

Traffic Impact Report

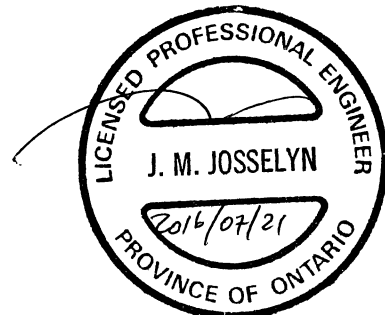
for

Picton Terminals

JEI Project 1353

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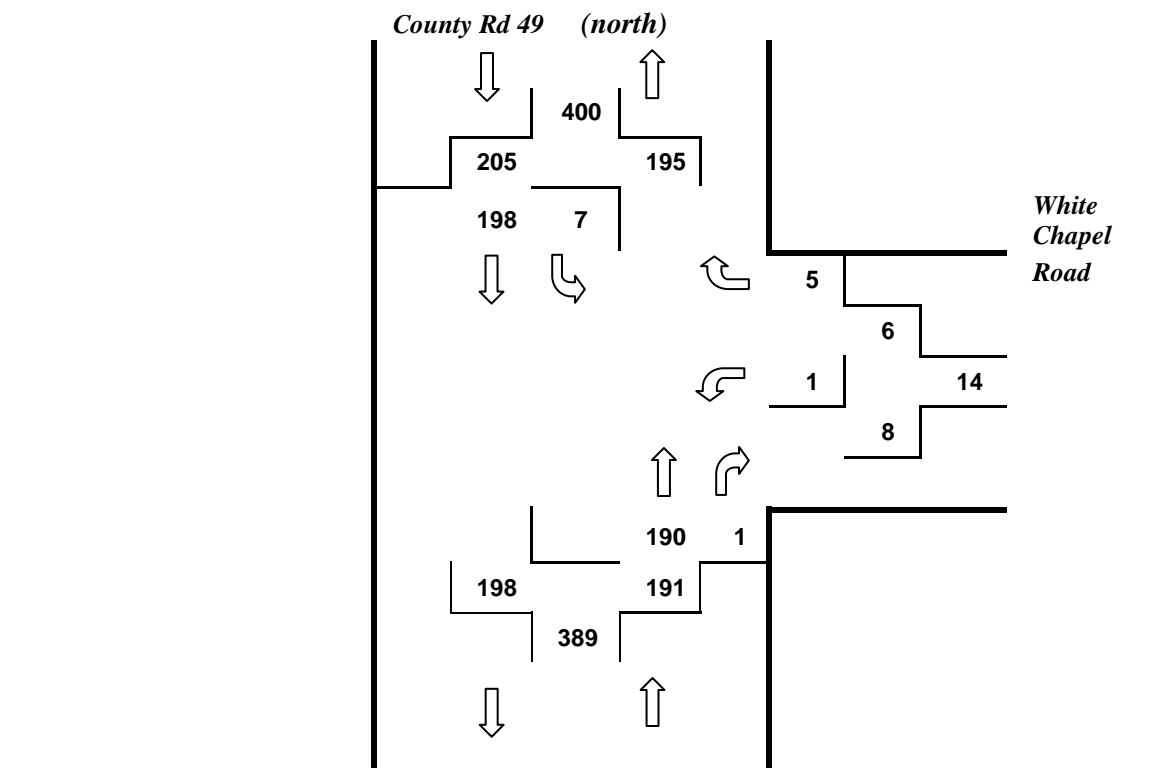
Executive Summary

Introduction – This report evaluates the traffic flow during a typical weekday peak traffic flow period for the Prince Edward County Road 49-White Chapel Road intersection, as a result of the proposed Picton Terminals water-port bulk hauling operation.

The routine seasonal weekday operation of the Picton Terminals is expected to generate truck traffic due to an anticipated increase in bulk hauling from cargo ships using the deep water port. The intersection’s present busier traffic flow periods are weekday AM & PM peak periods and are largely comprised of home to work, work to home commuter trips.

Summer weekend daily traffic volumes are typically higher than weekday traffic volumes in a tourist-recreation area such as Prince Edward County, but this traffic is spread over a longer portion of daylight hours and does not peak to the extent that the weekday PM peak commuter traffic does. Typically the bulk hauling operation will not generate haul-truck trips on a summer weekend or statutory holiday. Bulk hauling by truck is also not expected during the seasonal shut-down (typically December to March) of the St. Lawrence Seaway.

**Expected Traffic Flow: PEC Road 49 at White Chapel Road,
Weekday PM Peak Traffic Volume – Year 2022**



Traffic Impact Assessment Report – Picton Terminals

Recommendation – Conclusion

Traffic Volume – The estimated trip generation for the Picton Terminals at County Road 49 – White Chapel Road intersection will have a negligible effect on traffic flows and should not cause a hazard to or adversely interfere with other traffic on County Road 49 or White Chapel Road.

Turning Lane – The present lane configuration along County Road 49 will satisfy the traffic flow needs in the year 2022.

Traffic Control – The present traffic control devices, a stop sign on White Chapel Road, will satisfy the traffic flow needs in the year 2022.

Pedestrians & Bicyclists – The estimated trip generation for the Picton Terminals at County Road 49 – White Chapel Road intersection will have a negligible effect on pedestrian traffic or bicyclists.

Level of Service & Volume to Capacity – The individual traffic flows level of service (LOS) and the volume to capacity ratio (v/c) for the horizon year 2022 (in Table 2) satisfies the typical municipal road authority requirements regarding level of service or volume to capacity ratio for the each of the individual traffic flows at the for the County Road 49 – White Chapel Road intersection.

Sight Distance – The departing sight distance along County Road 49 measured from the stopped position on White Chapel Road exceeds the minimum requirement. This intersection complies with & exceeds the minimum approaching sight triangle measurements.



Picton Terminals site referenced to downtown Picton

Traffic Impact Assessment Report

Picton Terminals, Prince Edward County

1.0 Introduction

This report evaluates the traffic flow during a typical weekday peak traffic flow period for the Prince Edward County Road 49-White Chapel Road intersection, as a result of the proposed Picton Terminals water-port bulk hauling operation.

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Summer weekend daily traffic volumes are typically higher than weekday traffic volumes in a tourist-recreation area such as Prince Edward County, but this traffic is spread over a longer portion of daylight hours and does not peak to the extent that the weekday PM peak commuter traffic does. Typically the bulk hauling operation will not generate haul-truck trips on a summer weekend or statutory holiday. Bulk hauling by truck is also not expected during the seasonal shut-down (typically December to March) of the St. Lawrence Seaway.

Note: Photos below illustrating the Picton Terminals location are from FOTENN Planning Review report – Sept 2015.



Picton Terminals site location referenced to downtown Picton



Picton Terminals site at White Chapel Road

2.0 Existing Roadway Characteristics

2.1 Roadways

Prince Edward County Road 49 is a two-lane north-south roadway under municipal jurisdiction. White Chapel Road is a two-lane east-west roadway intersecting County Road 49 on the east forming a three way intersection, with White Chapel Road traffic controlled with a stop sign at County Road 49. White Chapel Road serves several residential & farming properties along its length, terminating at a turning basin about 1500 metres east of County Road 49.

The entrance to the water-port is on the south side of White Chapel Road, about 300 metres from County Road 49.

2.2 Vehicular Speed

The posted maximum speed limit on County Road 49 is 60 km/h, changing to 80 km/h about 430 metres north of White Chapel Road. The posted maximum speed limit on County Road 49 changes from 60 km/h to 50 km/h about 1200 metres south of White Chapel Road.

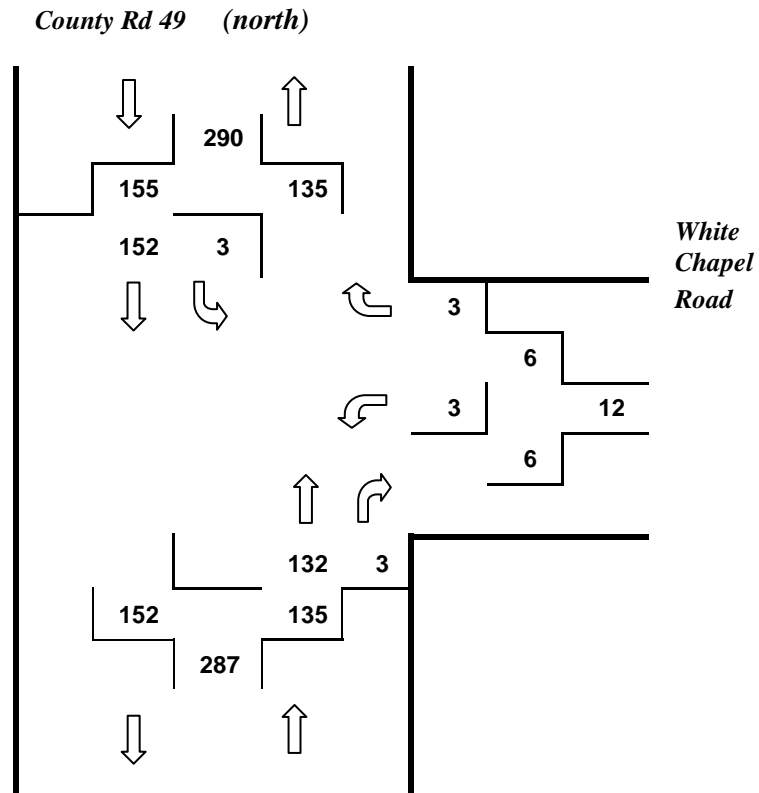
The posted maximum speed limit on White Chapel Road is 70 km/h.

2.3 Traffic Volume

Manual directional traffic counts in this report were collected during the PM and AM peak periods on a Tuesday-Wednesday, June 21-22, 2016 at the intersection of County Road 49-White Chapel Road. The AM & PM peak traffic volumes are shown in Figures 1 & 2 respectively.

The weekday PM peak traffic flow represents the busiest hourly volume during a weekday on this section of County Road 49.

**Figure 1 – County Road 49 at White Chapel Road, Prince Edward County
Weekday AM Peak Traffic Volume – June, 2016**

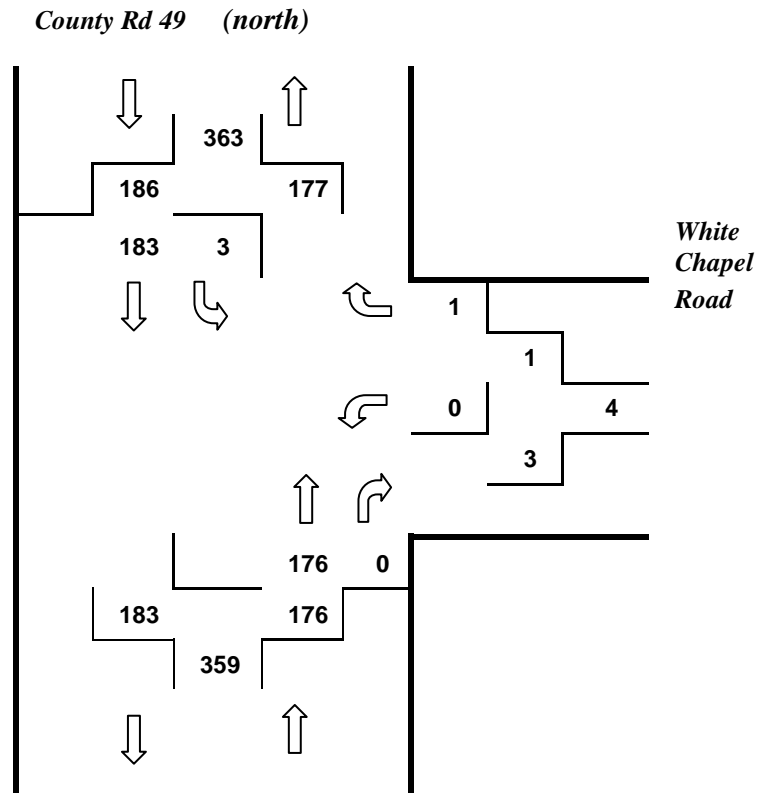


Please note that vehicle trips generated by Picton Terminals employees during the weekday work to home trips usually occur just prior to the PM peak period for County Road 49 traffic flows.

On Tuesday, June 21, three vehicles turned onto White Chapel Road and one vehicle turned from White Chapel Road during the PM peak period for the intersection total traffic flow.

In the 60 minutes before this peak period, the turning traffic was twelve (12) & twelve (12) respectively, more representative of a peak flow, but not coinciding with the peak flow time period on the major roadway.

**Figure 2 – County Road 49 at White Chapel Road, Prince Edward County
Weekday PM Peak Traffic Volume – June, 2016**



2.4 Pedestrians, Bicyclists

Neither the number of pedestrians nor bicyclists are noteworthy on the roadways in this area of Prince Edward County. An occasional pedestrian travels along the shoulder of County Road 49, or crosses County Road 49, or an occasional bicyclist travels along County Road 49.

2.5 Truck Traffic

Three or four axle trucks plus multi-axle transport type trucks make up about three to four percent (3% to 4%) of the traffic that flows through the County Road 49 – White Chapel Road intersection during the PM peak.

3.0 Future Traffic Volume

3.1 Traffic Volume Growth

The Ministry of Transportation – Ontario routinely records traffic volume data on Highway 33 east and west of Picton and on Highway 49 at the Skyway bridge. The traffic volume history at these three locations is shown in the appendix. This data suggests a realistic & generous growth rate of about 1.25 percent per year, non-compounded is appropriate for this area of County Road 49.

Prince Edward County staff has advised that an annual growth rate of 3.20% has been applied to a project on County Road 12 in the past, a rate considered unrealistic for this section of County Road 49.

3.2 Traffic Volume – Year 2022

Prior to assigning generated trips to a roadway and/or intersection, the accepted practice is to assess the expected annual growth of the existing traffic volumes on the adjacent roadways regardless of any development generated trips. This expected growth is usually referred to as background traffic. It is also normal practice to predict how much traffic will be added to the current traffic by a proposed development. The usual accepted method to accomplish this is to record pre-development traffic volumes, add the development generated trips with the assumption that the development is complete, and add the expected growth rate for five years after the completion date.

Assuming that the construction of the proposed commercial development is completed in about a two year time frame, traffic volumes are predicted for the year 2022, the build-out year (2017) plus 5 years beyond.

The expected annual traffic volume growth noted above represents the equivalent of about 400 vph on County Road 49 during the PM peak period by the year 2022. The traffic volume on White Chapel Road is expected to increase to about 30 vph.

3.3 Trip Generation

The Institute of Transportation Engineers (ITE) has compiled sets of data in their Trip Generation manual which identifies many types of developments and the number of vehicle trips each tends to generate. The ITE refers to this data as ‘trips generated per unit’. The data that they reference in their manual is often contributed by engineering professionals and interested parties, based on actual events. The data contained in this

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report is from the current ninth (9th) edition of this ‘Trip Generation’ manual.

The Institute of Transportation Engineers (ITE) Trip Generation manual, 9th Edition, indicates that a Waterport/Marine Terminal, Land Use 010, can be expected to generate about 0.30 average weekday vehicle trip ends per average weekday revenue-ton for break-bulk terminals. This rate equates to about 45 trip ends or four & a half (4.5) per hour, which is comparable to the expected trip ends at Picton Terminals port.

Table 1 – Expected Directional Distribution of Trip Ends Generated

Picton Terminals Trip Ends	Directional Split	Trips per Intersection Traffic Flow	Number Of Trips
AM Peak	Inbound	Northbound Right-turn	0
		Southbound Left-turn	4
	Outbound	Westbound Left-turn	0
		Westbound Right-turn	4
PM Peak	Inbound	Northbound Right-turn	0
		Southbound Left-turn	4
	Outbound	Westbound Left-turn	0
		Westbound Right-turn	4

By-pass trips were not calculated as part of this analysis due to the low number of generated trip ends. But of course, some of the traffic volumes assigned to the terminal operation could now be present in the traffic flow passing through the intersection.

Figures 3 & 4 below illustrate respectively the estimated traffic flows for the County Road 49 at White Chapel Road intersection for the weekday AM & PM peak in the year 2022.

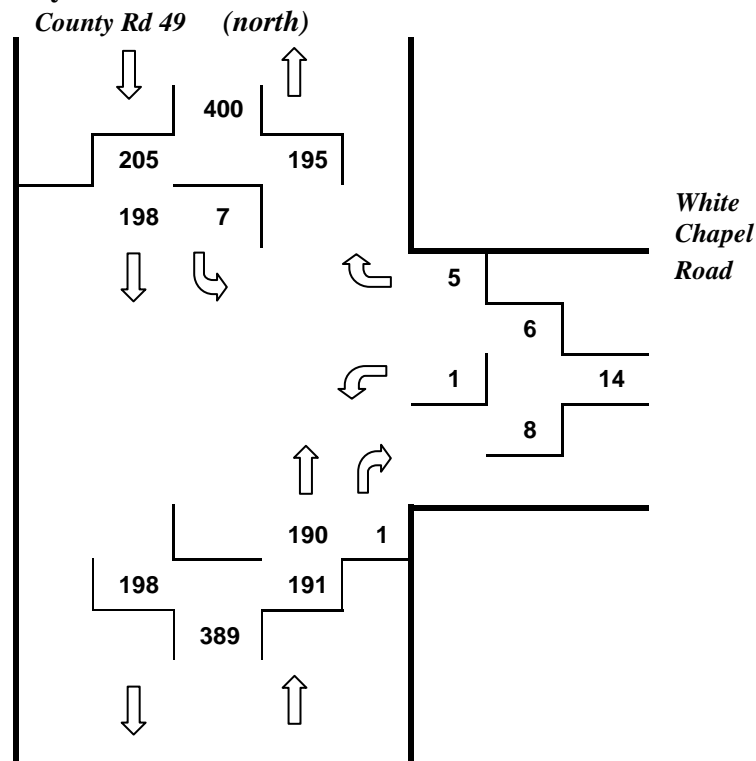
3.4 Truck Traffic

The volume of truck traffic along County Road 49 is expected to increase due to the planned re-development of the Picton Terminals located on White Chapel Road. The majority, if not all of the truck hauling trips will be oriented to northbound & southbound trips along County Road 49, from/to north of White Chapel Road. These trips could impact present traffic flows along County Road 49 due to their gradual acceleration to the expected 80 km/h operating speed north of County Road 6; however only a few of these trips might coincide with other peak period vehicle trips.

The expected maximum hauling at peak times is about 1500 metric tonnes (MT) of bulk cargo per weekday between 7:00 AM and 5:00 PM. Trucks usually carry about 43 MT/load, therefore about 30-40 loads during a ten (10) hour period per weekday arrive at & leave the terminal. This concentrated operation could occur about five (5) times per shipping season. Non-peak daily hauling of miscellaneous cargo is on average four (4) loads per weekday.

Products prepared and loaded at the port have included road salts, aggregates, farming products, biomass, steel products, recycled scrap steel, wine barrels, and various other local large industry products.

**Figure 3 – County Road 49 at White Chapel Road, Prince Edward County
Weekday PM Peak Traffic Volume – Year 2022**



4.0 Design Features

4.1 Design Speed

Whenever a roadway or intersection is being designed or assessed, it is important to determine what is the appropriate maximum speed limit or design speed to be assigned to the roadway. This ensures that the road authority is providing a safe and efficient roadway.

The maximum posted speed limit on this section of County Road 49 is 60 km/h and is an appropriate design speed for the purpose of any proposed local improvements/revisions.

4.2 Design Hour Volume

Whenever a roadway or intersection is being designed or assessed, decisions must be made as to what will be provided in the roadway cross-section, number of lanes, lane width, shoulders, turning lanes, and traffic control devices. These traffic analyses and the capacity of the roadway focus on the traffic volume during peak periods (hours). The AM & P.M. peak is usually the most reoccurring traffic flow, usually five days a week, fifty-two weeks a year. The weekday P.M. peak hour volume is usually higher than the weekday A.M. peak hour volume. This is why the roadway is usually designed to accommodate the weekday P.M. peak hour traffic flows, but obviously the AM peak traffic flows also have to be considered.

The critical design hour volumes for County Road 49 at White Chapel Road intersection are the weekday AM & PM peaks, and can presently be expected between 7:15 & 8:30 AM, and between 4:00 & 5:30 PM.

4.3 Left-turn Lane Assessment

A left-turn lane is usually provided when the number of left-turning vehicles creates a hazard to other motorists or reduces the capacity of the roadway and/or intersection.

A southbound left-turn lane & taper is not required on the north approach to the County Road 49 – White Chapel Road intersection due to the low numbers of left-turn vehicles, opposing vehicles & following vehicles.

4.4 Right-turn Lane Assessment

The Ministry of Transportation, Ontario uses a guideline that indicates that a right-turn lane and taper is beneficial when right-turning vehicles create a hazard (*to other traffic flows*) or when the volume of right-turns approaches the channelization criteria of about 60 vehicles per hour.

A northbound right-turn lane & taper on the County Road 49 approach to the White Chapel Road intersection is not required at the present time or within the foreseeable future.

4.5 Traffic Control Device Assessment

White Chapel Road is appropriately controlled by a stop sign at the intersection with County Road 49.

4.6 Operational Assessment

The Highway Capacity Manual, 2010 edition, is the usual standard used by road authorities to determine the operational assessment of a roadway and/or intersection. A new tool that replicates the Highway Capacity Manual is the software program “Synchro”, which is the method often preferred by municipal staff to calculate volume to capacity ratio and level of service at intersections controlled by traffic control signal or stop sign. Synchro 9 is utilized in this report to calculate capacity and level of service.

The Level of Service for (non-signalized) intersections controlled by stop sign, usually on the minor roadway, is determined by calculating the vehicle delay for the intersection rather than per approach or flow and is assigned a letter (A to F) to a range of values as noted below. Delay is usually only experienced by vehicles on the approach controlled by the stop sign.

Non-signalized Intersection LOS	
Average Delay per Vehicle	LOS
=<10	A
>10 to =<15	B
>15 to =<25	C
>25 to =<35	D
>35 to =<50	E
>50	F

For signalized intersections, the intersection Level of Service and the individual traffic movements/flows Level of Service are determined by calculating the total intersection delay and for each movement and assigning a letter (A to F) to a range of values as noted below.

The levels of delay are greater for signalized than stop controlled intersections as drivers often expect and accept more delay at a busier intersection which tends to be the intersections controlled by traffic signals. Usually all approaches experience some delay.

Signalized Intersection LOS	
Average Delay per Vehicle	LOS
≤ 10	A
>10 to ≤ 20	B
>20 to ≤ 35	C
>35 to ≤ 55	D
>55 to ≤ 80	E
>80	F

The Intersection Capacity Utilization (ICU) Level of Service gives insight into how an intersection is operating and how much extra capacity is available to handle traffic volume fluctuations. The ICU LOS is not a measurement in time as much as it is a barometer of the conditions that can be expected. In the ICU calculation the sum of critical phase times in seconds, and assumed to be 100% saturated, is expressed as a percentage when divided by a 120 second cycle length.

Intersection Capacity Utilization	
Average Delay per Vehicle	LOS
0% to 55%	A
>55% to 64%	B
>64% to 73%	C
>73% to 82%	D
>82% to 91%	E
>91% to 100%	F
>100% to 109%	G
>109%	H

A percentage value less than 100 means there is extra capacity at the intersection. A value greater than 100 indicates the intersection is operating at above its capacity. The ICU Level of Service ‘E’ or ‘F’ indicates less congestion than the Unsignalized or Signalized Intersection Level of Service ‘E’ or ‘F’ above.

Table 2 – Level of Service – Intersection of County Road 49 at White Chapel Road. Weekday AM & PM Peak, Year 2022

Intersection	Peak Hour	Intersection Capacity Utilization LOS
County Road 49 at White Chapel Road	AM	A
	PM	A

Note: Synchro software version 9.1 used to calculate Level of Service.

4.7 Approaching Intersection Sight Distance

The Geometric Design Standards for Ontario Highways manual (MTO), describes the required minimum sight distance for vehicles approaching an intersection, (see Appendix). The intersection design must provide sufficient sight distances for drivers approaching an intersection to observe & avoid potential conflicts with other vehicles (motorists) who may not obey the stop sign.

When a driver does not obey the stop condition, the driver(s) of other approaching vehicle(s) must take evasive action to avoid a collision. To do this they must first and foremost be able to see the offending vehicle from an optimal distance. This minimum sight visibility or sight triangle that allows a driver to perceive and avoid the potential conflict is a function of the number & width of approach lanes, and the design speed or operating speed of the major roadway. The minor roadway is assigned a standardized design/operating speed of 30 km/h.

The calculation of the sight triangle is based on the distance each vehicle travels in three (3.0) seconds, the time period required by each driver to react and avoid a collision. The assumed thirty (30) km/h speed of the vehicle on the minor roadway results in a calculated distance of twenty-five (25.0) metres along the approach of the minor roadway.

The minimum sight visibility distance is determined from the assumed speed of the approaching vehicles on each roadway. These two distances form two sides of the triangle. The third side of the daylighting or visibility triangle is a straight line connecting the points measured from the intersection along the two approaches.

To ensure the required sight line within the sight triangle, the height of the landscape feature should be low enough to allow an unobstructed view by the driver of one vehicle to the other vehicle. Typically the driver's assumed eye height is 1.05 metres above the surface of the roadway. In the event that the object overhangs the sight triangle, such as a cantilevered sign or branches of a tall mature deciduous tree, the area of concern could be considered as not lower than about 1.45 metres above the 1.05 metre sight line, or 2.5 metres above the road surface.

Note: Sight distance calculation for major roadway is design speed (km/h) x 1000 (metres) / 3600 (seconds/hour) x 3.0 (seconds).

This intersection complies with & exceeds the minimum sight triangle measurements.

4.8 Departing Intersection Sight Distance

The Geometric Design Standards for Ontario Highways manual (MTO), describes the required minimum sight distance for vehicles departing from an intersection, (see Appendix). The intersection design must provide sufficient sight distances for drivers approaching an intersection to observe & avoid potential conflicts with other vehicles.

The minimum sight distance from the stopped position at the intersection along County Road 49 is 135 metres. The measured sight distance in both directions, south & north, exceeds this requirement.

5.0 Recommendation – Conclusion

5.1 Traffic Volume

The estimated trip generation for the Picton Terminals at County Road 49 – White Chapel Road intersection will have a negligible effect on traffic flows and should not cause a hazard to or adversely interfere with other traffic on County Road 49 or White Chapel Road.

5.2 Turning Lane

The present lane configuration along County Road 49 will satisfy the traffic flow needs in the year 2022.

5.3 Traffic Control

The present traffic control devices, a stop sign on White Chapel Road, will satisfy the traffic flow needs in the year 2022.

5.4 Pedestrians & Bicyclists

The estimated trip generation for the Picton Terminals at County Road 49 – White Chapel Road intersection will have a negligible effect on pedestrian traffic or bicyclists.

5.5 Level of Service & Volume to Capacity

The level of service and volume to capacity ratio are based on Synchro software version 9.1 calculations.

The individual traffic flows level of service (LOS) and the volume to capacity ratio (v/c) for the horizon year 2022 (in Table 2) satisfies the typical municipal road authority requirements regarding level of service or volume to capacity ratio for the each of the individual traffic flows at the for the County Road 49 – White Chapel Road intersection.

5.6 Sight Distance

The departing sight distance along County Road 49 measured from the stopped position on White Chapel Road exceeds the minimum requirement.

This intersection complies with & exceeds the minimum approaching sight triangle measurements.

Appendix

Minimum Sight Distance Approaching Intersection

Intersection: PEC Road 49 at White Chapel Road.

Vehicle Speed: Posted Maximum = 60 km/h
 Operating Speed = 60 km/h (assumed).

The Geometric Design Standards for Ontario Highways manual (MTO), describes the required minimum sight distance for vehicles **approaching an intersection** as the triangle formed by a straight line connecting two points:

- one point in the centre of the approach lane on the major roadway, and
- one point in the centre of the approach lane on the minor roadway.
- each set of two points precede the potential point of conflict of the two vehicles, based on three seconds of travel at the posted maximum speed on the major roadway, and based on three seconds of travel at 30 km/h on the minor roadway.
- In the south-east sight triangle the calculated distances are 50 metres along the centre of the CR 49 northbound through lane measured southerly from the centre of the westbound lane of White Chapel Road, and 30 metres along the centre of the westbound lane of White Chapel Road measured at the intersection from the centre of the CR 49 northbound through lane.
- In the north-east sight triangle the calculated distances are 50 metres along the centre of the CR 49 southbound through lane measured northerly from the centre of the westbound lane of White Chapel Road, and 30 metres along the centre of the westbound lane of White Chapel Road measured at the intersection from the centre of the CR 49 southbound through lane.

Minimum Sight Distance Departing Intersection

Intersection: PEC Road 49 at White Chapel Road.

Vehicle Speed: Through Road Posted Maximum = 60 km/h
Through Road Operating Speed = 60 km/h (assumed).

The **Geometric Design Standards for Ontario Highways** manual (MTO), describes the required minimum sight distance for vehicles stopped at a Stop sign as a product of,

- the speed of vehicles approaching on the main street,
- the perception-reaction time of the driver of the stopped vehicle,
- the maneuver taken by the stopped vehicle, right turn, left turn, crossing, and
- the acceleration time in seconds required for the stopped vehicle to complete the maneuver and cross the intersection or clear the intersection and reach the speed of the main street vehicle moving in the same direction.

The formula is $da = (V/3.6) \times (tp+ta)$, where,

'da' is the minimum sight distance and the distance traveled by vehicles on the main street at the operating/posted speed, during the maneuver by the 'stopped' vehicle.

'V' is the operating speed (speed limit) of the vehicles on the main street.

'tp' is the perception-reaction time of the driver of the stopped vehicle, (usually 2.0 seconds).

'ta' is the time in seconds for the stopped vehicle to start, accelerate and clear the intersection for the total distance 'S'. ($S=D+W+L$).

'D' is the distance in meters from the edge of the main street to the front of the stopped vehicle.

'W' is the distance in meters that the stopped vehicle must travel to complete the intended maneuver, left or right turn or cross.

'L' is the length of the vehicle in meters, (usually 6.0 meters).

A typical result of this calculation for a left turn or right turn onto the major roadway with a **posted maximum speed limit of 60 km/h is 135 meters**. If the typical vehicle on the minor roadway is a truck and/or the minor roadway has a substantial grade on the approach to the major roadway, adjustments are made for these factors.

To account for the typical driver, in the typical vehicle, in the typical lane position, the measurements are taken in a standard method,

- measurements are taken from the centre of each approach lane,
- from the height of eye of the stopped driver (1.05 m.),
- to the top of the approaching vehicle on the main street (1.30 m.);
- the 'driver's eye' in the stopped vehicle is located 3.0 meters back from the stop line, or
- 5.0 meters back from the through edge of pavement, if no stop line.

In an urban area with sidewalks, the stop line is usually 1.0 meters from the nearest crosswalk line. The crosswalk is usually 2.5 meters wide and is usually centered on the sidewalks or path of the pedestrian crossing. The front edge of the crossing is usually 0.6 meters back from the edge of the through lane. If there is on-street parking adjacent, this 0.6 m. measurement is usually from the through edge of pavement.

This could place the driver of the stopped vehicle $(0.6 + 2.5 + 1.0 + 3.0) = 7.1$ m from the edge of the main street. In the absence of crosswalks and pedestrians, this distance would usually be 4.25 to 6.0 meters.

