delay, s/veh	9.5
Intersection LOS	A

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Traffic Vol, veh/h	7	50	25	48	65	107	22	71	30	76	108	6
Future Vol, veh/h	7	50	25	48	65	107	22	71	30	76	108	6
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	2	0	0	3	2	0	0	0	1	1	0
Mvmt Flow	8	54	27	52	71	116	24	77	33	83	117	7
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.6	9.7	9	9.9
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	18%	9%	22%	40%
Vol Thru, %	58%	61%	30%	57%
Vol Right, %	24%	30%	49%	3%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	123	82	220	190
LT Vol	22	7	48	76
Through Vol	71	50	65	108
RT Vol	30	25	107	6
Lane Flow Rate	134	89	239	207
Geometry Grp	1	1	1	1
Degree of Util (X)	0.179	0.12	0.305	0.282
Departure Headway (Hd)	4.823	4.859	4.591	4.911
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	738	732	777	727
Service Time	2.893	2.931	2.648	2.975
HCM Lane V/C Ratio	0.182	0.122	0.308	0.285
HCM Control Delay	9	8.6	9.7	9.9
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	0.6	0.4	1.3	1.2

HCM Unsignalized Intersection Capacity Analysis
3: Quarter Town Line & Concession Street W.

2017 Baseline PM Peak
170219 Tillsburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔			↔	
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	10	33	10	34	45	73	7	111	59	70	92	4
Future Volume (vph)	10	33	10	34	45	73	7	111	59	70	92	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	11	36	11	37	49	79	8	121	64	76	100	4

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total (vph)	58	165	193	180
Volume Left (vph)	11	37	8	76
Volume Right (vph)	11	79	64	4
Hadj (s)	-0.01	-0.11	-0.09	0.20
Departure Headway (s)	5.0	4.8	4.6	4.9
Degree Utilization, x	0.08	0.22	0.25	0.25
Capacity (veh/h)	644	695	738	692
Control Delay (s)	8.5	9.1	9.1	9.5
Approach Delay (s)	8.5	9.1	9.1	9.5
Approach LOS	A	A	A	A

Intersection Summary	
Delay	9.2
Level of Service	A
Intersection Capacity Utilization	42.3%
ICU Level of Service	A
Analysis Period (min)	15

HCM 2010 AWSC
3: Quarter Town Line & Concession Street W.

2017 Baseline PM Peak
170219 Tillsburg Quarter Town Line

Intersection												
Intersection Delay, s/veh	9.3											
Intersection LOS	A											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	33	10	34	45	73	7	111	59	70	92	4
Future Vol, veh/h	10	33	10	34	45	73	7	111	59	70	92	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles, %	0	3	10	12	4	8	14	4	9	11	4	25
Mvmt Flow	11	36	11	37	49	79	8	121	64	76	100	4
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay	8.4	9.3	9.4	9.6
HCM LOS	A	A	A	A

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	4%	19%	22%	42%
Vol Thru, %	63%	62%	30%	55%
Vol Right, %	33%	19%	48%	2%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	177	53	152	166
LT Vol	7	10	34	70
Through Vol	111	33	45	92
RT Vol	59	10	73	4
Lane Flow Rate	192	58	165	180
Geometry Grp	1	1	1	1
Degree of Util (X)	0.252	0.079	0.222	0.247
Departure Headway (Hd)	4.717	4.943	4.833	4.933
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	758	720	740	725
Service Time	2.766	3.005	2.883	2.984
HCM Lane V/C Ratio	0.253	0.081	0.223	0.248
HCM Control Delay	9.4	8.4	9.3	9.6
HCM Lane LOS	A	A	A	A
HCM 95th-tile Q	1	0.3	0.8	1

HCM Unsignalized Intersection Capacity Analysis
4: Quarter Town Line & Esseltine Drive/Sanders Crescent

2017 Baseline PM Peak
170219 Tillsburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations		↕			↕			↕			↕		
Traffic Volume (veh/h)	15	8	11	2	2	23	2	97	11	19	114	14	
Future Volume (Veh/h)	15	8	11	2	2	23	2	97	11	19	114	14	
Sign Control	Stop			Stop			Free			Free			
Grade	0%			0%			0%			0%			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Hourly flow rate (vph)	16	9	12	2	2	25	2	105	12	21	124	15	
Pedestrians	2			8						25			
Lane Width (m)	3.6			3.6						3.6			
Walking Speed (m/s)	1.2			1.2						1.2			
Percent Blockage	0			1						2			
Right turn flare (veh)													
Median type							None			None			
Median storage (veh)													
Upstream signal (m)													
pX, platoon unblocked													
vC, conflicting volume	342	304	134	313	306	144	141						125
vC1, stage 1 conf vol													
vC2, stage 2 conf vol													
vCu, unblocked vol	342	304	134	313	306	144	141						125
tC, single (s)	7.1	7.2	6.2	7.1	7.0	6.3	4.6						4.1
tC, 2 stage (s)													
tF (s)	3.5	4.7	3.3	3.5	4.5	3.4	2.7						2.2
p0 queue free %	97	98	99	100	100	97	100						99
cM capacity (veh/h)	572	493	919	610	523	861	1192						1434

Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	37	29	119	160
Volume Left	16	2	2	21
Volume Right	12	25	12	15
cSH	624	802	1192	1434
Volume to Capacity	0.06	0.04	0.00	0.01
Queue Length 95th (m)	1.5	0.9	0.0	0.4
Control Delay (s)	11.1	9.7	0.1	1.1
Lane LOS	B	A	A	A
Approach Delay (s)	11.1	9.7	0.1	1.1
Approach LOS	B	A		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	30.4%	ICU Level of Service	A
Analysis Period (min)	15		

HCM Unsignalized Intersection Capacity Analysis
5: Quarter Town Line & Baldwin Street

2017 Baseline PM Peak
170219 Tillsburg Quarter Town Line



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		+			+			+			+	
Traffic Volume (veh/h)	9	19	2	33	26	75	4	43	63	78	31	12
Future Volume (Veh/h)	9	19	2	33	26	75	4	43	63	78	31	12
Sign Control	Stop			Stop			Free			Free		
Grade	0%			0%			0%			0%		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	21	2	36	28	82	4	47	68	85	34	13
Pedestrians												1
Lane Width (m)												3.6
Walking Speed (m/s)												1.2
Percent Blockage												0
Right turn flare (veh)												
Median type						None				None		
Median storage (veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	396	334	40	312	306	82	47				115	
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	396	334	40	312	306	82	47				115	
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1				4.1	
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2				2.2	
p0 queue free %	98	96	100	94	95	92	100				94	
cM capacity (veh/h)	477	554	1036	590	574	974	1573				1462	
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total	33	146	119	132								
Volume Left	10	36	4	85								
Volume Right	2	82	68	13								
cSH	543	753	1573	1462								
Volume to Capacity	0.06	0.19	0.00	0.06								
Queue Length 95th (m)	1.5	5.7	0.1	1.5								
Control Delay (s)	12.1	10.9	0.3	5.1								
Lane LOS	B	B	A	A								
Approach Delay (s)	12.1	10.9	0.3	5.1								
Approach LOS	B	B										
Intersection Summary												
Average Delay			6.3									
Intersection Capacity Utilization			29.9%	ICU Level of Service								A
Analysis Period (min)			15									