



**13030 Lundy's Lane
City of Thorold**

Transportation Impact Study Update

Paradigm Transportation Solutions Limited

2025-09
210565



Project Summary



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13030 Lundy's Lane City of Thorold Transportation Impact Study Update



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Executive Summary

Content

Rudanco Hospitality Corp. retained Paradigm Transportation Solutions Limited (Paradigm) to conduct this Transportation Impact Study (TIS) update for a mixed-use development located at 13030 Lundy's Lane in the City of Thorold.

The development application requires an Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA).

This TIS includes an analysis of existing traffic conditions, a description of the proposed development traffic, traffic forecasts for a Phase 1 opening year horizon (Year 2028), full build-out horizon (Year 2035), five-year horizon (Year 2040) from full build-out, ten-year horizon (year 2045) from full build-out, and any recommendations required to accommodate future traffic conditions.

Development Concept

The property owner is proposing to subdivide the property into new building lots and blocks designated for highway commercial, residential, and employment land uses.

The demonstration plan envisions the following Phase 1 land uses:

- ▶ Single detached homes – 74 units; and
- ▶ Townhomes – 176 units;

For full build-out, the following land uses are proposed:

- ▶ Single detached homes – 115 units;
- ▶ Townhomes – 222 units;
- ▶ Apartments – 1,699 units;
- ▶ Ground floor retail – 5,240 m² (56,403 sq.ft.); and
- ▶ Supermarket – 2,890 m² (31,108 sq.ft.).

Vehicle access is proposed by two new public roadways to Thorold Townline Road located approximately 254 and 445 metres north of Lundy's Lane (Highway 20). Connections to the neighbouring Rolling Meadows subdivision are also proposed via Discovery Drive and Horizon Heights.



Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Conditions:** The study area intersections are currently operating with acceptable levels of service with capacity issues at the following intersections:
 - Lundy's Lane (Highway 20) and Thorold Townline Road;
 - Lundy's Lane (Highway 20) and Barker Parkway; and
 - Thorold Townline Road and Beaverdams Road.
- ▶ **Development Trip Generation:** The Phase 1 portion of the proposed site is forecast to generate 124 new trips in the AM peak hour and 161 new trips in the PM peak hour. Where as the overall site development at full build-out is forecast to generate 803 new trips in the AM peak hour and 1,278 new trips in the PM peak hour.
- ▶ **Background Traffic Forecast:** The future traffic volumes are estimated to consist of:
 - Generalized background traffic growth – estimated to be 2% per annum;
 - Traffic generated by the future development of:
 - The Rolling Meadows Development – a multi-phase development located west of the subject site, consisting of primarily residential units including single-family, townhomes, medium density, and high-density units; and
 - The proposed Upper's Quarry – a quarry located on the west side of Thorold Townline Road near Beechwood Road. The preferred haul route for the quarry will direct trucks northbound on Thorold Townline Road through non-residential areas.
- ▶ **Background Traffic Operations:** As the traffic volumes increase at the study area intersections, the existing capacity issues are exacerbated, and additional issues are identified at the study area intersections.
- ▶ **Total Traffic Operations (Phase 1 – Year 2028):** The capacity deficiencies identified under background conditions will continue to occur with the addition of site generated traffic. Please note that the addition of the site generated traffic to the background traffic during Phase 1 results in minor increases in delay at the study area intersections.



Thorold Townline Road and Street A is forecast to operate with LOS B and v/c ratios of 0.07 or less during the AM and PM peak hours under total traffic conditions.

Thorold Townline Road and Street H is forecast to operate with LOS B and v/c ratios of 0.07 or less during the AM and PM peak hours under total traffic conditions.

► **Remedial Measures (Phase 1 – Year 2028):**

To accommodate future background traffic volumes (non-site generated traffic) the following improvements are identified:

- Lundy's Lane (Highway 20) and Thorold Townline Road requires a second eastbound and westbound through lanes, and a southbound right-turn lane with 50 metres of storage.
- Lundy's Lane (Highway 20) and Barker Parkway a two-lane roundabout along with a second eastbound and westbound through lanes.
- Thorold Townline Road and Beaverdams Road a traffic control signal. In addition, auxiliary turn lanes on all approaches should be considered, provided the expanded lane geometry can be accommodated without impacting the environmental features surrounding the intersection.

To accommodate site generated traffic the following improvements are identified:

- Thorold Townline Road and Street A, a northbound left-turn lane with 15 metres of storage.
- Thorold Townline Road and Street H, a northbound left-turn lane with 15 metres of storage.

► **Background Traffic Operations (Full Build Out – Year 2035):**

As the traffic volumes increase due to non-site generated traffic, the previously identified capacity issues are exacerbated, and new localized congestion is forecast to occur.

► **Total Traffic Operations (Full Build Out – Year 2035):** The capacity deficiencies identified under background conditions will continue to occur with the addition of site generated traffic.

Thorold Townline Road and Street A is forecast to operate with the minor approach at LOS E/F range and v/c ratios of 0.97 or less during the PM peak hour under total traffic conditions. Traffic control signals are not warranted under 2045 total traffic conditions.

Thorold Townline Road and Street H is forecast to operate with the minor approach at LOS F and v/c ratios greater than the critical threshold or less during the AM and PM peak hours



under total traffic conditions. Traffic control signal warrants are justified at 120 percent.

► **Remedial Measures (Full Build Out – Year 2035):**

The background traffic improvements identified for the Phase 1 Year 2028 horizon are required. To accommodate site generated traffic the following improvements are identified:

- Lundy's Lane (Highway 20) and Thorold Townline Road a westbound right-turn lane with 50 metres of storage.
- Thorold Townline Road and Street A, a northbound left-turn lane with 40 metres of storage is warranted from the 2035 total horizon. An increase of 25 metres from Phase 1. A southbound right-turn taper is warranted from the 2035 total horizon.
- Thorold Townline Road and Street H, installation of traffic control signals, a northbound left-turn lane with 80 metres of storage is warranted from the 2035 total horizon. An increase of 65 metres from Phase 1. A southbound right-turn taper is warranted from the 2035 total horizon.

Recommendations

Based on the findings of this study, it is recommended that:

- The MTO/Region monitors the future traffic volumes at the study area intersections and consider implementing the following improvements to accommodate the forecast Year 2028 (Phase 1) due to background traffic volumes (non-site generated traffic):

Lundy's Lane (Highway 20) at Thorold Townline Road

- A second eastbound and westbound through lane, and
- A southbound right-turn lane with 50 metres of storage.

Lundy's Lane (Highway 20) and Barker Parkway

- A two-lane roundabout; and
- A second eastbound and westbound through lane.

Thorold Townline Road and Beaverdams Road

- A traffic control signal; and
- Provided the surrounding environmental features are not impacted, auxiliary turn lanes on all approaches should be considered.



- ▶ The Niagara Region reduce the speed limit along Thorold Townline Road to 50 km/h to reflect future build-out of the area.
- ▶ When construction begins (part of Phase 1) at the proposed Street A intersection, a northbound left-turn lane with 15 meters of storage be constructed.

At full build-out (Year 2035), the storage lane should be extended to 40 meters, and a southbound right-turn taper should be added.

- ▶ When construction begins (part of Phase 1) at the proposed Street H intersection, a northbound left-turn lane with 15 meters of storage should be constructed. Additionally, provisions for underground traffic signal conduits should be considered.

At full build-out (Year 2035), the storage lane should be extended to 80 meters, and a southbound right-turn taper should be added. The traffic control signals should be electrified, and a separate eastbound left-turn lane with 50 meters of storage should be provided on the Street H approach.

- ▶ At full build-out (Year 2035) the MTO/Region determine if a westbound right-turn lane is required at the Lundy's Lane (Highway 20) & Thorold Townline Road intersection to support the build-out of the surrounding area.

Table ES.1 summarizes the remedial measures and when they are required to address the study area intersection operations.



TABLE ES.1: MITIGATION MEASURES

Intersection	Remedial Measures	Horizon
Lundy's Lane (Highway 20) & Thorold Townline Road	Second eastbound through lane	2028 Background
	Additional Storage for existing eastbound right-turn lane – 40 metres total (increase of 20 metres)	2028 Background
	Second westbound through lane	2028 Background
	Westbound right-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven
	Additional storage for existing northbound left-turn lane – 65 metres total (increase of 45 metres)	2028 Background
	Southbound right-turn with 50 metres of storage	2028 Background
	Optimized signal timings	Continuous Monitoring
Lundy's Lane (Highway 20) & Barker Parkway	Two-lane roundabout	2028 Background
	Second eastbound approach lane	2028 Background
	Second westbound approach lane	2028 Background
Thorold Townline Road & Beaverdams Road	Traffic control signals	2028 Background
	Eastbound left-turn lane with 35 metres of storage	2028 Background
	Westbound left-turn lane with 65 metres of storage	2028 Background
	Northbound left-turn lane with 20 metres of storage	2028 Background
	Southbound left-turn lane with 45 metres of storage	2028 Background
Thorold Townline Road & Street A	Northbound left-turn lane with 15 metres of storage. Consider ultimate storage length.	Phase 1 Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 40 metres (ultimate)	2035 Full Build-out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven



Intersection	Remedial Measures	Horizon
Thorold Townline Road & Street H	Northbound left-turn lane with 15 metres of storage.	Phase 1 Total Traffic – Application Driven
	Traffic control signals and optimized signal timings. Consider installing signal conduits during Phase 1.	2035 Full Build-Out Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 80 metres (ultimate).	2035 Full Build-Out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven
	Eastbound left-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven



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1 Introduction

In December 2023, Paradigm Transportation Solutions Limited (Paradigm) prepared a Transportation Impact Study¹ (December 2023 TIS) for the subject site.

This study is an update to the December 2023 TIS and reflects changes in the development plans and review agencies comments.

1.1 Overview

Rudanco Hospitality Corp. retained Paradigm Transportation Solutions Limited to conduct this Transportation Impact Study for a mixed-use development located at 13030 Lundy's Lane in the City of Thorold.

The development application requires an Official Plan Amendment (OPA) and Zoning By-law Amendment (ZBA).

Figure 1.1 illustrates the site location.

The scope of the study includes:

- ▶ Assessment of the current traffic and site conditions within the study area;
- ▶ Estimates of background traffic growth for full build-out of the development, as well as five- and ten-year horizons from build-out;
- ▶ Estimates of additional traffic generated by the proposed development of the subject site;
- ▶ Analyses of the impact of the future traffic on the study area road network; and
- ▶ Identification of recommendations necessary to mitigate traffic impacts due to the site generated traffic in a satisfactory manner.

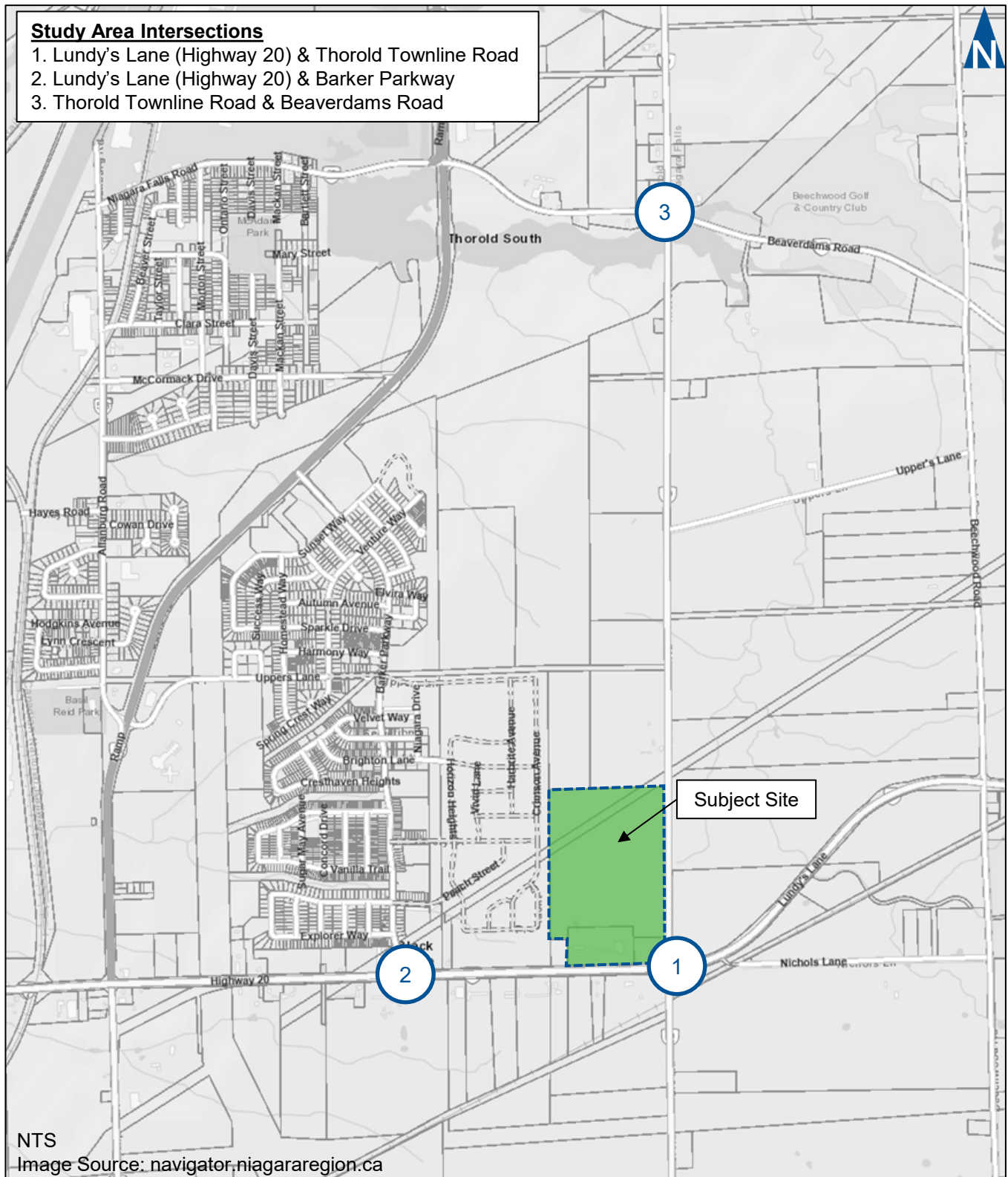
Appendix A contains the previous pre-study consultation material and responses from MTO, Niagara Region, and the City of Thorold. The study generally follows the MTO² and Niagara Region³ Transportation Impact Study Guidelines.

¹ Paradigm Transportation Solutions Limited, 13030 Lundy's Lane, Thorold ON, *Transportation Impact Study*, (PTSL, December 2023).

² Traffic Office, Highway Operations Management, Ontario Ministry of Transportation, *General Guidelines for the Preparation of Traffic Impact Studies*, (Toronto: Queen's Printer for Ontario, March 2023).

³ CIMA, *Transportation Impact Assessment Guidelines*, (CIMA: Niagara Region, July 2023).





1.2 Study Area

The study area intersections assessed include:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road (signalized);
- ▶ Lundy's Lane (Highway 20) and Barker Parkway (single-lane roundabout);
- ▶ Thorold Townline Road and Beaverdams Road (all-way stop control); and
- ▶ The two proposed municipal road connections to Thorold Townline Road.



2 Existing Conditions

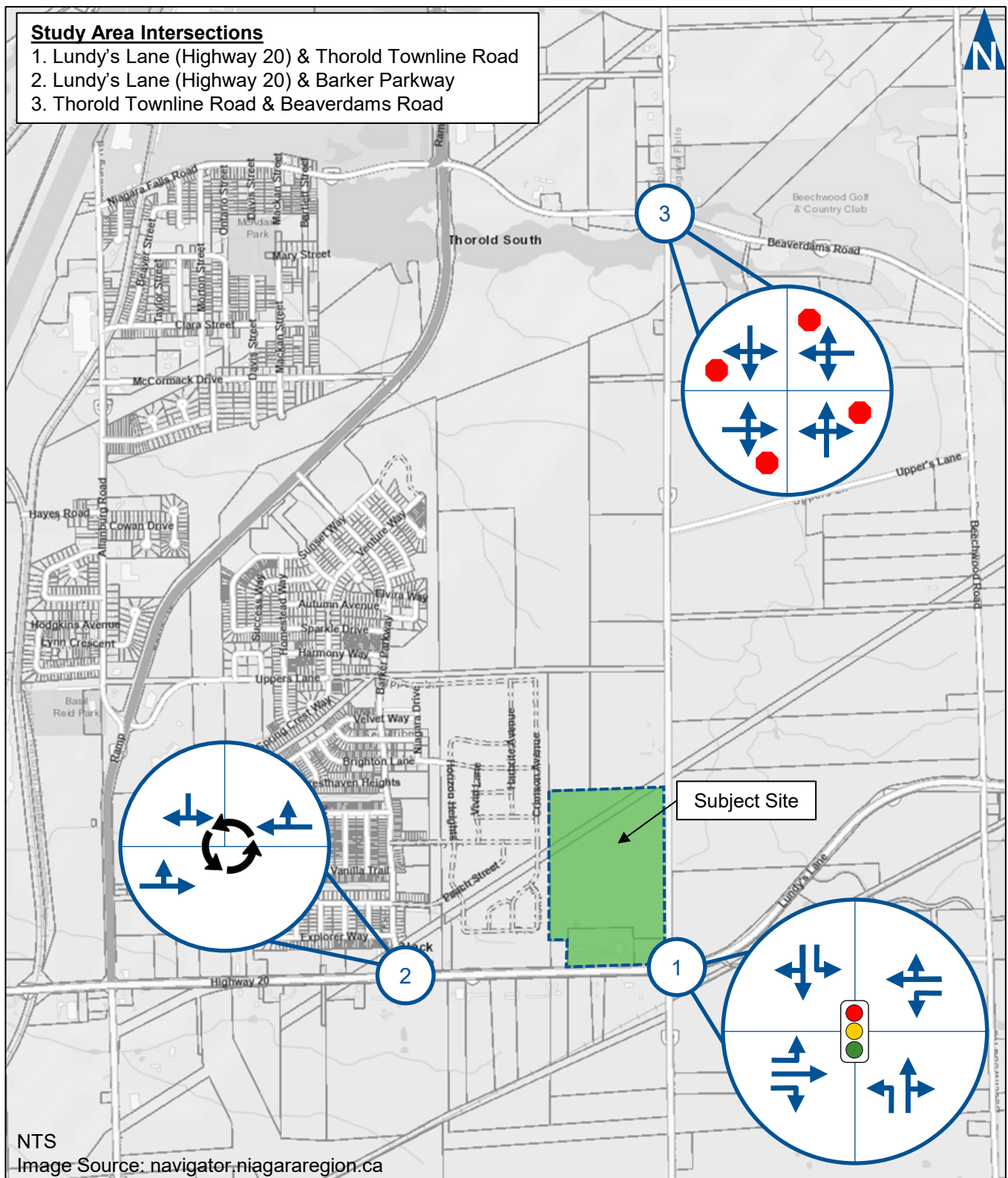
2.1 Roadway Characteristics

The roadways of interest within the study area include:

- ▶ **Lundy's Lane (Highway 20)** – Two-lane rural roadway with a posted speed limit of 80 kilometres per hour. The roadway is under the MTO's jurisdiction. The intersection with Thorold Townline Road is signalized. Along the roadway no dedicated pedestrian or cycling facilities are present.
- ▶ **Thorold Townline Road (Regional Road 70)** – Two-lane rural thoroughfare roadway with a posted speed limit of 80 kilometres per hour. The roadway is under the Niagara Region's jurisdiction. Along the roadway no dedicated pedestrian or cycling facilities are present.
- ▶ **Beaverdams Road** – Two-lane rural roadway with a posted speed limit of 80 kilometres per hour. The roadway is under the Niagara Region's jurisdiction. Along the roadway no dedicated pedestrian or cycling facilities are present.
- ▶ **Barker Parkway** – Two-lane urban collector road with a speed limit of 50 kilometers per hour. The roadway is under the City of Thorold's jurisdiction. Along the roadway no dedicated pedestrian or cycling facilities are present.

Figure 2.1 illustrates the existing lane configurations and traffic control at the study area intersections.





2.2 Walking

Along the study area roadways there are no dedicated pedestrian or cycling facilities present.

Walk Score is an online tool that assigns a numerical walkability score between 0 and 100 ranking communities based on how many businesses, parks, theatres, schools, and other common destinations are within walking distance.

The subject site has a Walk Score⁴ of 8 and is considered “Car Dependent,” which means almost all errands require a car.

2.3 Cycling

The local bicycle network provides a variety of cycling facilities within the area. **Figure 2.2** illustrates the existing cycling network.

Lundy's Lane east of Thorold Townline Road is designated as an existing cycling facility. West of Thorold Townline Road, Lundy's Lane (Highway 20) is identified as a future cycling facility. Beaverdams Road is identified as an infill link on municipal road or other corridor.

The strategic cycling network places short-term priority on building the connections that are most likely to be used based on existing network, infill opportunities, and planned capital investments.

⁴ <https://www.walkscore.com/score/13030-lundys-ln-thorold-on-canada> (2025-08-07)





2.4 Transit Service

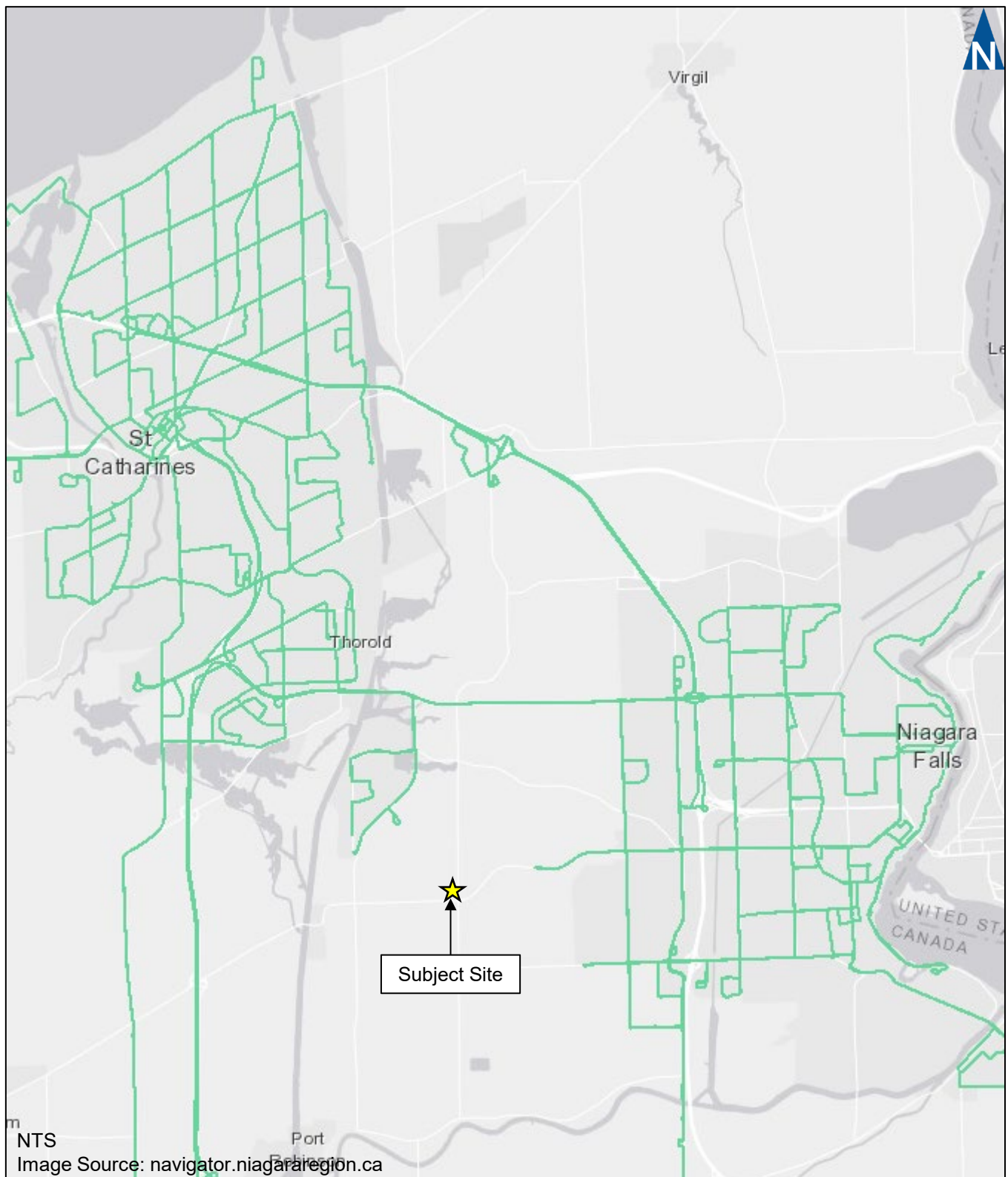
Niagara Region Transit provides transit services within St. Catharines and Thorold. The closest service is route 322 (Thorold South) which runs from the Barker Parkway and Davis Road intersections to the Towpath Terminal with 60-minute headways Monday to Saturday. This stop is approximately 1.83 km from the northwest corner of the subject site.

Niagara Region Transit also provides service in Niagara Falls. This route is operated by 601 (WEGO Red Line) which turnarounds at the Campark Resorts on Lundy's Lane approximately 1.70 km east of Thorold Townline Road. This route operates seven days a week with headways approximately every 30 minutes.

The study area is currently lacking in public transport options. It is recommended that Niagara Region Transit look to extend transit lines out to this area upon full build-out of the subject site and the Rolling Meadows community to reduce the need for private automobile use.

Figure 2.3 illustrates the existing transit network.





2.5 Traffic Volumes

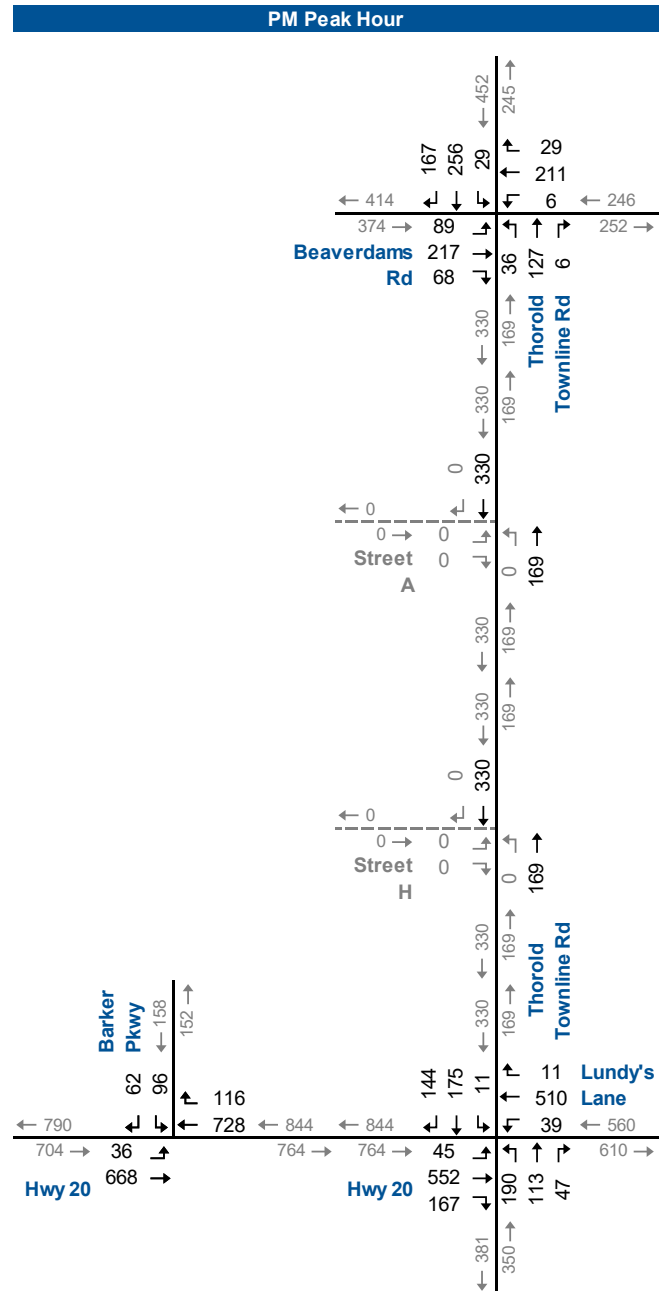
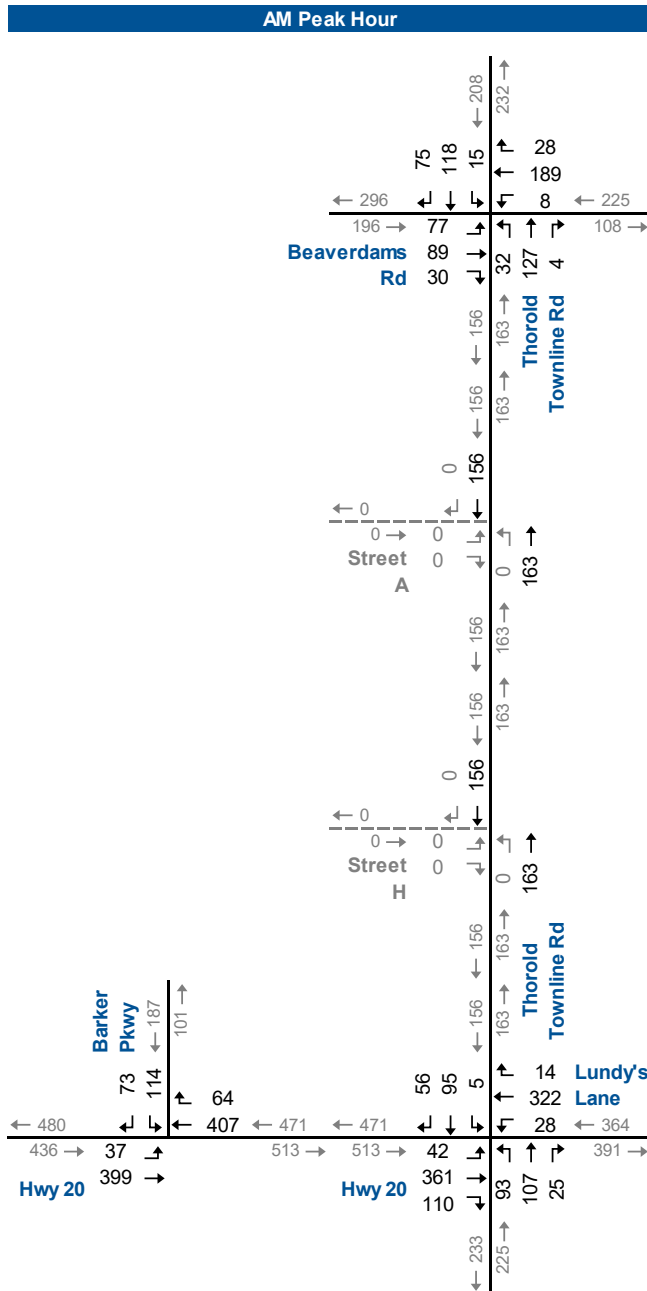
Table 2.1 summarizes the location and date of the existing turning movement count (TMC) data used in the analysis. The data was collected by Paradigm with the traffic signal timing plans provided by Niagara Region. **Appendix B** contains the existing count data and signal timing plans.

TABLE 2.1: TURNING MOVEMENT COUNT SUMMARY

Intersection	Date
Lundy's Lane (Highway 20) & Thorold Townline Road	Wednesday June 18, 2025
Lundy's Lane (Highway 20) & Barker Parkway	Wednesday June 18, 2025
Thorold Townline Road & Beaverdams Road	Wednesday June 18, 2025

The turning movement counts were balanced to ensure the traffic volumes remain consistent through the study area. **Figure 2.4** illustrates the base year weekday AM and PM peak hour traffic volumes.





2.6 Traffic Operations

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 desiring to make a movement, compared to the estimated capacity for that movement. The capacity is based on several criteria related to the opposing traffic flows. The highest possible rating is LOS A, under which the average total delay is equal or less than 10 seconds per vehicle. When the average delay exceeds 80 seconds at signalized intersections (50 seconds at unsignalized), the movement is considered to have a LOS F, and remedial measures are usually implemented if they are feasible.

The operations of the study area intersections were evaluated under existing traffic conditions using Synchro 12 software and Highway Capacity Manual (HCM) 2000 procedures, SimTraffic 12 (five iterations of 15-minute seed time and 60-minute evaluation time), and ACRADY roundabout procedures.

The intersection analysis considered the following measures of performance:

- ▶ The LOS for each turning movement. LOS is based on the average control delay per vehicle;
- ▶ The volume to capacity ratio (v/c) for each intersection; and
- ▶ 95th percentile queue length (m) as provided by Synchro.

Under the Region's TIS Guidelines, the following criteria identifies critical conditions and signify that mitigation measures may need to be considered:

- ▶ At signalized intersections, movements with v/c ratio greater than 0.85 and/or LOS E or worse;
- ▶ At unsignalized intersections, movements expected to operate at LOS D or worse and/or where the estimated 95th percentile queue length for an individual movement exceeds the available queueing space;
- ▶ Any site accesses where entrances or egress is anticipated to be blocked by traffic queues from an upstream/downstream intersection;
- ▶ An exclusive turning movement in which the 95th percentile queue will exceed the available storage space; and



- ▶ Exclusive left and right turn lanes that are inaccessible due to the length of queues in the adjacent through lanes.

The MTO TIS Guidelines stipulate a critical threshold for signalized intersections. A volume-to-capacity ratio exceeding 0.85 is the threshold at which mitigation measures must be considered.

Table 2.2 summarizes the operational results. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Eastbound right-turn lane with queue length exceeding available storage during the AM and PM peak hours; and
 - Northbound left-turn lane with queue length exceeding available storage during the AM and PM peak hours.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
- ▶ Thorold Townline Road and Beaverdams Road:
 - Eastbound approach with LOS E and v/c ratio of 0.83 during the PM peak hour; and
 - Southbound approach with LOS F and v/c ratio of 0.95 during the PM peak hour.

Appendix C contains the supporting detailed Synchro/ARCADY reports.



TABLE 2.2: BASE YEAR OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	A 5 0.12 22 90 69	A 6 0.44 43 - -	A 5 0.14 21 20 -1	A 6 - -	A 5 0.07 12 55 43	A 6 - -	> > > >	A 6 - -	B 16 0.44 25 20 -5	B 15 0.43 29 - -	> > > >	B 15 - -	B 13 0.02 6 20 14	B 15 0.45 38 - -	> > > >	B 15 - -	A 9
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	B 11 0.33 22 - -	> > > > >	B 11 - -	< < < < <	B 12 0.37 22 - -	> > > > >	B 12 - -	< < < < <	B 11 0.29 33 - -	> > > > >	B 11 - -	< < < < <	B 11 0.35 29 - -	> > > > >	B 11 - -	B 11
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				A 5 0.37 3					A 7 0.47 3								A 4 0.19 3
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	B 12 0.25 23 90 67	B 20 0.75 100 - -	B 12 0.25 66 20 -46	B 18 - -	B 12 0.22 19 55 36	C 26 0.83 90 - -	> > > >	C 25 - -	D 38 0.51 63 20 -43	B 16 0.30 69 - -	> > > >	C 28 - -	B 14 0.03 13 20 7	C 21 0.63 66 - -	> > > >	C 21 - -	C 22
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	E 37 0.83 41 - -	> > > > >	E 37 - -	< < < < <	C 21 0.58 26 - -	> > > > >	C 21 - -	< < < < <	C 17 0.42 35 - -	> > > > >	C 17 - -	< < < < <	F 55 0.95 64 - -	> > > > >	F 55 - -	E 37
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				A 7 0.60 3					F 81 1.00 217								A 5 0.19 3

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



3 Development Concept

3.1 Site Description

The subject site is located at 13030 Lundy's Lane on the northwest corner of Thorold Townline Road and Lundy's Lane (Highway 20) in the City of Thorold. The site is located within the MTO permit control area.

The property owner is proposing to subdivide the property into new building lots and blocks designated for highway commercial, residential, and employment land uses.

The demonstration plan envisions the following land uses:

- ▶ Single detached homes – 115 units;
- ▶ Townhomes – 222 units;
- ▶ Apartments – 1,699 units;
- ▶ Ground floor retail – 5,240 m² (56,403 sq.ft.); and
- ▶ Supermarket – 2,890 m² (31,108 sq.ft.).

Of the above total units, Phase 1 consist of:

- ▶ Single detached homes – 74 units; and
- ▶ Townhomes – 176 units.

Vehicle access is illustrated by two new public roadways to Thorold Townline Road located approximately 254 metres (Street H) and 445 metres (Street A) north of Lundy's Lane (Highway). The Regions Access Management Guidelines⁵ note the minimum intersection spacing from nearest existing or planned traffic signal is 250 metres for an urban general roadway.

Street A (445 metres north of Lundy's Lane) would be located approximately 50 metres north of the private driveway to 6200 Thorold Townline Road on the east side of the roadway. There are no other existing private driveways opposite the subject site on Thorold Townline Road.

Street A is planned to connect to the Rolling Meadow Subdivision, which is located to the west of the site, via Discovery Drive.

⁵ CIMA, *Niagara Region Access Management Guidelines*, (CIMA: Niagara, July 2023).



Another connection to the Rolling Meadows is proposed via Street F. Street F is planned to connect to Horizon Heights. This will provide additional access to/from the subject lands.

It is recommended that Niagara Region consider reducing the speed limit along Thorold Townline Road to reflect the planned build-out of the subject site. Reducing the speed limit will help transform a thoroughfare designed for movement into a safer, more vibrant community space. Active transportation facilities (for example, sidewalks or multi-use paths) can provide for an improved experience for vulnerable road users and allow for a complete street design.

The build-out for Phase 1 is assumed to be Year 2028 dependent on market conditions. Full build-out of the site (ultimate) is assumed to be Year 2035, dependent on market conditions.

Figure 3.1 illustrates the concept plan.



3.1.1 Traffic Calming Opportunities

Various road users, including pedestrians, cyclists, automobiles, transit, trucks, and service vehicles, are intended to co-exist in relative safety and harmony on residential roads. When problems related to high traffic speeds, high traffic volumes, poor roadway geometry, poor traffic operations, or any combination of these characteristics are experienced, residential streets are no longer perceived as being pleasant or safe for all road uses (e.g. pedestrians, cyclists, and even drivers). A solution to mitigate these poor characteristics is traffic calming.

Traffic calming is a contentious subject and should be dealt with in a clear, concise, and transparent process that should meet the needs and expectations of the community. This section outlines several measures that could be implemented along the study area roadways, however if measures are implemented, they should be initiated and implemented based on consultation with the community.

The implementation of traffic calming should be well designed to minimize the inconvenience to local services such as garbage collection, snow ploughing, emergency services, and residents. There is also value in adding traffic calming measures incrementally to respond to local traffic issues while avoiding creating an excess “nuisance” to community travel. The following outlines measures that could be considered:

- ▶ **Narrowing**, decreases the overall width of the road and serves as a visual cue to drivers that they are entering a neighbourhood street or area. When used in this way the narrowing is called a ‘gateway’ to minor streets.
- ▶ **Corner Extension/Bulb-Out**, the horizontal extension of the sidewalk into the street results in a narrower roadway section. An effective method for narrowing pedestrian crossing distances and increase pedestrian visibility. Can also facilitate midblock crossing (known as a ‘choker’) to add public space and facilitate midblock pedestrian crossings on low-volume streets.
- ▶ **Radar Speed Signs**, to slow vehicles down by making drivers aware they are driving at speeds above the posted speed limits.
- ▶ **Pavement Treatments**, special pavement textures (cobblestones, bricks, etc.) and markings to designate specific areas.
- ▶ **Pedestrian Crossover**, where a crossing that is not signalized exists, such as to get to parks or schools, a pedestrian crossover can be used to satisfy a desired line. Pedestrian crossovers can be raised to meet sidewalk height to slow



vehicles down and increase safety and accessibility for pedestrians. Variation of signage, signals and line painting can increase visibility of pedestrians to drivers.

- ▶ **On-Street Parking**, the allocation of paved roadway space to parking of vehicles. It narrows the road travel lanes and increases side friction to traffic flow. On-street parking can either be parallel or angled, but parallel is preferred for maximized speed reduction.
- ▶ **Tighter Corner Radii** affects traffic turning speeds. A tighter radius forces a driver to reduce speed. It is particularly helpful for intersections with high pedestrian traffic.
- ▶ **Street Trees**, planting trees along a street to create a sense of enclosure and improve the pedestrian environment.
- ▶ **Neotraditional Street Design**, narrower lanes, shorter blocks, T-intersections, and other design features to control traffic speed and volumes.
- ▶ **Roadway Striping**, painting roadway markings that narrow traffic lanes and encourage lower traffic speeds.

As currently no significant speed issues exist, any existing speeding concerns can be address by City staff through traffic calming measures with public engagement to determine the most appropriate measures to implement.

As for subject development, any traffic calming measures internal to the new subdivision should be addressed through detailed engineering design.

3.2 Sight Distance

Thorold Townline Road is relatively straight and flat along the subject site frontage. There are slight dips and rises in the roadway to the north of the property. Sight distances have been reviewed to confirm if adequate sight distances are provided at the proposed municipal roadway connections to Thorold Townline Road.

The available sight distance along Thorold Townline Road and the three proposed municipal roadway connections have been assessed based on the methodology outlined in the Transportation Association of Canada Geometric Design Guide for Canadian Roads⁶ ("TAC

⁶ Transportation Association of Canada, *Geometric Design Guide for Canadian Roads*, (Ottawa: TAC, 2017).



Guide”). The following parameters have been referenced in the assessment:

- ▶ Design speed – 100 km/h (20 km/h over the posted speed limit);
- ▶ Object Height (Vehicle tail or brake light) – 0.60 m;
- ▶ Driver Eye Height – 1.08 m; and
- ▶ Top of Car – 1.30 m.

Table 3.1 summarizes the sight distances set out in the TAC Guide applicable to this analysis. **Appendix D** contains the sight distance assessment plots.

TABLE 3.1: TAC SIGHT DISTANCES

Sight Distance	Distance (m) 100 km/h Design Speed
Minimum Stopping Sight Distance ⁷	185 m
Intersection Sight Distance – Right-Turn from Stop ⁸	185 m
Intersection Sight Distance – Left-Turn from Stop ⁹	210 m

No sight distance issues are identified on Thorold Townline Road at the proposed two municipal roadway connections. The two roadway's location onto Thorold Townline Road meets the prescribed sight distances set out in the TAC Guide for a design speed of 100 km/h.

3.3 Site Traffic Generation

The Institute of Transportation Engineers (ITE) publication, Trip Generation¹⁰ has been referenced to estimate the site trip generation. The following land use codes were used to estimate the site's trip generation:

- ▶ 210 – Single Family, Detached Housing (Dwelling Units); and
- ▶ 220 – Multifamily Housing, Low-Rise (Dwelling Units).

Table 3.2 summarizes the estimated trip generation for the development. The highest number of calculated trips by use of the

⁷ Ibid. Table 2.5.2: Stopping Sight Distance on Level Roadways for Automobiles.

⁸ Ibid. Table 9.9.6: Design Intersection Sight Distance – Case B2, Right Turn from Stop.

⁹ Ibid. Table 9.9.4: Design Intersection Sight Distance – Case B1, Left Turn from Stop Design.

¹⁰ Institute of Transportation Engineers, *Trip Generation Manual*, 12th ed., (Washington, DC: ITE, 2025).



average rate or the linear equation has been taken to estimate the trip generation. No reductions for modal split were calculated to represent a conservative trip generation estimate.

Upon full build-out, Phase 1 is estimated to generate 124 AM peak hour trips and approximately 161 PM peak hour trips.

For full build-out, the following land use codes were used to estimate the site's trip generation:

- ▶ 210 – Single Family, Detached Housing (Dwelling Units);
- ▶ 220 – Multifamily Housing, Low-Rise (Dwelling Units);
- ▶ 221 – Multifamily Housing, Mid-Rise (Dwelling Units);
- ▶ 222 – Multifamily Housing, High-Rise (Dwelling Units);
- ▶ 821 – Shopping Plaza, 40-150k (GFA/1,00 sq.ft.); and
- ▶ 850 – Supermarket (GFA/1,000 sq.ft.).

Table 3.3 summarizes the estimated trip generation for the development. The highest number of calculated trips by use of the average rate or the linear equation has been taken to estimate the trip generation. No reductions for modal split were calculated to represent a conservative trip generation estimate.

Upon full build-out, the site is estimated to generate approximately 803 AM peak hour trips and approximately 1,278 PM peak hour trips.

It is noted that pass-by trips for the commercial land uses in the PM peak hour were obtained from Land Use Code 821 (Shopping Plaza) and Land Use Code 850 (Supermarket) from the ITE *Trip Generation Handbook*¹¹. The resulting net trip generation is approximately 841 AM peak hour trips and approximately 1,107 PM peak hour trips.

¹¹ Institute of Transportation Engineers, *Trip Generation Handbook*, 3rd ed., (Washington, DC: ITE, 2017).



TABLE 3.2: PHASE 1 ESTIMATED TRIP GENERATION

ITE Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
210 - Single Family, Detached Housing (Dwelling Units)	74	14	38	52	43	26	69
220 - Multifamily Housing, Low-Rise (Dwelling Units)	176	17	55	72	57	35	92
Net Trip Generation	250	31	93	124	100	61	161

TABLE 3.3: FULL BUILD-OUT ESTIMATED TRIP GENERATION

ITE Land Use	Units	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
210 - Single Family, Detached Housing (Dwelling Units)	115	21	60	81	66	41	107
220 - Multifamily Housing, Low-Rise (Dwelling Units)	222	22	69	91	71	44	115
221 - Multifamily Housing, Mid-Rise (Dwelling Units)	607	53	178	231	148	83	231
222 - Multifamily Housing, High-Rise (Dwelling Units)	1,092	63	155	218	173	111	284
821 - Shopping Plaza (40-150k) (GFA/1,000ft ²)	56.4	56	34	90	131	137	268
850 - Supermarket (GFA/1,000ft ²)	31.1	54	38	92	136	137	273
Total Trip Generation		269	534	803	725	553	1,278
821 Pass-by AM Peak Hour	0%	-	-	-	-	-	-
821 Pass-by PM Peak Hour	40%	-	-	-	53	53	106
850 Pass-by AM Peak Hour	0%	-	-	-	-	-	-
850 Pass-by PM Peak Hour	24%	-	-	-	32	33	65
Net Trip Generation		269	534	803	640	467	1,107



The site generated trips were assigned to the road network based on a review of existing traffic patterns at the study intersections as noted in the pre-study consultation.

Table 3.4 summarizes the estimated trip distribution.

TABLE 3.4: ESTIMATED TRIP DISTRIBUTION

Route	To/From	
	AM Peak Hour	PM Peak Hour
Thorold Townline Road (North)	11%	11%
Beaverdams Road (West)	13%	12%
Beaverdams Road (East)	10%	10%
Lundy's Lane (East)	24%	24%
Thorold Townline Road (South)	16%	16%
Highway 20 (West)	26%	27%
Total	100%	100%

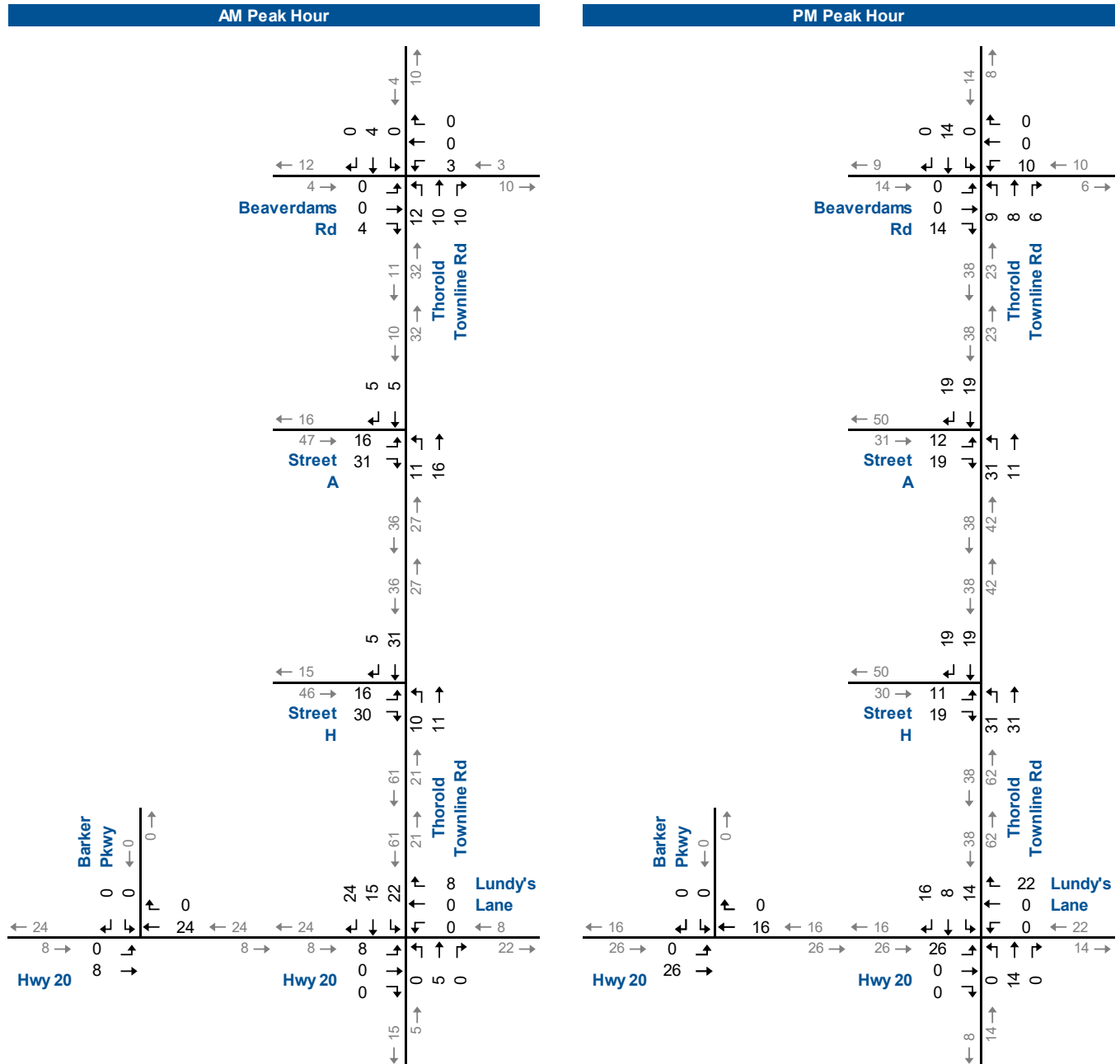
For a conservative assignment, all new site trips have been assigned to Street A and Street H. Once established, drivers would likely use the most logical path to/from their destinations. For example, trips to the northwest may use the collector roads (Discovery Drive and Barker Parkway) to Davis Road or to/from Highway 20 via Barker Parkway and the Rolling meadows internal roadways.

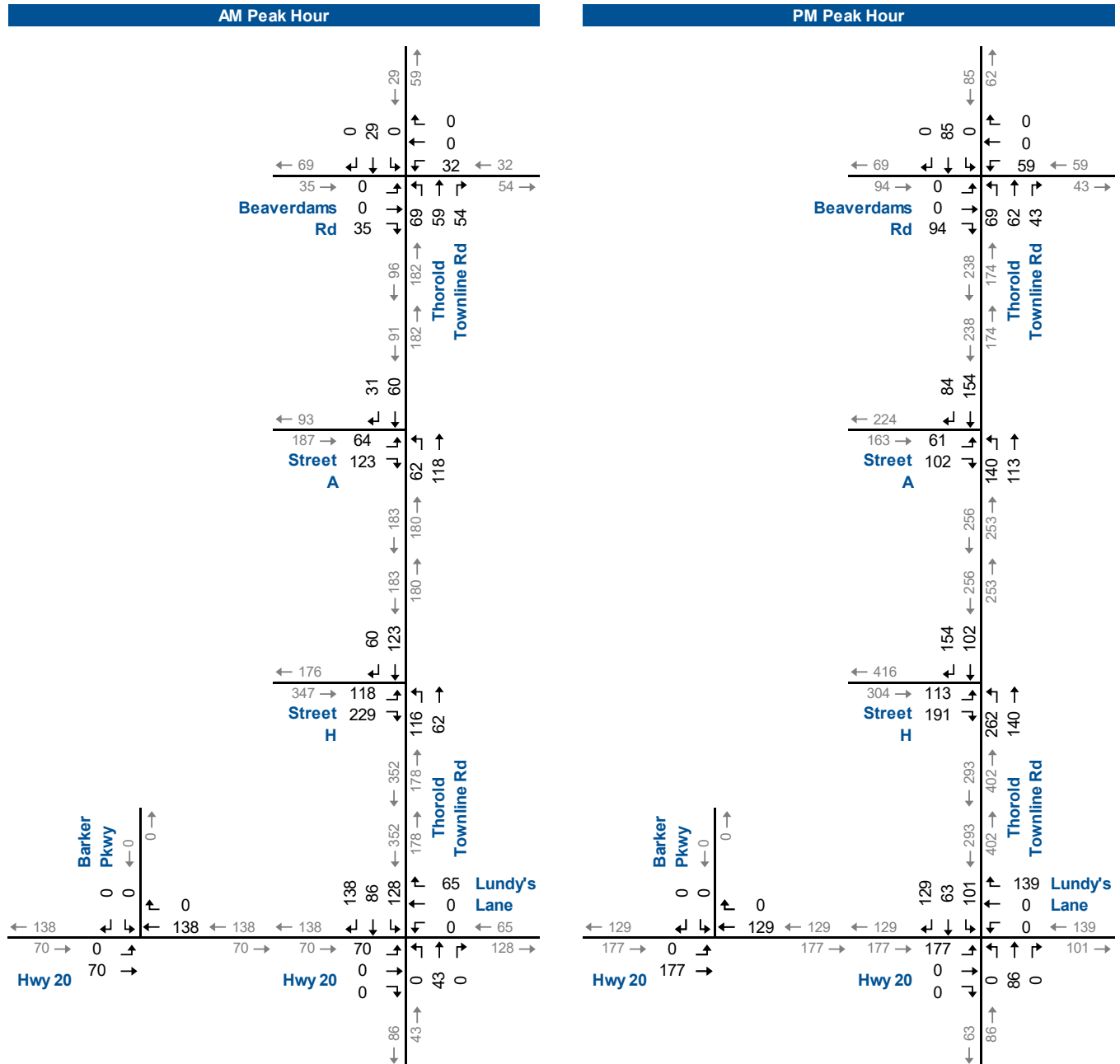
Figure 3.2 illustrates the Phase 1 site generated traffic volumes for the weekday AM and PM peak hours.

Figure 3.3 illustrates the full build-out site generated traffic volumes for the weekday AM and PM peak hours.

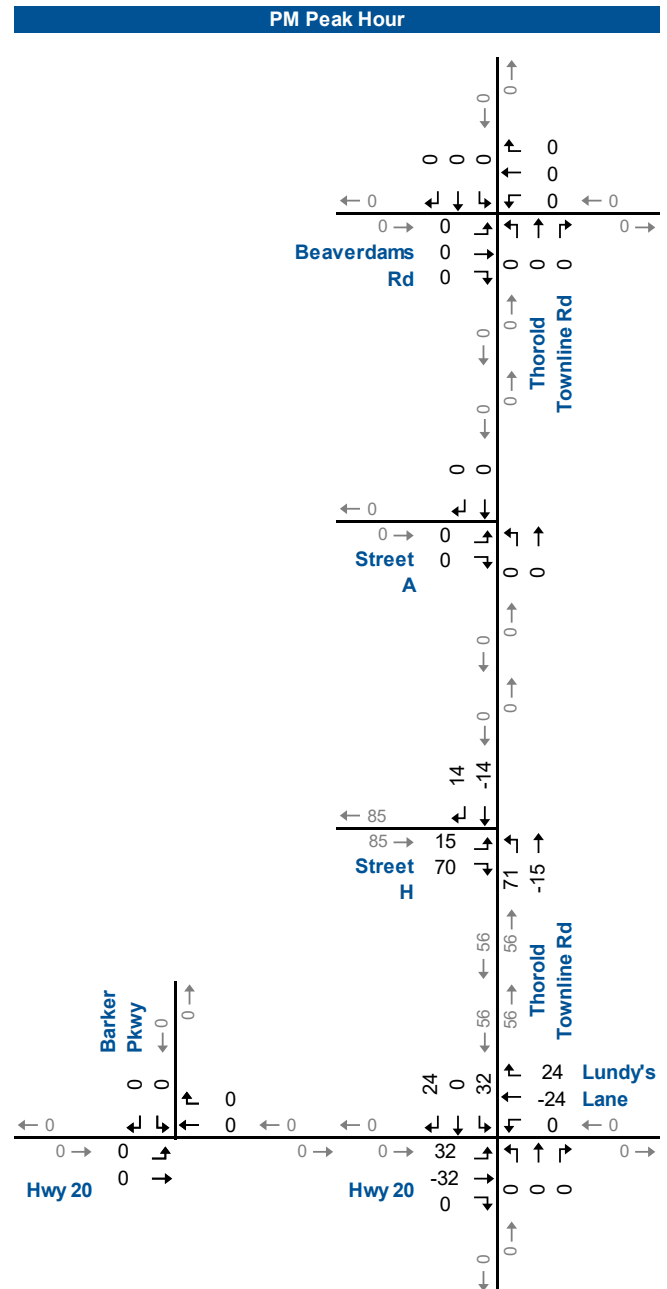
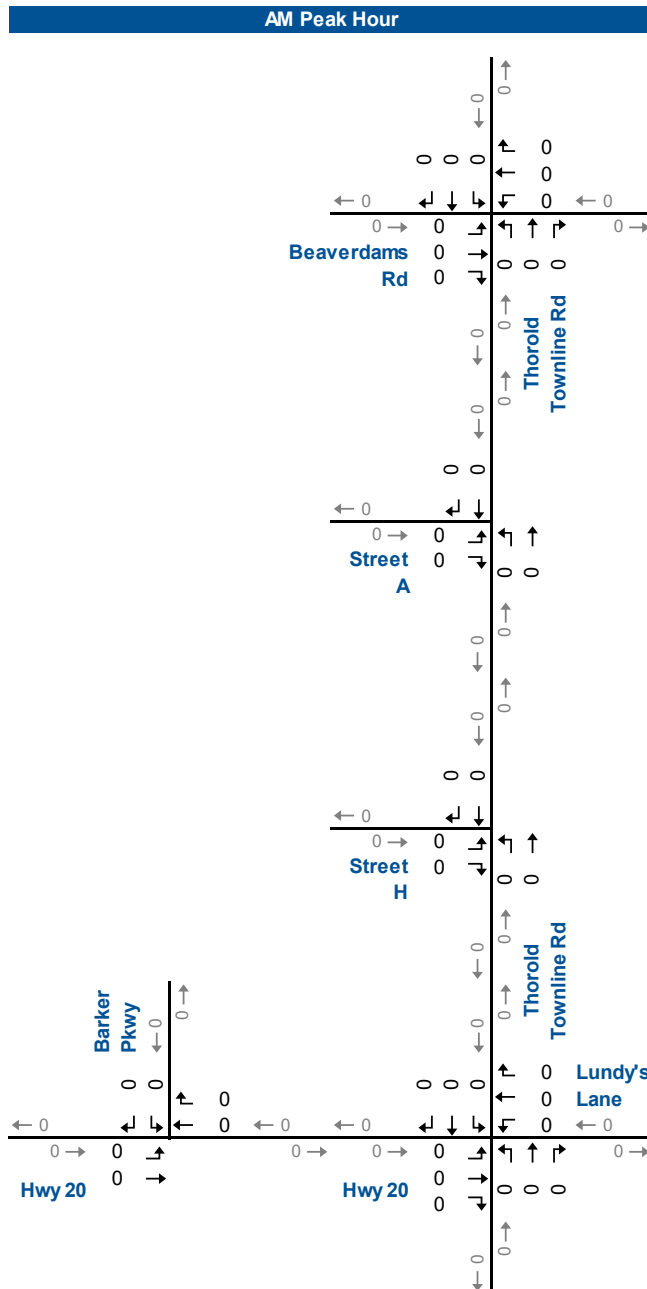
Figure 3.4 illustrates the pass-by trip assignment.







Full Build-Out Site Generated Traffic Volumes



4 Future Traffic Conditions

The assessment of future traffic conditions includes the following components necessary to assess the traffic implications on the adjacent road network:

- ▶ Future background traffic estimates;
- ▶ Level of service analysis for background traffic (pre-development);
- ▶ Future total traffic estimates; and
- ▶ Level of service analysis for total traffic (post-development).

The horizon years assessed include:

- ▶ Year 2028 representing Phase 1 development;
- ▶ Year 2033 representing a period of five years from Phase 1;
- ▶ Year 2035 representing the full build-out of the development;
- ▶ Year 2038 representing a period of ten years from Phase 1;
- ▶ Year 2040 representing a period of five years from full build-out; and
- ▶ Year 2045 representing a period of ten years from full build-out.

4.1 Forecast Traffic Volumes

The future traffic volumes are estimated to consist of:

- ▶ Increased non-site traffic (generalized background traffic growth) estimated to be 2% per annum¹²
- ▶ Traffic generated by the future development of:
 - Rolling Meadows¹³ – a multi-phase residential development covering an area of approximately 160 hectares north of Highway 20 and east of Davis Road consisting of primarily residential units including single-family, townhomes, medium density, and high-density units; and
 - Upper's Quarry¹⁴ – a 96.8-hectare quarry located on the west side of Thorold Townline Road near Beechwood Road. The quarry is anticipated to have an annual extraction limit of

¹² Growth rate confirmed by Regional Staff in initial pre-study consultation.

¹³ AECOM, *Rolling Meadows Development Traffic Impact Study*, (AECOM: Upper Canada Planning & Engineering Ltd, February 2019).

¹⁴ T.Y. Lin International Canada Inc., *TIS Addendum Upper's Quarry*, (TY Lin: Walkers Aggregates Inc, March 2023).



1.8 million tonnes of aggregate and a maximum annual production of 400,000 tonnes of asphalt.

The preferred Haul Route for the quarry is Haul Route Option 1 which will direct trucks northbound on Thorold Townline Road through a non-residential area. The October 2021 version of the supportive TIS recommended “that Walker Aggregates Inc. and the Town perform a review of the existing load capacity of Thorold Townline Road in order to determine if any upgrades are required, and if so, what cost would be associated with the upgrades.”¹⁵

- Traffic generated by the subject site.

Appendix E contains the adjacent development traffic volume assignment. The traffic volumes from the adjacent developments were obtained from their respective traffic studies.

Figure 4.1 illustrates the forecast background traffic volumes for the Phase 1 year (2028). **Figure 4.2** illustrates the forecast background traffic volumes for the full build-out year horizon (2035). **Figure 4.3** illustrates the forecast background traffic volumes for the five-year horizon from full build-out (2040). **Figure 4.4** illustrates the forecast background traffic volumes for the ten-year horizon from full build-out (2045).

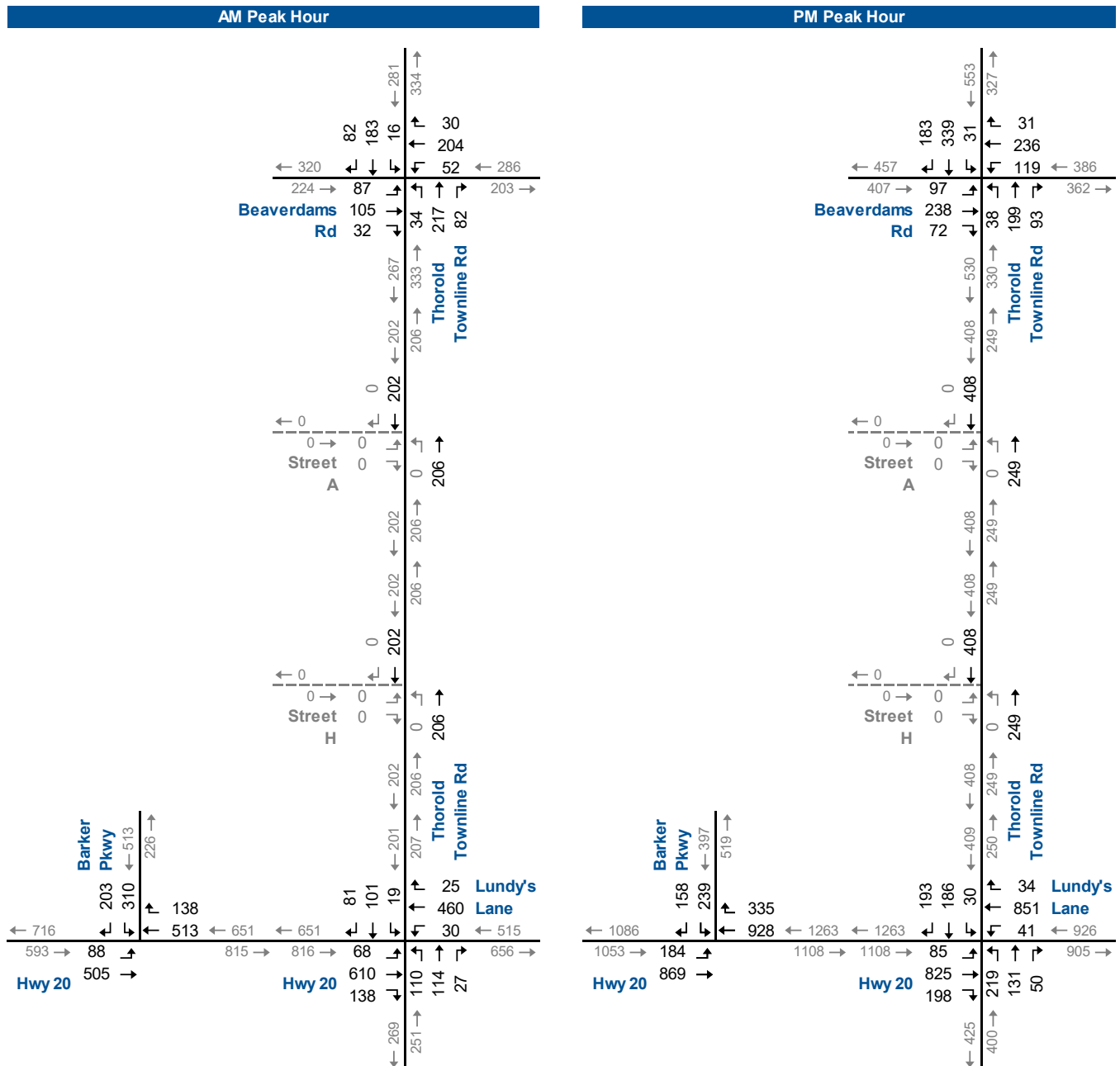
The total traffic volumes are the summation of forecast background traffic volumes and site-generated traffic volumes. **Figure 4.5** illustrates the forecast total traffic volumes for Phase 1 (2028). **Figure 4.6** illustrates the forecast total traffic volumes for the full build-out of the development horizon (2035). **Figure 4.7** illustrates the forecast total traffic volumes for the five-year horizon from full build-out (2040). **Figure 4.8** illustrates the forecast total traffic volumes for the ten-year horizon from full build-out (2045).

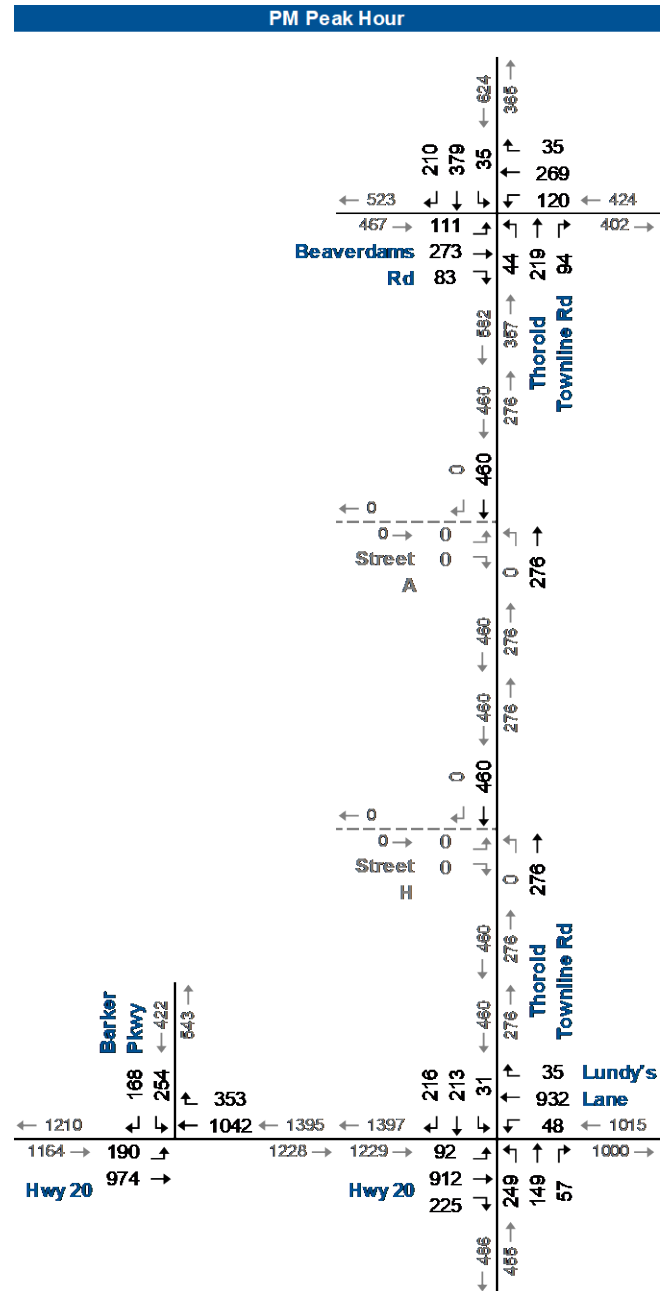
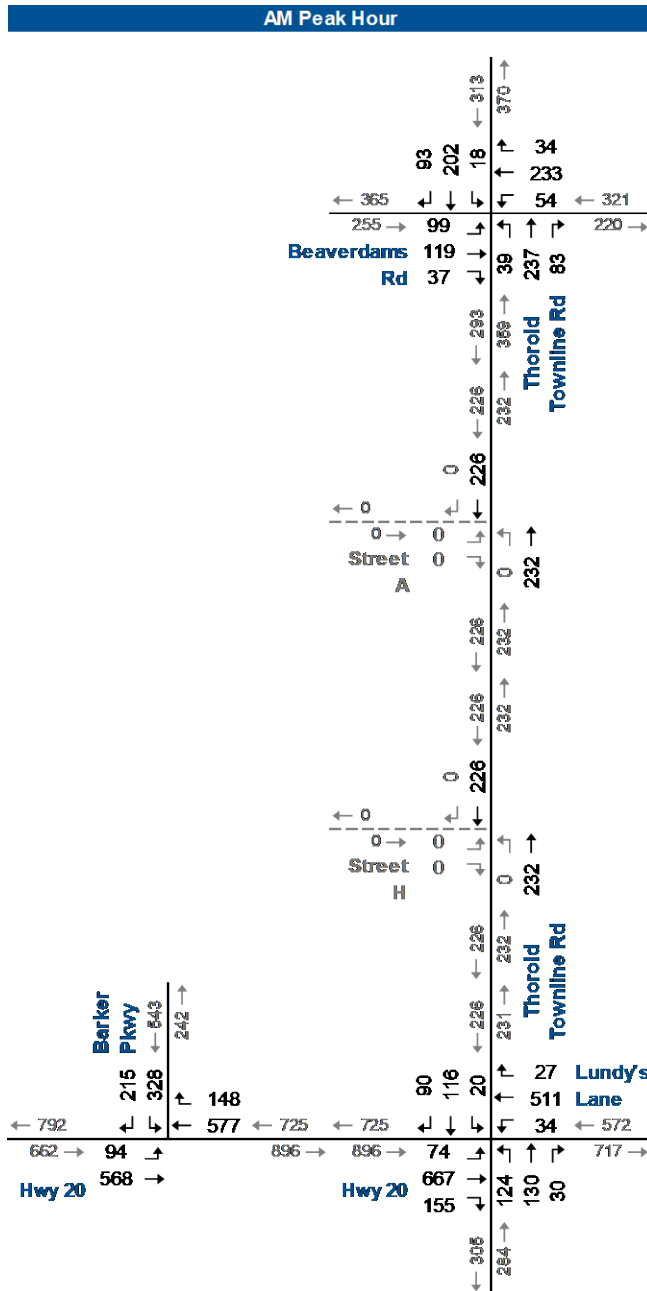
¹⁵ Traffic Impact Study Upper's Quarry, (The Municipal Infrastructure Group, October 2021) Executive Summary.

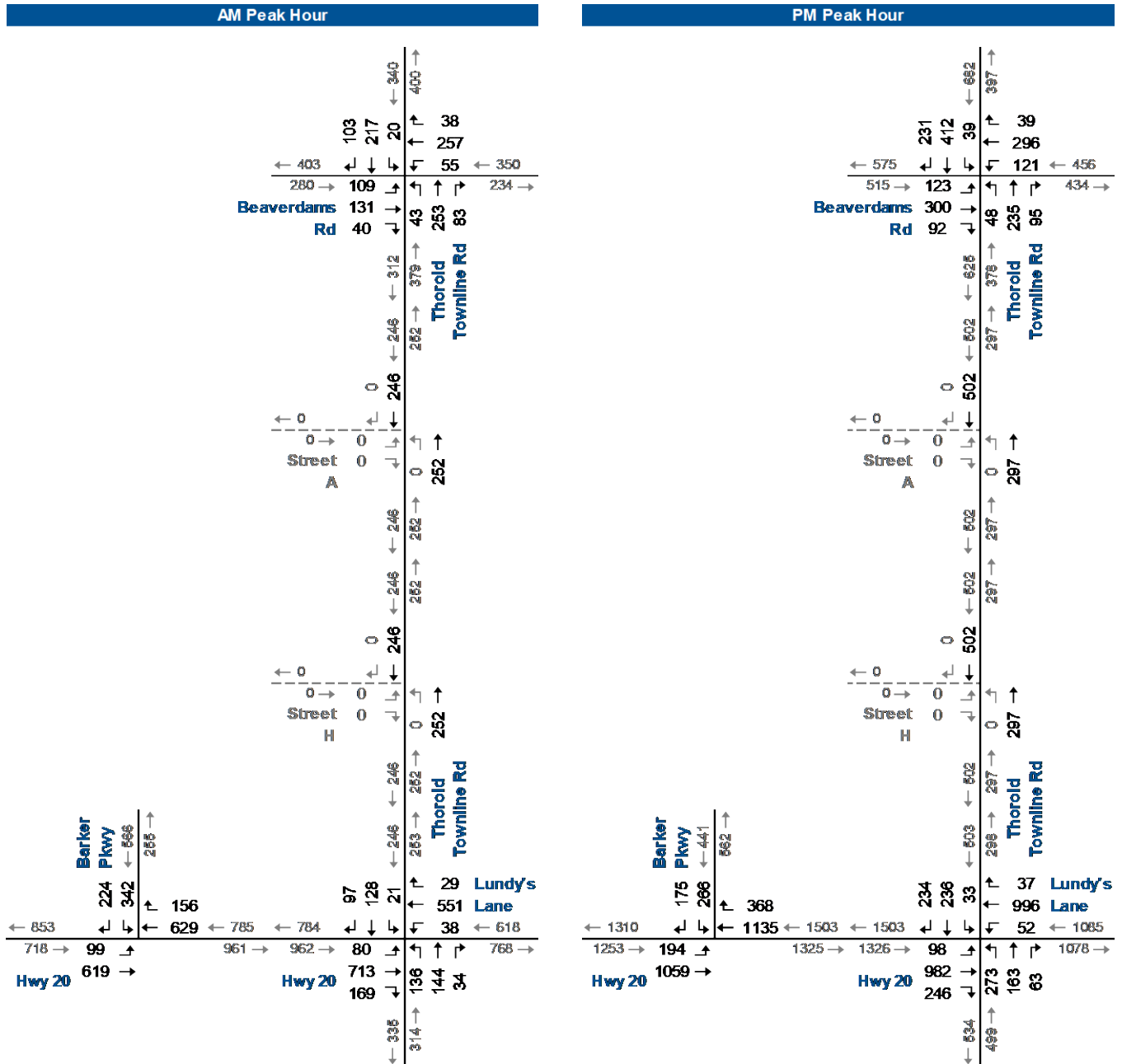


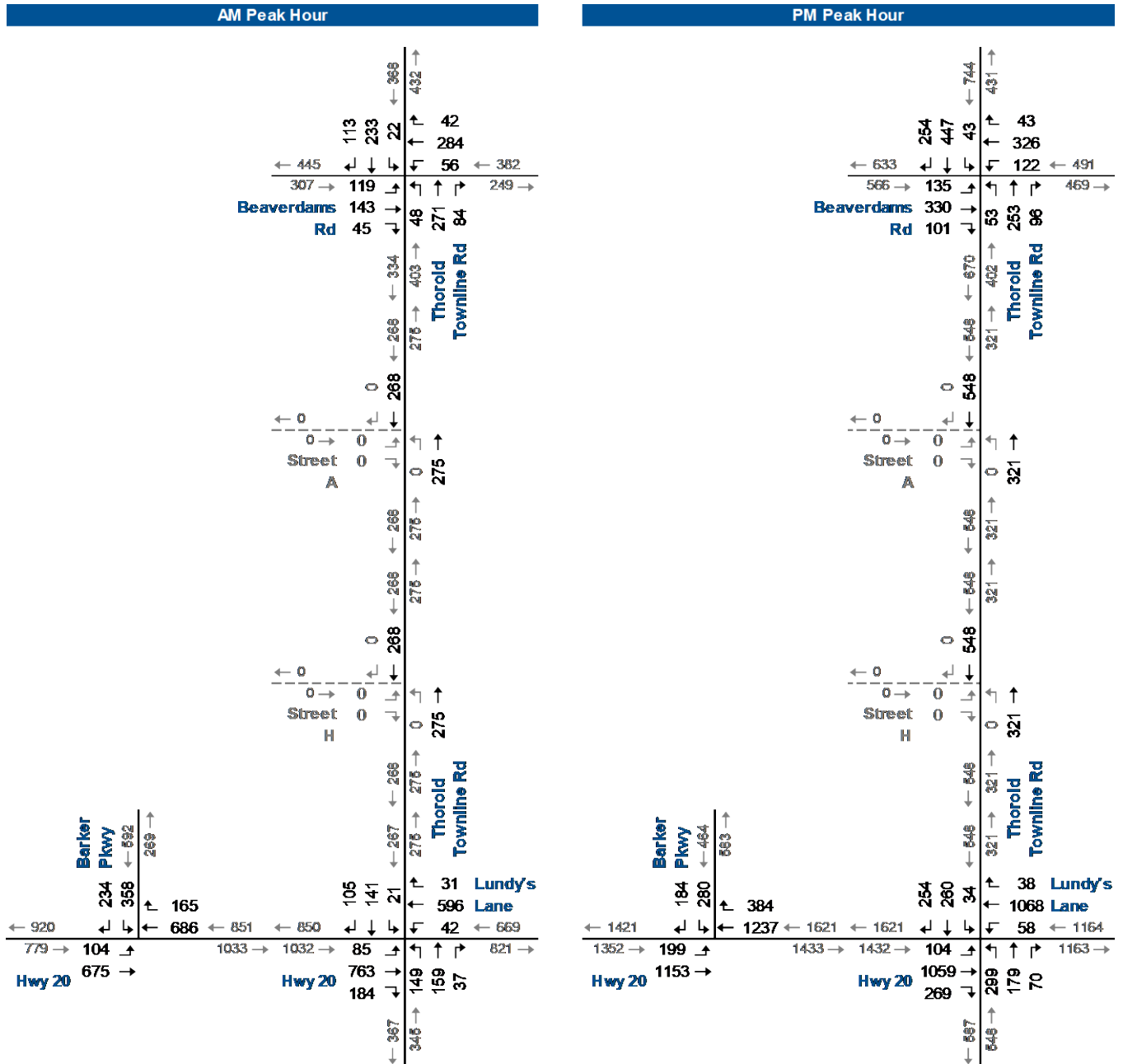


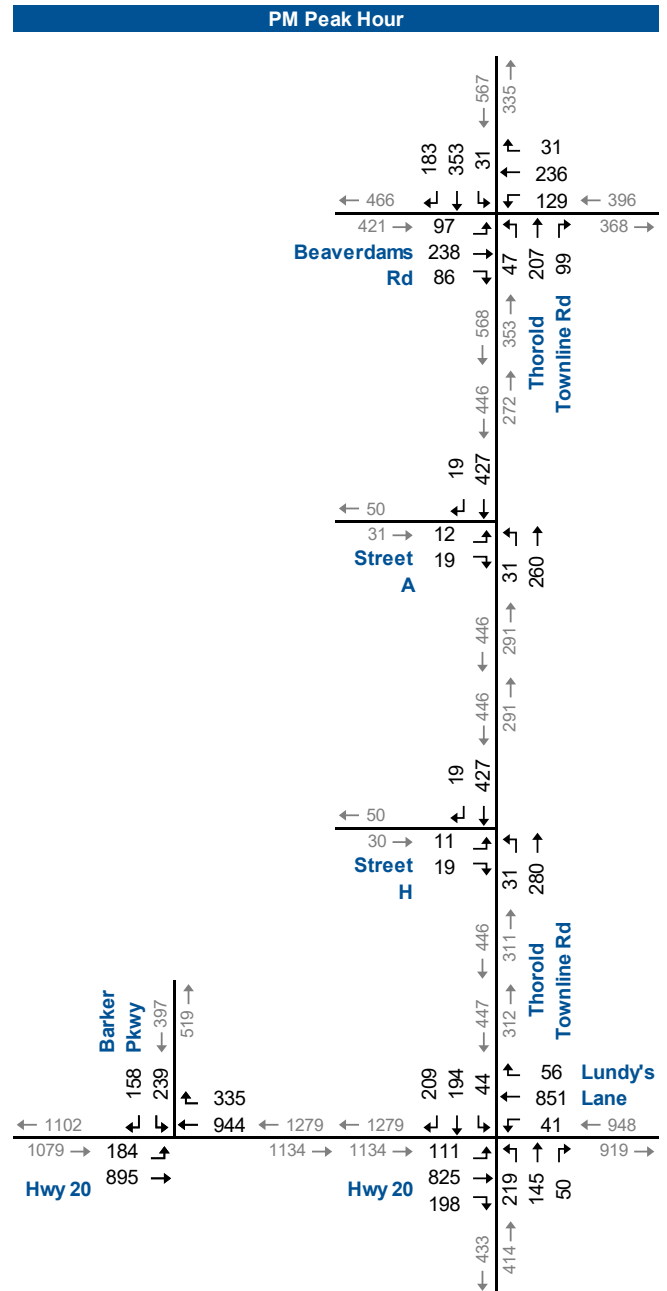
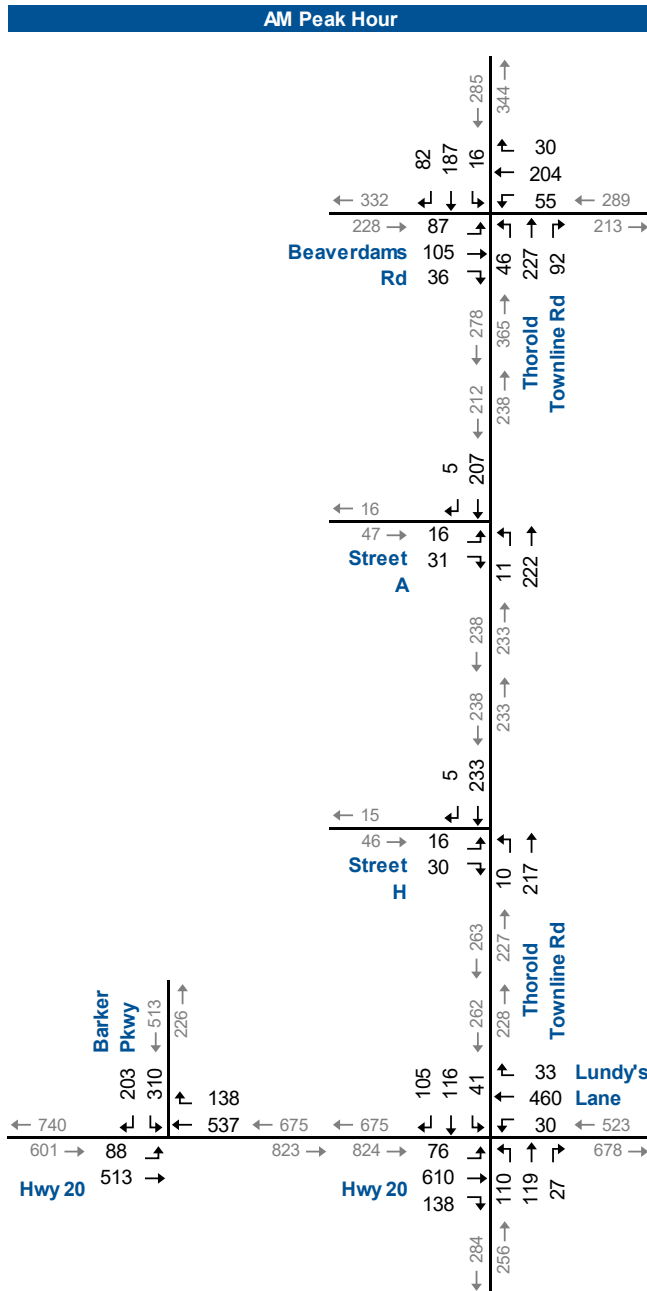
Figure 4.1

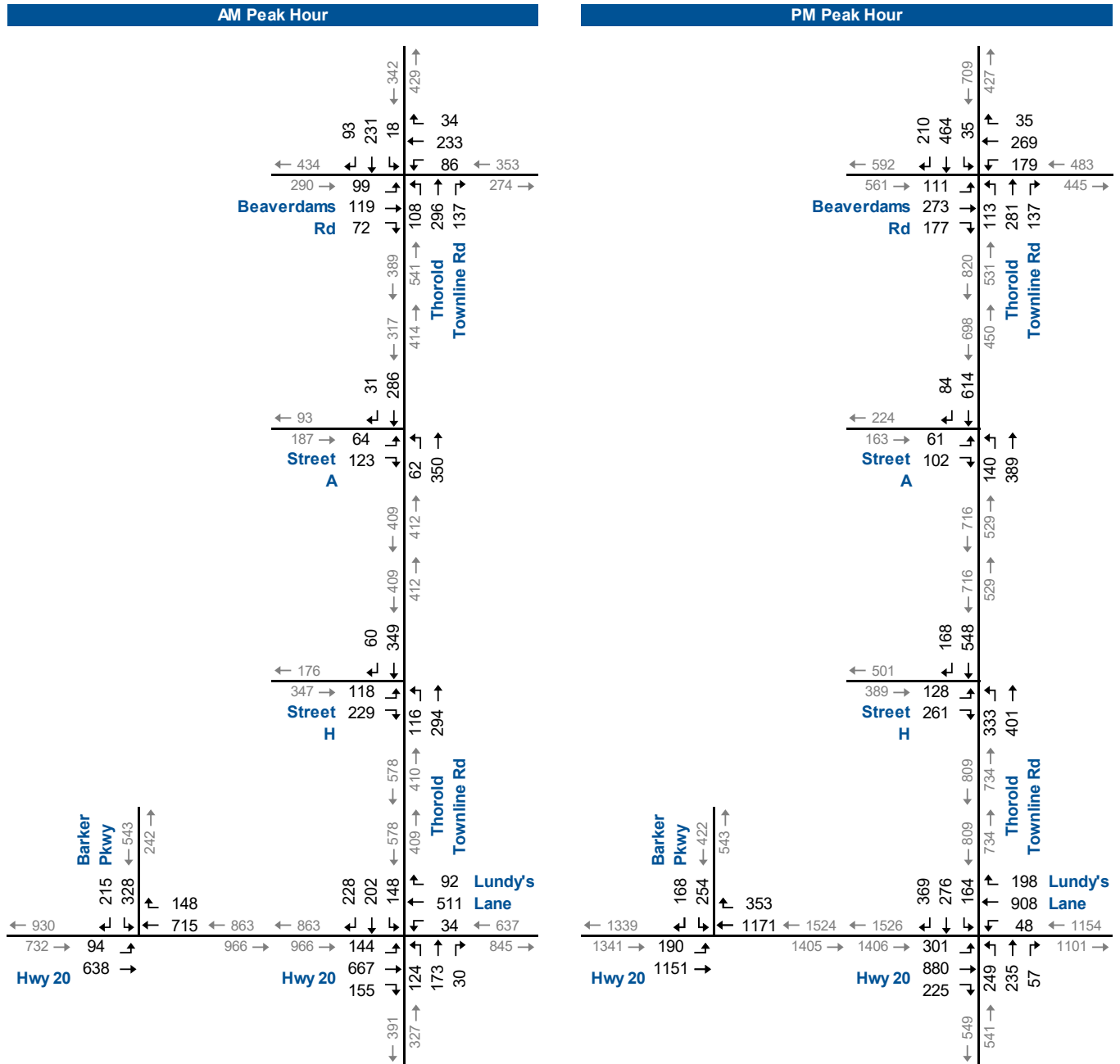








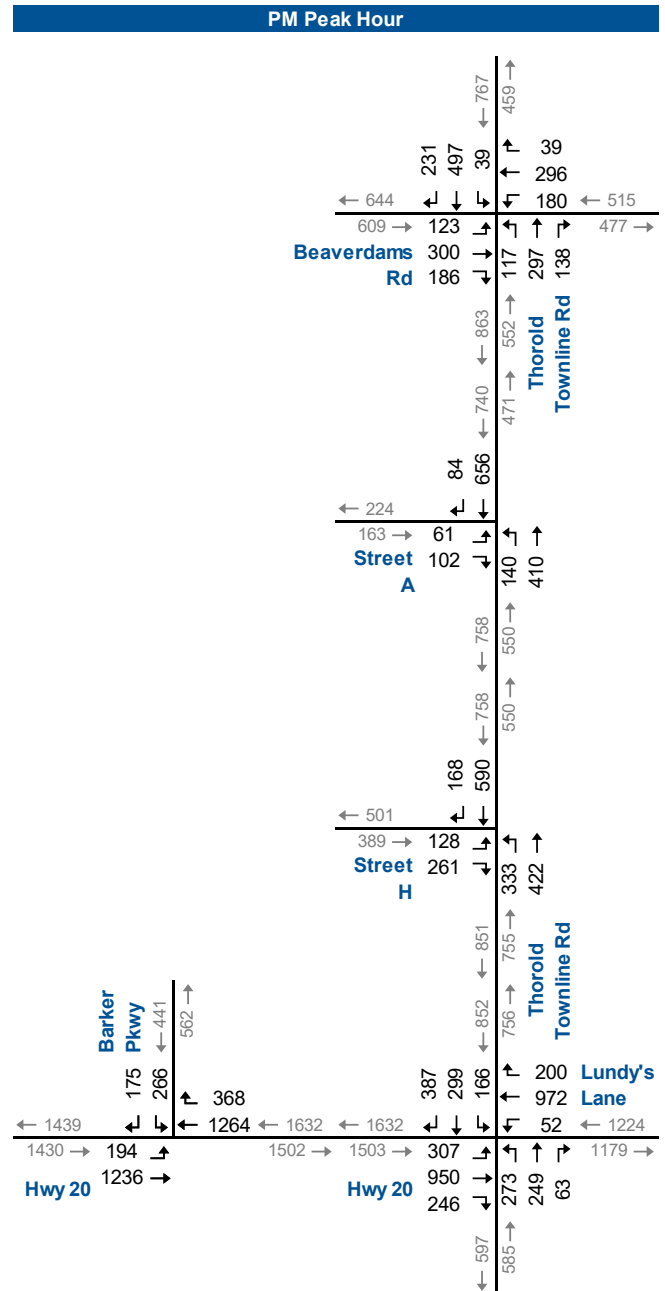
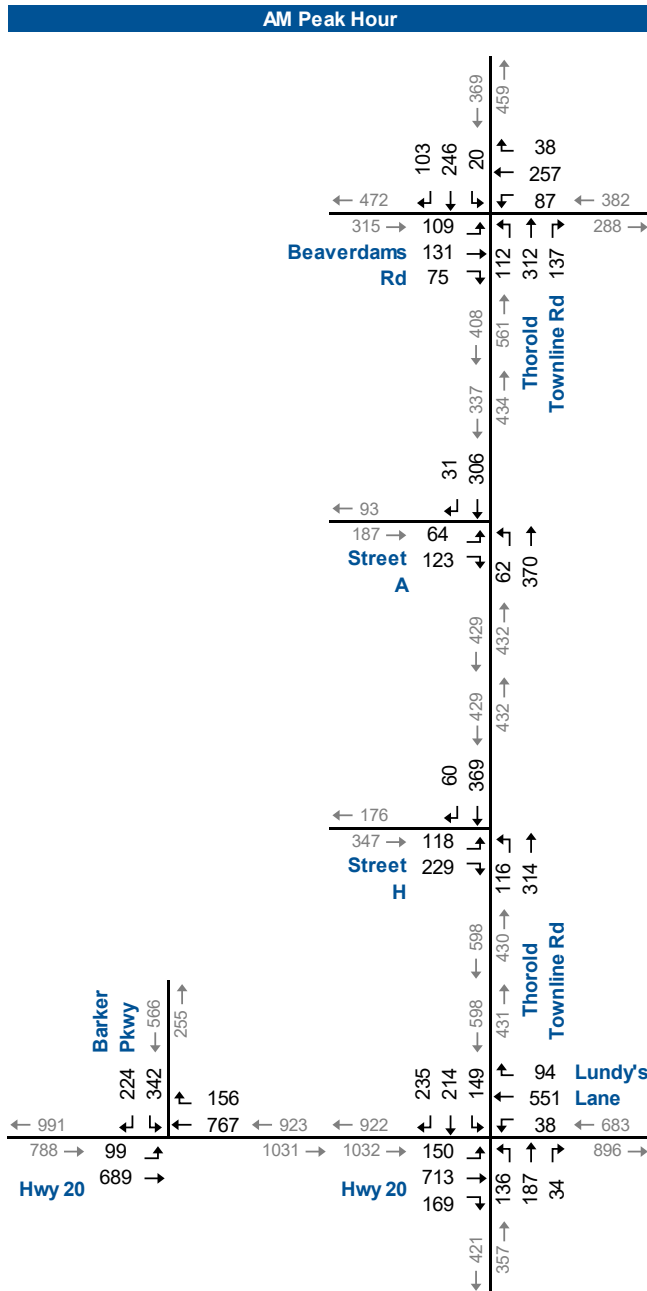


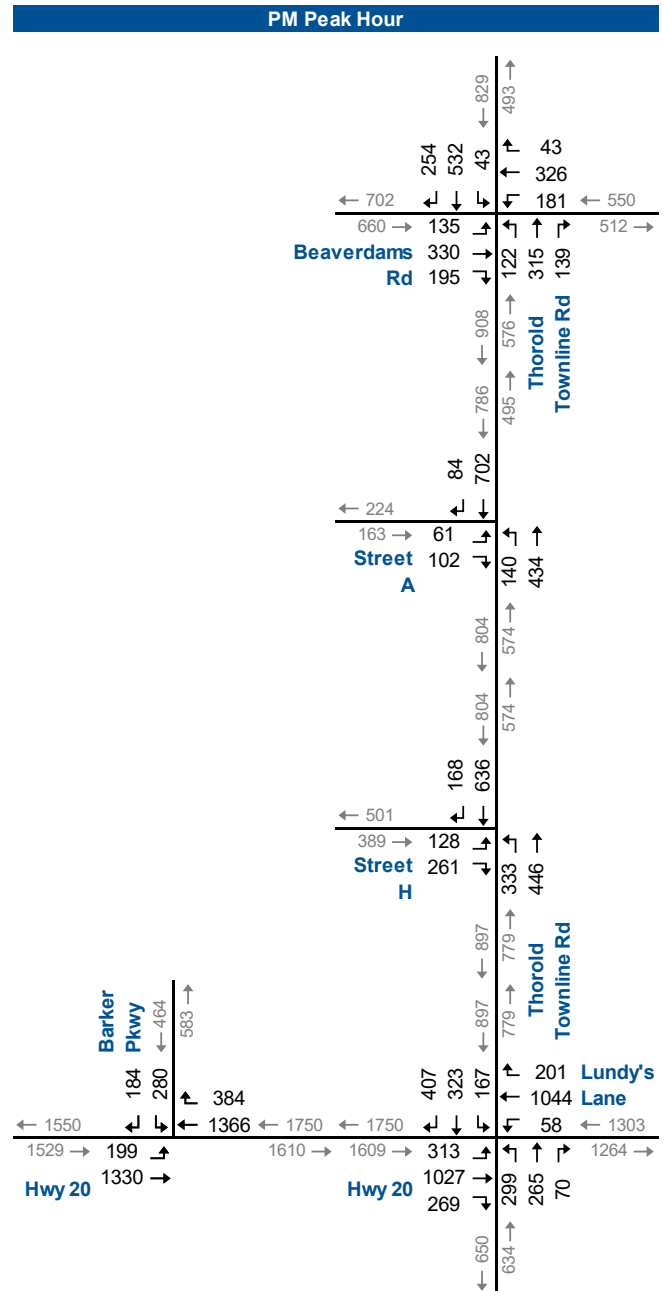
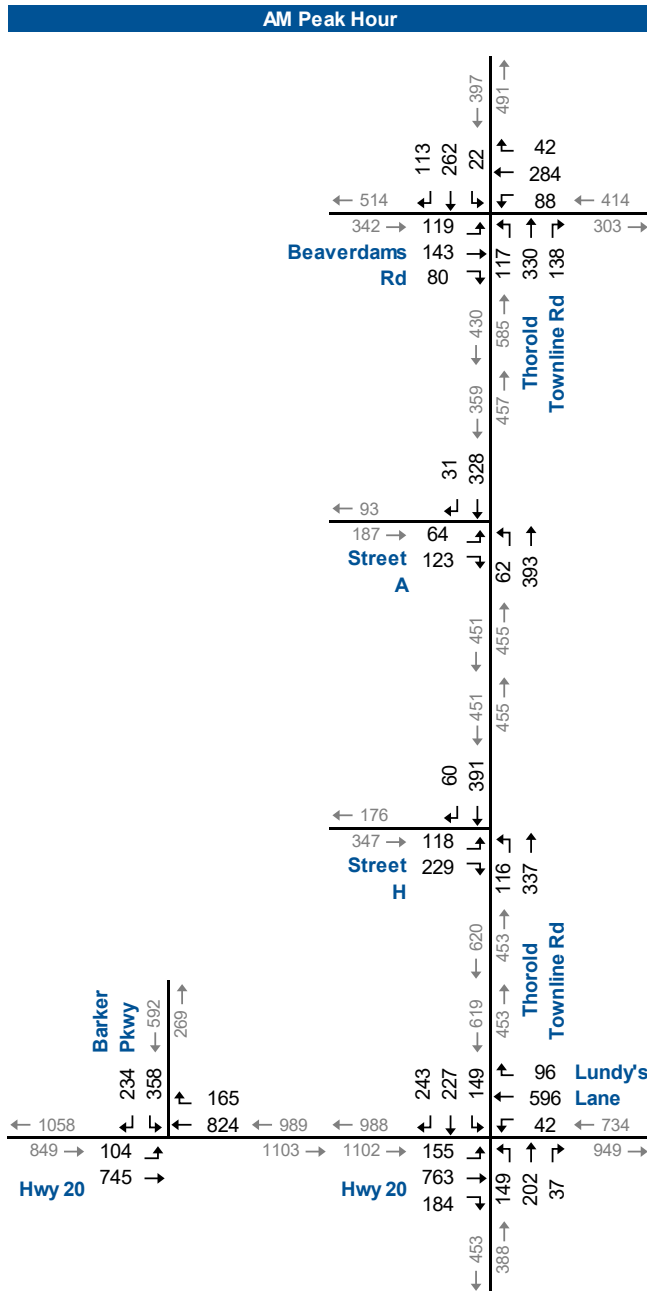


2035 Total Traffic Volumes

13030 Lundy's Lane, Thorold
210565

Figure 4.6





**2045 Total
Traffic Volumes**

4.2 Background Traffic Operations

The operational analysis of background traffic conditions (without development) followed the same methodology and parameters used for existing traffic conditions.

4.2.1 Phase 1 – Year 2028

Table 4.1 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road
 - Eastbound left-turn with LOS and v/c ratio greater than the critical threshold during the PM peak hour;
 - Eastbound through with LOS F and v/c ratio greater than the critical threshold during the PM peak hour;
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours;
 - Westbound left-turn with queue length greater than available storage during PM peak hour;
 - Westbound through/right-turn with LOS F and v/c ratio greater than the critical threshold during the PM peak hour;
 - Northbound left-turn with a queue length greater than available storage during the AM peak hour and LOS F, v/c ratio greater than the critical threshold, and queue length greater than available storage during PM peak hour; and
 - Southbound left-turn with a queue length greater than available storage during the PM peak hour.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway
 - Eastbound approach with LOS E and v/c ratio greater than the critical threshold during the PM peak hour; and
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS F and v/c ratios greater than critical threshold during the PM peak hour.

Appendix F1 contains the detailed Synchro/ARCADY reports.



TABLE 4.1: 2028 BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	A 7 0.26 31 90 59	B 13 0.74 81 - -	A 7 0.20 41 20 -21	B 11	A 6 0.14 14 55 41	B 13 0.71 65 - -	> > > > > >	B 12	B 19 0.49 34 20 -14	B 17 0.39 35 - -	> > > > > >	B 18	B 15 0.08 14 20 6	B 18 0.46 49 - -	> > > > > >	B 18	B 13
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	C 17 0.49 28 - -	> > > > >	C 17	< < < < <	C 20 0.60 32 - -	> > > > >	C 20	< < < < <	C 23 0.68 53 - -	> > > > >	C 23	< < < < <	C 19 0.59 36 - -	> > > > >	C 19	C 20
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				A 8 0.56 3					B 12 0.69 13								A 8 0.55 3
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 308 1.48 59 90 31	F 80 1.09 155 - -	B 13 0.32 88 20 -68	F 86	D 42 0.68 170 55 -115	F 200 1.38 614 - -	> > > > >	F 193	F 138 1.16 83 20 -63	B 19 0.35 691 - -	> > > > >	F 84	B 17 0.09 24 20 -4	C 29 0.75 79 - -	> > > > >	C 28	F 112
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 127 1.16 96 - -	> > > > >	F 127	< < < < <	F 108 1.10 65 - -	> > > > >	F 108	< < < < <	F 65 0.95 57 - -	> > > > >	F 65	< < < < <	F 286 1.56 673 - -	> > > > >	F 163	F 229
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				E 50 0.96 186					F 1545 1.72 609								A 6 0.43 3

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



4.2.2 Full Build Out - Year 2035

Table 4.3 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road
 - Eastbound through with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Westbound left-turn with LOS E, v/c ratio of 0.79 and queue length greater than available storage during PM peak hour.
 - Westbound through/right-turn with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Northbound left-turn with a queue length greater than available storage during the AM peak hour and LOS F, v/c ratio greater than the critical threshold, and queue length greater than available storage during PM peak hour.
 - Southbound left-turn with a queue length greater than available storage during the AM and PM peak hours.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway
 - Eastbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS F and v/c ratios greater than critical threshold during the PM peak hour.

Appendix F2 contains the detailed Synchro/ARCADY reports.



TABLE 4.2: 2035 BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	A 8 0.32 33 90 57	B 16 0.80 101 - -	A 7 0.23 56 20 -36	B 14	A 7 0.18 15 55 40	B 16 0.77 79 - -	> > > > >	B 15	C 24 0.60 39 20 -19	B 20 0.45 42 - -	> > > > >	C 22	B 17 0.09 19 20 1	C 21 0.53 58 - -	> > > > >	C 21	B 16
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	C 24 0.62 34 - -	> > > > >	C 24	< < < < <	D 31 0.75 46 - -	> > > > >	D 31	< < < < <	E 38 0.83 65 - -	> > > > >	E 38	< < < < <	D 28 0.72 43 - -	> > > > >	D 28	D 31
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				A 9 0.63 6					C 19 0.80 42								A 10 0.60 3
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 360 1.61 106 90 -16	F 125 1.20 219 - -	B 14 0.37 90 20 -70	F 122	E 63 0.79 173 55 -118	F 256 1.50 724 - -	> > > > >	F 247	F 312 1.58 64 20 -44	B 20 0.40 94 - -	> > > > >	F 180	B 17 0.10 26 20 -6	D 39 0.86 68 - -	> > > > >	D 37	F 158
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 201 1.35 50 - -	> > > > >	F 201	< < < < <	F 152 1.22 48 - -	> > > > >	F 152	< < < < <	F 86 1.03 59 - -	> > > > >	F 86	< < < < <	F 384 1.78 108 - -	> > > > >	F 384	F 229
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				F 143 1.07 351					F 2577 1.97 1996								A 7 0.46 612

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



4.2.3 Five Years from Full Build Out - Year 2040

Table 4.3 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Eastbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the PM peak hour.
 - Eastbound through with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Westbound left-turn with LOS F, v/c ratio of 0.86 and queue length greater than available storage during PM peak hour.
 - Westbound through/right-turn with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Northbound left-turn with a queue length greater than available storage during the AM peak hour. LOS F, v/c ratio greater than the critical threshold, and queue length greater than available storage during the PM peak hour.
 - Southbound left-turn with a queue length greater than available storage during the PM peak hours.
 - Southbound through/right-turn with LOS E and v/c ratio greater than the critical threshold during PM peak hour.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Eastbound approach with LOS E and v/c ratio of 0.90 during the AM peak hour. LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS E/F and v/c ratios approaching or greater than critical threshold during the AM and PM peak hours.

Appendix F3 contains the detailed Synchro/ARCADY reports.



TABLE 4.3: 2040 BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	A 9 0.37 51 90 39	B 19 0.84 118 - -	A 8 0.25 72 20 -52	B 16	A 8 0.22 42 55 13	B 19 0.82 118 - -	> > > > > >	B 18	C 33 0.71 45 20 -25	C 22 0.50 44 - -	> > > > > >	C 27	B 19 0.11 17 20 3	C 24 0.59 58 - -	> > > > > >	C 24	B 19
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	E 38 0.78 45 - -	> > > > >	E 38	< < < < <	F 59 0.93 44 - -	> > > > >	F 59	< < < < <	F 82 1.03 76 - -	> > > > >	F 82	< < < < <	F 56 0.92 54 - -	> > > > >	F 56	F 61
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				B 11 0.69 13					E 35 0.90 90								B 11 0.69 13
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 407 1.73 96 90 -6	F 164 1.29 185 - -	B 14 0.41 91 20 -71	F 154	F 84 0.86 165 55 -110	F 302 1.61 580 - -	> > > > >	F 291	F 516 2.03 71 20 -51	C 20 0.44 930 - -	> > > > >	F 292	B 17 0.11 32 20 -12	E 55 0.95 81 - -	> > > > >	D 53	F 203
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 258 1.49 515 - -	> > > > >	F 258	< < < < <	F 189 1.32 418 - -	> > > > >	F 189	< < < < <	F 103 1.09 68 - -	> > > > >	F 103	< < < < <	F 457 1.95 788 - -	> > > > >	F 457	F 280
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				F 289 1.16 509					F 3929 2.13 872								A 7 0.48 3

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



4.2.4 Ten Years from Full Build Out - Year 2045

Table 4.4 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Eastbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the PM peak hour.
 - Eastbound through with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Westbound left-turn with LOS F, v/c ratio of 0.95 and queue length greater than available storage during PM peak hour.
 - Westbound through/right-turn with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Northbound left-turn with a queue length greater than available storage during the AM peak hour. LOS F, v/c ratio greater than the critical threshold, and queue length greater than available storage during the PM peak hour.
 - Southbound left-turn with a queue length greater than available storage during the PM peak hours.
 - Southbound through/right-turn with LOS E and v/c ratio greater than the critical threshold during PM peak hour.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Eastbound approach with LOS F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS E/F and v/c ratios approaching or greater than critical threshold during the AM and PM peak hours.

Appendix F4 contains the detailed Synchro/ARCADY reports.



TABLE 4.4: 2040 BACKGROUND OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	B 11 0.44 77 90 13	C 24 0.89 150 - -	A 8 0.27 75 20 -55	C 20	A 9 0.30 48 55 7	C 25 0.88 173 - -	> > > >	C 24	D 49 0.83 55 20 -35	C 24 0.54 62 - -	> > > >	D 35	B 20 0.11 19 20 1	C 28 0.65 65 - -	> > > >	C 27	C 24
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 55 0.89 51 - -	> > > > >	F 55	< < < < <	F 97 1.07 72 - -	> > > > >	F 97	< < < < <	F 120 1.14 91 - -	> > > > >	F 120	< < < < <	F 87 1.04 93 - -	> > > > >	F 87	F 92
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				B 14 0.76 26				F 92 1.01 233									B 13 0.70 9
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 448 1.82 80 90 10	F 208 1.40 189 - -	B 15 0.45 93 20 -73	F 189	F 115 0.95 172 55 -117	F 352 1.72 580 - -	> > > >	F 340	F 840 2.75 71 20 -51	C 21 0.49 940 - -	> > > >	F 467	B 17 0.12 21 20 -1	F 86 1.07 80 - -	> > > >	F 82	F 262
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 322 1.64 495 - -	> > > > >	F 322	< < < < <	F 230 1.42 535 - -	> > > > >	F 230	< < < < <	F 128 1.16 60 - -	> > > > >	F 128	< < < < <	F 535 2.12 754 - -	> > > > >	F 535	F 338
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q Ex Avail.				F 520 1.26 610				F 4781 2.30 1055									A 7 0.50 3

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



4.3 Total Traffic Operations

The operational analysis of total traffic conditions (with development) followed the same methodology used for existing and background traffic conditions.

4.3.1 Phase 1 - Year 2028

Table 4.5 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Eastbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the PM peak hour;
 - Eastbound through with LOS F and v/c ratio greater than the critical threshold during the PM peak hour;
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours;
 - Westbound left-turn with queue length greater than available storage during PM peak hour;
 - Westbound through/right-turn with LOS F and v/c ratio greater than the critical threshold during the PM peak hour;
 - Northbound left-turn with queue length greater than available storage during AM peak hour. LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the PM peak hour; and
 - Southbound left-turn with a queue length greater than available storage during the AM and PM peak hours.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Eastbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour; and
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS E/F and v/c ratios greater than critical threshold during the AM and PM peak hours.

Appendix G1 contains the detailed Synchro/ARCADY reports.



The minor approaches of Street A and Street H to Thorold Townline Road are forecast to operate at LOS B and v/c ratios of 0.07 during the AM and PM peak hours.



TABLE 4.5: 2028 TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	A 8 0.31 38 90 52	B 14 0.75 88 - -	A 7 0.20 48 20 -28	B 12	A 7 0.14 16 55 39	B 14 0.73 72 - -	> > > > > >	B 13	C 20 0.53 41 20 -21	B 18 0.40 37 - -	> > > > > >	B 19	B 16 0.18 25 20 -5	B 20 0.55 48 - -	> > > > > >	B 19	B 14
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	C 18 0.52 28 - -	> > > > >	C 18	< < < < <	C 22 0.63 28 - -	> > > > >	C 22	< < < < <	D 29 0.77 55 - -	> > > > >	D 29	< < < < <	C 21 0.62 35 - -	> > > > >	C 21	C 23
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				A 8 0.57 3				B 13 0.72 19								A 8 0.56 4	B 10
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	B 11 0.07 15		> > >	B 11					< < <	A 0 0.01 6		A 0		A 0 0.14 0	> > >	A 0	A 1
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	B 11 0.07 14		> > >	B 11					< < <	A 0 0.01 4		A 0		A 0 0.15 0	> > >	A 0	A 1
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 503 1.95 160 90 -70	F 80 1.05 439 - -	B 13 0.32 90 20 -70	F 110	D 42 0.68 170 55 -115	F 217 1.42 652 - -	> > > > >	F 210	F 176 1.25 81 20 -61	B 20 0.38 879 - -	> > > > >	F 103	B 17 0.14 37 20 -17	C 33 0.80 106 - -	> > > > >	C 31	F 129
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 147 1.21 81 - -	> > > > >	F 147	< < < < <	F 124 1.15 83 - -	> > > > >	F 124	< < < < <	F 82 1.02 56 - -	> > > > >	F 82	< < < < <	F 315 1.62 701 - -	> > > > >	F 315	F 183
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				F 63 0.99 232				F 1699 1.77 609								A 6 0.43 3	F 814
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	B 14 0.07 13		> > >	B 14					< < <	A 1 0.03 11		A 1		A 0 0.29 0	> > >	A 0	A 1
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	B 14 0.07 14		> > >	B 14					< < <	A 1 0.03 16		A 1		A 0 0.29 1	> > >	A 0	A 1

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



4.3.2 Full Build Out - Year 2035

Table 4.6 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Eastbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the AM and PM peak hours.
 - Eastbound through with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Westbound left-turn with queue length greater than available storage during AM peak hour. LOS E, v/c ratio of 0.79 and queue length greater than available storage during PM peak hour.
 - Westbound through/right-turn with LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Northbound left-turn with LOS E/F, v/c ratio greater than the critical threshold and queue length greater than available storage during the AM and PM peak hours.
 - Southbound left-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Southbound through/right-turn with LOS D/F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Eastbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour; and
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS E/F and v/c ratios greater than critical threshold during the AM and PM peak hours.
- ▶ Thorold Townline Road and Street A:
 - Eastbound left/right-turn with LOS F and v/c ratio of 0.80 during the PM peak hour.



- ▶ Thorold Townline Road and Street H:
 - Eastbound left/right-turn with LOS F and v/c ratio greater than critical threshold during AM and PM peak hours.

Appendix G2 contains the detailed Synchro/ARCADY reports.



TABLE 4.6: 2035 TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall	
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 91 0.99 226 90 -136	F 30 0.88 1177 - -	B 12 0.25 86 20 -66	D 36	B 13 0.26 61 55 -6	D 51 0.98 195 - -	> > > >	D 49	E 69 0.89 86 20 -66	C 21 0.45 559 - -	> > > >	D 39	C 25 0.59 78 20 -58	D 53 0.94 144 - -	> > > >	D 46	D 42	
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	E 40 0.80 43 - -	> > > > >	E 40	< < < < <	F 61 0.94 59 - -	> > > > >	F 61	< < < < <	F 243 1.46 236 - -	> > > > >	F 243	< < < < <	F 54 0.90 65 - -	> > > > >	F 54	F 120	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				B 11 0.70 13				F 83 1.00 227									B 12 0.65 6	E 41
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	C 17 0.41 24		> > >	C 17					< < <	A 2 0.06 20		A 2		A 0 0.20 0	> > >	A 0	A 4	
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	F 55 0.90 83		> > >	F 55					< < <	A 3 0.11 28		A 3		A 0 0.26 3	> > >	A 0	C 18	
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 1981 5.27 213 90 -123	F 108 1.16 1090 - -	B 14 0.37 61 20 -41	F 493	E 63 0.79 156 55 -101	F 367 1.75 580 - -	> > > >	F 354	F 1460 4.11 72 20 -52	C 23 0.59 841 - -	> > > >	F 685	C 28 0.66 94 20 -74	F 189 1.33 221 - -	> > > >	F 156	F 409	
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 308 1.61 479 - -	> > > > >	F 308	< < < < <	F 222 1.40 550 - -	> > > > >	F 222	< < < < <	F 276 1.53 69 - -	> > > > >	F 276	< < < < <	F 493 2.03 746 - -	> > > > >	F 493	F 340	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				F 457 1.23 610				F 4287 2.20 2800									A 7 0.46 3	F 2175
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	F 64 0.80 28		> > >	F 64					< < <	A 4 0.18 24		A 4		A 0 0.45 2	> > >	A 0	A 9	
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	F Err 4.32 310		> > >	F Err					< < <	A 10 0.43 40		A 10		A 0 0.46 39	> > >	A 0	F 2119	

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



4.3.3 Five Years from Full Build Out - Year 2040

Table 4.7 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Eastbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the AM and PM peak hours.
 - Eastbound through with LOS D and v/c ratio greater than the critical threshold during the AM peak hour. LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Westbound left-turn with queue length greater than available storage during AM peak hour. LOS F, v/c ratio of 0.86 and queue length greater than available storage during PM peak hour.
 - Westbound through/right-turn with LOS E/F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
 - Northbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the AM and PM peak hours.
 - Southbound left-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Southbound through/right-turn with LOS E/F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Eastbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour; and
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS E/F and v/c ratios greater than critical threshold during the AM and PM peak hours.
- ▶ Thorold Townline Road and Street A:



- Eastbound left/right-turn with LOS F and v/c ratio of 0.87 during the PM peak hour.
- ▶ Thorold Townline Road and Street H:
 - Eastbound left/right-turn with LOS F and v/c ratio greater than critical threshold during AM and PM peak hours.

Appendix G3 contains the detailed Synchro/ARCADY reports.



TABLE 4.7: 2040 TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall	
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 192 1.27 231 90 -141	D 43 0.96 1209 - -61	B 13 0.28 81 20 -61	E 60	B 16 0.40 107 55 -52	E 76 1.07 295 - -52	> > > > >	E 73	F 101 1.00 82 20 -62	C 21 0.48 903 - -62	> > > > >	D 51	C 25 0.60 87 20 -67	E 59 0.96 162 - -67	> > > > >	D 50	E 60	
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 58 0.91 60 - -	> > > > >	F 58	< < < < <	F 99 1.08 77 - -	> > > > >	F 99	< < < < <	F 303 1.59 316 - -	> > > > >	F 303	< < < < <	F 90 1.05 90 - -	> > > > >	F 90	F 159	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				B 14 0.76 26					F 189 1.11 339								B 13 0.68 13	F 85
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	C 18 0.43 26		> > >	C 18						< < <	A 2 0.06 16		A 2		A 0 0.22 0	> > >	A 0	A 4
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	F 66 0.95 71		> > >	F 66						< < <	A 3 0.11 24		A 3		A 0 0.27 6	> > >	A 0	C 20
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 2031 5.39 213 90 -123	F 146 1.25 1044 - -47	B 14 0.41 67 20 -47	F 510	F 84 0.86 163 55 -108	F 413 1.86 580 - -108	> > > > >	F 399	F 1636 4.50 72 20 -52	C 24 0.63 840 - -52	> > > > >	F 777	C 31 0.71 94 20 -74	F 236 1.44 209 - -74	> > > > >	F 196	F 451	
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 368 1.74 449 - -	> > > > >	F 368	< < < < <	F 261 1.49 654 - -	> > > > >	F 261	< < < < <	F 303 1.59 71 - -	> > > > >	F 303	< < < < <	F 566 2.19 722 - -	> > > > >	F 566	F 393	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				F 683 1.33 610					F 5050 2.35 1093								A 7 0.48 3	F 2632
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	F 82 0.87 29		> > >	F 82						< < <	A 5 0.18 19		A 5		A 0 0.47 3	> > >	A 0	B 11
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	F Err 5.05 283		> > >	F Err						< < <	B 10 0.44 31		B 10		A 0 0.48 55	> > >	A 0	F 2049

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



4.3.4 Ten Year from Full Build Out - Year 2045

Table 4.8 summarizes the level of service conditions for the weekday AM and PM peak hours. No changes to the existing signal timings have been assumed. The following critical movements are noted:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Eastbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the AM and PM peak hours.
 - Eastbound through with LOS E and v/c ratio greater than the critical threshold during the AM peak hour. LOS F and v/c ratio greater than the critical threshold during the PM peak hour.
 - Eastbound right-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Westbound left-turn with queue length greater than available storage during AM peak hour. LOS F, v/c ratio of 0.95 and queue length greater than available storage during PM peak hour.
 - Westbound through/right-turn with LOS E/F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
 - Northbound left-turn with LOS F, v/c ratio greater than the critical threshold and queue length greater than available storage during the AM and PM peak hours.
 - Southbound left-turn with a queue length greater than available storage during the AM and PM peak hours.
 - Southbound through/right-turn with LOS F and v/c ratio greater than the critical threshold during the AM and PM peak hours.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Eastbound approach with LOS F and v/c ratio greater than the critical threshold during the PM peak hour; and
 - Westbound approach with LOS F and v/c ratio greater than the critical threshold during the AM and PM peak hour.
- ▶ Thorold Townline Road and Beaverdams Road:
 - All approaches with LOS F and v/c ratios greater than critical threshold during the AM and PM peak hours.
- ▶ Thorold Townline Road and Street A:



- Eastbound left/right-turn with LOS F and v/c ratio of 0.97 during the PM peak hour.
- ▶ Thorold Townline Road and Street H:
 - Eastbound left/right-turn with LOS F and v/c ratio greater than critical threshold during AM and PM peak hours.

Appendix G4 contains the detailed Synchro/ARCADY reports.



TABLE 4.8: 2045 TOTAL OPERATIONS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 353 1.65 220 90 -130	F 60 1.03 1227 - -61	B 13 0.31 81 20 -61	F 94	C 32 0.63 152 55 -97	F > 103 1.14 > >	F 99	F 168 1.20 77 20 -57	C 22 0.52 > >	E 78	C 27 0.63 90 20 -70	E 72 1.01 > >	> > > >	E 61	F 86		
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 75 0.99 89 - -	> > > > >	F 75	< < < < <	F 140 1.19 144 - -	> > > > >	F 140	< < < < <	F 349 1.70 516 - -	> > > > >	< < < < <	F 124 1.15 130 - -	> > > > >	F 124	F 194	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				C 20 0.83 48				F 385 1.23 502								B 14 0.70 16	F 167
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	C 19 0.45 25		> > >	C 19					< < <	A 2 0.06 17		A 2		A 0 0.23 1	> > >	A 0	A 4
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	F 80 1.00 160		> > >	F 80					< < <	A 3 0.12 30		A 3		A 0 0.29 44	> > >	A 0	C 24
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 2075 5.48 212 90 -122	F 189 1.35 1138 - -40	B 15 0.45 60 20 -40	F 527	F 115 0.95 171 55 -116	F > 464 1.97 579 - >	> > >	F 448	F 1827 4.92 72 20 -52	C 26 0.68 788 - >	> > >	F 875	D 37 0.76 94 20 -74	F 284 1.55 218 - >	> > >	F 237	F 495
	Thorold Townline Road & Beaverdams Road	AWSC	LOS Delay V/C Q Ex Avail.	< < < < <	F 433 1.89 456 - -	> > > > >	F 433	< < < < <	F 303 1.59 641 - -	> > >	F 303	< < <	F 333 1.66 73 - -	> > >	< < <	F 645 2.37 722 - -	> > >	F 645	F 451	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				F 981 1.43 610				F 5850 2.52 1270								A 7 0.50 6	F 3137
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q	F 110 0.97 25		> > >	F 110					< < <	A 5 0.19 20		A 5		A 0 0.50 1	> > >	A 0	B 14
	Thorold Townline Road & Street H	TWSC	LOS Delay V/C Q	F Err 6.02 313		> > >	F Err					< < <	B 11 0.46 34		B 11		A 0 0.51 48	> > >	A 0	F 1977

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



5 Remedial Measures

5.1 Lundy's Lane and Thorold Townline Road

Intersection capacity deficiencies at the Lundy's Lane (Highway 20) and Thorold Townline Road intersection are forecast to occur with the anticipated background traffic growth. That is, without the development of the subject site.

The intersection is forecast to operate with 95th percentile queue reach greater than available storage during the AM peak hour and delay and capacity constraints under future background traffic conditions during the PM peak hour. The addition of site generated traffic will add to the delay and capacity constraints at the intersection.

Optimizing the signal timings splits within the existing cycle lengths is not expected to fully mitigate the delay and capacity issues, specifically for the individual movements with high traffic volumes.

The addition of a second through lane for the eastbound and westbound directions will allow more east/west traffic through the intersection allowing more green time to the northbound and southbound approaches.

A southbound right-turn lane and westbound right-turn lane with a minimum of 50 metres of storage are also required to remove slower turning vehicles allowing more through vehicles on the green phase.

As noted in **Section 5.6**, the addition of the second eastbound and westbound through lanes and the southbound right-turn lane are required under the 2028 background horizon. It is recommended the Ministry of Transportation (MTO) / Region monitor traffic volumes for this intersection to determine when widening is required as a result of future background traffic volumes.

5.2 Lundy's Lane and Barker Parkway

Intersection capacity deficiencies at the Lundy's Lane (Highway 20) and Thorold Townline Road intersection are forecast to occur with the anticipated background traffic growth. That is, without the development of the subject site.

Future background traffic is expected to cause significant delays and capacity constraints for the intersection's eastbound and westbound approaches during the PM peak hour.



The widening of the roundabout to a two-lane roundabout would allow the addition of a second approach lane for the eastbound and westbound directions increasing the capacity of the roundabout.

As noted in **Section 5.6**, the widening of the roundabout and eastbound and westbound approaches are required under the 2028 background horizon. It is recommended the Ministry of Transportation (MTO) / Region monitor traffic volumes for this intersection to determine when widening is required as a result of future background traffic volumes.

5.3 Thorold Townline Road and Beaverdams Road

Intersection capacity deficiencies at the Thorold Townline Road and Beaverdams Road intersection are forecast to occur with the anticipated background traffic growth. That is, without the development of the subject site.

The intersection was assessed using the *Ontario Traffic Manual*¹⁶ (Book 12 – Traffic Signals) Justification 7 signal warrant procedures. It indicates that traffic control signals are 120% warranted under 2028 future background conditions. **Appendix H** contains the warrant analysis.

Even with traffic control signals, the intersection is forecast to operate with delay and capacity constraints based on its current lane configuration. Exclusive left-turn lanes for all approaches would improve the operations at the intersections. Although exclusive left-turn lanes are not required for some approaches, the need for lane balancing would be required for safety purposes.

As noted in the Uppers Quarry TIS, there is the potential for environmental constraints on the south side of Beaverdams Road that may limit the ability to expand the intersections lane geometry.

To accommodate the forecast growth in non-site related traffic, it is recommended that the Region install a warranted traffic control signal by the 2028 background horizon. In addition, auxiliary turn lanes on all approaches should be considered, provided the expanded lane geometry can be accommodated without impacting the environmental features on the south side of Beaverdams Road.

¹⁶ Ontario Ministry of Transportation, Ontario Traffic Manual Book 12: Traffic Signals, (Toronto: Queen's Printer for Ontario, 2012).



It is recommended that the Region monitor the future traffic volumes at this intersection and update the traffic control measures and lane geometry accordingly.

5.4 Thorold Townline Road and Street A

The proposed intersection of Thorold Townline Road and Street A is forecast to operate with acceptable levels of service during the AM and PM peak hours for Phase 1 of the development. With full build-out of the development, the proposed intersection of Thorold Townline Road and Street A is forecast to operate with acceptable levels of service during the AM peak hour and increased delay during the PM peak hour under future traffic conditions.

The intersection was assessed using the *Ontario Traffic Manual*¹⁷ (Book 12 – Traffic Signals) Justification 7 signal warrant procedures. With full build-out of the development, it indicates that traffic control signals are not warranted under 2045 future total conditions.

Appendix H contains the warrant analysis.

The need for auxiliary turn lanes at this intersection was assessed.

5.4.1 Left-Turn Lane

The need for dedicated left-turn lane at Street A with Thorold Townline Road was assessed using Ministry of Transportation (MTO) procedures outlined in the *Design Supplement for the TAC Guide*¹⁸.

The percentages of left-turning vehicles in the approaching volume were rounded to the nearest 5%, as nomographs are only provided for 5% increments. This apparent requirement is due to the nature of the warrant procedure that assumes a minimum of 5% of left turning vehicles in the advancing volume.

A design speed 100 km/h (20 km/h over the posted speed limit) was used as the study area roads are currently rural with higher travel speeds.

The warrants have been completed for the AM and PM peak hour for all horizon years using the two-lane highways unsignalized nomographs.

¹⁷ Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals*, (Toronto: Queen's Printer for Ontario, 2012).

¹⁸ Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queen's Printer for Ontario, 2020),



Table 5.1 summarizes the left-turn lane warrant analyses. It indicates that a northbound left-turn lane with 15 metres of storage is warranted starting from the 2028 total horizon year for Phase 1 of the development. For full build-out of the development it indicates that a northbound left-turn lane with 50 metres of storage is warranted starting from the 2035 total horizon year. Fifteen additional metres of storage (65 metres total) is warranted in the 2045 horizon year.

As build-out occurs, the Niagara Region should consider reducing the speed limit along Thorold Townline Road. **Table 5.2** summarizes the left-turn lane warrant analysis using a 70 km/h design speed to reflect a reduced speed limit of 50 km/h. A northbound left-turn lane is not warranted for the 2028 total horizon year for Phase 1 of the development. For full build-out of the development, it indicates that a northbound left-turn lane with 40 metres of storage is warranted starting from the 2035 total horizon year. Fifteen additional metres of storage (55 metres total) is warranted in the 2045 horizon year.

Appendix I contains the left-turn warrant nomographs.

It is recommended that a northbound left-turn lane with 40 metres of storage be constructed on Thorold Townline Road when the Street A connection to Thorold Townline Road is established.



TABLE 5.1: STREET A LEFT-TURN LANE WARRANT SUMMARY (100 KM/H DESIGN SPEED)

Roadway	Thorold Townline Road							
Intersection	Street A							
Approach Direction	Northbound							
Design Speed	100 km/h							
Horizon	Total (2028)		Total (2035)		Total (2040)		Total (2045)	
Peak Hour	AM	PM	AM	PM	AM	PM	AM	PM
Advancing Volume	222	291	412	529	432	550	455	574
Opposing Volumes	207	446	317	698	337	740	359	786
Left Turning Traffic	11	31	62	140	62	140	62	140
% of Left Turning Traffic	5%	11%	15%	26%	14%	25%	14%	24%
Figure Used*	9A-23	9A-23	9A-24	9A-25	9A-24	9A-25	9A-24	9A-25
Warranted	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Storage Length Required	-	15m	25m	50m	25m	55m	25m	65m

* Based on MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads - October 2023

TABLE 5.2: STREET A LEFT-TURN LANE WARRANT SUMMARY (70 KM/H DESIGN SPEED)

Roadway	Thorold Townline Road							
Intersection	Street A							
Approach Direction	Northbound							
Design Speed	70 km/h							
Horizon	Total (2028)		Total (2035)		Total (2040)		Total (2045)	
Peak Hour	AM	PM	AM	PM	AM	PM	AM	PM
Advancing Volume	222	291	412	529	432	550	455	574
Opposing Volumes	207	446	317	698	337	740	359	786
Left Turning Traffic	11	31	62	140	62	140	62	140
% of Left Turning Traffic	5%	11%	15%	26%	14%	25%	14%	24%
Figure Used*	9A-11	9A-11	9A-12	9A-13	9A-12	9A-13	9A-12	9A-13
Warranted	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Storage Length Required	-	-	15m	40m	15m	50m	15m	55m

* Based on MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads - October 2023



5.4.2 Right-Turn Lane

The proposed intersection of Thorold Townline Road and Street A was assessed to determine if the forecast traffic volumes warrant installation of separate right-turn lanes.

Although right-turns are generally made more efficiently than left-turn movements, exclusive right-turn lanes are often provided for many of the same reasons that left-turn lanes are provided such as a reduction in rear-end collisions and less delay for the through traffic.

MTO guidelines (*Geometric Design Standards for Ontario Highways*) note that right-turn lanes or tapers may be considered where right-turn volumes exceed 60 vehicles per hour (vph) and where right-turning vehicles create a hazard or reduce capacity at the intersection.

The highest forecast right-turn movement at the proposed municipal roadway connection is approximately 5 vph during the AM peak hour and 19 vph during the PM peak hour during Phase 1 of the development. After full build-out of the development, the highest forecast right-turn movement at the proposed municipal roadway connection is approximately 31 vph during the AM peak hour and 84 vph during the PM peak hour. Given the forecast volumes a right-turn taper could be considered for the full build-out of the development.

5.5 Thorold Townline Road and Street H

The minor approach at the new intersection of Thorold Townline Road and Street H is forecast to operate with acceptable levels of service during the AM and PM peak hours for Phase 1 of the development. With full build-out of the development, the minor approach at the new intersection of Thorold Townline Road and Street H is forecast to operate with poor levels of service during the AM and PM peak hour under future traffic conditions.

The intersection was assessed using the *Ontario Traffic Manual*¹⁹ (Book 12 – Traffic Signals) Justification 7 signal warrant procedures. It indicates that traffic control signals are not warranted under 2038 future Phase 1 total traffic conditions. With full build-out of the development, it indicates that traffic control signals are 120% satisfied under 2045 future total conditions, however, as this is a new intersection with forecast traffic, it must satisfy the 150% warrant for traffic control signals to be justified, which it does not. An unwarranted

¹⁹ Ontario Ministry of Transportation, *Ontario Traffic Manual Book 12: Traffic Signals*, (Toronto: Queen's Printer for Ontario, 2012).



traffic control signal is recommended to accommodate site generated traffic under full build-out.

Appendix H contains the warrant analysis.

The need for auxiliary turn lanes at this intersection was assessed.

5.5.1 Left-Turn Lane

The need for dedicated left-turn lane at Street H with Thorold Townline Road was assessed using Ministry of Transportation (MTO) procedures outlined in the *Design Supplement for the TAC Guide*²⁰.

A design speed of 100 km/h (20 km/h over the posted speed limit) was used. **Table 5.3** summarizes the left-turn lane warrant analyses. It indicates that a northbound left-turn lane with 15 metres of storage is warranted starting from the 2028 future Phase 1 total horizon year. With full build-out of the development, the northbound left-turn lane is warranted for a minimum of 80 metres of storage starting from the 2035 total horizon year.

As build-out occurs, the Niagara Region should consider reducing the speed limit along Thorold Townline Road. **Table 5.4** summarizes the left-turn lane warrant analysis using a 70 km/h design speed to reflect a reduced speed limit of 50 km/h. With full build-out of the development, the northbound left-turn lane with a minimum of 80 metres of storage is warranted starting from the 2035 total horizon year.

Appendix I contains the left-turn warrant nomographs.

It is recommended that a northbound left-turn lane with 80 metres of storage be constructed on Thorold Townline Road when the Street H connection to Thorold Townline Road is established.

²⁰ Ontario Ministry of Transportation, *MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads*, (Toronto: Queen's Printer for Ontario, 2020),



TABLE 5.3: STREET H LEFT-TURN LANE WARRANT SUMMARY (100 KM/H DESIGN SPEED)

Roadway	Thorold Townline Road							
Intersection	Street H							
Approach Direction	Northbound							
Design Speed	100 km/h							
Horizon	Total (2028)		Total (2035)		Total (2040)		Total (2045)	
Peak Hour	AM	PM	AM	PM	AM	PM	AM	PM
Advancing Volume	227	311	410	734	430	755	453	779
Opposing Volumes	238	446	409	716	429	758	451	804
Left Turning Traffic	10	31	116	333	116	333	116	333
% of Left Turning Traffic	4%	10%	28%	45%	27%	44%	26%	43%
Figure Used*	9A-23	9A-23	9A-25	9A-26	9A-25	9A-26	9A-25	9A-26
Warranted	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Storage Length Required	-	15m	30m	80+m	30m	80+m	30m	80+m

* Based on MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads - October 2023

TABLE 5.4: STREET H LEFT-TURN LANE WARRANT SUMMARY (70 KM/H DESIGN SPEED)

Roadway	Thorold Townline Road							
Intersection	Street H							
Approach Direction	Northbound							
Design Speed	100 km/h							
Horizon	Total (2028)		Total (2035)		Total (2040)		Total (2045)	
Peak Hour	AM	PM	AM	PM	AM	PM	AM	PM
Advancing Volume	227	311	410	734	430	755	453	779
Opposing Volumes	238	446	409	716	429	758	451	804
Left Turning Traffic	10	31	116	333	116	333	116	333
% of Left Turning Traffic	4%	10%	28%	45%	27%	44%	26%	43%
Figure Used*	9A-11	9A-11	9A-13	9A-14	9A-13	9A-14	9A-13	9A-14
Warranted	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Storage Length Required	-	-	25m	80+m	25m	80+m	25m	80+m

* Based on MTO Design Supplement for TAC Geometric Design Guide for Canadian Roads - October 2023



5.5.2 Right-Turn Lane

The proposed intersection of Thorold Townline Road and Street H was assessed to determine if the forecast traffic volumes warrant installation of separate right-turn lanes.

The highest forecast right-turn movement at the proposed municipal roadway connection is approximately 5 vph during the AM peak hour and 19 vph during the PM peak hour during Phase 1 of the development. After full build-out of the development, the highest forecast right-turn movement at the proposed municipal roadway connection is approximately 60 vph during the AM peak hour and 168 vph during the PM peak hour. Given the forecast volumes a right-turn taper could be considered for the full build-out of the development.

5.6 Phase 1 Operational Analysis with Improvements

Synchro analysis was conducted for the 2028 horizon year Phase 1 total traffic conditions with no adjustments to traffic volumes and the following improvements:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Second eastbound through lane;
 - Second westbound through lane;
 - Southbound right-turn lane; and
 - Optimized signal timings.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Two-lane roundabout; and
 - Two-lane eastbound and westbound approaches.
- ▶ Thorold Townline Road and Beaverdams Road:
 - Traffic control signals with optimized signal timings;
 - Eastbound left-turn lane with 20 metres of storage;
 - Westbound left-turn lane with 25 metres of storage;
 - Northbound left-turn lane with 40 metres of storage; and
 - Southbound left-turn lane with 20 metres of storage.
- ▶ Thorold Townline Road and Street A:
 - Northbound left-turn lane with 15 metres of storage.
- ▶ Thorold Townline Road and Street H:
 - Northbound left-turn lane with 15 metres of storage.



Table 5.5 summarizes the level of service conditions for the year 2028 total traffic conditions with the remedial measures outlined above. With the implementation of the noted remedial measures, intersection operations are forecast to operate with acceptable level of service.

Appendix J1 contains the detailed Synchro/ARCADY reports.



TABLE 5.5: 2028 TOTAL OPERATIONS WITH IMPROVEMENTS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																
				Eastbound				Westbound				Northbound				Southbound				Overall
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay 7 V/C Q 27 Ex 90 Avail. 63	A 7 0.27	A 7 0.43	A 6 0.14	A 7	A 6 0.11	A 7 0.41	> >	A 7	B 14 0.41	B 13 0.39	> >	B 13	B 12 0.18	B 12 0.29	B 12 0.11	B 12 0.19	A 9
	Thorold Townline Road & Beaverdams Road	TCS	LOS Delay 13 V/C Q 24 Ex 50 Avail. 26	B 13 0.40	B 12 0.34	> >	B 13	B 12 0.20	B 16 0.62	> >	B 15	A 6 0.13	A 8 0.52	> >	A 7	A 5 0.04	A 7 0.44	> >	A 7 0.10	B 10
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				A 3 0.30 3				A 3 0.37 3								A 3 0.28 3	A 3
	Thorold Townline Road & Street A	TWSC	LOS Delay 11 V/C Q 15 Ex - Avail. -	B 11 0.07		> >	B 11					A 8 0.01	A 0 0.14		A 0		A 0 0.14	> >	A 0 0.10	A 1
	Thorold Townline Road & Street H	TWSC	LOS Delay 11 V/C Q 14 Ex - Avail. -	B 11 0.07		> >	B 11					A 8 0.01	A 0 0.14		A 0		A 0 0.15	> >	A 0 0.10	A 1
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay 38 V/C Q 62 Ex 90 Avail. 28	D 38 0.79	B 13 0.56	A 10 0.19	B 15	B 10 0.24	B 16 0.73	> >	B 16	D 54 0.90	B 18 0.40	> >	D 37	C 23 0.21	C 26 0.55	C 27 0.57	C 26 0.42	B 20
	Thorold Townline Road & Beaverdams Road	TCS	LOS Delay 16 V/C Q 31 Ex 50 Avail. 19	B 16 0.46	C 24 0.76	> >	C 22	C 25 0.69	B 18 0.63	> >	C 20	A 8 0.21	A 9 0.47	> >	A 9	A 7 0.08	C 21 0.85	> >	C 20 0.95	B 18
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				A 3 0.53 3				B 12 0.82 36								A 3 0.26 3	A 7
	Thorold Townline Road & Street A	TWSC	LOS Delay 14 V/C Q 13 Ex - Avail. -	B 14 0.07		> >	B 14					A 8 0.03	A 0 0.17		A 1		A 0 0.29	> >	A 0 0.10	A 1
	Thorold Townline Road & Street H	TWSC	LOS Delay 14 V/C Q 13 Ex - Avail. -	B 14 0.07		> >	B 14					A 8 0.03	A 0 0.18		A 1		A 0 0.29	> >	A 0 0.10	A 1

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



5.6.1 Phase 1 Queue Length

The northbound left-turn 95th percentile queue length on Thorold Townline Road at Street H is forecast to be approximately 11 metres (PM peak hour). The southbound queue length on Thorold Townline Road at Lundy's Lane (Highway 20) is forecast at 36 metres (PM peak hour).

With approximately 254 metres separation between Lundy's Lane (Highway 20) and Street H, there should be adequate distance for back-to-back left-turn lanes to be constructed on Thorold Townline Road.

The forecast queue length on Street A at Thorold Townline Road is approximately 15 metres. The driveway for Block 134 is approximately 60 metres from Thorold Townline Road. For Street H, the forecast queue length is 14 metres. The driveways to Block 132 and Block 133 are approximately 60 metres from Thorold Townline Road.

5.7 Full Build-Out Operational Analysis with Improvements

Synchro analysis was conducted for the full build-out total traffic conditions with no adjustments to traffic volumes and the following improvements:

- ▶ Lundy's Lane (Highway 20) and Thorold Townline Road:
 - Second eastbound through lane;
 - Westbound right-turn lane
 - Second westbound through lane;
 - Southbound right-turn lane; and
 - Optimized signal timings.
- ▶ Lundy's Lane (Highway 20) and Barker Parkway:
 - Two-lane roundabout;
- ▶ Thorold Townline Road and Beaverdams Road:
 - Traffic control signals with optimized signal timings;
 - Eastbound left-turn lane with 20 metres of storage;
 - Westbound left-turn lane with 25 metres of storage;
 - Northbound left-turn lane with 40 metres of storage; and
 - Southbound left-turn lane with 20 metres of storage.
- ▶ Thorold Townline Road and Street A:



- Northbound left-turn lane with 40 metres of storage; and
- Southbound right-turn taper.
- ▶ Thorold Townline Road and Street H:
 - Traffic control signals with optimized signal timings;
 - Eastbound left-turn lane with 50 metres of storage;
 - Northbound left-turn lane with 55 metres of storage; and
 - Southbound right-turn taper.

Table 5.6 summarizes the level of service conditions for the year 2035 total traffic conditions with the remedial measures outlined above. With the implementation of the noted remedial measures, intersection operations are forecast to operate with acceptable level of service with some critical movements during the PM peak hour.

Appendix J2 contains the detailed Synchro/ARCADY reports.



TABLE 5.6: 2035 TOTAL OPERATIONS WITH IMPROVEMENTS

Analysis Period	Intersection	Control Type	MOE	Direction / Movement / Approach																	
				Eastbound				Westbound				Northbound				Southbound				Overall	
				Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach	Left	Through	Right	Approach		
AM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	B 13 0.56 46 90 44	A 10 0.47 50 - 16	A 8 0.16 24 40 16	B 10	A 8 0.15 14 55 41	A 9 0.37 41 - 29	A 10 0.11 21 50 29	A 9	B 16 0.47 40 50 10	B 16 0.49 43 - 23	> > > >	B 16	C 21 0.62 56 50 -6	B 16 0.43 50 - 23	B 14 0.23 27 50 23	B 16	B 12	
	Thorold Townline Road & Beaverdams Road	TCS	LOS Delay V/C Q Ex Avail.	B 13 0.42 32 50 18	B 12 0.38 32 - 2	> > > > >	B 13	B 12 0.28 22 50 28	B 15 0.60 36 - -	> > > > >	B 14	A 9 0.37 31 50 19	B 16 0.76 67 - 2	> > > > >	B 14	A 7 0.03 9 50 41	B 10 0.57 48 - 2	> > > > >	B 10	B 13	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				A 3 0.37 3				A 4 0.49 3									A 3 0.32 3	A 3
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q Ex Avail.	C 17 0.40 20 - -		> > > > >	C 17					A 8 0.06 12 40 28	A 0 0.22 0 - -		A 1		A 0 0.18 0 - -	A 0 0.02 1 10 9	A 0	A 4	
	Thorold Townline Road & Street H	TCS	LOS Delay V/C Q Ex Avail.	B 13 0.33 22 50 28		B 14 0.21 25 - -	B 13					A 6 0.31 27 80 53	A 6 0.37 34 - -		A 6		A 6 0.44 43 - -	A 5 0.08 24 10 -14	A 6	A 8	
PM Peak Hour	Highway 20 (Lundy's Lane) & Thorold Townline Road	TCS	LOS Delay V/C Q Ex Avail.	F 541 2.18 231 90 -141	B 16 0.63 542 - -	B 13 0.31 57 40 -17	F 135	B 19 0.33 61 55 -6	C 29 0.83 169 - -	B 18 0.30 91 50 -41	C 26	E 61 0.94 123 50 -73	C 21 0.58 538 - -	> > > > >	D 40	C 25 0.64 50 50 0	B 19 0.46 61 - -12	C 24 0.66 62 50 -12	C 23	E 66	
	Thorold Townline Road & Beaverdams Road	TCS	LOS Delay V/C Q Ex Avail.	B 20 0.49 68 50 -18	D 42 0.90 117 - -	> > > > >	D 37	F 151 1.18 104 50 -54	C 21 0.60 677 - -	> > > > >	E 69	F 109 1.02 118 50 -68	B 19 0.70 1458 - -	> > > > >	D 38	B 11 0.13 115 50 -65	F 98 1.13 592 - -	> > > > >	F 94	E 62	
	Highway 20 (Lundy's Lane) & Baker Parkway	RBT	LOS Delay V/C Q				A 5 0.66 9				F 168 1.10 158									A 3 0.29 3	F 80
	Thorold Townline Road & Street A	TWSC	LOS Delay V/C Q Ex Avail.	F 55 0.75 29 - -		> > > > >	F 55						B 10 0.18 21 40 19	A 0 0.25 0 - -		A 3		A 0 0.39 0 - 5	A 0 0.05 5 10 5	A 0	A 8
	Thorold Townline Road & Street H	TCS	LOS Delay V/C Q Ex Avail.	C 30 0.51 33 50 17		C 28 0.25 44 - -	C 29						C 28 0.83 55 80 25	A 5 0.39 45 - -		B 15		C 30 0.86 118 - -	B 15 0.32 36 10 -26	C 27	C 23

MOE - Measure of Effectiveness

LOS - Level of Service

Delay - Average Delay per Vehicle in Seconds

Q - 95th Percentile Queue Length (m)

Ex. - Existing Available Storage (m)

Avail. - Available Storage (m)

TCS - Traffic Control Signal

TWSC - Two-Way Stop Control

AWSC - All-Way Stop Control

RBT - Roundabout



5.7.1 Full Build-Out Queue Length

The northbound left-turn 95th percentile queue length on Thorold Townline Road at Street H is forecast to be approximately 55 metres (PM peak hour). The southbound queue length on Thorold Townline Road at Lundy's Lane (Highway 20) is forecast at 50 metres (PM peak hour).

With approximately 254 metres separation between Lundy's Lane (Highway 20) and Street H, there should be adequate distance for back-to-back left-turn lanes to be constructed on Thorold Townline Road.

The forecast queue length on Street A at Thorold Townline Road is approximately 29 metres. The driveway for Block 134 is approximately 60 metres from Thorold Townline Road. For Street H, the forecast queue length is 44 metres. The driveways to Block 132 and Block 133 are approximately 60 metres from Thorold Townline Road. Minor adjustments to driveway position may be required at SPA.

5.8 Summary

Delay and capacity deficiencies are forecast to occur at the study area intersections in the future with the anticipated background growth in traffic. **Table 5.7** summarizes the remedial measures and when they are required to address the study area intersection operations.

Figure 5.1 illustrates the future lane configuration and traffic control of the study area intersections. **Appendix K** contains the functional design for the study area intersections. Detailed engineering drawings will be prepared at a later stage in the development process.



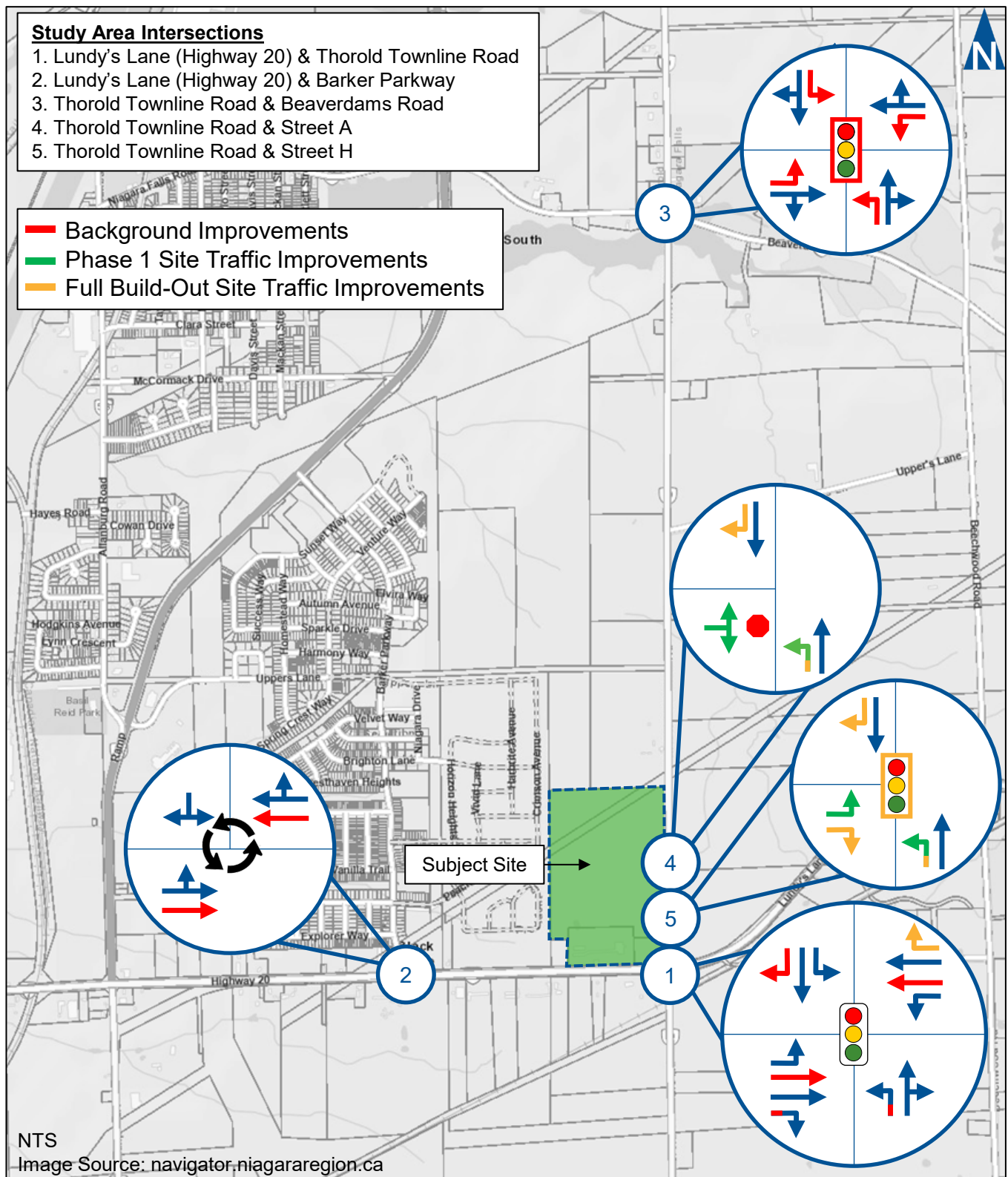
TABLE 5.7: MITIGATION MEASURES

Intersection	Remedial Measures	Horizon
Lundy's Lane (Highway 20) & Thorold Townline Road	Second eastbound through lane	2028 Background
	Additional Storage for existing eastbound right-turn lane – 40 metres total (increase of 20 metres)	2028 Background
	Second westbound through lane	2028 Background
	Westbound right-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven
	Additional storage for existing northbound left-turn lane – 65 metres total (increase of 45 metres)	2028 Background
	Southbound right-turn with 50 metres of storage	2028 Background
	Optimized signal timings	Continuous Monitoring
Lundy's Lane (Highway 20) & Barker Parkway	Two-lane roundabout	2028 Background
	Second eastbound approach lane	2028 Background
	Second westbound approach lane	2028 Background
Thorold Townline Road & Beaverdams Road	Traffic control signals	2028 Background
	Eastbound left-turn lane with 35 metres of storage	2028 Background
	Westbound left-turn lane with 65 metres of storage	2028 Background
	Northbound left-turn lane with 20 metres of storage	2028 Background
	Southbound left-turn lane with 45 metres of storage	2028 Background
Thorold Townline Road & Street A	Northbound left-turn lane with 15 metres of storage. Consider ultimate storage length.	Phase 1 Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 40 metres (ultimate)	2035 Full Build-out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven



Intersection	Remedial Measures	Horizon
Thorold Townline Road & Street H	Northbound left-turn lane with 15 metres of storage.	Phase 1 Total Traffic – Application Driven
	Traffic control signals and optimized signal timings. Consider installing signal conduits during Phase 1.	2035 Full Build-Out Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 80 metres (ultimate).	2035 Full Build-Out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven
	Eastbound left-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven





6 Conclusions & Recommendations

6.1 Conclusions

Based on the investigations carried out, it is concluded that:

- ▶ **Existing Traffic Conditions:** The study area intersections are currently operating with acceptable levels of service with capacity issues at the following intersections:
 - Lundy's Lane (Highway 20) and Thorold Townline Road;
 - Lundy's Lane (Highway 20) and Barker Parkway; and
 - Thorold Townline Road and Beaverdams Road.
- ▶ **Development Trip Generation:** The Phase 1 portion of the proposed site is forecast to generate 124 new trips in the AM peak hour and 161 new trips in the PM peak hour. Where as the overall site development at full build-out is forecast to generate 803 new trips in the AM peak hour and 1,278 new trips in the PM peak hour.
- ▶ **Background Traffic Forecast:** The future traffic volumes are estimated to consist of:
 - Generalized background traffic growth – estimated to be 2% per annum;
 - Traffic generated by the future development of:
 - The Rolling Meadows Development – a multi-phase development located west of the subject site, consisting of primarily residential units including single-family, townhomes, medium density, and high-density units; and
 - The proposed Upper's Quarry – a quarry located on the west side of Thorold Townline Road near Beechwood Road. The preferred haul route for the quarry will direct trucks northbound on Thorold Townline Road through non-residential areas.
- ▶ **Background Traffic Operations:** As the traffic volumes increase at the study area intersections, the existing capacity issues are exacerbated, and additional issues are identified at the study area intersections.
- ▶ **Total Traffic Operations (Phase 1 – Year 2028):** The capacity deficiencies identified under background conditions will continue to occur with the addition of site generated traffic. Please note that the addition of the site generated traffic to the background



traffic during Phase 1 results in minor increases in delay at the study area intersections.

Thorold Townline Road and Street A is forecast to operate with LOS B and v/c ratios of 0.07 or less during the AM and PM peak hours under total traffic conditions.

Thorold Townline Road and Street H is forecast to operate with LOS B and v/c ratios of 0.07 or less during the AM and PM peak hours under total traffic conditions.

► **Remedial Measures (Phase 1 – Year 2028):**

To accommodate future background traffic volumes (non-site generated traffic) the following improvements are identified:

- Lundy's Lane (Highway 20) and Thorold Townline Road requires a second eastbound and westbound through lanes, and a southbound right-turn lane with 50 metres of storage.
- Lundy's Lane (Highway 20) and Barker Parkway a two-lane roundabout along with a second eastbound and westbound through lanes.
- Thorold Townline Road and Beaverdams Road a traffic control signal. In addition, auxiliary turn lanes on all approaches should be considered, provided the expanded lane geometry can be accommodated without impacting the environmental features surrounding the intersection.

To accommodate site generated traffic the following improvements are identified:

- Thorold Townline Road and Street A, a northbound left-turn lane with 15 metres of storage.
- Thorold Townline Road and Street H, a northbound left-turn lane with 15 metres of storage.

► **Background Traffic Operations (Full Build Out – Year 2035):**

As the traffic volumes increase due to non-site generated traffic, the previously identified capacity issues are exacerbated, and new localized congestion is forecast to occur.

► **Total Traffic Operations (Full Build Out – Year 2035):** The capacity deficiencies identified under background conditions will continue to occur with the addition of site generated traffic.

Thorold Townline Road and Street A is forecast to operate with the minor approach at LOS E/F range and v/c ratios of 0.97 or less during the PM peak hour under total traffic conditions.

Traffic control signals are not warranted under 2045 total traffic conditions.



Thorold Townline Road and Street H is forecast to operate with the minor approach at LOS F and v/c ratios greater than the critical threshold or less during the AM and PM peak hours under total traffic conditions. Traffic control signal warrants are justified at 120 percent.

► **Remedial Measures (Full Build Out – Year 2035):**

The background traffic improvements identified for the Phase 1 Year 2028 horizon are required. To accommodate site generated traffic the following improvements are identified:

- Lundy's Lane (Highway 20) and Thorold Townline Road a westbound right-turn lane with 50 metres of storage.
- Thorold Townline Road and Street A, a northbound left-turn lane with 40 metres of storage is warranted from the 2035 total horizon. An increase of 25 metres from Phase 1. A southbound right-turn taper is warranted from the 2035 total horizon.
- Thorold Townline Road and Street H, installation of traffic control signals, a northbound left-turn lane with 80 metres of storage is warranted from the 2035 total horizon. An increase of 65 metres from Phase 1. A southbound right-turn taper is warranted from the 2035 total horizon.

6.2 Recommendations

Based on the findings of this study, it is recommended that:

- The MTO/Region monitors the future traffic volumes at the study area intersections and consider implementing the following improvements to accommodate the forecast Year 2028 (Phase 1) due to background traffic volumes (non-site generated traffic):

Lundy's Lane (Highway 20) at Thorold Townline Road

- A second eastbound and westbound through lane, and
- A southbound right-turn lane with 50 metres of storage.

Lundy's Lane (Highway 20) and Barker Parkway

- A two-lane roundabout; and
- A second eastbound and westbound through lane.

Thorold Townline Road and Beaverdams Road

- A traffic control signal; and



- Provided the surrounding environmental features are not impacted, auxiliary turn lanes on all approaches should be considered.
- ▶ The Niagara Region reduce the speed limit along Thorold Townline Road to 50 km/h to reflect future build-out of the area.
- ▶ When construction begins (part of Phase 1) at the proposed Street A intersection, a northbound left-turn lane with 15 meters of storage be constructed.
At full build-out (Year 2035), the storage lane should be extended to 40 meters, and a southbound right-turn taper should be added.
- ▶ When construction begins (part of Phase 1) at the proposed Street H intersection, a northbound left-turn lane with 15 meters of storage should be constructed. Additionally, provisions for underground traffic signal conduits should be considered.
At full build-out (Year 2035), the storage lane should be extended to 80 meters, and a southbound right-turn taper should be added. The traffic control signals should be electrified, and a separate eastbound left-turn lane with 50 meters of storage should be provided on the Street H approach.
- ▶ At full build-out (Year 2035) the MTO/Region determine if a westbound right-turn lane is required at the Lundy's Lane (Highway 20) & Thorold Townline Road intersection to support the build-out of the surrounding area.

Table 6.1 summarizes the remedial measures and when they are required to address the study area intersection operations.



TABLE 6.1: MITIGATION MEASURES

Intersection	Remedial Measures	Horizon
Lundy's Lane (Highway 20) & Thorold Townline Road	Second eastbound through lane	2028 Background
	Additional Storage for existing eastbound right-turn lane – 40 metres total (increase of 20 metres)	2028 Background
	Second westbound through lane	2028 Background
	Westbound right-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven
	Additional storage for existing northbound left-turn lane – 65 metres total (increase of 45 metres)	2028 Background
	Southbound right-turn with 50 metres of storage	2028 Background
	Optimized signal timings	Continuous Monitoring
Lundy's Lane (Highway 20) & Barker Parkway	Two-lane roundabout	2028 Background
	Second eastbound approach lane	2028 Background
	Second westbound approach lane	2028 Background
Thorold Townline Road & Beaverdams Road	Traffic control signals	2028 Background
	Eastbound left-turn lane with 35 metres of storage	2028 Background
	Westbound left-turn lane with 65 metres of storage	2028 Background
	Northbound left-turn lane with 20 metres of storage	2028 Background
	Southbound left-turn lane with 45 metres of storage	2028 Background
Thorold Townline Road & Street A	Northbound left-turn lane with 15 metres of storage. Consider ultimate storage length.	Phase 1 Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 40 metres (ultimate)	2035 Full Build-out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven



Intersection	Remedial Measures	Horizon
Thorold Townline Road & Street H	Northbound left-turn lane with 15 metres of storage.	Phase 1 Total Traffic – Application Driven
	Traffic control signals and optimized signal timings. Consider installing signal conduits during Phase 1.	2035 Full Build-Out Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 80 metres (ultimate).	2035 Full Build-Out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven
	Eastbound left-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven



Appendix A

Pre-Study Consultation



From: [Dunsmore, Susan](#)
To: [Andrew Evans](#); [Lagakos, Ted \(MTO\)](#)
Cc: [tphorn75@gmail.com](#); [Scott Catton](#); [Nunes, Paul \(MTO\)](#); [sean.dunsmore@thorold.ca](#); [Deluca, Peter \(MTO\)](#); [Angela Nesbitt](#)
Subject: RE: (210565) Thorold Townline Rd at Lundy's Lane (Hwy 20), Thorold TIS Scope of Work
Date: July 18, 2023 2:19:48 PM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)
[image008.png](#)
[PW5.R01.pdf](#)

Hello Andrew

Transportation planning staff have reviewed the TIS terms of reference and have provided the following comments in red below. For Regional traffic data requests can be made through the website using the following link:
<https://www.niagararegion.ca/living/roads/permits/traffic-data-requests.aspx>. For any upgrades required on Thorold Townline Road functional designs are to be included in the TIS as per our guidelines.

If you require anything further please contact me at your convenience.

Thank you



Susan M. Dunsmore, P.Eng.
MANAGER, DEVELOPMENT ENGINEERING
Niagara Region, 1815 Sir Isaac Brock Way, Thorold, ON, L2V 4T7
P : (905) 980 - 6000 ext. 3661
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E : susan.dunsmore@niagararegion.ca



From: Andrew Evans <aevans@ptsl.com>
Sent: Thursday, June 29, 2023 8:18 AM
To: Lagakos, Ted (MTO) <Ted.Lagakos@ontario.ca>
Cc: tphorn75@gmail.com; Scott Catton <scatton@ptsl.com>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; sean.dunsmore@thorold.ca; Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>; Angela Nesbitt <Angela.Nesbitt@thorold.ca>
Subject: RE: (210565) Thorold Townline Rd at Lundy's Lane (Hwy 20), Thorold TIS Scope of Work

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email system. Use caution when clicking links or opening attachments unless you recognize the sender and know the content is safe.

Greetings,

Based on previous discussions with MTO, please find below our revised terms of reference for a Transportation Impact Study for the proposed development of the lands on the northwest quadrant of Thorold Townline Road and Lundy's Lane (Highway 20) in the City of Thorold.

Please review and provide comment at your earliest convenience.

SITE DESCRIPTION

- The subject site is located on the northwest quadrant of Thorold Townline Road and Lundy's Lane (Highway 20) in the City of Thorold. The concept plan is primarily residential with a mixed-use/commercial block at the corner of Townline Road and Lundy's Lane. **The concept plan is attached.** The site statistics include the following land uses:

- Single family homes;
- Townhouses (several types),
- Mid-rise multifamily buildings, and
- Mixed-Use Residential/Commercial Land Uses.

Build out may occur in phases with the ultimate build-out date to be determined.

Vehicle access is proposed by three new municipal roadway connections to the Thorold Townline Road.

PROPOSED TERMS OF REFERENCE

- Study Area Intersections:

- Highway 20 & Thorold Townline Road (signalized)
- Thorold Townline Road & Beaverdams Road (unsignalized); and
- The proposed three new roadway connections to the existing road network.
- **Highway 20 and Barker Pkwy – Roundabout**

Analysis Periods:

- Weekday AM peak hour
- Weekday PM peak hour

Existing Data:

- Existing 8-hour TMC data for the above noted intersections being counted either July 6th or the week of July 10th.
- Existing signal timing plans.

Horizon Year

- **Existing condition**
- Build-out Year

- Five-years post build-out; and
- Ten-years post build-out.

If the development will be built in multiple phases, the study should include capacity analysis at the end of each phase, additional to the ultimate buildout year and the 5 & 10 years after buildout.

Analysis

- Synchro 11, HCM 2000 analysis
- SimTraffic Queueing (five 60-min iterations)

Background Traffic

- Generalized growth rate 2% per annum
- Active Development Applications. **To be identified by Region/City (City of Thorold and City of NF are to supply information on surrounding applications in the area)**
-

Future Road Improvements

- **To be identified by Region/City**
- **There are no Regional capital projects at this time in the area.**
-

Trip Generation

- ITE Trip Generation Data 11th Edition with no modal split reductions.
- ITE Pass-by Trip Rates (Commercial land uses)

Site Traffic Distribution

- TTS data- **Please also consider the existing traffic distribution**

Report

- We will document the study methodologies, findings, and conclusions in a report with appendices containing the detailed analysis results and any data collected.

Please let us know your comments on the study.

General Comments:

- Transportation staff have reviewed the TIS terms of reference and plan submitted and will permit one full access to Thorold Townline and the other two accesses would have to be restricted (if the TIS justify the need for additional restricted accesses). Three full access points are not supported by staff. The TIS will have to evaluate the required access requirements for the site and justify any additional full accesses beyond the one permitted
-
- Please include the left lane warrant analysis in the TIS.
- The Region might request a right-turn taper at the middle access if the number of generated trips is significant

- Additionally, Transportation team highly recommends the developer to urbanize this road segment of Thorold Townline Road (RR70) along the two development blocks, and the Region's Speed Limit Policy be used to determine if a change in the posted speed is warranted.
- If the Consultant utilizes historical traffic counts, traffic counts to be factored into a baseline condition (existing condition) using a growth rate of 2% per annum. Historic counts at Covid pandemic period to be avoided.
- The submitted site plan to show the following:
 1. Accesses dimensions and clear throat lengths. Clear throat length to be as per TAC requirements or TIS queue assessment results.
 2. The distance between the proposed accesses.
 3. All adjacent/ opposite existing driveway accesses at Thorold Townline Rd.
- The TIS/site plan to demonstrate the path of vehicles passing by the commercial blocks (Block 72 and Block 73). Will parking lots be allocated opposite to Thorold Townline road or behind the commercial buildings? Commercial buildings are to be accessed from Streets A & C.
-
- The Consultant is to follow Niagara Region Guidelines for TIS (2012) for traffic analysis software settings, intersections capacity thresholds and other requirements.
- For the ideal saturation flows, there are currently new saturation flow rates that will be a part of the new TIS Guidelines. The Consultant can use either the below new saturation values or 1750 across the board for all movements.

Variable	Ideal Saturation Flow
T	1,629
L	1,504
LT	1,228
LL	2,194
R	1,351
RT	1,388
LTR	1,483

Please let us know your comments on the study.

Thank you and regards.

Andrew Evans, M.Sc.

Transportation Planner

Paradigm Transportation Solutions Limited

p: 905.381.2229 x 305

m: 519.497.3239



From: Lagakos, Ted (MTO) <Ted.Lagakos@ontario.ca>

Sent: Tuesday, December 7, 2021 12:47 PM

To: Andrew Evans <aevans@ptsl.com>

Cc: tphorn75@gmail.com; Scott Catton <scatton@ptsl.com>; Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; sean.dunsmore@thorold.ca; Deluca, Peter (MTO) <Peter.Deluca@ontario.ca>; Angela Nesbitt <Angela.Nesbitt@thorold.ca>

Subject: RE: (210565) Thorold Townline Rd at Lundy's Lane (Hwy 20), Thorold TIS Scope of Work

Afternoon Andrew,

This is confirm that I will be the Ministry contact for this file. Please ensure that all future correspondence for MTO is sent directly to my attention.

The ministry has already provided the City pre-consultation comments where we stated that Highway 20 access will not be permitted, as well as intersection spacing requirements off of Thorold Town line Road.

As a result, please revise your scoping document and plan accordingly and resubmit for MTO review/comment.

Ted Lagakos
Senior Project Manager (Niagara/Hamilton)
Highway Corridor Management Section - Central Operations

Ministry of Transportation
159 Sir William Hearst Avenue, 7th Floor
Toronto, ON M3M 0B7

Phone: 416-268-3932

E-Mail: ted.lagakos@ontario.ca

Web: www.mto.gov.on.ca/english/engineering/management/corridor

From: Andrew Evans <aevans@ptsl.com>

Sent: December 7, 2021 11:40 AM

To: Dunsmore, Susan <Susan.Dunsmore@niagararegion.ca>; sean.dunsmore@thorold.ca; Nunes, Paul (MTO) <Paul.Nunes@ontario.ca>; Lagakos, Ted (MTO) <Ted.Lagakos@ontario.ca>

Cc: tphorn75@gmail.com; Scott Catton <scatton@ptsl.com>

Subject: (210565) Thorold Townline Rd at Lundy's Lane (Hwy 20), Thorold TIS Scope of Work

CAUTION -- EXTERNAL E-MAIL - Do not click links or open attachments unless you recognize the sender.

Greetings,

Paradigm Transportation Solutions Limited is preparing the Transportation Impact Study for the proposed development of the lands on the northwest quadrant of Thorold Townline Road and Lundy's Lane (Highway 20) in the City of Thorold. Below is a brief description of the concept and our proposed terms of reference for the TIS.

Please review and provide comment at your earliest convenience.

SITE DESCRIPTION

-
The subject site is located on the northwest quadrant of Thorold Townline Road and Lundy's Lane (Highway 20) in the City of Thorold. The concept plan is primarily residential with a mixed-use/commercial block at the concern of Townline Road and Lundy's Lane. **The concept plan is attached.** The site statistics include the following land uses:

- Single family homes;
- Townhouses (several types),
- Mid-rise multifamily buildings, and
- Mixed-Use Residential/Commercial Land Uses.

Build out may occur in phases with the ultimate build-out date to be determined.

Vehicle access is proposed by three new municipal roadway connections to the external road network. The position of the proposed intersections are described generally as follows:

- Street A located approximately 390 metres north of Lundy's Lane on Thorold Townline Road.
- Street B located approximately 590 metres north of Lundy's Lane on Thorold Townline Road.
- Street C located approximately 300 metres west of Thorold Townline Road on Lundy's Lane (Highway 20).

PROPOSED TERMS OF REFERENCE

-
Study Area Intersections:

- Highway 20 & Highway 58 (signalized);
- Highway 20 & Thorold Townline Road (signalized);

- Thorold Townline Road & Beaverdams Road (unsignalized);
- The proposed new roadway connections to the existing road network.

Analysis Periods:

- Weekday AM peak hour
- Weekday PM peak hour

Existing Data:

- Existing 8-hour TMC data for the above noted intersections
- Existing signal timing plans.
- Should we collect new count data or should we rely on the historical count data and factor the old count data to a baseline condition?
- If counts will be factored to baseline condition we proposed a 2% growth rate per annum consistent with the Region's TIS guidelines.

Horizon Year

- Build-out Year
- Five-years post build-out; and
- Ten-years post build-out.

Analysis

- Synchro 10, HCM 2000 analysis
- SimTraffic Queueing (five 60-min iterations)

Background Traffic

- Generalized growth rate 2% per annum
- Active Development Applications. **To be identified by Region/City**

Future Road Improvements

- **To be identified by Region/City**

Trip Generation

- ITE Trip Generation Data 11th Edition with no modal split reductions.
- ITE Pass-by Trip Rates (Commercial land uses)

Site Traffic Distribution

- TTS data

Report

- We will document the study methodologies, findings, and conclusions in a report with appendices containing the detailed analysis results and any data collected.

Please let us know your comments on the study.

Thank you and regards.

Andrew Evans, M.Sc.

Transportation Planner



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Appendix B

Traffic Data





Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsl.com

Count Name: Lundys Lane & Thorold Townline Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 1

Turning Movement Data

Start Time	Lundys Lane Eastbound						Lundys Lane Westbound						Thorold Townline Road Northbound						Thorold Townline Road 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	1	19	8	0	0	28	12	37	1	0	0	50	8	15	8	0	0	31	0	8	8	0	0	16	125
7:15 AM	8	98	32	0	0	138	3	59	2	0	0	64	13	23	5	0	0	41	0	19	2	0	0	21	264
7:30 AM	8	85	22	0	0	115	8	60	4	0	0	72	18	38	10	0	0	66	3	30	6	0	0	39	292
7:45 AM	11	91	25	0	0	127	15	74	2	0	0	91	15	12	11	0	0	38	4	23	7	0	0	34	290
Hourly Total	28	293	87	0	0	408	38	230	9	0	0	277	54	88	34	0	0	176	7	80	23	0	0	110	971
8:00 AM	10	78	22	0	0	110	12	82	2	0	0	96	23	26	1	0	0	50	2	19	13	0	0	34	290
8:15 AM	9	101	22	0	0	132	2	73	5	0	0	80	24	26	13	0	0	63	2	24	14	0	0	40	315
8:30 AM	12	93	27	0	0	132	9	77	5	0	0	91	24	28	6	0	0	58	0	27	14	0	0	41	322
8:45 AM	11	89	39	0	0	139	5	90	2	0	0	97	22	27	5	0	0	54	1	25	15	0	0	41	331
Hourly Total	42	361	110	0	0	513	28	322	14	0	0	364	93	107	25	0	0	225	5	95	56	0	0	156	1258
9:00 AM	2	36	16	0	0	54	8	77	2	0	0	87	31	18	7	0	0	56	4	29	10	0	0	43	240
9:15 AM	7	86	25	0	0	118	7	62	2	0	0	71	12	14	7	0	0	33	3	16	12	0	0	31	253
9:30 AM	9	68	34	0	0	111	7	81	3	0	0	91	38	32	13	0	0	83	3	36	9	0	0	48	333
9:45 AM	7	78	39	0	0	124	5	50	1	0	0	56	28	12	10	0	0	50	2	20	5	0	0	27	257
Hourly Total	25	268	114	0	0	407	27	270	8	0	0	305	109	76	37	0	0	222	12	101	36	0	0	149	1083
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	8	45	16	0	0	69	6	60	4	0	0	70	19	21	5	0	0	45	5	21	3	1	0	30	214
11:15 AM	4	91	24	0	0	119	4	69	5	0	0	78	20	20	5	0	0	45	2	19	6	0	0	27	269
11:30 AM	12	101	20	0	0	133	6	73	2	0	0	81	24	26	5	0	0	55	3	22	7	0	0	32	301
11:45 AM	10	97	34	0	0	141	7	70	2	0	0	79	31	22	11	0	0	64	7	15	8	0	0	30	314
Hourly Total	34	334	94	0	0	462	23	272	13	0	0	308	94	89	26	0	0	209	17	77	24	1	0	119	1098
12:00 PM	8	59	31	0	0	98	7	60	2	0	0	69	34	27	2	0	0	63	3	34	7	0	0	44	274
12:15 PM	8	92	24	0	0	124	15	75	1	0	0	91	31	13	11	0	0	55	2	17	18	0	1	37	307
12:30 PM	4	96	30	0	0	130	6	54	7	0	0	67	29	22	5	0	0	56	4	21	9	0	0	34	287
12:45 PM	10	96	36	0	0	142	9	98	6	0	0	113	35	21	13	0	0	69	2	29	9	0	0	40	364
Hourly Total	30	343	121	0	0	494	37	287	16	0	0	340	129	83	31	0	0	243	11	101	43	0	1	155	1232
1:00 PM	5	87	33	0	0	125	14	68	6	0	0	88	33	25	7	0	0	65	2	33	7	0	0	42	320
1:15 PM	6	60	18	0	1	84	12	82	6	0	0	100	26	18	5	0	0	49	1	32	9	0	0	42	275
1:30 PM	7	139	46	0	0	192	2	61	1	0	0	64	31	41	9	0	0	81	6	31	7	0	0	44	381
1:45 PM	11	103	23	0	0	137	4	81	6	0	0	91	27	33	10	0	0	70	5	33	13	0	0	51	349
Hourly Total	29	389	120	0	1	538	32	292	19	0	0	343	117	117	31	0	0	265	14	129	36	0	0	179	1325
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	7	70	31	0	0	108	16	100	4	0	0	120	38	33	7	0	0	78	4	28	16	0	1	48	354
3:15 PM	12	113	36	0	0	161	13	125	3	0	0	141	31	28	14	0	0	73	2	37	13	0	0	52	427
3:30 PM	9	107	31	0	0	147	11	97	2	0	0	110	42	24	14	0	0	80	5	35	17	0	0	57	394

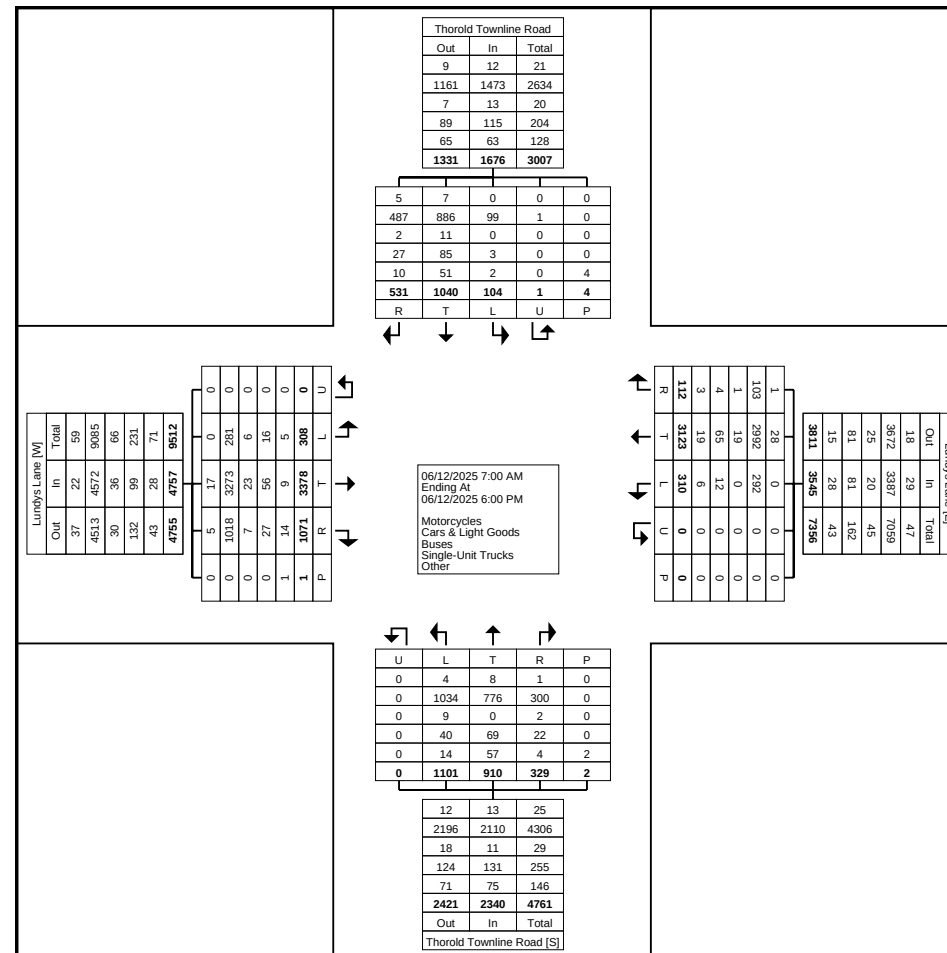
3:45 PM	14	100	35	0	0	149	6	119	3	0	0	128	28	26	16	0	0	70	1	22	21	0	0	44	391
Hourly Total	42	390	133	0	0	565	46	441	12	0	0	499	139	111	51	0	0	301	12	122	67	0	1	201	1566
4:00 PM	6	77	19	0	0	102	16	116	3	0	0	135	47	34	13	0	0	94	6	36	26	0	0	68	399
4:15 PM	16	137	35	0	0	188	12	151	2	0	0	165	46	33	14	0	0	93	2	45	23	0	0	70	516
4:30 PM	5	119	36	0	0	160	8	122	4	0	0	134	39	40	14	0	0	93	4	45	35	0	0	84	471
4:45 PM	8	140	36	0	0	184	8	146	3	0	0	157	48	30	15	0	0	93	3	45	39	0	0	87	521
Hourly Total	35	473	126	0	0	634	44	535	12	0	0	591	180	137	56	0	0	373	15	171	123	0	0	309	1907
5:00 PM	13	132	41	0	0	186	9	125	2	0	0	136	47	21	12	0	0	80	7	49	33	0	0	89	491
5:15 PM	8	151	42	0	0	201	11	126	5	0	0	142	42	37	9	0	2	88	0	47	39	0	0	86	517
5:30 PM	16	129	48	0	0	193	11	113	1	0	0	125	53	25	11	0	0	89	1	34	33	0	2	68	475
5:45 PM	6	115	35	0	0	156	4	110	1	0	0	115	44	19	6	0	0	69	3	34	18	0	0	55	395
Hourly Total	43	527	166	0	0	736	35	474	9	0	0	518	186	102	38	0	2	326	11	164	123	0	2	298	1878
Grand Total	308	3378	1071	0	1	4757	310	3123	112	0	0	3545	1101	910	329	0	2	2340	104	1040	531	1	4	1676	12318
Approach %	6.5	71.0	22.5	0.0	-	-	8.7	88.1	3.2	0.0	-	-	47.1	38.9	14.1	0.0	-	-	6.2	62.1	31.7	0.1	-	-	-
Total %	2.5	27.4	8.7	0.0	-	38.6	2.5	25.4	0.9	0.0	-	28.8	8.9	7.4	2.7	0.0	-	19.0	0.8	8.4	4.3	0.0	-	13.6	-
Motorcycles	0	17	5	0	-	22	0	28	1	0	-	29	4	8	1	0	-	13	0	7	5	0	-	12	76
% Motorcycles	0.0	0.5	0.5	-	-	0.5	0.0	0.9	0.9	-	-	0.8	0.4	0.9	0.3	-	-	0.6	0.0	0.7	0.9	0.0	-	0.7	0.6
Cars & Light Goods	281	3273	1018	0	-	4572	292	2992	103	0	-	3387	1034	776	300	0	-	2110	99	886	487	1	-	1473	11542
% Cars & Light Goods	91.2	96.9	95.1	-	-	96.1	94.2	95.8	92.0	-	-	95.5	93.9	85.3	91.2	-	-	90.2	95.2	85.2	91.7	100.0	-	87.9	93.7
Buses	6	23	7	0	-	36	0	19	1	0	-	20	9	0	2	0	-	11	0	11	2	0	-	13	80
% Buses	1.9	0.7	0.7	-	-	0.8	0.0	0.6	0.9	-	-	0.6	0.8	0.0	0.6	-	-	0.5	0.0	1.1	0.4	0.0	-	0.8	0.6
Single-Unit Trucks	16	56	27	0	-	99	12	65	4	0	-	81	40	69	22	0	-	131	3	85	27	0	-	115	426
% Single-Unit Trucks	5.2	1.7	2.5	-	-	2.1	3.9	2.1	3.6	-	-	2.3	3.6	7.6	6.7	-	-	5.6	2.9	8.2	5.1	0.0	-	6.9	3.5
Articulated Trucks	5	8	13	0	-	26	4	19	3	0	-	26	14	57	4	0	-	75	1	50	10	0	-	61	188
% Articulated Trucks	1.6	0.2	1.2	-	-	0.5	1.3	0.6	2.7	-	-	0.7	1.3	6.3	1.2	-	-	3.2	1.0	4.8	1.9	0.0	-	3.6	1.5
Bicycles on Road	0	1	1	0	-	2	2	0	0	0	-	2	0	0	0	0	-	0	1	1	0	0	-	2	6
% Bicycles on Road	0.0	0.0	0.1	-	-	0.0	0.6	0.0	0.0	-	-	0.1	0.0	0.0	0.0	-	-	0.0	1.0	0.1	0.0	0.0	-	0.1	0.0
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	4	-	-
% Pedestrians	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Lundys Lane & Thorold Townline Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 3



Turning Movement Data Plot

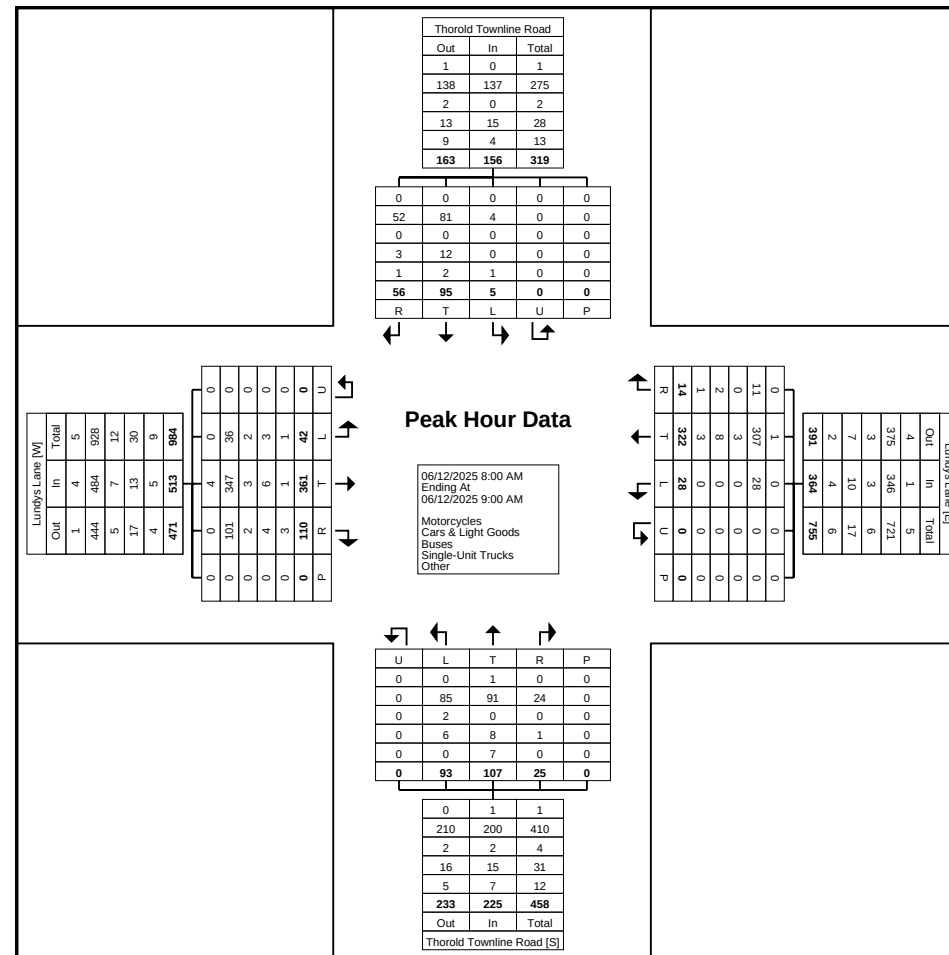
Start Time	Lundys Lane Eastbound						Lundys Lane Westbound						Thorold Townline Road Northbound						Thorold Townline Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
8:00 AM	10	78	22	0	0	110	12	82	2	0	0	96	23	26	1	0	0	50	2	19	13	0	0	34	290
8:15 AM	9	101	22	0	0	132	2	73	5	0	0	80	24	26	13	0	0	63	2	24	14	0	0	40	315
8:30 AM	12	93	27	0	0	132	9	77	5	0	0	91	24	28	6	0	0	58	0	27	14	0	0	41	322
8:45 AM	11	89	39	0	0	139	5	90	2	0	0	97	22	27	5	0	0	54	1	25	15	0	0	41	331
Total	42	361	110	0	0	513	28	322	14	0	0	364	93	107	25	0	0	225	5	95	56	0	0	156	1258
Approach %	8.2	70.4	21.4	0.0	-	-	7.7	88.5	3.8	0.0	-	-	41.3	47.6	11.1	0.0	-	-	3.2	60.9	35.9	0.0	-	-	-
Total %	3.3	28.7	8.7	0.0	-	40.8	2.2	25.6	1.1	0.0	-	28.9	7.4	8.5	2.0	0.0	-	17.9	0.4	7.6	4.5	0.0	-	12.4	-
PHF	0.875	0.894	0.705	0.000	-	0.923	0.583	0.894	0.700	0.000	-	0.938	0.969	0.955	0.481	0.000	-	0.893	0.625	0.880	0.933	0.000	-	0.951	0.950
Motorcycles	0	4	0	0	-	4	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	6
% Motorcycles	0.0	1.1	0.0	-	-	0.8	0.0	0.3	0.0	-	-	0.3	0.0	0.9	0.0	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.5
Cars & Light Goods	36	347	101	0	-	484	28	307	11	0	-	346	85	91	24	0	-	200	4	81	52	0	-	137	1167
% Cars & Light Goods	85.7	96.1	91.8	-	-	94.3	100.0	95.3	78.6	-	-	95.1	91.4	85.0	96.0	-	-	88.9	80.0	85.3	92.9	-	-	87.8	92.8
Buses	2	3	2	0	-	7	0	3	0	0	-	3	2	0	0	0	-	2	0	0	0	0	-	0	12
% Buses	4.8	0.8	1.8	-	-	1.4	0.0	0.9	0.0	-	-	0.8	2.2	0.0	0.0	-	-	0.9	0.0	0.0	0.0	-	-	0.0	1.0
Single-Unit Trucks	3	6	4	0	-	13	0	8	2	0	-	10	6	8	1	0	-	15	0	12	3	0	-	15	53
% Single-Unit Trucks	7.1	1.7	3.6	-	-	2.5	0.0	2.5	14.3	-	-	2.7	6.5	7.5	4.0	-	-	6.7	0.0	12.6	5.4	-	-	9.6	4.2
Articulated Trucks	1	1	3	0	-	5	0	3	1	0	-	4	0	7	0	0	-	7	1	2	1	0	-	4	20
% Articulated Trucks	2.4	0.3	2.7	-	-	1.0	0.0	0.9	7.1	-	-	1.1	0.0	6.5	0.0	-	-	3.1	20.0	2.1	1.8	-	-	2.6	1.6
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

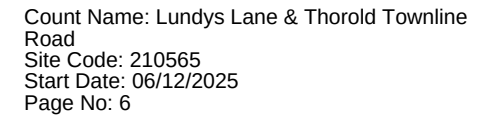


Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsI.com

Count Name: Lundys Lane & Thorold Townline
Road
Site Code: 210565
Start Date: 06/12/2025
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Start Time	Lundys Lane Eastbound						Lundys Lane Westbound						Thorold Townline Road Northbound						Thorold Townline Road 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	
12:45 PM	10	96	36	0	0	142	9	98	6	0	0	113	35	21	13	0	0	69	2	29	9	0	0	40	364
1:00 PM	5	87	33	0	0	125	14	68	6	0	0	88	33	25	7	0	0	65	2	33	7	0	0	42	320
1:15 PM	6	60	18	0	1	84	12	82	6	0	0	100	26	18	5	0	0	49	1	32	9	0	0	42	275
1:30 PM	7	139	46	0	0	192	2	61	1	0	0	64	31	41	9	0	0	81	6	31	7	0	0	44	381
Total	28	382	133	0	1	543	37	309	19	0	0	365	125	105	34	0	0	264	11	125	32	0	0	168	1340
Approach %	5.2	70.3	24.5	0.0	-	-	10.1	84.7	5.2	0.0	-	-	47.3	39.8	12.9	0.0	-	-	6.5	74.4	19.0	0.0	-	-	-
Total %	2.1	28.5	9.9	0.0	-	40.5	2.8	23.1	1.4	0.0	-	27.2	9.3	7.8	2.5	0.0	-	19.7	0.8	9.3	2.4	0.0	-	12.5	-
PHF	0.700	0.687	0.723	0.000	-	0.707	0.661	0.788	0.792	0.000	-	0.808	0.893	0.640	0.654	0.000	-	0.815	0.458	0.947	0.889	0.000	-	0.955	0.879
Motorcycles	0	2	1	0	-	3	0	1	0	0	-	1	0	0	0	0	-	0	0	1	0	0	-	1	5
% Motorcycles	0.0	0.5	0.8	-	-	0.6	0.0	0.3	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.8	0.0	-	-	0.6	0.4
Cars & Light Goods	25	371	128	0	-	524	34	299	19	0	-	352	118	88	29	0	-	235	10	99	27	0	-	136	1247
% Cars & Light Goods	89.3	97.1	96.2	-	-	96.5	91.9	96.8	100.0	-	-	96.4	94.4	83.8	85.3	-	-	89.0	90.9	79.2	84.4	-	-	81.0	93.1
Buses	0	1	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	2	0	0	-	2	3
% Buses	0.0	0.3	0.0	-	-	0.2	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	1.6	0.0	-	-	1.2	0.2
Single-Unit Trucks	3	6	2	0	-	11	2	8	0	0	-	10	4	9	5	0	-	18	0	12	5	0	-	17	56
% Single-Unit Trucks	10.7	1.6	1.5	-	-	2.0	5.4	2.6	0.0	-	-	2.7	3.2	8.6	14.7	-	-	6.8	0.0	9.6	15.6	-	-	10.1	4.2
Articulated Trucks	0	1	1	0	-	2	1	1	0	0	-	2	3	8	0	0	-	11	0	11	0	0	-	11	26
% Articulated Trucks	0.0	0.3	0.8	-	-	0.4	2.7	0.3	0.0	-	-	0.5	2.4	7.6	0.0	-	-	4.2	0.0	8.8	0.0	-	-	6.5	1.9
Bicycles on Road	0	1	1	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	1	0	0	0	-	1	3
% Bicycles on Road	0.0	0.3	0.8	-	-	0.4	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	9.1	0.0	0.0	-	-	0.6	0.2
Bicycles on Crosswalk	-	-	-	-	1	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	100.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Turning Movement Peak Hour Data Plot (12:45 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Lundys Lane & Thorold Townline Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 8

Turning Movement Peak Hour Data (4:45 PM)

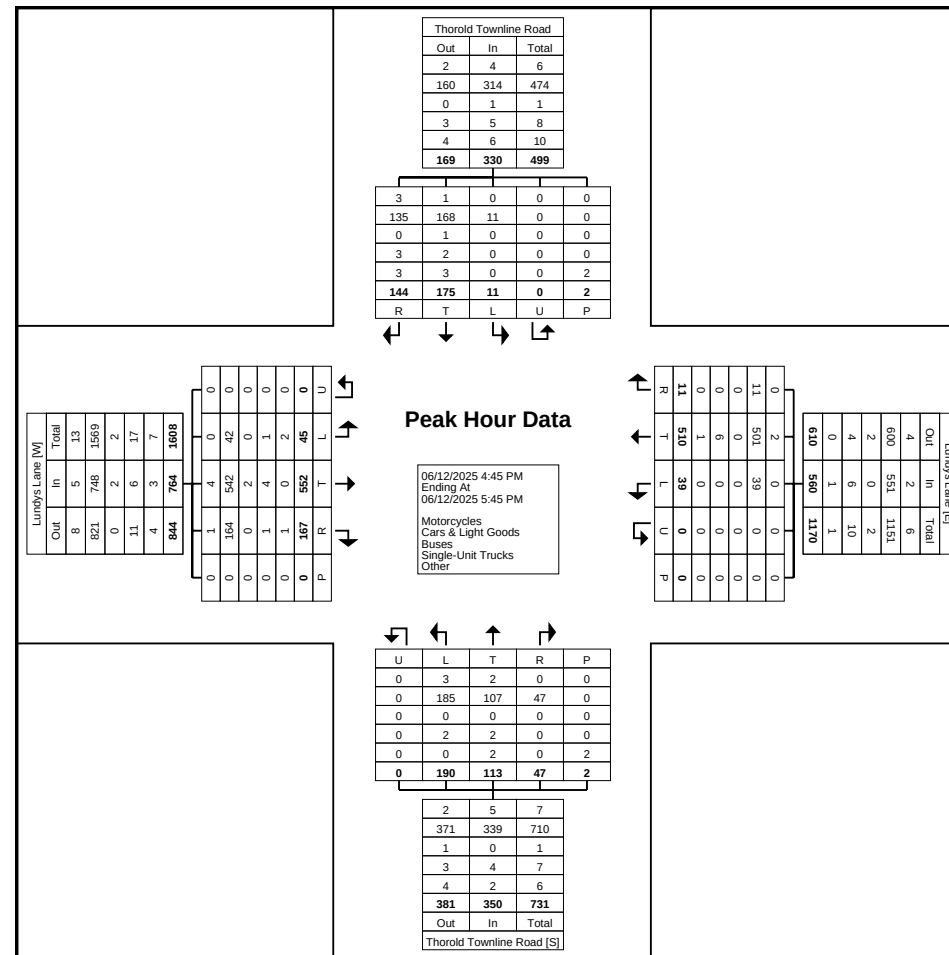
Start Time	Lundys Lane Eastbound						Lundys Lane Westbound						Thorold Townline Road Northbound						Thorold Townline Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:45 PM	8	140	36	0	0	184	8	146	3	0	0	157	48	30	15	0	0	93	3	45	39	0	0	87	521
5:00 PM	13	132	41	0	0	186	9	125	2	0	0	136	47	21	12	0	0	80	7	49	33	0	0	89	491
5:15 PM	8	151	42	0	0	201	11	126	5	0	0	142	42	37	9	0	2	88	0	47	39	0	0	86	517
5:30 PM	16	129	48	0	0	193	11	113	1	0	0	125	53	25	11	0	0	89	1	34	33	0	2	68	475
Total	45	552	167	0	0	764	39	510	11	0	0	560	190	113	47	0	2	350	11	175	144	0	2	330	2004
Approach %	5.9	72.3	21.9	0.0	-	-	7.0	91.1	2.0	0.0	-	-	54.3	32.3	13.4	0.0	-	-	3.3	53.0	43.6	0.0	-	-	-
Total %	2.2	27.5	8.3	0.0	-	38.1	1.9	25.4	0.5	0.0	-	27.9	9.5	5.6	2.3	0.0	-	17.5	0.5	8.7	7.2	0.0	-	16.5	-
PHF	0.703	0.914	0.870	0.000	-	0.950	0.886	0.873	0.550	0.000	-	0.892	0.896	0.764	0.783	0.000	-	0.941	0.393	0.893	0.923	0.000	-	0.927	0.962
Motorcycles	0	4	1	0	-	5	0	2	0	0	-	2	3	2	0	0	-	5	0	1	3	0	-	4	16
% Motorcycles	0.0	0.7	0.6	-	-	0.7	0.0	0.4	0.0	-	-	0.4	1.6	1.8	0.0	-	-	1.4	0.0	0.6	2.1	-	-	1.2	0.8
Cars & Light Goods	42	542	164	0	-	748	39	501	11	0	-	551	185	107	47	0	-	339	11	168	135	0	-	314	1952
% Cars & Light Goods	93.3	98.2	98.2	-	-	97.9	100.0	98.2	100.0	-	-	98.4	97.4	94.7	100.0	-	-	96.9	100.0	96.0	93.8	-	-	95.2	97.4
Buses	0	2	0	0	-	2	0	0	0	0	-	0	0	0	0	0	-	0	0	1	0	0	-	1	3
% Buses	0.0	0.4	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.6	0.0	-	-	0.3	0.1
Single-Unit Trucks	1	4	1	0	-	6	0	6	0	0	-	6	2	2	0	0	-	4	0	2	3	0	-	5	21
% Single-Unit Trucks	2.2	0.7	0.6	-	-	0.8	0.0	1.2	0.0	-	-	1.1	1.1	1.8	0.0	-	-	1.1	0.0	1.1	2.1	-	-	1.5	1.0
Articulated Trucks	2	0	1	0	-	3	0	1	0	0	-	1	0	2	0	0	-	2	0	3	3	0	-	6	12
% Articulated Trucks	4.4	0.0	0.6	-	-	0.4	0.0	0.2	0.0	-	-	0.2	0.0	1.8	0.0	-	-	0.6	0.0	1.7	2.1	-	-	1.8	0.6
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	2	-	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Lundys Lane & Thorold Townline
Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 9



Turning Movement Peak Hour Data Plot (4:45 PM)

Signal Code: 070H20**Intersection: RR70 (TOWNLINE RD.) & HWY 20 (LUNDYS LANE)****Municipality: thorold****Owner: MTO****Last Modified: 2018-03-28 11:28:16 AM**

Timing Parameters	EBD & WBD LUNDY'S LANE	NBD & SBD TOWNLINE RD.	-	n/a	-	-
Min Green	20	10	0	0	0	0
Walk	15	15	0	0	0	0
Ped Clearance	7	14	0	0	0	0
Vehicle Ext.	5	5	0	0	0	0
Max Green	50	40	0	0	0	0
Yellow	5	4	0	0	0	0
All Red	2	2	0	0	0	0

Offset

Minimum Cycle	43	0
Pedestrian Cycle	64	
Maximum Cycle	103	0
Operation	FA	

Installed On: 2001-05-02

Count Date: 2008-05-14

FA = Fully Actuated

SA = Semi Actuated

FT = Fixed Time

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5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@ptsll.com

Count Name: Lundys Lane & Barker Parkway
Site Code: 210565
Start Date: 06/12/2025
Page No: 1

Turning Movement Data

Start Time	Lundys Lane Eastbound					Lundys Lane Westbound					Barker Parkway Southbound					Int. Total
	Left	Thru	U-Turn	Peds	App. Total	Thru	Right	U-Turn	Peds	App. Total	Left	Right	U-Turn	Peds	App. Total	
7:00 AM	5	14	0	0	19	38	8	0	0	46	12	7	0	1	19	84
7:15 AM	12	124	0	0	136	74	8	0	0	82	17	12	0	1	29	247
7:30 AM	4	110	0	0	114	65	9	0	0	74	19	12	0	0	31	219
7:45 AM	3	94	0	0	97	96	5	0	0	101	28	6	0	0	34	232
Hourly Total	24	342	0	0	366	273	30	0	0	303	76	37	0	2	113	782
8:00 AM	11	94	0	0	105	98	21	0	0	119	29	16	0	0	45	269
8:15 AM	11	100	1	0	112	91	15	0	0	106	24	21	0	0	45	263
8:30 AM	7	104	0	0	111	103	12	0	0	115	33	15	0	0	48	274
8:45 AM	8	103	0	0	111	114	16	0	0	130	28	21	0	0	49	290
Hourly Total	37	401	1	0	439	406	64	0	0	470	114	73	0	0	187	1096
9:00 AM	9	52	0	0	61	88	21	0	0	109	18	19	0	0	37	207
9:15 AM	8	84	0	0	92	77	8	0	0	85	21	10	0	0	31	208
9:30 AM	6	105	0	0	111	110	17	0	0	127	16	6	0	0	22	260
9:45 AM	3	99	1	0	103	74	5	0	0	79	19	9	0	0	28	210
Hourly Total	26	340	1	0	367	349	51	0	0	400	74	44	0	0	118	885
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	6	44	1	0	51	63	11	0	0	74	13	7	0	0	20	145
11:15 AM	7	119	0	0	126	92	10	0	0	102	15	13	0	0	28	256
11:30 AM	8	116	0	0	124	91	13	0	0	104	15	9	0	0	24	252
11:45 AM	4	106	0	0	110	89	15	1	0	105	19	11	0	0	30	245
Hourly Total	25	385	1	0	411	335	49	1	0	385	62	40	0	0	102	898
12:00 PM	8	93	0	0	101	91	11	0	0	102	17	12	0	0	29	232
12:15 PM	9	98	0	0	107	115	17	0	0	132	13	8	0	0	21	260
12:30 PM	12	129	0	0	141	88	11	0	0	99	14	11	0	0	25	265
12:45 PM	5	112	0	0	117	118	24	0	0	142	19	8	0	0	27	286
Hourly Total	34	432	0	0	466	412	63	0	0	475	63	39	0	0	102	1043
1:00 PM	9	98	0	0	107	106	7	2	0	115	22	15	0	0	37	259
1:15 PM	8	58	0	0	66	92	20	1	0	113	27	13	0	0	40	219
1:30 PM	6	161	0	0	167	94	13	0	0	107	23	11	0	0	34	308
1:45 PM	9	108	0	0	117	99	15	0	0	114	22	6	0	0	28	259
Hourly Total	32	425	0	0	457	391	55	3	0	449	94	45	0	0	139	1045
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	11	138	0	0	149	131	17	2	0	150	20	9	0	0	29	328
3:15 PM	13	150	0	0	163	141	21	0	0	162	12	8	0	0	20	345
3:30 PM	14	120	1	0	135	132	25	0	0	157	24	13	0	0	37	329
3:45 PM	10	107	1	0	118	131	26	1	0	158	29	4	0	0	33	309

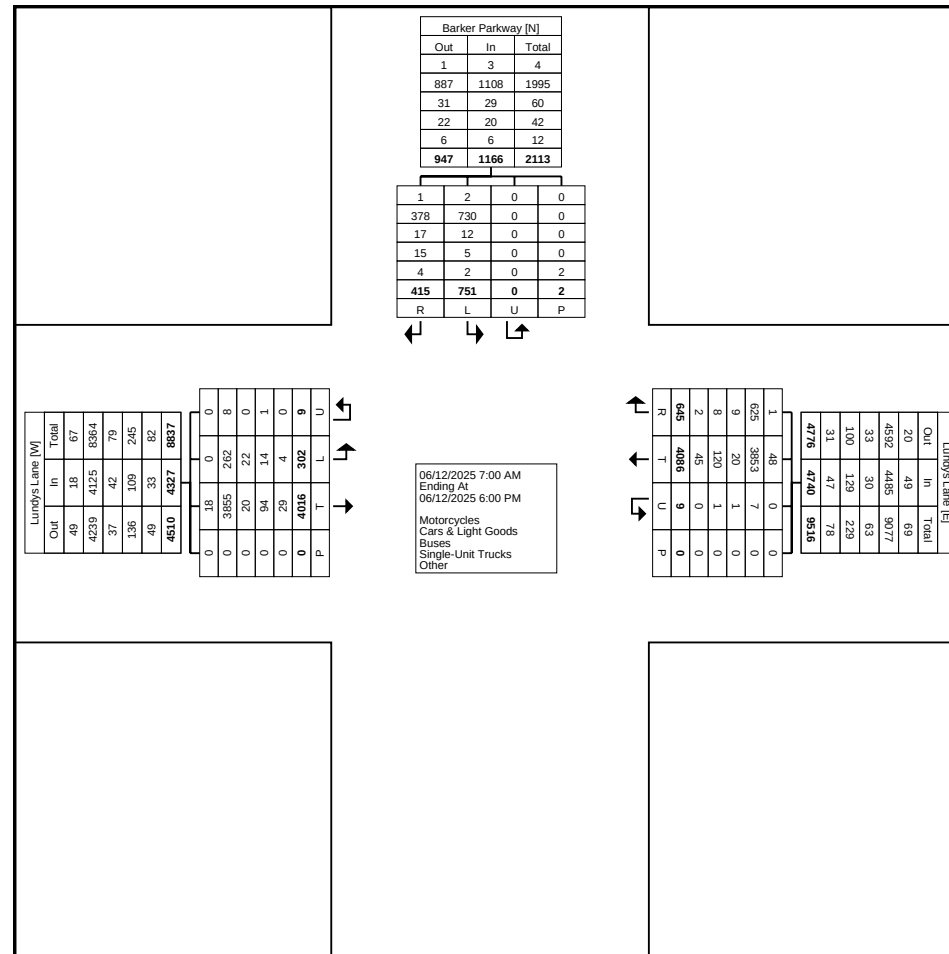
Hourly Total	48	515	2	0	565	535	89	3	0	627	85	34	0	0	119	1311
4:00 PM	11	101	0	0	112	158	28	0	0	186	20	6	0	0	26	324
4:15 PM	7	164	1	0	172	186	38	1	0	225	23	13	0	0	36	433
4:30 PM	9	124	0	0	133	164	22	1	0	187	29	17	0	0	46	366
4:45 PM	9	148	1	0	158	191	33	0	0	224	21	13	0	0	34	416
Hourly Total	36	537	2	0	575	699	121	2	0	822	93	49	0	0	142	1539
5:00 PM	5	168	1	0	174	187	26	0	0	213	20	21	0	0	41	428
5:15 PM	8	171	0	0	179	193	30	0	0	223	22	12	0	0	34	436
5:30 PM	14	156	1	0	171	173	30	0	0	203	29	16	0	0	45	419
5:45 PM	13	144	0	0	157	133	37	0	0	170	19	5	0	0	24	351
Hourly Total	40	639	2	0	681	686	123	0	0	809	90	54	0	0	144	1634
Grand Total	302	4016	9	0	4327	4086	645	9	0	4740	751	415	0	2	1166	10233
Approach %	7.0	92.8	0.2	-	-	86.2	13.6	0.2	-	-	64.4	35.6	0.0	-	-	-
Total %	3.0	39.2	0.1	-	42.3	39.9	6.3	0.1	-	46.3	7.3	4.1	0.0	-	11.4	-
Motorcycles	0	18	0	-	18	48	1	0	-	49	2	1	0	-	3	70
% Motorcycles	0.0	0.4	0.0	-	0.4	1.2	0.2	0.0	-	1.0	0.3	0.2	-	-	0.3	0.7
Cars & Light Goods	262	3855	8	-	4125	3853	625	7	-	4485	730	378	0	-	1108	9718
% Cars & Light Goods	86.8	96.0	88.9	-	95.3	94.3	96.9	77.8	-	94.6	97.2	91.1	-	-	95.0	95.0
Buses	22	20	0	-	42	20	9	1	-	30	12	17	0	-	29	101
% Buses	7.3	0.5	0.0	-	1.0	0.5	1.4	11.1	-	0.6	1.6	4.1	-	-	2.5	1.0
Single-Unit Trucks	14	94	1	-	109	120	8	1	-	129	5	15	0	-	20	258
% Single-Unit Trucks	4.6	2.3	11.1	-	2.5	2.9	1.2	11.1	-	2.7	0.7	3.6	-	-	1.7	2.5
Articulated Trucks	4	28	0	-	32	44	1	0	-	45	2	4	0	-	6	83
% Articulated Trucks	1.3	0.7	0.0	-	0.7	1.1	0.2	0.0	-	0.9	0.3	1.0	-	-	0.5	0.8
Bicycles on Road	0	1	0	-	1	1	1	0	-	2	0	0	0	-	0	3
% Bicycles on Road	0.0	0.0	0.0	-	0.0	0.0	0.2	0.0	-	0.0	0.0	0.0	-	-	0.0	0.0
Bicycles on Crosswalk	-	-	-	0	-	-	-	-	0	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-
Pedestrians	-	-	-	0	-	-	-	-	0	-	-	-	-	2	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	100.0	-	-



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

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Count Name: Lundys Lane & Barker Parkway
Site Code: 210565
Start Date: 06/12/2025
Page No: 3



Turning Movement Data Plot

[illegible]

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

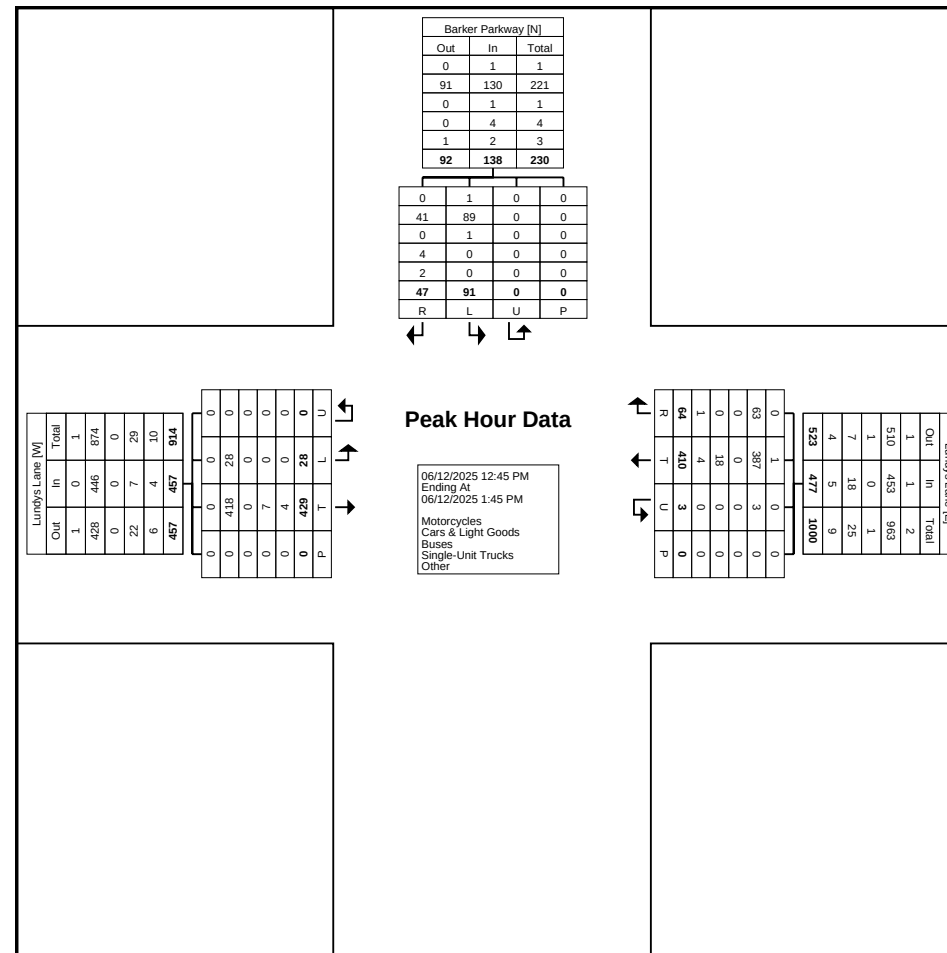
[illegible]



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Count Name: Lundys Lane & Barker Parkway
Site Code: 210565
Start Date: 06/12/2025
Page No: 7



Turning Movement Peak Hour Data Plot (12:45 PM)

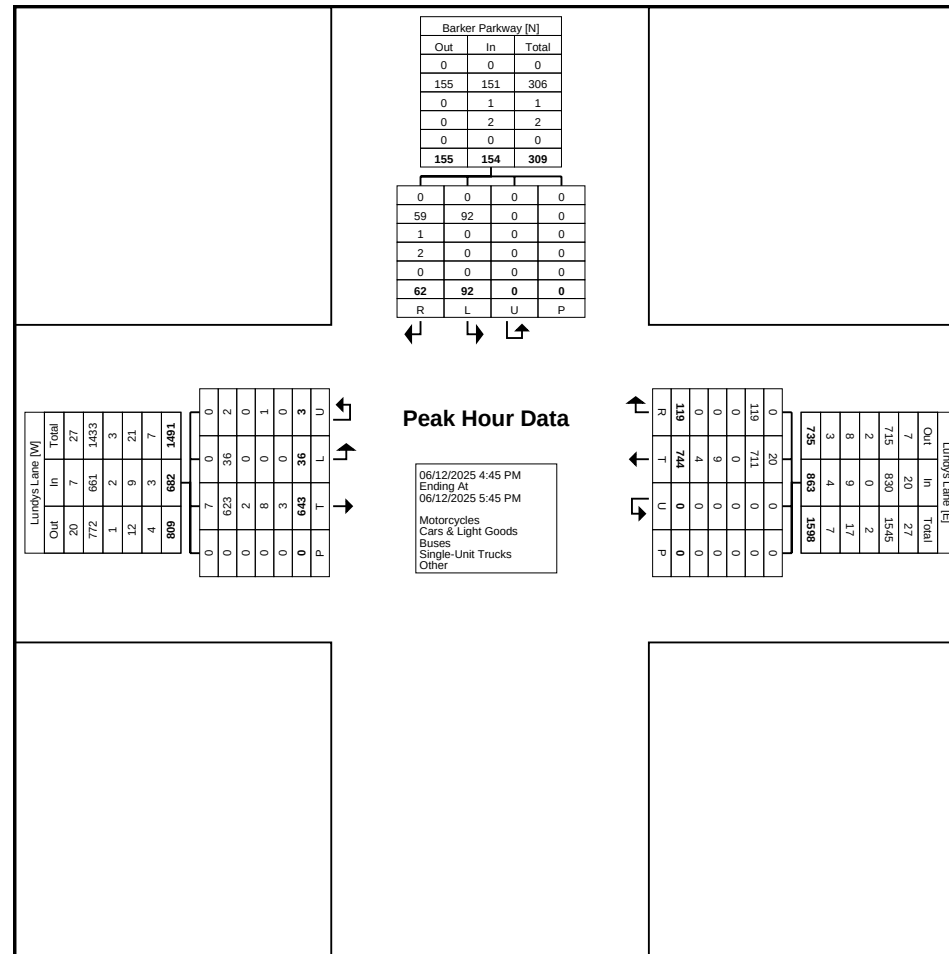
[illegible]



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Cambridge, Ontario, Canada N1R 8J8
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Count Name: Lundys Lane & Barker Parkway
Site Code: 210565
Start Date: 06/12/2025
Page No: 9



Turning Movement Peak Hour Data Plot (4:45 PM)



Paradigm Transportation Solutions Limited
5A-150 Pinebush Rd

Cambridge, Ontario, Canada N1R 8J8
519-896-3163 cbowness@pts1.com

Count Name: Thorold Townline Road &
Beaverdams Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 1

Turning Movement Data

Start Time	Beaverdams Road Eastbound						Beaverdams Road Westbound						Thorold Townline Road Northbound						Thorold Townline Road 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	9	13	3	0	0	25	0	16	2	0	0	18	4	16	0	0	0	20	2	19	4	0	0	25	88
7:15 AM	8	15	4	0	0	27	2	23	4	0	0	29	6	27	1	0	0	34	3	16	7	0	0	26	116
7:30 AM	14	33	14	0	0	61	2	27	5	0	0	34	17	29	1	0	0	47	1	21	12	0	0	34	176
7:45 AM	24	34	7	0	0	65	0	57	9	0	0	66	6	21	1	0	0	28	4	29	15	0	0	48	207
Hourly Total	55	95	28	0	0	178	4	123	20	0	0	147	33	93	3	0	0	129	10	85	38	0	0	133	587
8:00 AM	22	20	2	0	0	44	1	46	6	0	0	53	5	31	2	0	0	38	1	33	17	0	0	51	186
8:15 AM	17	20	9	0	0	46	3	49	5	0	0	57	10	30	2	0	0	42	4	32	18	0	0	54	199
8:30 AM	22	26	7	0	0	55	3	46	9	0	0	58	11	35	0	0	0	46	7	29	14	0	0	50	209
8:45 AM	16	23	13	0	0	52	2	48	8	0	0	58	7	36	0	0	0	43	3	32	26	0	0	61	214
Hourly Total	77	89	31	0	0	197	9	189	28	0	0	226	33	132	4	0	0	169	15	126	75	0	0	216	808
9:00 AM	14	17	8	0	0	39	2	22	3	0	0	27	3	20	0	0	0	23	1	34	17	0	0	52	141
9:15 AM	6	18	4	0	0	28	1	12	5	0	0	18	4	13	1	0	0	18	4	22	13	0	0	39	103
9:30 AM	8	20	13	0	0	41	2	30	4	0	0	36	8	38	2	0	0	48	6	30	4	0	0	40	165
9:45 AM	1	22	10	0	0	33	1	24	5	0	0	30	5	20	3	0	0	28	2	23	7	0	0	32	123
Hourly Total	29	77	35	0	0	141	6	88	17	0	0	111	20	91	6	0	0	117	13	109	41	0	0	163	532
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11:00 AM	3	17	3	0	0	23	0	27	6	0	0	33	9	24	2	0	0	35	5	24	4	0	0	33	124
11:15 AM	10	24	7	0	0	41	1	24	7	0	0	32	4	21	1	0	0	26	7	23	6	0	0	36	135
11:30 AM	9	22	5	0	0	36	2	20	9	0	0	31	5	35	1	0	0	41	3	25	16	0	0	44	152
11:45 AM	6	20	11	0	0	37	2	34	8	0	0	44	10	26	0	0	0	36	7	23	13	0	0	43	160
Hourly Total	28	83	26	0	0	137	5	105	30	0	0	140	28	106	4	0	0	138	22	95	39	0	0	156	571
12:00 PM	5	17	10	0	0	32	1	29	6	0	0	36	7	28	1	0	0	36	5	30	9	0	0	44	148
12:15 PM	6	22	3	0	0	31	2	31	5	0	0	38	4	19	1	0	0	24	2	28	9	0	0	39	132
12:30 PM	5	36	11	0	0	52	4	39	5	0	0	48	9	22	1	0	0	32	2	21	12	0	0	35	167
12:45 PM	8	26	14	0	0	48	0	21	6	0	0	27	9	30	1	0	0	40	4	28	11	0	0	43	158
Hourly Total	24	101	38	0	0	163	7	120	22	0	0	149	29	99	4	0	0	132	13	107	41	0	0	161	605
1:00 PM	8	24	11	0	0	43	1	30	6	0	0	37	8	24	0	0	0	32	2	30	7	0	0	39	151
1:15 PM	3	31	8	0	0	42	1	29	3	0	0	33	10	22	0	0	0	32	6	32	8	0	0	46	153
1:30 PM	8	29	9	0	0	46	1	44	6	0	0	51	14	33	1	0	0	48	1	34	14	0	0	49	194
1:45 PM	13	23	8	0	0	44	1	41	6	0	0	48	10	37	0	0	0	47	2	37	30	0	0	69	208
Hourly Total	32	107	36	0	0	175	4	144	21	0	0	169	42	116	1	0	0	159	11	133	59	0	0	203	706
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3:00 PM	6	26	10	0	0	42	0	44	5	0	0	49	15	27	2	0	0	44	9	40	25	0	0	74	209
3:15 PM	14	36	11	0	0	61	3	61	5	0	0	69	15	24	5	0	0	44	4	43	34	0	0	81	255
3:30 PM	18	33	11	0	0	62	2	28	11	0	0	41	7	29	2	0	0	38	9	42	27	0	0	78	219

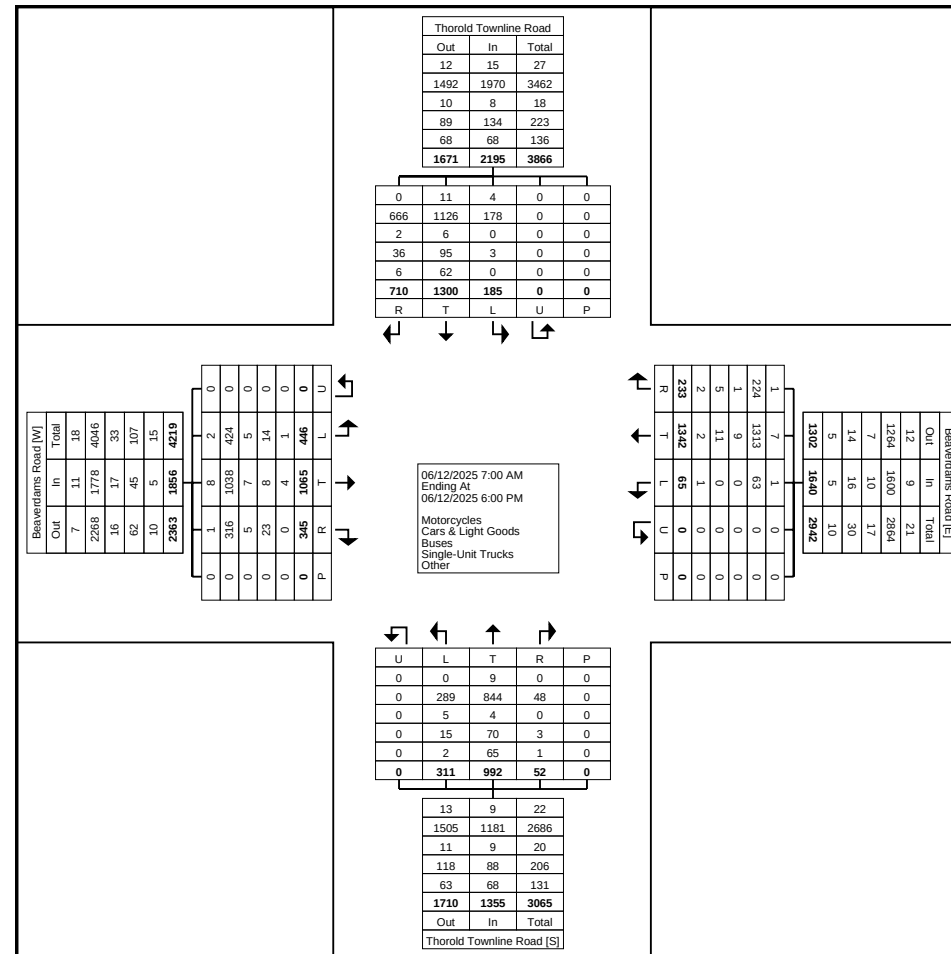
3:45 PM	12	45	12	0	0	69	3	40	6	0	0	49	12	24	4	0	0	40	6	37	28	0	0	71	229
Hourly Total	50	140	44	0	0	234	8	173	27	0	0	208	49	104	13	0	0	166	28	162	114	0	0	304	912
4:00 PM	23	43	7	0	0	73	4	57	5	0	0	66	17	19	1	0	0	37	15	56	30	0	0	101	277
4:15 PM	23	49	19	0	0	91	0	63	10	0	0	73	13	42	1	0	0	56	6	47	45	0	0	98	318
4:30 PM	23	53	19	0	0	95	3	44	9	0	0	56	13	41	2	0	0	56	10	67	33	0	0	110	317
4:45 PM	17	63	15	0	0	95	1	54	6	0	0	61	14	32	1	0	0	47	7	77	36	0	0	120	323
Hourly Total	86	208	60	0	0	354	8	218	30	0	0	256	57	134	5	0	0	196	38	247	144	0	0	429	1235
5:00 PM	26	52	15	0	0	93	2	50	4	0	0	56	2	31	3	0	0	36	6	63	53	0	0	122	307
5:15 PM	14	44	9	0	0	67	6	53	16	0	0	75	11	31	2	0	0	44	9	80	43	0	0	132	318
5:30 PM	16	41	12	0	0	69	3	46	13	0	0	62	3	34	5	0	0	42	12	58	38	0	0	108	281
5:45 PM	9	28	11	0	0	48	3	33	5	0	0	41	4	21	2	0	0	27	8	35	25	0	0	68	184
Hourly Total	65	165	47	0	0	277	14	182	38	0	0	234	20	117	12	0	0	149	35	236	159	0	0	430	1090
Grand Total	446	1065	345	0	0	1856	65	1342	233	0	0	1640	311	992	52	0	0	1355	185	1300	710	0	0	2195	7046
Approach %	24.0	57.4	18.6	0.0	-	-	4.0	81.8	14.2	0.0	-	-	23.0	73.2	3.8	0.0	-	-	8.4	59.2	32.3	0.0	-	-	-
Total %	6.3	15.1	4.9	0.0	-	26.3	0.9	19.0	3.3	0.0	-	23.3	4.4	14.1	0.7	0.0	-	19.2	2.6	18.5	10.1	0.0	-	31.2	-
Motorcycles	2	8	1	0	-	11	1	7	1	0	-	9	0	9	0	0	-	9	4	11	0	0	-	15	44
% Motorcycles	0.4	0.8	0.3	-	-	0.6	1.5	0.5	0.4	-	-	0.5	0.0	0.9	0.0	-	-	0.7	2.2	0.8	0.0	-	-	0.7	0.6
Cars & Light Goods	424	1038	316	0	-	1778	63	1313	224	0	-	1600	289	844	48	0	-	1181	178	1126	666	0	-	1970	6529
% Cars & Light Goods	95.1	97.5	91.6	-	-	95.8	96.9	97.8	96.1	-	-	97.6	92.9	85.1	92.3	-	-	87.2	96.2	86.6	93.8	-	-	89.7	92.7
Buses	5	7	5	0	-	17	0	9	1	0	-	10	5	4	0	0	-	9	0	6	2	0	-	8	44
% Buses	1.1	0.7	1.4	-	-	0.9	0.0	0.7	0.4	-	-	0.6	1.6	0.4	0.0	-	-	0.7	0.0	0.5	0.3	-	-	0.4	0.6
Single-Unit Trucks	14	8	23	0	-	45	0	11	5	0	-	16	15	70	3	0	-	88	3	95	36	0	-	134	283
% Single-Unit Trucks	3.1	0.8	6.7	-	-	2.4	0.0	0.8	2.1	-	-	1.0	4.8	7.1	5.8	-	-	6.5	1.6	7.3	5.1	-	-	6.1	4.0
Articulated Trucks	1	0	0	0	-	1	0	2	1	0	-	3	2	65	0	0	-	67	0	61	6	0	-	67	138
% Articulated Trucks	0.2	0.0	0.0	-	-	0.1	0.0	0.1	0.4	-	-	0.2	0.6	6.6	0.0	-	-	4.9	0.0	4.7	0.8	-	-	3.1	2.0
Bicycles on Road	0	4	0	0	-	4	1	0	1	0	-	2	0	0	1	0	-	1	0	1	0	0	-	1	8
% Bicycles on Road	0.0	0.4	0.0	-	-	0.2	1.5	0.0	0.4	-	-	0.1	0.0	0.0	1.9	-	-	0.1	0.0	0.1	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
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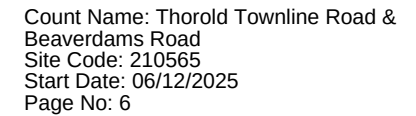
Count Name: Thorold Townline Road &
Beaverdams Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 3



Turning Movement Data Plot

Start Time	Beaverdams Road Eastbound						Beaverdams Road Westbound						Thorold Townline Road Northbound						Thorold Townline Road 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	22	20	2	0	0	44	1	46	6	0	0	53	5	31	2	0	0	38	1	33	17	0	0	51	186
8:15 AM	17	20	9	0	0	46	3	49	5	0	0	57	10	30	2	0	0	42	4	32	18	0	0	54	199
8:30 AM	22	26	7	0	0	55	3	46	9	0	0	58	11	35	0	0	0	46	7	29	14	0	0	50	209
8:45 AM	16	23	13	0	0	52	2	48	8	0	0	58	7	36	0	0	0	43	3	32	26	0	0	61	214
Total	77	89	31	0	0	197	9	189	28	0	0	226	33	132	4	0	0	169	15	126	75	0	0	216	808
Approach %	39.1	45.2	15.7	0.0	-	-	4.0	83.6	12.4	0.0	-	-	19.5	78.1	2.4	0.0	-	-	6.9	58.3	34.7	0.0	-	-	-
Total %	9.5	11.0	3.8	0.0	-	24.4	1.1	23.4	3.5	0.0	-	28.0	4.1	16.3	0.5	0.0	-	20.9	1.9	15.6	9.3	0.0	-	26.7	-
PHF	0.875	0.856	0.596	0.000	-	0.895	0.750	0.964	0.778	0.000	-	0.974	0.750	0.917	0.500	0.000	-	0.918	0.536	0.955	0.721	0.000	-	0.885	0.944
Motorcycles	0	0	0	0	-	0	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	2
% Motorcycles	0.0	0.0	0.0	-	-	0.0	0.0	0.5	0.0	-	-	0.4	0.0	0.8	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.2
Cars & Light Goods	73	89	28	0	-	190	9	185	28	0	-	222	28	112	4	0	-	144	14	110	66	0	-	190	746
% Cars & Light Goods	94.8	100.0	90.3	-	-	96.4	100.0	97.9	100.0	-	-	98.2	84.8	84.8	100.0	-	-	85.2	93.3	87.3	88.0	-	-	88.0	92.3
Buses	2	0	0	0	-	2	0	2	0	0	-	2	3	0	0	0	-	3	0	0	0	0	-	0	7
% Buses	2.6	0.0	0.0	-	-	1.0	0.0	1.1	0.0	-	-	0.9	9.1	0.0	0.0	-	-	1.8	0.0	0.0	0.0	-	-	0.0	0.9
Single-Unit Trucks	1	0	3	0	-	4	0	1	0	0	-	1	1	10	0	0	-	11	1	12	6	0	-	19	35
% Single-Unit Trucks	1.3	0.0	9.7	-	-	2.0	0.0	0.5	0.0	-	-	0.4	3.0	7.6	0.0	-	-	6.5	6.7	9.5	8.0	-	-	8.8	4.3
Articulated Trucks	1	0	0	0	-	1	0	0	0	0	-	0	1	9	0	0	-	10	0	4	3	0	-	7	18
% Articulated Trucks	1.3	0.0	0.0	-	-	0.5	0.0	0.0	0.0	-	-	0.0	3.0	6.8	0.0	-	-	5.9	0.0	3.2	4.0	-	-	3.2	2.2
Bicycles on Road	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0
% Bicycles on Road	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
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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



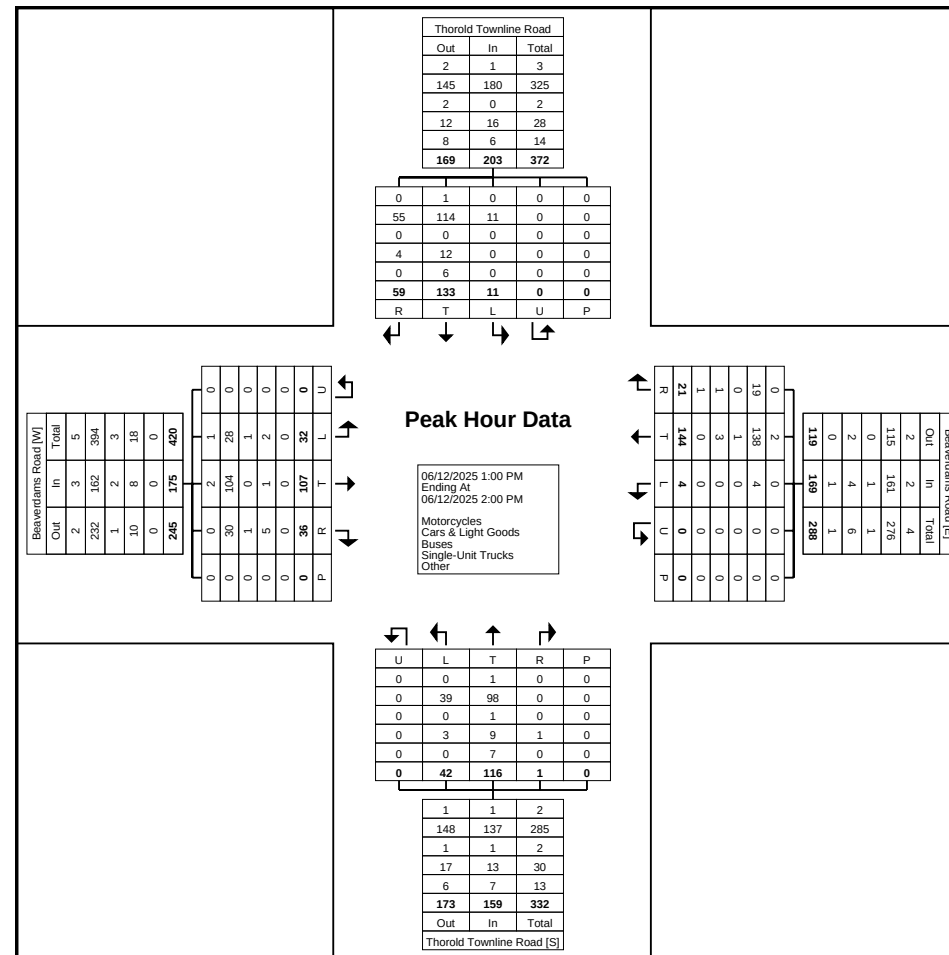
Start Time	Beaverdams Road Eastbound						Beaverdams Road Westbound						Thorold Townline Road Northbound						Thorold Townline Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
1:00 PM	8	24	11	0	0	43	1	30	6	0	0	37	8	24	0	0	0	32	2	30	7	0	0	39	151
1:15 PM	3	31	8	0	0	42	1	29	3	0	0	33	10	22	0	0	0	32	6	32	8	0	0	46	153
1:30 PM	8	29	9	0	0	46	1	44	6	0	0	51	14	33	1	0	0	48	1	34	14	0	0	49	194
1:45 PM	13	23	8	0	0	44	1	41	6	0	0	48	10	37	0	0	0	47	2	37	30	0	0	69	208
Total	32	107	36	0	0	175	4	144	21	0	0	169	42	116	1	0	0	159	11	133	59	0	0	203	706
Approach %	18.3	61.1	20.6	0.0	-	-	2.4	85.2	12.4	0.0	-	-	26.4	73.0	0.6	0.0	-	-	5.4	65.5	29.1	0.0	-	-	-
Total %	4.5	15.2	5.1	0.0	-	24.8	0.6	20.4	3.0	0.0	-	23.9	5.9	16.4	0.1	0.0	-	22.5	1.6	18.8	8.4	0.0	-	28.8	-
PHF	0.615	0.863	0.818	0.000	-	0.951	1.000	0.818	0.875	0.000	-	0.828	0.750	0.784	0.250	0.000	-	0.828	0.458	0.899	0.492	0.000	-	0.736	0.849
Motorcycles	1	2	0	0	-	3	0	2	0	0	-	2	0	1	0	0	-	1	0	1	0	0	-	1	7
% Motorcycles	3.1	1.9	0.0	-	-	1.7	0.0	1.4	0.0	-	-	1.2	0.0	0.9	0.0	-	-	0.6	0.0	0.8	0.0	-	-	0.5	1.0
Cars & Light Goods	28	104	30	0	-	162	4	138	19	0	-	161	39	98	0	0	-	137	11	114	55	0	-	180	640
% Cars & Light Goods	87.5	97.2	83.3	-	-	92.6	100.0	95.8	90.5	-	-	95.3	92.9	84.5	0.0	-	-	86.2	100.0	85.7	93.2	-	-	88.7	90.7
Buses	1	0	1	0	-	2	0	1	0	0	-	1	0	1	0	0	-	1	0	0	0	0	-	0	4
% Buses	3.1	0.0	2.8	-	-	1.1	0.0	0.7	0.0	-	-	0.6	0.0	0.9	0.0	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.6
Single-Unit Trucks	2	1	5	0	-	8	0	3	1	0	-	4	3	9	1	0	-	13	0	12	4	0	-	16	41
% Single-Unit Trucks	6.3	0.9	13.9	-	-	4.6	0.0	2.1	4.8	-	-	2.4	7.1	7.8	100.0	-	-	8.2	0.0	9.0	6.8	-	-	7.9	5.8
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	7	0	0	-	7	0	6	0	0	-	6	13
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	6.0	0.0	-	-	4.4	0.0	4.5	0.0	-	-	3.0	1.8
Bicycles on Road	0	0	0	0	-	0	0	0	1	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	1
% Bicycles on Road	0.0	0.0	0.0	-	-	0.0	0.0	0.0	4.8	-	-	0.6	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.1
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Paradigm Transportation Solutions Limited
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Count Name: Thorold Townline Road &
Beaverdams Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 7



Turning Movement Peak Hour Data Plot (1:00 PM)

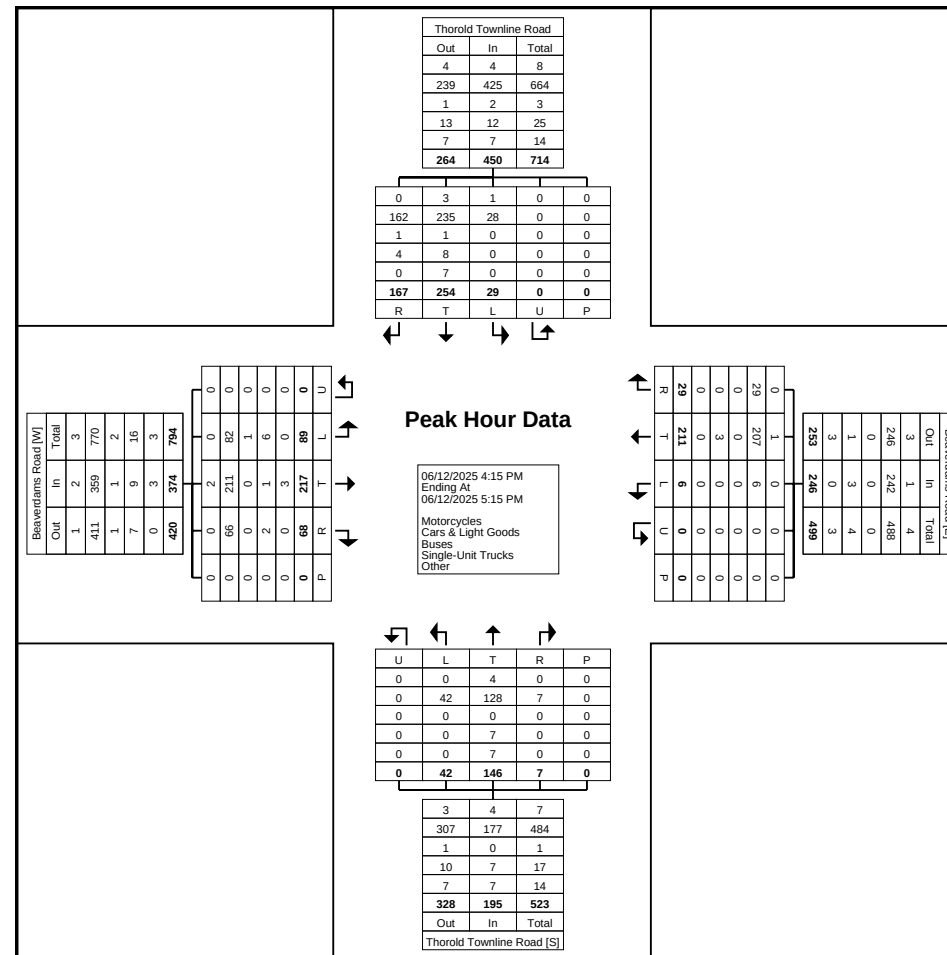
Start Time	Beaverdams Road Eastbound						Beaverdams Road Westbound						Thorold Townline Road Northbound						Thorold Townline Road Southbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:15 PM	23	49	19	0	0	91	0	63	10	0	0	73	13	42	1	0	0	56	6	47	45	0	0	98	318
4:30 PM	23	53	19	0	0	95	3	44	9	0	0	56	13	41	2	0	0	56	10	67	33	0	0	110	317
4:45 PM	17	63	15	0	0	95	1	54	6	0	0	61	14	32	1	0	0	47	7	77	36	0	0	120	323
5:00 PM	26	52	15	0	0	93	2	50	4	0	0	56	2	31	3	0	0	36	6	63	53	0	0	122	307
Total	89	217	68	0	0	374	6	211	29	0	0	246	42	146	7	0	0	195	29	254	167	0	0	450	1265
Approach %	23.8	58.0	18.2	0.0	-	-	2.4	85.8	11.8	0.0	-	-	21.5	74.9	3.6	0.0	-	-	6.4	56.4	37.1	0.0	-	-	-
Total %	7.0	17.2	5.4	0.0	-	29.6	0.5	16.7	2.3	0.0	-	19.4	3.3	11.5	0.6	0.0	-	15.4	2.3	20.1	13.2	0.0	-	35.6	-
PHF	0.856	0.861	0.895	0.000	-	0.984	0.500	0.837	0.725	0.000	-	0.842	0.750	0.869	0.583	0.000	-	0.871	0.725	0.825	0.788	0.000	-	0.922	0.979
Motorcycles	0	2	0	0	-	2	0	1	0	0	-	1	0	4	0	0	-	4	1	3	0	0	-	4	11
% Motorcycles	0.0	0.9	0.0	-	-	0.5	0.0	0.5	0.0	-	-	0.4	0.0	2.7	0.0	-	-	2.1	3.4	1.2	0.0	-	-	0.9	0.9
Cars & Light Goods	82	211	66	0	-	359	6	207	29	0	-	242	42	128	7	0	-	177	28	235	162	0	-	425	1203
% Cars & Light Goods	92.1	97.2	97.1	-	-	96.0	100.0	98.1	100.0	-	-	98.4	100.0	87.7	100.0	-	-	90.8	96.6	92.5	97.0	-	-	94.4	95.1
Buses	1	0	0	0	-	1	0	0	0	0	-	0	0	0	0	0	-	0	0	1	1	0	-	2	3
% Buses	1.1	0.0	0.0	-	-	0.3	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	0.4	0.6	-	-	0.4	0.2
Single-Unit Trucks	6	1	2	0	-	9	0	3	0	0	-	3	0	7	0	0	-	7	0	8	4	0	-	12	31
% Single-Unit Trucks	6.7	0.5	2.9	-	-	2.4	0.0	1.4	0.0	-	-	1.2	0.0	4.8	0.0	-	-	3.6	0.0	3.1	2.4	-	-	2.7	2.5
Articulated Trucks	0	0	0	0	-	0	0	0	0	0	-	0	0	7	0	0	-	7	0	7	0	0	-	7	14
% Articulated Trucks	0.0	0.0	0.0	-	-	0.0	0.0	0.0	0.0	-	-	0.0	0.0	4.8	0.0	-	-	3.6	0.0	2.8	0.0	-	-	1.6	1.1
Bicycles on Road	0	3	0	0	-	3	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	3
% Bicycles on Road	0.0	1.4	0.0	-	-	0.8	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
Bicycles on Crosswalk	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Bicycles on Crosswalk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Count Name: Thorold Townline Road &
Beaverdams Road
Site Code: 210565
Start Date: 06/12/2025
Page No: 9



Turning Movement Peak Hour Data Plot (4:15 PM)

Appendix C

Base Year Operations Synchro Reports



Lanes, Volumes, Timings

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Base Year - 2025

AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱	↱	↰	↰	↰	↰	↰	↰	↰	↰	↰
Traffic Volume (vph)	42	361	110	28	322	14	93	107	25	5	95	56
Future Volume (vph)	42	361	110	28	322	14	93	107	25	5	95	56
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.994			0.972			0.944	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1318	0	1311	1203	0	1191	1170	0
Flt Permitted	0.523			0.501			0.653			0.666		
Satd. Flow (perm)	690	1582	1063	754	1318	0	901	1203	0	835	1170	0
Right Turn on Red			Yes		Yes			Yes			Yes	
Satd. Flow (RTOR)			88		4			16			39	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	46	392	120	30	350	15	101	116	27	5	103	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	46	392	120	30	365	0	101	143	0	5	164	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

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Lanes, Volumes, Timings

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Base Year - 2025

AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	27.4	27.4	27.4	27.4	27.4		15.1	15.1		15.1	15.1	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62		0.34	0.34		0.34	0.34	
v/c Ratio	0.11	0.40	0.17	0.06	0.45		0.33	0.34		0.02	0.39	
Control Delay (s/veh)	7.6	9.1	3.7	7.1	10.1		17.0	14.8		12.4	13.9	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	7.6	9.1	3.7	7.1	10.1		17.0	14.8		12.4	13.9	
LOS	A	A	A	A	B		B	B		B	B	
Approach Delay (s/veh)		7.8			9.8			15.7			13.8	
Approach LOS		A			A			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 44.5

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.45

Intersection Signal Delay (s/veh): 10.5

Intersection LOS: B

Intersection Capacity Utilization 73.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Thorold Townline & Highway 20, Thorold
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Queues

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Base Year - 2025

AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	46	392	120	30	365	101	143	5	164
v/c Ratio	0.11	0.40	0.17	0.06	0.45	0.33	0.34	0.02	0.39
Control Delay (s/veh)	7.6	9.1	3.7	7.1	10.1	17.0	14.8	12.4	13.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	7.6	9.1	3.7	7.1	10.1	17.0	14.8	12.4	13.9
Queue Length 50th (m)	1.6	17.0	1.1	1.0	16.3	6.3	7.9	0.3	7.8
Queue Length 95th (m)	7.4	47.5	8.7	5.3	48.1	20.0	23.8	2.4	25.0
Internal Link Dist (m)	912.7			557.5			759.0		
Turn Bay Length (m)	90.0	20.0			55.0	20.0			20.0
Base Capacity (vph)	652	1494	1009	712	1245	722	967	669	945
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.07	0.26	0.12	0.04	0.29	0.14	0.15	0.01	0.17

Intersection Summary

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Base Year - 2025

AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Traffic Volume (vph)	42	361	110	28	322	14	93	107	25	5	95	56
Future Volume (vph)	42	361	110	28	322	14	93	107	25	5	95	56
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1318		1311	1203		1191	1170	
Flt Permitted	0.52	1.00	1.00	0.50	1.00		0.65	1.00		0.67	1.00	
Satd. Flow (perm)	690	1582	1063	753	1318		901	1203		835	1170	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	46	392	120	30	350	15	101	116	27	5	103	61
RTOR Reduction (vph)	0	0	38	0	2	0	0	12	0	0	29	0
Lane Group Flow (vph)	46	392	82	30	363	0	101	131	0	5	135	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases	4				8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	22.9	22.9	22.9	22.9	22.9		9.6	9.6		9.6	9.6	
Effective Green, g (s)	25.9	25.9	25.9	25.9	25.9		11.6	11.6		11.6	11.6	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57		0.25	0.25		0.25	0.25	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	392	900	605	428	750		229	306		212	298	
v/s Ratio Prot		0.25			c0.28			0.11			c0.12	
v/s Ratio Perm	0.07		0.08	0.04			0.11			0.01		
v/c Ratio	0.12	0.44	0.14	0.07	0.48		0.44	0.43		0.02	0.45	
Uniform Delay, d1	4.5	5.6	4.6	4.4	5.8		14.2	14.2		12.7	14.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3	0.1	0.1	0.5		1.4	1.0		0.0	1.1	
Delay (s)	4.7	6.0	4.7	4.5	6.3		15.6	15.1		12.8	15.4	
Level of Service	A	A	A	A	A		B	B		B	B	
Approach Delay (s/veh)		5.6			6.2			15.3			15.3	
Approach LOS		A			A			B			B	

Intersection Summary

HCM 2000 Control Delay (s/veh)	8.7	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	45.5	Sum of lost time (s)	8.0
Intersection Capacity Utilization	73.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Base Year - 2025
AM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	77	89	30	8	189	28	32	127	4	15	118	75
Future Volume (vph)	77	89	30	8	189	28	32	127	4	15	118	75
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.979			0.983			0.997			0.951		
Flt Protected	0.981			0.998			0.990			0.996		
Satd. Flow (prot)	0	1376	0	0	1431	0	0	1285	0	0	1252	0
Flt Permitted	0.981			0.998			0.990			0.996		
Satd. Flow (perm)	0	1376	0	0	1431	0	0	1285	0	0	1252	0
Link Speed (k/h)	50			50			50			50		
Link Distance (m)	418.6			537.1			2628.2			714.3		
Travel Time (s)	30.1			38.7			189.2			51.4		
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	84	97	33	9	205	30	35	138	4	16	128	82
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	214	0	0	244	0	0	177	0	0	226	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control	Stop			Stop			Stop			Stop		

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization 60.8%	ICU Level of Service B
Analysis Period (min) 15	

HCM Unsignalized Intersection Capacity Analysis
102: Thorold Townline Rd & Beaverdams Rd

Base Year - 2025
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	77	89	30	8	189	28	32	127	4	15	118	75
Future Volume (vph)	77	89	30	8	189	28	32	127	4	15	118	75
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)	84	97	33	9	205	30	35	138	4	16	128	82
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	214	244	177	226								
Volume Left (vph)	84	9	35	16								
Volume Right (vph)	33	30	4	82								
Hadj (s)	0.05	-0.04	0.26	0.00								
Departure Headway (s)	5.5	5.4	5.9	5.5								
Degree Utilization, x	0.33	0.37	0.29	0.35								
Capacity (veh/h)	596	614	554	598								
Control Delay (s/veh)	11.2	11.5	11.2	11.4								
Approach Delay (s/veh)	11.2	11.5	11.2	11.4								
Approach LOS	B	B	B	B								
Intersection Summary												
Delay	11.4											
Level of Service	B											
Intersection Capacity Utilization	60.8%			ICU Level of Service						B		
Analysis Period (min)	15											

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Base Year - 2025
AM Peak Hour

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	37	399	407	64	114	73
Future Volume (vph)	37	399	407	64	114	73
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.982		0.947	
Flt Protected		0.996			0.970	
Satd. Flow (prot)	0	1147	1281	0	1281	0
Flt Permitted		0.996			0.970	
Satd. Flow (perm)	0	1147	1281	0	1281	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	40	434	442	70	124	79
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	474	512	0	203	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	94.1%			ICU Level of Service F		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Base Year - 2025
AM Peak Hour

	EBL	EBT	WBT	WBR	SBL	SBR
Movement						
Right Turn Channelized						
Traffic Volume (veh/h)	37	399	407	64	114	73
Future Volume (veh/h)	37	399	407	64	114	73
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	40	434	442	70	124	79
Approach Volume (veh/h)		474	512		203	
Crossing Volume (veh/h)		124	40		442	
High Capacity (veh/h)		1257	1342		978	
High v/c (veh/h)		0.38	0.38		0.21	
Low Capacity (veh/h)		1045	1123		794	
Low v/c (veh/h)		0.45	0.46		0.26	
Intersection Summary						
Maximum v/c High	0.38					
Maximum v/c Low	0.46					
Intersection Capacity Utilization	94.1%			ICU Level of Service F		

HCM 6th Roundabout
103: Highway 20 & Barker Parkway

Base Year - 2025
AM Peak Hour

Intersection			
Intersection Delay, s/veh	7.3		
Intersection LOS	A		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	474	512	203
Demand Flow Rate, veh/h	506	545	216
Vehicles Circulating, veh/h	129	50	469
Vehicles Exiting, veh/h	556	585	126
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	7.5	7.1	7.2
Approach LOS	A	A	A
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	506	545	216
Cap Entry Lane, veh/h	1210	1311	855
Entry HV Adj Factor	0.937	0.940	0.940
Flow Entry, veh/h	474	512	203
Cap Entry, veh/h	1134	1233	804
V/C Ratio	0.418	0.416	0.253
Control Delay, s/veh	7.5	7.1	7.2
LOS	A	A	A
95th %tile Queue, veh	2	2	1

Queuing and Blocking Report

Base Year - 2025
AM Peak Hour

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	25.8	50.6	24.8	15.3	49.8	33.4	35.8	12.6	52.1
Average Queue (m)	8.9	24.6	10.0	5.4	24.4	13.1	13.2	0.9	18.2
95th Queue (m)	21.5	43.3	20.7	12.4	41.6	25.3	28.7	6.4	37.8
Link Distance (m)	902.4		568.8				768.8		2603.3
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0		55.0		20.0		20.0
Storage Blk Time (%)	10		1		0		4		7
Queuing Penalty (veh)	15		2		0		5		0

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	23.2	30.2	43.6	38.0
Average Queue (m)	13.7	11.8	19.0	17.2
95th Queue (m)	21.5	21.6	32.9	29.4
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	32.0	29.6	31.0
Average Queue (m)	8.3	5.1	10.8
95th Queue (m)	22.0	19.0	23.8
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 27

Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Barker and Hwy 20 arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-06 4:04:34 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - Existing							
Intersection 1Lane - Leg North	0.25	~1	4.30	0.19	A	5.49	A
Intersection 1Lane - Leg West	0.63	1.07	4.78	0.37	A		
Intersection 1Lane - Leg East	0.95	1.06	6.60	0.47	A		
Intersection 1Ln+C - Leg North	0.08	~1	2.38	0.07	A	2.77	A
Intersection 1Ln+C - Leg West	0.35	~1	2.66	0.25	A		
Intersection 1Ln+C - Leg East	0.38	~1	3.04	0.26	A		
Intersection 2Lane - Leg North	0.11	~1	2.01	0.10	A	2.19	A
Intersection 2Lane - Leg West	0.27	~1	2.06	0.20	A		
Intersection 2Lane - Leg East	0.34	~1	2.39	0.24	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM
"D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM
"D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM
"D4 - BG 2030, PM" model duration: 4:00 PM - 5:30 PM
"D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM
"D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM
"D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM
"D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM
"D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM
"D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM
"D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:04:33 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Existing, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Existing, AM	Existing	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				5.49	A
1Ln+C	1Ln+C	Single Lane - Channelized Rights	Roundabout	North,West,East				2.77	A
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				2.19	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only

1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	187.00	100.000
1Lane	West	ONE HOUR	✓	436.00	100.000
1Lane	East	ONE HOUR	✓	475.00	100.000
1Ln+C	North	ONE HOUR	✓	187.00	100.000
1Ln+C	West	ONE HOUR	✓	436.00	100.000
1Ln+C	East	ONE HOUR	✓	471.00	100.000
2Lane	North	ONE HOUR	✓	187.00	100.000
2Lane	West	ONE HOUR	✓	436.00	100.000
2Lane	East	ONE HOUR	✓	471.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	0.000	73.000	114.000
	West	399.000	0.000	37.000
	East	64.000	411.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	0.00	0.39	0.61
	West	0.92	0.00	0.08
	East	0.13	0.87	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

From		To		
		North	West	East
From	North	0.000	73.000	114.000
	West	399.000	0.000	37.000
	East	64.000	407.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

From		To		
		North	West	East
From	North	0.00	0.39	0.61
	West	0.92	0.00	0.08
	East	0.14	0.86	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
From	North	0.000	73.000	114.000
	West	399.000	0.000	37.000
	East	64.000	407.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
From	North	0.00	0.39	0.61
	West	0.92	0.00	0.08
	East	0.14	0.86	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

From		To		
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

From	To		
	North	West	East
	0.0	10.0	4.0
	5.0	0.0	32.0
East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From	To		
	North	West	East
	1.000	1.100	1.040
	1.050	1.000	1.320
East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From	To		
	North	West	East
	0.0	10.0	4.0
	5.0	0.0	32.0
East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.19	4.30	0.25	~1	A	171.59	257.39	17.09	3.98	0.19	17.09	3.98
1Lane	West	0.37	4.78	0.63	1.07	A	400.08	600.12	43.38	4.34	0.48	43.38	4.34
1Lane	East	0.47	6.60	0.95	1.06	A	435.87	653.80	60.66	5.57	0.67	60.66	5.57
1Ln+C	North	0.07	2.38	0.08	~1	A	171.59	156.91	5.97	2.28	0.07	5.97	2.28
1Ln+C	West	0.25	2.66	0.35	~1	A	400.08	600.12	25.09	2.51	0.28	25.09	2.51
1Ln+C	East	0.26	3.04	0.38	~1	A	432.20	560.21	26.06	2.79	0.29	26.06	2.79
2Lane	North	0.10	2.01	0.11	~1	A	171.59	257.39	8.26	1.92	0.09	8.26	1.92
2Lane	West	0.20	2.06	0.27	~1	A	400.08	600.12	19.70	1.97	0.22	19.70	1.97
2Lane	East	0.24	2.39	0.34	~1	A	432.20	648.30	24.02	2.22	0.27	24.03	2.22

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	140.78		35.20			140.21	347.02	307.84	0.00	1179.28	948.91	0.119	0.00	0.14	3.679	A
1Lane	West	328.24		82.06			326.82	362.56	85.48	0.00	1307.38	1022.65	0.251	0.00	0.36	3.915	A
1Lane	East	357.60		89.40			355.78	113.21	299.09	0.00	1184.35	815.81	0.302	0.00	0.46	4.012	A
1Ln+C	North	140.78	85.83	21.46	54.96	48.18	85.62	299.60	305.55	0.00	1799.14	1140.87	0.048	0.00	0.05	2.184	A
1Ln+C	West	328.24	328.24	82.06	0.00	54.96	327.38	305.55	85.62	0.00	1955.36	1205.83	0.168	0.00	0.21	2.361	A
1Ln+C	East	354.59	306.41	76.60	48.18	0.00	305.55	113.40	299.60	0.00	1803.37	1232.37	0.170	0.00	0.22	2.546	A
2Lane	North	140.78		35.20			140.50	347.84	305.71	0.00	2215.33	1625.23	0.064	0.00	0.07	1.843	A
2Lane	West	328.24		82.06			327.56	360.56	85.85	0.00	2374.42	1720.06	0.138	0.00	0.17	1.879	A
2Lane	East	354.59		88.65			353.79	113.45	299.76	0.00	2219.63	1298.36	0.160	0.00	0.20	2.051	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	168.11		42.03			167.95	415.76	368.91	0.00	1143.94	948.91	0.147	0.14	0.18	3.919	A
1Lane	West	391.96		97.99			391.54	434.47	102.39	0.00	1298.19	1022.65	0.302	0.36	0.46	4.241	A
1Lane	East	427.02		106.75			426.35	135.62	358.32	0.00	1150.07	815.81	0.371	0.46	0.62	5.288	A
1Ln+C	North	168.11	102.48	25.62	65.63	57.53	102.43	358.49	365.64	0.00	1756.46	1140.87	0.058	0.05	0.06	2.263	A
1Ln+C	West	391.96	391.96	97.99	0.00	65.63	391.74	365.64	102.43	0.00	1943.41	1205.83	0.202	0.21	0.27	2.476	A
1Ln+C	East	423.42	365.88	91.47	57.53	0.00	365.64	135.68	358.49	0.00	1761.54	1232.37	0.208	0.22	0.28	2.733	A
2Lane	North	168.11		42.03			168.04	416.05	365.70	0.00	2171.96	1625.23	0.077	0.07	0.09	1.908	A

2Lane	West	391.96		97.99			391.79	431.30	102.44	0.00	2362.28	1720.06	0.166	0.17	0.21	1.952	A
2Lane	East	423.42		105.85			423.20	135.69	358.54	0.00	2177.14	1298.36	0.194	0.20	0.26	2.183	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	205.89		51.47			205.64	508.97	451.40	0.00	1096.19	948.91	0.188	0.18	0.24	4.294	A
1Lane	West	480.04		120.01			479.35	531.68	125.36	0.00	1284.89	1022.65	0.374	0.46	0.63	4.771	A
1Lane	East	522.98		130.75			521.69	166.04	438.67	0.00	1103.56	815.81	0.474	0.62	0.95	6.568	A
1Ln+C	North	205.89	125.52	31.38	80.37	70.47	125.44	439.00	447.72	0.00	1698.16	1140.87	0.074	0.06	0.08	2.380	A
1Ln+C	West	480.04	480.04	120.01	0.00	80.37	479.71	447.72	125.44	0.00	1927.07	1205.83	0.249	0.27	0.35	2.657	A
1Ln+C	East	518.58	448.12	112.03	70.47	0.00	447.72	166.15	439.00	0.00	1704.36	1232.37	0.263	0.28	0.38	3.036	A
2Lane	North	205.89		51.47			205.79	509.50	447.81	0.00	2112.60	1625.23	0.097	0.09	0.11	2.006	A
2Lane	West	480.04		120.01			479.80	528.15	125.45	0.00	2345.65	1720.06	0.205	0.21	0.27	2.061	A
2Lane	East	518.58		129.65			518.23	166.17	439.08	0.00	2118.91	1298.36	0.245	0.26	0.34	2.393	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	205.89		51.47			205.89	509.76	452.50	0.00	1095.56	948.91	0.188	0.24	0.25	4.299	A
1Lane	West	480.04		120.01			480.03	532.87	125.51	0.00	1284.80	1022.65	0.374	0.63	0.63	4.779	A
1Lane	East	522.98		130.75			522.96	166.25	439.30	0.00	1103.20	815.81	0.474	0.95	0.95	6.600	A
1Ln+C	North	205.89	125.52	31.38	80.37	70.47	125.52	439.30	448.11	0.00	1697.88	1140.87	0.074	0.08	0.08	2.380	A
1Ln+C	West	480.04	480.04	120.01	0.00	80.37	480.04	448.11	125.52	0.00	1927.02	1205.83	0.249	0.35	0.35	2.657	A
1Ln+C	East	518.58	448.12	112.03	70.47	0.00	448.11	166.25	439.30	0.00	1704.14	1232.37	0.263	0.38	0.38	3.037	A
2Lane	North	205.89		51.47			205.89	509.77	448.11	0.00	2112.38	1625.23	0.097	0.11	0.11	2.006	A
2Lane	West	480.04		120.01			480.04	528.49	125.52	0.00	2345.60	1720.06	0.205	0.27	0.27	2.061	A
2Lane	East	518.58		129.65			518.58	166.25	439.31	0.00	2118.75	1298.36	0.245	0.34	0.34	2.393	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	168.11		42.03			168.35	417.02	370.58	0.00	1142.97	948.91	0.147	0.25	0.18	3.925	A
1Lane	West	391.96		97.99			392.63	436.30	102.63	0.00	1298.05	1022.65	0.302	0.63	0.47	4.253	A
1Lane	East	427.02		106.75			428.29	135.95	359.31	0.00	1149.49	815.81	0.371	0.95	0.63	5.319	A
1Ln+C	North	168.11	102.48	25.62	65.63	57.53	102.56	359.00	366.28	0.00	1756.01	1140.87	0.058	0.08	0.06	2.264	A
1Ln+C	West	391.96	391.96	97.99	0.00	65.63	392.29	366.28	102.56	0.00	1943.32	1205.83	0.202	0.35	0.27	2.482	A
1Ln+C	East	423.42	365.88	91.47	57.53	0.00	366.28	135.85	359.00	0.00	1761.18	1232.37	0.208	0.38	0.28	2.735	A
2Lane	North	168.11		42.03			168.21	416.50	366.18	0.00	2171.61	1625.23	0.077	0.11	0.09	1.908	A
2Lane	West	391.96		97.99			392.20	431.85	102.55	0.00	2362.21	1720.06	0.166	0.27	0.21	1.954	A
2Lane	East	423.42		105.85			423.77	135.83	358.92	0.00	2176.87	1298.36	0.195	0.34	0.26	2.184	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE/hr)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	140.78		35.20			140.94	349.05	310.01	0.00	1178.02	948.91	0.120	0.18	0.14	3.688	A
1Lane	West	328.24		82.06			328.66	365.03	85.92	0.00	1307.72	1022.65	0.251	0.47	0.36	3.932	A
1Lane	East	357.60		89.40			358.29	113.81	300.77	0.00	1183.37	815.81	0.302	0.63	0.46	4.647	A
1Ln+C	North	140.78	85.83	21.46	54.96	48.18	85.87	300.59	306.66	0.00	1798.36	1140.87	0.048	0.06	0.05	2.187	A
1Ln+C	West	328.24	328.24	82.06	0.00	54.96	328.46	306.66	85.87	0.00	1955.17	1205.83	0.168	0.27	0.22	2.364	A
1Ln+C	East	354.59	306.41	76.60	48.18	0.00	306.66	113.75	300.59	0.00	1802.67	1232.37	0.170	0.28	0.22	2.550	A
2Lane	North	140.78		35.20			140.94	349.05	310.01	0.00	2214.65	1621.25	0.135	0.18	0.14	3.688	A
2Lane	West	328.24		82.06			328.41	361.59	85.87	0.00	2342.27	1720.06	0.138	0.21	0.17	3.882	A
2Lane	East	354.59		88.65			354.81	113.74	300.54	0.00	2129.68	1298.36	0.160	0.26	0.20	2.054	A

2Lane	North	1.07	0.07	1.843	A	A
2Lane	West	2.53	0.17	1.879	A	A
2Lane	East	2.99	0.20	2.051	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	2.69	0.18	3.919	A	A
1Lane	West	6.77	0.45	4.241	A	A
1Lane	East	9.13	0.61	5.288	A	A
1Ln+C	North	0.96	0.06	2.263	A	A
1Ln+C	West	3.99	0.27	2.478	A	A
1Ln+C	East	4.10	0.27	2.733	A	A
2Lane	North	1.32	0.09	1.908	A	A
2Lane	West	3.15	0.21	1.952	A	A
2Lane	East	3.80	0.25	2.183	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	3.60	0.24	4.294	A	A
1Lane	West	9.28	0.62	4.771	A	A
1Lane	East	13.73	0.92	6.568	A	A
1Ln+C	North	1.23	0.08	2.380	A	A
1Ln+C	West	5.23	0.35	2.657	A	A
1Ln+C	East	5.57	0.37	3.036	A	A
2Lane	North	1.70	0.11	2.006	A	A
2Lane	West	4.07	0.27	2.061	A	A
2Lane	East	5.09	0.34	2.393	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	3.67	0.24	4.299	A	A
1Lane	West	9.51	0.63	4.779	A	A
1Lane	East	14.25	0.95	6.600	A	A
1Ln+C	North	1.24	0.08	2.380	A	A
1Ln+C	West	5.30	0.35	2.657	A	A
1Ln+C	East	5.65	0.38	3.037	A	A
2Lane	North	1.72	0.11	2.006	A	A
2Lane	West	4.12	0.27	2.061	A	A
2Lane	East	5.16	0.34	2.393	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	2.81	0.19	3.925	A	A
1Lane	West	7.12	0.47	4.253	A	A
1Lane	East	9.78	0.65	5.319	A	A
1Ln+C	North	0.98	0.07	2.264	A	A
1Ln+C	West	4.11	0.27	2.482	A	A
1Ln+C	East	4.24	0.28	2.735	A	A
2Lane	North	1.35	0.09	1.908	A	A
2Lane	West	3.23	0.22	1.954	A	A
2Lane	East	3.91	0.26	2.184	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	2.20	0.15	3.688	A	A
1Lane	West	5.49	0.37	3.932	A	A
1Lane	East	7.11	0.47	4.647	A	A
1Ln+C	North	0.79	0.05	2.187	A	A
1Ln+C	West	3.28	0.22	2.364	A	A
1Ln+C	East	3.31	0.22	2.550	A	A
2Lane	North	1.09	0.07	1.846	A	A
2Lane	West	2.60	0.17	1.882	A	A
2Lane	East	3.07	0.20	2.054	A	A

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.14	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.36	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	0.46	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.05	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.21	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.22	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.07	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.17	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.20	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.18	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.46	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	0.62	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.06	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.27	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.28	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.09	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.21	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.26	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.24	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.63	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	0.95	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.08	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.35	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.38	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.11	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.27	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.34	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.25	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.63	0.00	0.00	0.00	1.07			N/A	N/A
1Lane	East	0.95	0.00	0.00	0.00	1.06			N/A	N/A
1Ln+C	North	0.08	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.35	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.38	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.11	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.27	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

2Lane	East	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.06	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.09	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.21	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.14	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.05	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.22	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.22	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.07	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.17	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.20	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Lanes, Volumes, Timings

Base Year - 2025

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	45	552	167	39	510	11	190	113	47	11	175	144
Future Volume (vph)	45	552	167	39	510	11	190	113	47	11	175	144
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00	1.00							
Frt			0.850		0.997			0.956			0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1370	0	1415	1290	0	1429	1250	0
Flt Permitted	0.288			0.260			0.427			0.627		
Satd. Flow (perm)	404	1613	1110	391	1370	0	636	1290	0	943	1250	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			87		2			28			55	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	49	600	182	42	554	12	207	123	51	12	190	157
Shared Lane Traffic (%)												
Lane Group Flow (vph)	49	600	182	42	566	0	207	174	0	12	347	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Thorold Townline & Highway 20, Thorold
PTSL (210565)Synchro 12 Report
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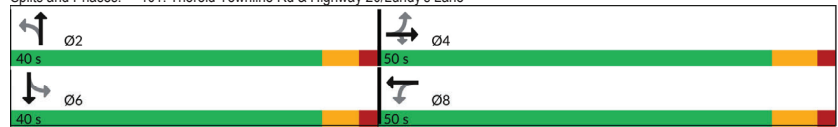
Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Base Year - 2025
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4				8		2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	38.7	38.7	38.7	38.7	38.7		31.3	31.3		31.3	31.3	
Actuated g/C Ratio	0.49	0.49	0.49	0.49	0.49		0.40	0.40		0.40	0.40	
v/c Ratio	0.25	0.75	0.31	0.22	0.84		0.82	0.33		0.03	0.65	
Control Delay (s/veh)	16.3	23.8	8.4	15.7	30.7		50.6	17.0		16.8	24.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	16.3	23.8	8.4	15.7	30.7		50.6	17.0		16.8	24.0	
LOS	B	C	A	B	C		D	B		B	C	
Approach Delay (s/veh)		20.0			29.7			35.2			23.8	
Approach LOS		B			C			D			C	

Intersection Summary												
Area Type:	Other											
Cycle Length: 90												
Actuated Cycle Length: 78.5												
Natural Cycle: 85												
Control Type: Actuated-Uncoordinated												
Maximum v/c Ratio: 0.84												
Intersection Signal Delay (s/veh): 26.0	Intersection LOS: C											
Intersection Capacity Utilization 95.2%	ICU Level of Service F											
Analysis Period (min) 15												

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Thorold Townline & Highway 20, Thorold
PTSL (210565)

Synchro 12 Report
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Queues
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Base Year - 2025
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	49	600	182	42	566	207	174	12	347
v/c Ratio	0.25	0.75	0.31	0.22	0.84	0.82	0.33	0.03	0.65
Control Delay (s/veh)	16.3	23.8	8.4	15.7	30.7	50.6	17.0	16.8	24.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	16.3	23.8	8.4	15.7	30.7	50.6	17.0	16.8	24.0
Queue Length 50th (m)	4.7	80.7	8.8	4.0	81.1	31.9	17.2	1.3	41.0
Queue Length 95th (m)	12.8	124.5	21.6	11.1	#146.3	#74.1	33.9	4.8	74.3
Internal Link Dist (m)		912.7			557.5		759.0		2604.2
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	249	993	717	240	844	306	636	454	631
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.20	0.60	0.25	0.18	0.67	0.68	0.27	0.03	0.55

Intersection Summary
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Thorold Townline & Highway 20, Thorold
PTSL (210565)

Synchro 12 Report
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HCM Signalized Intersection Capacity Analysis
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Base Year - 2025
PM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑	↱	↰	↑	↱	↰	↑	↱	↰	↑	↱
Traffic Volume (vph)	45	552	167	39	510	11	190	113	47	11	175	144
Future Volume (vph)	45	552	167	39	510	11	190	113	47	11	175	144
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1334	1613	1110	1427	1369		1415	1290		1429	1251	
Flt Permitted	0.29	1.00	1.00	0.26	1.00		0.43	1.00		0.63	1.00	
Satd. Flow (perm)	404	1613	1110	391	1369		636	1290		943	1251	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	49	600	182	42	554	12	207	123	51	12	190	157
RTOR Reduction (vph)	0	0	44	0	1	0	0	17	0	0	33	0
Lane Group Flow (vph)	49	600	138	42	565	0	207	157	0	12	314	0
Confl. Peds. (#/hr)	2		2	2	2		2					
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	35.6	35.6	35.6	35.6	35.6		29.3	29.3		29.3	29.3	
Effective Green, g (s)	38.6	38.6	38.6	38.6	38.6		31.3	31.3		31.3	31.3	
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.50		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	200	799	550	193	678		255	518		378	502	
v/s Ratio Prot		0.37			c0.41			0.12			0.25	
v/s Ratio Perm	0.12		0.12	0.11			c0.33			0.01		
v/c Ratio	0.25	0.75	0.25	0.22	0.83		0.81	0.30		0.03	0.63	
Uniform Delay, d1	11.3	15.8	11.3	11.1	16.9		20.7	15.9		14.1	18.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	4.0	0.2	0.6	8.7		17.6	0.3		0.0	2.4	
Delay (s)	11.9	19.8	11.6	11.7	25.5		38.2	16.2		14.2	21.1	
Level of Service	B	B	B	B	C		D	B		B	C	
Approach Delay (s/veh)		17.5			24.6			28.2			20.8	
Approach LOS		B			C			C			C	

Intersection Summary			
HCM 2000 Control Delay (s/veh)	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.82		
Actuated Cycle Length (s)	77.9	Sum of lost time (s)	8.0
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Base Year - 2025
PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↰			↰			↰			↰	
Traffic Volume (vph)	89	217	68	6	211	29	36	127	6	29	256	167
Future Volume (vph)	89	217	68	6	211	29	36	127	6	29	256	167
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.975			0.984			0.995			0.950	
Flt Protected		0.988			0.999			0.990			0.997	
Satd. Flow (prot)	0	1379	0	0	1445	0	0	1359	0	0	1344	0
Flt Permitted		0.988			0.999			0.990			0.997	
Satd. Flow (perm)	0	1379	0	0	1445	0	0	1359	0	0	1344	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	97	236	74	7	229	32	39	138	7	32	278	182
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	407	0	0	268	0	0	184	0	0	492	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 88.0%	ICU Level of Service E											
Analysis Period (min) 15												

HCM Unsignalized Intersection Capacity Analysis
102: Thorold Townline Rd & Beaverdams Rd

Base Year - 2025
PM Peak Hour

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Movement												
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	89	217	68	6	211	29	36	127	6	29	256	167
Future Volume (vph)	89	217	68	6	211	29	36	127	6	29	256	167
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)	97	236	74	7	229	32	39	138	7	32	278	182
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	407	268	184	492								
Volume Left (vph)	97	7	39	32								
Volume Right (vph)	74	32	7	182								
Hadj (s)	0.00	-0.05	0.15	-0.13								
Departure Headway (s)	7.3	7.7	8.3	7.0								
Degree Utilization, x	0.83	0.58	0.42	0.95								
Capacity (veh/h)	465	439	399	508								
Control Delay (s/veh)	36.7	20.7	17.1	54.5								
Approach Delay (s/veh)	36.7	20.7	17.1	54.5								
Approach LOS	E	C	C	F								
Intersection Summary												
Delay				37.3								
Level of Service				E								
Intersection Capacity Utilization				88.0%								
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Base Year - 2025
PM Peak Hour

	EBL	EBT	WBT	WBR	SBL	SBR
Lane Group						
Lane Configurations						
Traffic Volume (vph)	36	668	728	116	96	62
Future Volume (vph)	36	668	728	116	96	62
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.981		0.947	
Flt Protected		0.997			0.970	
Satd. Flow (prot)	0	1202	1339	0	1336	0
Flt Permitted		0.997			0.970	
Satd. Flow (perm)	0	1202	1339	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	39	726	791	126	104	67
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	765	917	0	171	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	118.2%					
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Base Year - 2025
PM Peak Hour

	EBL	EBT	WBT	WBR	SBL	SBR
Movement						
Right Turn Channelized						
Traffic Volume (veh/h)	36	668	728	116	96	62
Future Volume (veh/h)	36	668	728	116	96	62
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	39	726	791	126	104	67
Approach Volume (veh/h)		765	917		171	
Crossing Volume (veh/h)		104	39		791	
High Capacity (veh/h)		1277	1343		738	
High v/c (veh/h)		0.60	0.68		0.23	
Low Capacity (veh/h)		1063	1123		583	
Low v/c (veh/h)		0.72	0.82		0.29	
Intersection Summary						
Maximum v/c High			0.68			
Maximum v/c Low			0.82			
Intersection Capacity Utilization			118.2%		ICU Level of Service	H

HCM 6th Roundabout
103: Highway 20 & Barker Parkway

Base Year - 2025
PM Peak Hour

Intersection			
Intersection Delay, s/veh	11.6		
Intersection LOS	B		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	765	917	171
Demand Flow Rate, veh/h	780	933	174
Vehicles Circulating, veh/h	104	39	807
Vehicles Exiting, veh/h	877	845	165
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	11.0	12.5	9.9
Approach LOS	B	B	A
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	780	933	174
Cap Entry Lane, veh/h	1241	1326	606
Entry HV Adj Factor	0.981	0.983	0.983
Flow Entry, veh/h	765	917	171
Cap Entry, veh/h	1218	1304	595
V/C Ratio	0.629	0.704	0.287
Control Delay, s/veh	11.0	12.5	9.9
LOS	B	B	A
95th %tile Queue, veh	5	6	1

Queuing and Blocking Report

Base Year - 2025
PM Peak Hour

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	28.0	112.3	70.0	26.9	106.9	67.8	97.8	21.7	81.8
Average Queue (m)	10.8	61.6	26.0	8.5	53.3	36.6	28.4	2.1	37.8
95th Queue (m)	22.8	100.1	65.8	19.4	90.3	62.7	69.2	12.7	66.3
Link Distance (m)	902.4			568.8			768.8		
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0	20.0		55.0	20.0		20.0		
Storage Blk Time (%)	33		2	8		49	9	0	27
Queuing Penalty (veh)	70		11	3		79	17	0	3

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	56.0	34.1	39.2	79.0
Average Queue (m)	23.8	14.3	20.7	35.2
95th Queue (m)	40.7	25.5	34.5	64.0
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	39.7	75.9	22.5
Average Queue (m)	9.8	11.7	10.4
95th Queue (m)	26.6	51.1	18.9
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 183

Thorold Townline & Highway 20, Thorold
PTSL (210565)

SimTraffic Report
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Junctions 8

ARCADY 8 - Roundabout Module

Version: 8.0.6.541 [19821,26/11/2015]
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-06 4:05:16 PM

Summary of intersection performance

	PM						Intersection Delay (s)	Intersection LOS
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS			
	A1 - Existing							
Intersection 1Lane - Leg North	0.24	~1	5.01	0.19	A	43.52	E	
Intersection 1Lane - Leg West	1.50	1.02	7.03	0.60	A			
Intersection 1Lane - Leg East	20.77	72.22	81.16	1.00	F			
Intersection 1Ln+C - Leg North	0.08	~1	2.68	0.07	A	4.17	A	
Intersection 1Ln+C - Leg West	0.68	1.02	3.14	0.40	A			
Intersection 1Ln+C - Leg East	1.17	?	5.30	0.54	A			
Intersection 2Lane - Leg North	0.11	~1	2.18	0.09	A	3.01	A	
Intersection 2Lane - Leg West	0.50	1.02	2.31	0.33	A			
Intersection 2Lane - Leg East	0.97	~1	3.75	0.49	A			

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM
"D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM
"D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM
"D4 - BG 2030, PM" model duration: 4:00 PM - 5:30 PM
"D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM
"D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM
"D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM
"D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM
"D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM
"D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM
"D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:05:15 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - Existing, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
Existing, PM	Existing	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				43.52	E
1Ln+C	1Ln+C	Single Lane - Chanzelized Rights	Roundabout	North,West,East				4.17	A
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				3.01	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	F - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only

1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flow Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	158.00	100.000
1Lane	West	ONE HOUR	✓	704.00	100.000
1Lane	East	ONE HOUR	✓	844.00	100.000
1Ln+C	North	ONE HOUR	✓	158.00	100.000
1Ln+C	West	ONE HOUR	✓	704.00	100.000
1Ln+C	East	ONE HOUR	✓	844.00	100.000
2Lane	North	ONE HOUR	✓	158.00	100.000
2Lane	West	ONE HOUR	✓	704.00	100.000
2Lane	East	ONE HOUR	✓	844.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	0.000	62.000	96.000
	West	668.000	0.000	36.000
	East	116.000	728.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	0.00	0.39	0.61
	West	0.95	0.00	0.05
	East	0.14	0.86	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

From		To		
		North	West	East
From	North	0.000	62.000	96.000
	West	668.000	0.000	36.000
	East	116.000	728.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

From		To		
		North	West	East
From	North	0.00	0.39	0.61
	West	0.95	0.00	0.05
	East	0.14	0.86	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
From	North	0.000	62.000	96.000
	West	668.000	0.000	36.000
	East	116.000	728.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
From	North	0.00	0.39	0.61
	West	0.95	0.00	0.05
	East	0.14	0.86	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

From		To		
		North	West	East
From	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

From		To		
		North	West	East
From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

From		To		
		North	West	East
From	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
From	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.19	5.01	0.24	~1	A	144.98	217.48	16.33	4.51	0.18	16.33	4.51
1Lane	West	0.60	7.03	1.50	1.02	A	646.00	969.00	93.19	5.77	1.04	93.20	5.77
1Lane	East	1.00	81.16	20.77	72.22	F	774.47	1161.70	604.10	31.20	6.71	604.17	31.20
1Ln+C	North	0.07	2.68	0.08	~1	A	144.98	132.14	5.50	2.50	0.06	5.50	2.50
1Ln+C	West	0.40	3.14	0.68	1.02	A	646.00	969.00	45.97	2.85	0.51	45.97	2.85
1Ln+C	East	0.54	5.30	1.17	?	A	774.47	1002.04	71.02	4.25	0.79	71.03	4.25
2Lane	North	0.09	2.18	0.11	~1	A	144.98	217.48	7.41	2.05	0.08	7.41	2.05
2Lane	West	0.33	2.31	0.50	1.02	A	646.00	969.00	34.65	2.15	0.39	34.65	2.15
2Lane	East	0.49	3.75	0.97	~1	A	774.47	1161.70	60.65	3.13	0.67	60.66	3.13

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	118.95		29.74			118.43	586.85	543.04	0.00	1043.16	959.44	0.114	0.00	0.13	3.966	A
1Lane	West	530.01		132.50			527.28	589.51	71.96	0.00	1315.80	1020.06	0.403	0.00	0.68	4.636	A
1Lane	East	635.41		158.85			629.56	98.92	500.32	0.00	1067.68	797.27	0.595	0.00	1.46	8.250	A
1Ln+C	North	118.95	72.27	18.07	46.68	87.33	72.09	501.48	546.08	0.00	1628.30	1156.19	0.044	0.00	0.05	2.313	A
1Ln+C	West	530.01	530.01	132.50	0.00	46.68	528.51	546.08	72.09	0.00	1964.96	1194.95	0.270	0.00	0.37	2.551	A
1Ln+C	East	635.41	548.08	137.02	87.33	0.00	546.08	99.11	501.48	0.00	1659.97	1210.82	0.330	0.00	0.50	3.291	A
2Lane	North	118.95		29.74			118.70	588.89	546.53	0.00	2041.23	1649.34	0.058	0.00	0.06	1.907	A
2Lane	West	530.01		132.50			528.85	593.11	72.12	0.00	2384.21	1711.86	0.222	0.00	0.29	1.976	A
2Lane	East	635.41		158.85			633.62	99.16	501.80	0.00	2073.57	1262.05	0.306	0.00	0.45	2.539	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	142.04		35.51			141.87	703.01	649.52	0.00	981.53	959.44	0.145	0.13	0.17	4.367	A
1Lane	West	632.88		158.22			631.83	705.19	86.20	0.00	1307.55	1020.06	0.484	0.68	0.95	5.419	A
1Lane	East	758.74		189.68			753.01	118.51	599.52	0.00	1010.47	797.27	0.751	1.46	2.89	13.915	B
1Ln+C	North	142.04	86.30	21.58	55.74	104.28	86.25	600.10	653.62	0.00	1551.91	1156.18	0.056	0.05	0.06	2.455	A
1Ln+C	West	632.88	632.88	158.22	0.00	55.74	632.44	653.62	86.25	0.00	1954.90	1194.95	0.324	0.37	0.49	2.774	A
1Ln+C	East	758.74	654.46	163.61	104.28	0.00	653.62	118.59	600.10	0.00	1589.93	1210.82	0.412	0.50	0.71	3.918	A
2Lane	North	142.04		35.51			141.97	704.41	653.87	0.00	1963.63	1649.34	0.072	0.06	0.08	2.013	A

2Lane	West	632.88		158.22			632.57	709.58	86.26	0.00	2373.98	1711.86	0.267	0.29	0.37	2.106	A
2Lane	East	758.74		189.68			758.06	118.61	600.22	0.00	2002.42	1262.05	0.379	0.45	0.62	2.941	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	173.96		43.49			173.70	854.61	760.54	0.00	917.28	959.45	0.190	0.17	0.24	4.933	A
1Lane	West	775.12		193.78			772.95	828.70	105.54	0.00	1296.36	1020.05	0.598	0.95	1.49	6.978	A
1Lane	East	929.26		232.32			881.72	145.06	733.42	0.00	932.97	797.27	0.996	2.89	14.78	49.201	E
1Ln+C	North	173.96	105.70	26.42	68.26	127.72	105.62	734.77	799.71	0.00	1448.15	1156.21	0.073	0.06	0.08	2.681	A
1Ln+C	West	775.12	775.12	193.78	0.00	68.26	774.37	799.71	105.62	0.00	1941.15	1194.93	0.399	0.49	0.67	3.142	A
1Ln+C	East	929.26	801.54	200.39	127.72	0.00	799.71	145.22	734.77	0.00	1494.28	1210.83	0.536	0.71	1.17	5.273	A
2Lane	North	173.96		43.49			173.86	862.53	800.36	0.00	1857.73	1649.39	0.094	0.11	0.11	2.178	A
2Lane	West	775.12		193.78			774.61	868.58	105.64	0.00	2359.98	1711.83	0.328	0.37	0.50	2.314	A
2Lane	East	929.26		232.32			927.89	145.25	735.00	0.00	1904.98	1262.06	0.488	0.62	0.96	3.743	A

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	173.96		43.49			173.94	859.85	780.96	0.00	905.51	959.45	0.192	0.24	0.24	5.014	A
1Lane	West	775.12		193.78			775.06	849.12	105.69	0.00	1296.28	1020.05	0.598	1.49	1.50	7.035	A
1Lane	East	929.26		232.32			905.29	145.32	735.43	0.00	931.81	797.27	0.997	14.78	20.77	81.158	F
1Ln+C	North	173.96	105.70	26.42	68.26	127.72	105.70	735.47	801.51	0.00	1446.87	1156.21	0.073	0.08	0.08	2.683	A
1Ln+C	West	775.12	775.12	193.78	0.00	68.26	775.11	801.51	105.70	0.00	1941.09	1194.93	0.399	0.67	0.68	3.145	A
1Ln+C	East	929.26	801.54	200.39	127.72	0.00	801.51	145.33	735.47	0.00	1493.78	1210.83	0.537	1.17	1.17	5.304	A
2Lane	North	173.96		43.49			173.96	863.19	801.53	0.00	1856.68	1649.39	0.094	0.11	0.11	2.179	A
2Lane	West	775.12		193.78			775.11	869.79	105.70	0.00	2359.93	1711.83	0.328	0.50	0.50	2.314	A
2Lane	East	929.26		232.32			929.25	145.33	735.48	0.00	1904.63	1262.06	0.488	0.96	0.97	3.753	A

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	142.04		35.51			142.28	716.41	714.62	0.00	943.85	959.44	0.150	0.24	0.18	4.579	A
1Lane	West	632.88		158.22			635.02	770.45	86.45	0.00	1307.41	1020.06	0.484	1.50	0.97	5.474	A
1Lane	East	758.74		189.68			828.49	118.92	602.55	0.00	1008.72	797.27	0.752	20.77	3.33	26.920	D
1Ln+C	North	142.04	86.30	21.58	55.74	104.28	86.38	601.22	656.27	0.00	1550.03	1156.18	0.056	0.08	0.06	2.461	A
1Ln+C	West	632.88	632.88	158.22	0.00	55.74	633.62	656.27	86.38	0.00	1954.81	1194.95	0.324	0.68	0.49	2.779	A
1Ln+C	East	758.74	654.46	163.61	104.28	0.00	656.27	118.78	601.22	0.00	1589.13	1210.82	0.412	1.17	0.72	3.943	A
2Lane	North	142.04		35.51			142.14	705.47	655.63	0.00	1962.35	1649.34	0.072	0.11	0.08	2.015	A
2Lane	West	632.88		158.22			633.38	711.41	86.36	0.00	2373.91	1711.86	0.267	0.50	0.37	2.109	A
2Lane	East	758.74		189.68			760.10	118.75	601.00	0.00	2001.85	1262.05	0.379	0.97	0.62	2.951	A

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	118.95		29.74			119.15	592.26	554.28	0.00	1036.65	959.44	0.115	0.18	0.13	3.998	A
1Lane	West	530.01		132.50			531.10	601.03	72.39	0.00	1315.55	1020.06	0.403	0.97	0.69	4.684	A
1Lane	East	635.41		158.85			642.60	99.55	503.94	0.00	1065.78	797.27	0.596	3.33	1.54	8.795	A
1Ln+C	North	118.95	72.27	18.07	46.68	87.33	72.32	503.33	548.93	0.00	1626.27	1156.19	0.044	0.06	0.05	2.318	A
1Ln+C	West	530.01	530.01	132.50	0.00	46.68	530.46	548.93	72.32	0.00	1964.80	1194.95	0.270	0.49	0.38	2.559	A
1Ln+C	East	635.41	548.08	137.02	87.33	0.00	548.93	99.45	503.33	0.00	1658.66	1210.82	0.330	0.72	0.51	3.313	A
2Lane	North	118.95		29.74			119.02	590.63	548.67	0.00	2039.68	1649.34	0.058	0.08	0.06	1.909	A
2Lane	West	530.01		132.50			530.33	595.37	72.31	0.00	2384.07	1711.86	0.222	0.37	0.29	1.980	A
2Lane	East	635.41		158.85			636.10	99.43	503.21	0.00	2072.55	1262.05	0.307	0.62	0.45	2.552	A

Queueing Delay Results for each time segment**Queueing Delay results: (16:00-16:15)**

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	1.92	0.13	3.966	A	A
1Lane	West	9.90	0.66	4.636	A	A
1Lane	East	20.59	1.37	8.250	A	A
1Ln+C	North	0.69	0.05	2.313	A	A
1Ln+C	West	5.53	0.37	2.551	A	A
1Ln+C	East	7.33	0.49	3.291	A	A

2Lane	North	0.93	0.06	1.907	A	A
2Lane	West	4.30	0.29	1.976	A	A
2Lane	East	6.59	0.44	2.539	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	2.53	0.17	4.367	A	A
1Lane	West	13.80	0.92	5.419	A	A
1Lane	East	39.65	2.64	13.915	B	B
1Ln+C	North	0.87	0.06	2.455	A	A
1Ln+C	West	7.19	0.48	2.774	A	A
1Ln+C	East	10.41	0.69	3.918	A	A
2Lane	North	1.18	0.08	2.013	A	A
2Lane	West	5.48	0.37	2.106	A	A
2Lane	East	9.11	0.61	2.941	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	3.49	0.23	4.933	A	A
1Lane	West	21.41	1.43	6.978	A	A
1Lane	East	152.35	10.16	49.201	E	D
1Ln+C	North	1.16	0.08	2.681	A	A
1Ln+C	West	9.93	0.66	3.142	A	A
1Ln+C	East	16.93	1.13	5.273	A	A
2Lane	North	1.56	0.10	2.178	A	A
2Lane	West	7.35	0.49	2.314	A	A
2Lane	East	14.08	0.94	3.743	A	A

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	3.60	0.24	5.014	A	A
1Lane	West	22.44	1.50	7.035	A	A
1Lane	East	269.26	17.95	81.158	F	F
1Ln+C	North	1.18	0.08	2.683	A	A
1Ln+C	West	10.12	0.67	3.145	A	A
1Ln+C	East	17.56	1.17	5.304	A	A
2Lane	North	1.58	0.11	2.179	A	A
2Lane	West	7.46	0.50	2.314	A	A
2Lane	East	14.45	0.96	3.753	A	A

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	2.77	0.18	4.579	A	A
1Lane	West	14.98	1.00	5.474	A	A
1Lane	East	97.70	6.51	26.920	D	C
1Ln+C	North	0.90	0.06	2.461	A	A
1Ln+C	West	7.47	0.50	2.779	A	A
1Ln+C	East	11.06	0.74	3.943	A	A
2Lane	North	1.21	0.08	2.015	A	A
2Lane	West	5.64	0.38	2.109	A	A
2Lane	East	9.54	0.64	2.951	A	A

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	2.02	0.13	3.998	A	A
1Lane	West	10.66	0.71	4.684	A	A
1Lane	East	24.55	1.64	8.795	A	A
1Ln+C	North	0.71	0.05	2.318	A	A
1Ln+C	West	5.74	0.38	2.559	A	A
1Ln+C	East	7.73	0.52	3.313	A	A
2Lane	North	0.96	0.06	1.909	A	A
2Lane	West	4.43	0.30	1.980	A	A
2Lane	East	6.87	0.46	2.552	A	A

Queue Variation Results for each time segment

Queue Variation results: (17:00-17:15)

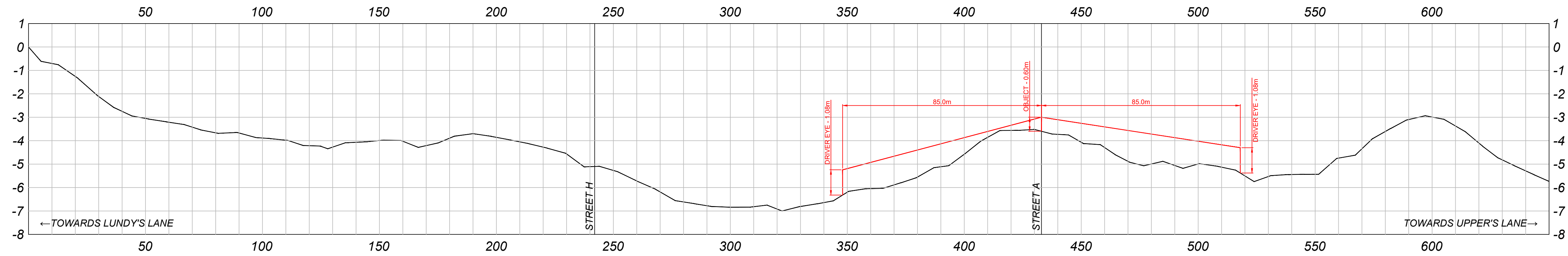
Intersection	Leg	Mean (PCE)	Q5 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability of Reaching or Exceeding Marker	Probability of Exactly Reaching Marker
1Lane	North	0.13	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.69	0.00	0.00	0.00	1.02			N/A	N/A
1Lane	East	1.54	0.00	0.00	0.00	3.05			N/A	N/A
1LnC	North	0.05	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1LnC	West	0.38	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1LnC	East	0.51	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.06	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.29	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.45	-1	-1	-1	-1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Appendix D

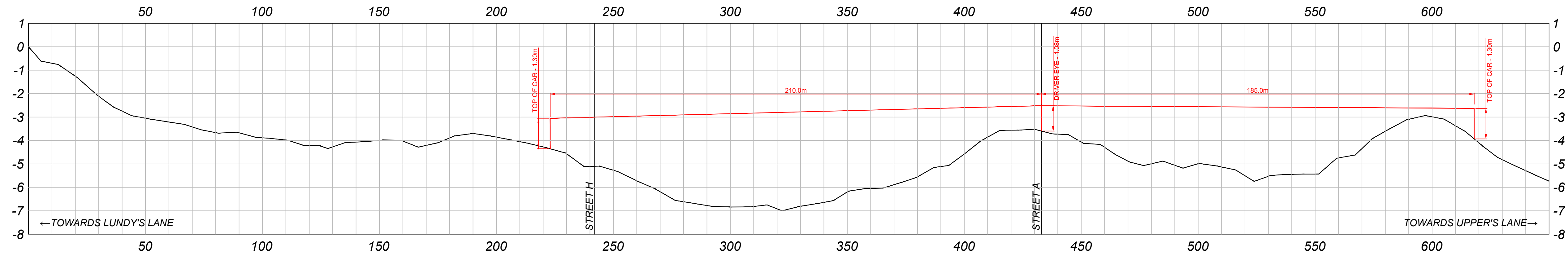
Sight Distance Assessment



STREET A - MINIMUM STOPPING SIGHT DISTANCE



STREET A - INTERSECTION SIGHT DISTANCE



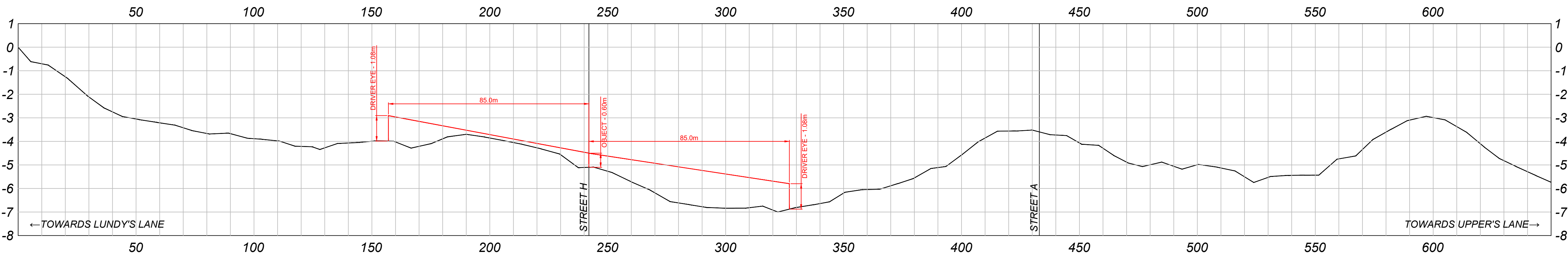
NO.	DATE	INITIAL	REVISION DETAIL
DRAWING STATUS			
ISSUED FOR REVIEW			
APPROVED		DATE: _____	
SIGNATURE _____			



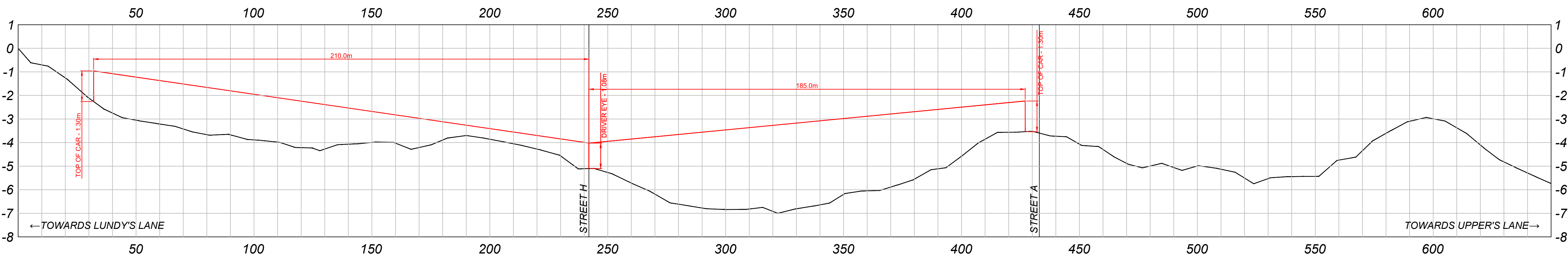
SIGHT DISTANCE ASSESSMENT
THOROLD TOWNLINE ROAD
THOROLD, ON

PROJECT NO.: 210565	DATE: OCTOBER 2023	SCALE: 1:550	DRAWING NO.:
DRAWN: LC	DESIGN: LC	CHECK: SC	01

STREET H - MINIMUM STOPPING SIGHT DISTANCE



STREET H - INTERSECTION SIGHT DISTANCE



NO.	DATE	INITIAL	REVISION DETAIL
DRAWING STATUS			
ISSUED FOR REVIEW			
APPROVED		DATE: _____	
SIGNATURE _____			



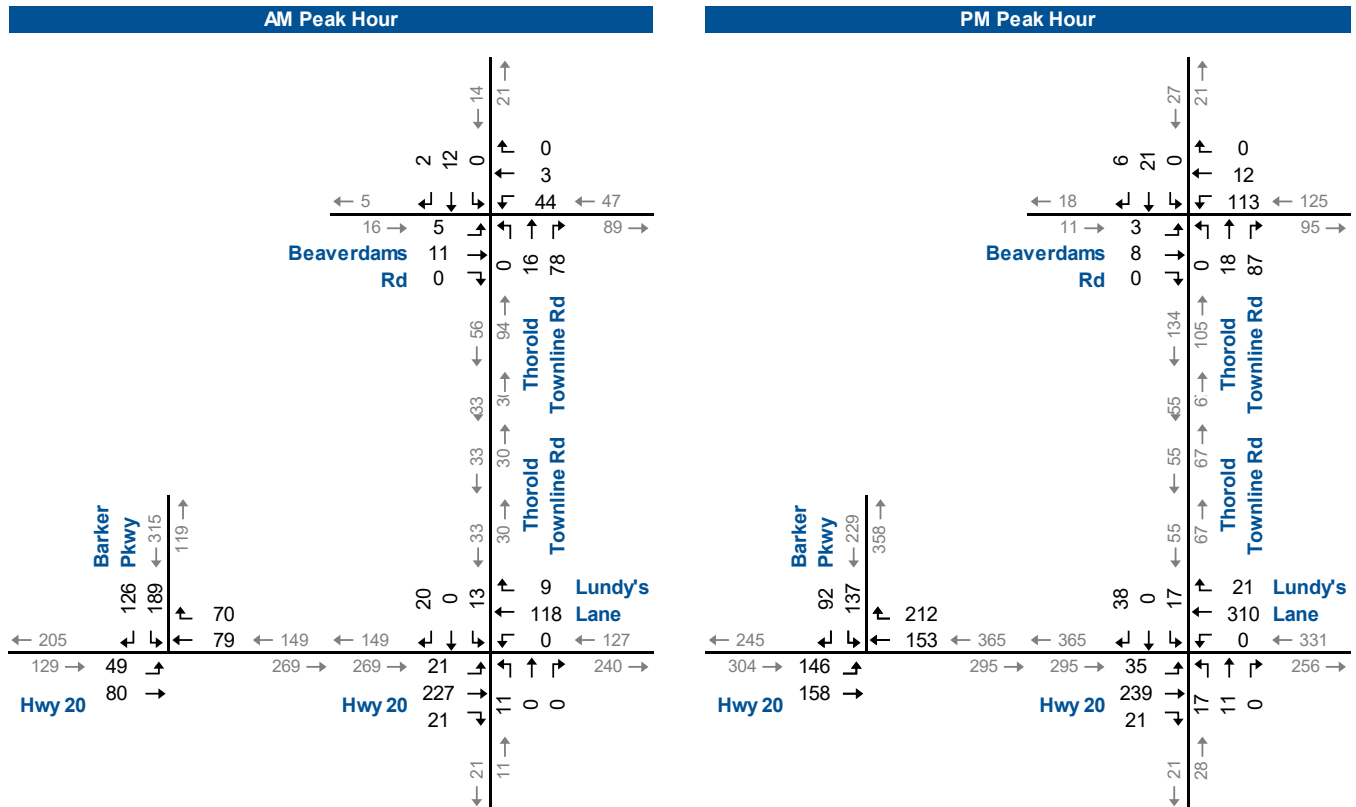
SIGHT DISTANCE ASSESSMENT
THOROLD TOWNLINE ROAD
THOROLD, ON

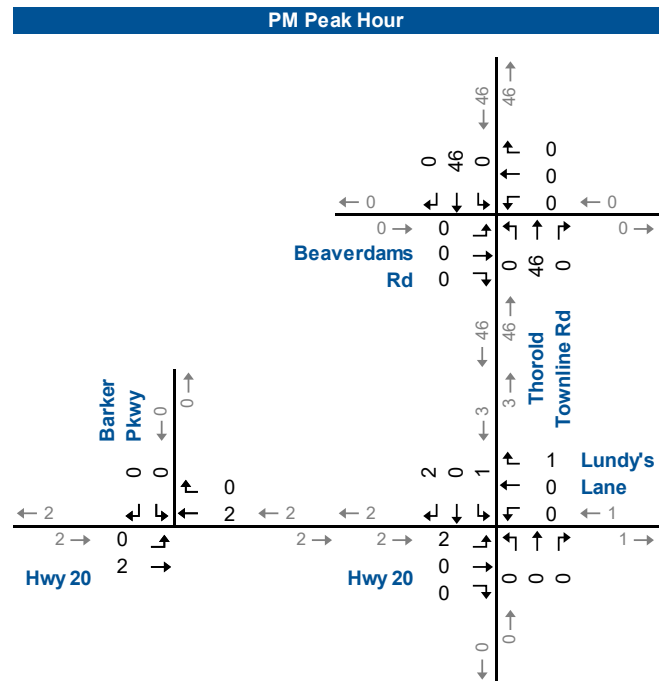
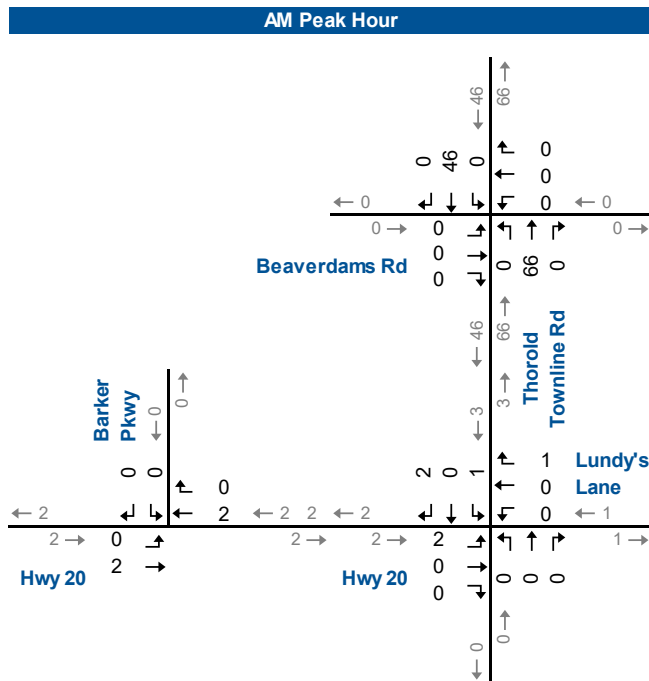
PROJECT NO.: 210565	DATE: AUG 2025	SCALE: 1:1000 VERT: 10:1	DRAWING NO.: 02
DRAWN: LC	DESIGN: LC	CHECK: SC	

Appendix E

Background Development Traffic Volumes







Appendix F1

2028 Background Operations Synchro Reports



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	610	138	30	460	25	110	114	27	19	101	81
Future Volume (vph)	68	610	138	30	460	25	110	114	27	19	101	81
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.992			0.972			0.933	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1313	0	1311	1203	0	1191	1162	0
Flt Permitted	0.375			0.277			0.591			0.660		
Satd. Flow (perm)	495	1582	1063	417	1313	0	815	1203	0	827	1162	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65		4			16			53	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	74	663	150	33	500	27	120	124	29	21	110	88
Shared Lane Traffic (%)												
Lane Group Flow (vph)	74	663	150	33	527	0	120	153	0	21	198	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	34.4	34.4	34.4	34.4	34.4		18.2	18.2		18.2	18.2	
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56		0.30	0.30		0.30	0.30	
v/c Ratio	0.27	0.74	0.24	0.14	0.71		0.50	0.41		0.09	0.52	
Control Delay (s/veh)	10.9	17.1	5.7	9.2	16.9		28.0	21.2		19.1	20.0	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	10.9	17.1	5.7	9.2	16.9		28.0	21.2		19.1	20.0	
LOS	B	B	A	A	B		C	C		B	C	
Approach Delay (s/veh)		14.6			16.5			24.2			19.9	
Approach LOS		B			B			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 61

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.74

Intersection Signal Delay (s/veh): 17.1

Intersection LOS: B

Intersection Capacity Utilization 89.8%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2028 - Phase 1

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	74	663	150	33	527	120	153	21	198
v/c Ratio	0.27	0.74	0.24	0.14	0.71	0.50	0.41	0.09	0.52
Control Delay (s/veh)	10.9	17.1	5.7	9.2	16.9	28.0	21.2	19.1	20.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	10.9	17.1	5.7	9.2	16.9	28.0	21.2	19.1	20.0
Queue Length 50th (m)	3.8	49.7	4.0	1.6	38.0	11.1	12.2	1.7	13.1
Queue Length 95th (m)	14.4	121.7	15.5	7.2	98.7	31.4	32.8	7.4	37.8
Internal Link Dist (m)	912.7		557.5		759.0		2604.2		
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	388	1241	848	327	1031	509	758	516	746
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.53	0.18	0.10	0.51	0.24	0.20	0.04	0.27
Intersection Summary									

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2028 - Phase 1
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	68	610	138	30	460	25	110	114	27	19	101	81
Future Volume (vph)	68	610	138	30	460	25	110	114	27	19	101	81
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1313		1311	1203		1191	1162	
Flt Permitted	0.38	1.00	1.00	0.28	1.00		0.59	1.00		0.66	1.00	
Satd. Flow (perm)	495	1582	1063	417	1313		815	1203		827	1162	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	74	663	150	33	500	27	120	124	29	21	110	88
RTOR Reduction (vph)	0	0	28	0	2	0	0	11	0	0	37	0
Lane Group Flow (vph)	74	663	122	33	525	0	120	142	0	21	161	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	31.2	31.2	31.2	31.2	31.2		16.1	16.1		16.1	16.1	
Effective Green, g (s)	34.2	34.2	34.2	34.2	34.2		18.1	18.1		18.1	18.1	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57		0.30	0.30		0.30	0.30	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	280	897	602	236	744		244	361		248	348	
v/s Ratio Prot		c0.42			0.40			0.12			0.14	
v/s Ratio Perm	0.15		0.11	0.08			c0.15			0.03		
v/c Ratio	0.26	0.74	0.20	0.14	0.71		0.49	0.39		0.08	0.46	
Uniform Delay, d1	6.6	9.7	6.4	6.1	9.4		17.3	16.7		15.2	17.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	3.2	0.2	0.3	3.1		1.6	0.7		0.1	1.0	
Delay (s)	7.2	12.9	6.5	6.4	12.5		18.9	17.4		15.3	18.1	
Level of Service	A	B	A	A	B		B	B		B	B	
Approach Delay (s/veh)		11.4			12.1			18.1			17.9	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			13.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.65									
Actuated Cycle Length (s)			60.3			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			89.8%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2028 - Phase 1
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	105	32	52	204	30	34	217	82	16	183	82
Future Volume (vph)	87	105	32	52	204	30	34	217	82	16	183	82
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.986			0.967			0.961	
Flt Protected		0.981			0.991			0.995			0.997	
Satd. Flow (prot)	0	1381	0	0	1429	0	0	1289	0	0	1264	0
Flt Permitted		0.981			0.991			0.995			0.997	
Satd. Flow (perm)	0	1381	0	0	1429	0	0	1289	0	0	1264	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	95	114	35	57	222	33	37	236	89	17	199	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	244	0	0	312	0	0	362	0	0	305	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	72.6%						ICU Level of Service C					
Analysis Period (min)	15											

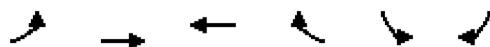
HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2028 - Phase 1
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	87	105	32	52	204	30	34	217	82	16	183	82
Future Volume (vph)	87	105	32	52	204	30	34	217	82	16	183	82
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)	95	114	35	57	222	33	37	236	89	17	199	89
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	244	312	362	305								
Volume Left (vph)	95	57	37	17								
Volume Right (vph)	35	33	89	89								
Hadj (s)	0.05	0.00	0.05	0.05								
Departure Headway (s)	7.2	6.9	6.8	6.9								
Degree Utilization, x	0.49	0.60	0.68	0.59								
Capacity (veh/h)	440	473	488	473								
Control Delay (s/veh)	16.9	19.9	23.2	19.3								
Approach Delay (s/veh)	16.9	19.9	23.2	19.3								
Approach LOS	C	C	C	C								
Intersection Summary												
Delay			20.1									
Level of Service			C									
Intersection Capacity Utilization			72.6%	ICU Level of Service					C			
Analysis Period (min)			15									

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2028 - Phase 1
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	505	513	138	310	203
Future Volume (vph)	88	505	513	138	310	203
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.971		0.947	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1131	1264	0	1282	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1131	1264	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	96	549	558	150	337	221
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	645	708	0	558	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:		Other				
Control Type: Roundabout						
Intersection Capacity Utilization 145.0%				ICU Level of Service H		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2028 - Phase 1
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	88	505	513	138	310	203
Future Volume (veh/h)	88	505	513	138	310	203
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	549	558	150	337	221
Approach Volume (veh/h)		645	708		558	
Crossing Volume (veh/h)		337	96		558	
High Capacity (veh/h)		1063	1285		891	
High v/c (veh/h)		0.61	0.55		0.63	
Low Capacity (veh/h)		870	1070		717	
Low v/c (veh/h)		0.74	0.66		0.78	
Intersection Summary						
Maximum v/c High			0.63			
Maximum v/c Low			0.78			
Intersection Capacity Utilization			145.0%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	17.2		
Intersection LOS	C		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	645	708	558
Demand Flow Rate, veh/h	695	755	593
Vehicles Circulating, veh/h	350	119	591
Vehicles Exiting, veh/h	834	926	283
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	17.2	11.2	24.9
Approach LOS	C	B	C
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	695	755	593
Cap Entry Lane, veh/h	966	1222	755
Entry HV Adj Factor	0.927	0.937	0.941
Flow Entry, veh/h	645	708	558
Cap Entry, veh/h	896	1145	711
V/C Ratio	0.720	0.618	0.785
Control Delay, s/veh	17.2	11.2	24.9
LOS	C	B	C
95th %tile Queue, veh	6	4	8

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	42.5	91.6	52.6	19.3	76.8	40.2	42.4	19.7	54.2
Average Queue (m)	15.0	48.7	14.0	5.9	38.8	17.9	18.2	4.2	25.5
95th Queue (m)	31.1	80.7	41.3	14.4	64.8	33.8	34.6	14.1	48.8
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)		24	1		2	13	8	1	15
Queuing Penalty (veh)		49	4		0	18	8	2	3

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	35.8	44.2	64.6	41.8
Average Queue (m)	17.0	17.1	30.2	22.4
95th Queue (m)	27.7	32.4	53.0	36.1
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	82.3	60.9	110.1
Average Queue (m)	30.0	17.4	42.0
95th Queue (m)	65.7	42.2	89.9
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 84

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-18 3:24:09 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - BG 2028						
Intersection 1Lane - Leg North	1.28	?	8.21	0.55	A	9.44	A
Intersection 1Lane - Leg West	1.38	1.08	7.68	0.56	A		
Intersection 1Lane - Leg East	2.35	4.26	12.01	0.69	B		
Intersection 1Ln+C - Leg North	0.28	~1	2.94	0.21	A	3.37	A
Intersection 1Ln+C - Leg West	0.63	1.08	3.48	0.37	A		
Intersection 1Ln+C - Leg East	0.56	1.06	3.61	0.35	A		
Intersection 2Lane - Leg North	0.41	~1	2.61	0.28	A	2.70	A
Intersection 2Lane - Leg West	0.46	~1	2.54	0.30	A		
Intersection 2Lane - Leg East	0.58	1.07	2.91	0.35	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - BG 2028, AM" model duration: 8:00 AM - 9:30 AM

"D2 - BG 2028, PM" model duration: 4:00 PM - 5:30 PM

"D3 - BG 2033, AM" model duration: 8:00 AM - 9:30 AM

"D4 - BG 2033, PM" model duration: 4:00 PM - 5:30 PM

"D5 - BG 2038, AM" model duration: 8:00 AM - 9:30 AM

"D6 - BG 2038, PM" model duration: 4:00 PM - 5:30 PM

"D7 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM

"D8 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM

"D9 - TT 2033, AM" model duration: 8:00 AM - 9:30 AM

"D10 - TT 2033, PM" model duration: 4:00 PM - 5:30 PM

"D11 - TT 2038, AM" model duration: 8:00 AM - 9:30 AM

"D12 - TT 2038, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-18 3:24:08 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2028, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2028, AM	BG 2028	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				9.44	A
1Ln+C	1Ln+C	Single Lane - Chanelized Rights	Roundabout	North,West,East				3.37	A
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				2.70	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	

1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	513.00	100.000
1Lane	West	ONE HOUR	✓	593.00	100.000
1Lane	East	ONE HOUR	✓	651.00	100.000
1Ln+C	North	ONE HOUR	✓	513.00	100.000
1Ln+C	West	ONE HOUR	✓	593.00	100.000
1Ln+C	East	ONE HOUR	✓	651.00	100.000
2Lane	North	ONE HOUR	✓	513.00	100.000
2Lane	West	ONE HOUR	✓	593.00	100.000
2Lane	East	ONE HOUR	✓	651.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
	From	North	West	East
	North	0.000	203.000	310.000
	West	505.000	0.000	88.000

	East	138.000	513.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.21	0.79	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	203.000	310.000
	West	505.000	0.000	88.000
	East	138.000	513.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.21	0.79	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.000	203.000	310.000
	West	505.000	0.000	88.000
	East	138.000	513.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.21	0.79	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	10.0	4.0
	West	5.0	0.0	32.0

	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.55	8.21	1.28	?	A	470.74	706.11	77.03	6.55	0.86	77.04	6.55
1Lane	West	0.56	7.68	1.38	1.08	A	544.15	816.22	85.15	6.26	0.95	85.16	6.26
1Lane	East	0.69	12.01	2.35	4.26	B	597.37	896.05	128.09	8.58	1.42	128.10	8.58
1Ln+C	North	0.21	2.94	0.28	~1	A	470.74	426.69	19.26	2.71	0.21	19.26	2.71
1Ln+C	West	0.37	3.48	0.63	1.08	A	544.15	816.22	42.46	3.12	0.47	42.46	3.12
1Ln+C	East	0.35	3.61	0.56	1.06	A	597.37	706.11	37.68	3.20	0.42	37.68	3.20
2Lane	North	0.28	2.61	0.41	~1	A	470.74	706.11	28.09	2.39	0.31	28.09	2.39
2Lane	West	0.30	2.54	0.46	~1	A	544.15	816.22	31.80	2.34	0.35	31.80	2.34
2Lane	East	0.35	2.91	0.58	1.07	A	597.37	896.05	38.86	2.60	0.43	38.86	2.60

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	386.21		96.55			384.04	481.31	383.70	0.00	1135.37	967.43	0.340	0.00	0.54	5.079	A
1Lane	West	446.44		111.61			443.97	535.67	232.07	0.00	1223.13	1019.10	0.365	0.00	0.62	4.972	A
1Lane	East	490.11		122.53			486.92	297.96	378.09	0.00	1138.62	855.16	0.430	0.00	0.80	5.862	A
1Ln+C	North	386.21	233.38	58.35	152.83	103.89	232.74	379.02	385.01	0.00	1742.70	1111.26	0.134	0.00	0.16	2.478	A
1Ln+C	West	446.44	446.44	111.61	0.00	152.83	445.07	385.01	232.74	0.00	1850.86	1226.86	0.241	0.00	0.34	2.770	A
1Ln+C	East	490.11	386.21	96.55	103.89	0.00	385.01	298.79	379.02	0.00	1746.96	1274.07	0.221	0.00	0.30	2.799	A
2Lane	North	386.21		96.55			385.29	482.92	385.23	0.00	2157.84	1650.06	0.179	0.00	0.23	2.157	A
2Lane	West	446.44		111.61			445.38	537.69	232.83	0.00	2268.02	1715.48	0.197	0.00	0.26	2.138	A
2Lane	East	490.11		122.53			488.86	298.92	379.29	0.00	2162.14	1380.18	0.227	0.00	0.31	2.293	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	461.18		115.29			460.27	576.87	459.90	0.00	1091.28	967.43	0.423	0.54	0.77	6.055	A
1Lane	West	533.09		133.27			532.12	642.03	278.14	0.00	1196.47	1019.10	0.446	0.62	0.86	5.859	A
1Lane	East	585.24		146.31			583.61	357.10	453.16	0.00	1095.18	855.16	0.534	0.80	1.20	7.479	A
1Ln+C	North	461.18	278.68	69.67	182.49	124.06	278.51	453.63	460.80	0.00	1688.87	1111.26	0.165	0.16	0.20	2.654	A
1Ln+C	West	533.09	533.09	133.27	0.00	182.49	532.68	460.80	278.51	0.00	1818.35	1226.86	0.293	0.34	0.45	3.032	A
1Ln+C	East	585.24	461.18	115.29	124.06	0.00	460.80	357.55	453.63	0.00	1693.96	1274.07	0.272	0.30	0.39	3.094	A
2Lane	North	461.18		115.29			460.91	577.71	460.87	0.00	2103.16	1650.06	0.219	0.23	0.30	2.330	A
2Lane	West	533.09		133.27			532.80	643.26	278.52	0.00	2234.99	1715.48	0.239	0.26	0.34	2.290	A
2Lane	East	585.24		146.31			584.85	357.59	453.73	0.00	2108.32	1380.18	0.278	0.31	0.41	2.519	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	564.82		141.21			562.86	705.30	561.38	0.00	1032.54	967.43	0.547	0.77	1.26	8.114	A
1Lane	West	652.91		163.23			650.88	784.11	340.13	0.00	1160.59	1019.10	0.563	0.86	1.37	7.617	A
1Lane	East	716.76		179.19			712.39	436.72	554.29	0.00	1036.64	855.16	0.691	1.20	2.30	11.680	B
1Ln+C	North	564.82	341.32	85.33	223.51	151.94	341.03	555.40	564.15	0.00	1615.46	1111.26	0.211	0.20	0.28	2.937	A
1Ln+C	West	652.91	652.91	163.23	0.00	223.51	652.19	564.15	341.03	0.00	1773.94	1226.86	0.368	0.45	0.63	3.473	A
1Ln+C	East	716.76	564.82	141.21	151.94	0.00	564.15	437.81	555.40	0.00	1621.68	1274.07	0.348	0.39	0.56	3.606	A
2Lane	North	564.82		141.21			564.38	707.40	564.29	0.00	2028.39	1650.06	0.278	0.30	0.41	2.614	A
2Lane	West	652.91		163.23			652.42	787.62	341.05	0.00	2189.78	1715.48	0.298	0.34	0.46	2.536	A
2Lane	East	716.76		179.19			716.09	437.87	555.61	0.00	2034.67	1380.18	0.352	0.41	0.58	2.909	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	564.82		141.21			564.76	707.87	564.67	0.00	1030.64	967.43	0.548	1.26	1.28	8.211	A
1Lane	West	652.91		163.23			652.85	788.15	341.28	0.00	1159.93	1019.10	0.563	1.37	1.38	7.685	A
1Lane	East	716.76		179.19			716.57	438.16	555.97	0.00	1035.67	855.16	0.692	2.30	2.35	12.009	B
1Ln+C	North	564.82	341.32	85.33	223.51	151.94	341.31	556.01	564.82	0.00	1614.99	1111.26	0.211	0.28	0.28	2.938	A
1Ln+C	West	652.91	652.91	163.23	0.00	223.51	652.90	564.82	341.31	0.00	1773.74	1226.86	0.368	0.63	0.63	3.477	A
1Ln+C	East	716.76	564.82	141.21	151.94	0.00	564.82	438.20	556.01	0.00	1621.25	1274.07	0.348	0.56	0.56	3.611	A
2Lane	North	564.82		141.21			564.82	707.95	564.82	0.00	2028.01	1650.06	0.279	0.41	0.41	2.614	A
2Lane	West	652.91		163.23			652.90	788.32	341.31	0.00	2189.59	1715.48	0.298	0.46	0.46	2.536	A
2Lane	East	716.76		179.19			716.76	438.20	556.01	0.00	2034.38	1380.18	0.352	0.58	0.58	2.912	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	461.18		115.29			463.12	580.67	464.63	0.00	1088.53	967.43	0.424	1.28	0.79	6.136	A
1Lane	West	533.09		133.27			535.09	647.89	279.86	0.00	1195.48	1019.10	0.446	1.38	0.88	5.922	A
1Lane	East	585.24		146.31			589.62	359.26	455.69	0.00	1093.71	855.16	0.535	2.35	1.25	7.678	A
1Ln+C	North	461.18	278.68	69.67	182.49	124.06	278.97	454.59	461.84	0.00	1688.13	1111.26	0.165	0.28	0.21	2.656	A
1Ln+C	West	533.09	533.09	133.27	0.00	182.49	533.80	461.84	278.97	0.00	1818.02	1226.86	0.293	0.63	0.45	3.036	A
1Ln+C	East	585.24	461.18	115.29	124.06	0.00	461.84	358.19	454.59	0.00	1693.28	1274.07	0.272	0.56	0.40	3.099	A
2Lane	North	461.18		115.29			461.62	578.59	461.70	0.00	2102.56	1650.06	0.219	0.41	0.30	2.332	A
2Lane	West	533.09		133.27			533.57	644.37	278.95	0.00	2234.68	1715.48	0.239	0.46	0.34	2.293	A
2Lane	East	585.24		146.31			585.90	358.13	454.39	0.00	2107.84	1380.18	0.278	0.58	0.41	2.524	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	386.21		96.55			387.16	485.31	387.57	0.00	1133.13	967.43	0.341	0.79	0.55	5.135	A
1Lane	West	446.44		111.61			447.45	540.78	233.95	0.00	1222.04	1019.10	0.365	0.88	0.63	5.038	A
1Lane	East	490.11		122.53			491.83	300.36	381.05	0.00	1136.91	855.16	0.431	1.25	0.82	5.967	A
1Ln+C	North	386.21	233.38	58.35	152.83	103.89	233.56	380.55	386.60	0.00	1741.57	1111.26	0.134	0.21	0.16	2.482	A
1Ln+C	West	446.44	446.44	111.61	0.00	152.83	446.86	386.60	233.56	0.00	1850.27	1226.86	0.241	0.45	0.35	2.778	A
1Ln+C	East	490.11	386.21	96.55	103.89	0.00	386.60	299.88	380.55	0.00	1745.87	1274.07	0.221	0.40	0.30	2.807	A
2Lane	North	386.21		96.55			386.48	484.42	386.52	0.00	2156.91	1650.06	0.179	0.30	0.23	2.163	A
2Lane	West	446.44		111.61			446.74	539.46	233.55	0.00	2267.50	1715.48	0.197	0.34	0.27	2.141	A
2Lane	East	490.11		122.53			490.50	299.84	380.44	0.00	2161.30	1380.18	0.227	0.41	0.31	2.297	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	7.89	0.53	5.079	A	A
1Lane	West	8.96	0.60	4.972	A	A
1Lane	East	11.49	0.77	5.862	A	A
1Ln+C	North	2.37	0.16	2.478	A	A
1Ln+C	West	5.05	0.34	2.770	A	A
1Ln+C	East	4.42	0.29	2.799	A	A
2Lane	North	3.42	0.23	2.157	A	A
2Lane	West	3.91	0.26	2.138	A	A
2Lane	East	4.60	0.31	2.293	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	11.22	0.75	6.055	A	A
1Lane	West	12.56	0.84	5.859	A	A
1Lane	East	17.37	1.16	7.479	A	A
1Ln+C	North	3.04	0.20	2.654	A	A
1Ln+C	West	6.61	0.44	3.032	A	A
1Ln+C	East	5.84	0.39	3.094	A	A
2Lane	North	4.42	0.29	2.330	A	A
2Lane	West	5.02	0.33	2.290	A	A
2Lane	East	6.05	0.40	2.519	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	18.09	1.21	8.114	A	A
1Lane	West	19.67	1.31	7.617	A	A
1Lane	East	32.04	2.14	11.680	B	B
1Ln+C	North	4.11	0.27	2.937	A	A
1Ln+C	West	9.24	0.62	3.473	A	A
1Ln+C	East	8.29	0.55	3.606	A	A
2Lane	North	6.05	0.40	2.614	A	A
2Lane	West	6.78	0.45	2.536	A	A
2Lane	East	8.52	0.57	2.909	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	19.04	1.27	8.211	A	A
1Lane	West	20.63	1.38	7.685	A	A
1Lane	East	34.89	2.33	12.009	B	B
1Ln+C	North	4.17	0.28	2.938	A	A
1Ln+C	West	9.42	0.63	3.477	A	A
1Ln+C	East	8.46	0.56	3.611	A	A
2Lane	North	6.14	0.41	2.614	A	A
2Lane	West	6.88	0.46	2.536	A	A
2Lane	East	8.67	0.58	2.912	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	12.26	0.82	6.136	A	A
1Lane	West	13.67	0.91	5.922	A	A
1Lane	East	19.65	1.31	7.678	A	A
1Ln+C	North	3.13	0.21	2.656	A	A
1Ln+C	West	6.88	0.46	3.036	A	A
1Ln+C	East	6.08	0.41	3.099	A	A
2Lane	North	4.55	0.30	2.332	A	A
2Lane	West	5.17	0.34	2.293	A	A
2Lane	East	6.26	0.42	2.524	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	8.52	0.57	5.135	A	A
1Lane	West	9.67	0.64	5.038	A	A
1Lane	East	12.65	0.84	5.967	A	A
1Ln+C	North	2.45	0.16	2.482	A	A
1Ln+C	West	5.26	0.35	2.778	A	A
1Ln+C	East	4.60	0.31	2.807	A	A
2Lane	North	3.52	0.23	2.163	A	A
2Lane	West	4.04	0.27	2.141	A	A
2Lane	East	4.76	0.32	2.297	A	A

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

1Lane	West	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	0.80	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.16	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.77	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.86	0.00	0.00	0.00	1.08			N/A	N/A
1Lane	East	1.20	0.00	0.00	2.13	2.13			N/A	N/A
1Ln+C	North	0.20	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.39	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.26	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	1.37	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	2.30	0.00	0.00	0.00	4.26			N/A	N/A
1Ln+C	North	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.28	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	1.38	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	2.35	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.63	0.00	0.00	0.00	1.08			N/A	N/A
1Ln+C	East	0.56	0.00	0.00	0.00	1.06			N/A	N/A
2Lane	North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.58	0.00	0.00	0.00	1.07			N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.79	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

1Lane	West	0.88	0.00	0.00	0.00	1.08			N/A	N/A
1Lane	East	1.25	0.00	0.00	2.13	3.20			N/A	N/A
1Ln+C	North	0.21	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.40	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.55	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	0.82	0.00	0.00	1.07	2.13			N/A	N/A
1Ln+C	North	0.16	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	825	198	41	851	34	219	131	50	30	186	193
Future Volume (vph)	85	825	198	41	851	34	219	131	50	30	186	193
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.994			0.959			0.924	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1365	0	1415	1294	0	1429	1239	0
Flt Permitted	0.087			0.087			0.347			0.589		
Satd. Flow (perm)	122	1613	1110	131	1365	0	517	1294	0	886	1239	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			69		3			25			69	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	92	897	215	45	925	37	238	142	54	33	202	210
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	897	215	45	962	0	238	196	0	33	412	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	1.48	1.09	0.36	0.68	1.38		1.16	0.37		0.09	0.77	
Control Delay (s/veh)	311.3	82.2	10.7	69.9	201.7		140.0	18.9		17.8	30.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	311.3	82.2	10.7	69.9	201.7		140.0	18.9		17.8	30.6	
LOS	F	F	B	E	F		F	B		B	C	
Approach Delay (s/veh)		86.9			195.8			85.3			29.7	
Approach LOS		F			F			F			C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 145

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.48

Intersection Signal Delay (s/veh): 113.9

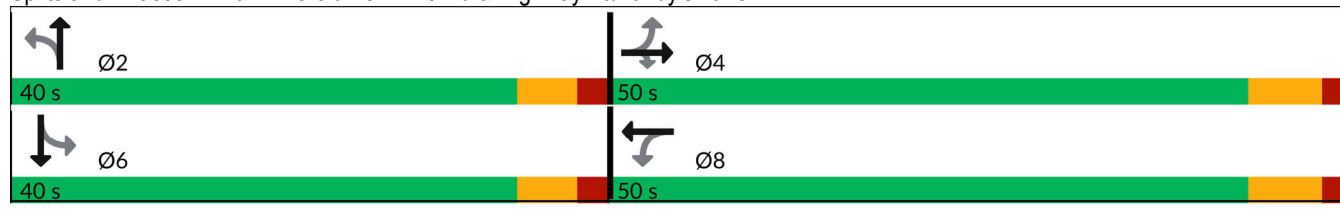
Intersection LOS: F

Intersection Capacity Utilization 139.0%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2028 - Phase 1

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	92	897	215	45	962	238	196	33	412
v/c Ratio	1.48	1.09	0.36	0.68	1.38	1.16	0.37	0.09	0.77
Control Delay (s/veh)	311.3	82.2	10.7	69.9	201.7	140.0	18.9	17.8	30.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	311.3	82.2	10.7	69.9	201.7	140.0	18.9	17.8	30.6
Queue Length 50th (m)	~23.3	~185.4	14.2	5.8	~236.3	~51.5	21.1	3.7	53.5
Queue Length 95th (m)	#43.8	#258.5	30.2	#27.0	#312.5	#97.8	39.2	9.9	#103.8
Internal Link Dist (m)		912.7			557.5		759.0		2604.2
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	601	66	699	206	532	354	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.48	1.09	0.36	0.68	1.38	1.16	0.37	0.09	0.77

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2028 - Phase 1
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	825	198	41	851	34	219	131	50	30	186	193
Future Volume (vph)	85	825	198	41	851	34	219	131	50	30	186	193
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1366		1415	1293		1429	1238	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.35	1.00		0.59	1.00	
Satd. Flow (perm)	122	1613	1110	131	1366		516	1293		885	1238	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	897	215	45	925	37	238	142	54	33	202	210
RTOR Reduction (vph)	0	0	34	0	1	0	0	15	0	0	41	0
Lane Group Flow (vph)	92	897	181	45	961	0	238	181	0	33	371	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	698		206	517		354	495	
v/s Ratio Prot		0.56			0.70			0.14			0.30	
v/s Ratio Perm	c0.75		0.16	0.34			c0.46			0.04		
v/c Ratio	1.48	1.09	0.32	0.68	1.38		1.16	0.35		0.09	0.75	
Uniform Delay, d1	22.0	22.0	12.9	16.5	22.0		27.0	18.8		16.8	23.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	285.6	58.2	0.3	25.2	178.2		110.9	0.4		0.1	6.1	
Delay (s)	307.6	80.2	13.2	41.7	200.2		137.9	19.3		16.9	29.3	
Level of Service	F		B	D	F		F	B		B	C	
Approach Delay (s/veh)		85.6			193.1			84.3			28.3	
Approach LOS		F			F			F			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			112.2			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.33									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			139.0%			ICU Level of Service				H		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2028 - Phase 1
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	238	72	119	236	31	38	199	93	31	339	183
Future Volume (vph)	97	238	72	119	236	31	38	199	93	31	339	183
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.976			0.989			0.962			0.955	
Flt Protected		0.988			0.985			0.994			0.997	
Satd. Flow (prot)	0	1380	0	0	1436	0	0	1337	0	0	1349	0
Flt Permitted		0.988			0.985			0.994			0.997	
Satd. Flow (perm)	0	1380	0	0	1436	0	0	1337	0	0	1349	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	105	259	78	129	257	34	41	216	101	34	368	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	442	0	0	420	0	0	358	0	0	601	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	91.3%											
Analysis Period (min)	15											
	ICU Level of Service F											

HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2028 - Phase 1
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	97	238	72	119	236	31	38	199	93	31	339	183
Future Volume (vph)	97	238	72	119	236	31	38	199	93	31	339	183
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)	105	259	78	129	257	34	41	216	101	34	368	199
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	442	420	358	601								
Volume Left (vph)	105	129	41	34								
Volume Right (vph)	78	34	101	199								
Hadj (s)	0.00	0.02	-0.04	-0.11								
Departure Headway (s)	9.4	9.5	9.5	9.3								
Degree Utilization, x	1.16	1.10	0.95	1.56								
Capacity (veh/h)	385	391	373	399								
Control Delay (s/veh)	126.6	107.9	65.4	286.4								
Approach Delay (s/veh)	126.6	107.9	65.4	286.4								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				163.0								
Level of Service				F								
Intersection Capacity Utilization				91.3%	ICU Level of Service							F
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2028 - Phase 1
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	184	869	928	335	239	158
Future Volume (vph)	184	869	928	335	239	158
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.964		0.946	
Flt Protected		0.991			0.971	
Satd. Flow (prot)	0	1197	1319	0	1336	0
Flt Permitted		0.991			0.971	
Satd. Flow (perm)	0	1197	1319	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	200	945	1009	364	260	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1145	1373	0	432	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	220.6%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2028 - Phase 1
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	184	869	928	335	239	158
Future Volume (veh/h)	184	869	928	335	239	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	200	945	1009	364	260	172
Approach Volume (veh/h)		1145	1373		432	
Crossing Volume (veh/h)		260	200		1009	
High Capacity (veh/h)		1129	1184		618	
High v/c (veh/h)		1.01	1.16		0.70	
Low Capacity (veh/h)		930	979		479	
Low v/c (veh/h)		1.23	1.40		0.90	
Intersection Summary						
Maximum v/c High			1.16			
Maximum v/c Low			1.40			
Intersection Capacity Utilization		220.6%		ICU Level of Service	H	

Intersection			
Intersection Delay, s/veh	98.4		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1145	1373	432
Demand Flow Rate, veh/h	1164	1393	441
Vehicles Circulating, veh/h	260	200	1029
Vehicles Exiting, veh/h	1210	1224	564
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	78.0	130.2	51.8
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1164	1393	441
Cap Entry Lane, veh/h	1058	1125	483
Entry HV Adj Factor	0.984	0.986	0.980
Flow Entry, veh/h	1145	1373	432
Cap Entry, veh/h	1041	1109	473
V/C Ratio	1.100	1.238	0.913
Control Delay, s/veh	78.0	130.2	51.8
LOS	F	F	F
95th %tile Queue, veh	28	45	10

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	56.4	162.2	70.0	134.9	583.9	70.0	586.9	29.3	91.6
Average Queue (m)	23.8	100.6	41.7	62.5	568.8	66.3	327.9	6.2	48.0
95th Queue (m)	59.0	154.6	87.8	169.7	613.5	83.2	690.8	23.5	78.7
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)					91		3		
Queuing Penalty (veh)					0		0		
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	3	44	2		74	92	21	1	39
Queuing Penalty (veh)	28	124	16		30	167	45	2	12

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	109.4	83.7	67.1	491.1
Average Queue (m)	47.5	33.1	31.4	336.1
95th Queue (m)	96.4	65.0	56.9	672.7
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)				7
Queuing Penalty (veh)				0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1008.5	903.7	58.2
Average Queue (m)	930.3	731.1	21.2
95th Queue (m)	1171.1	1089.2	43.7
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	58	0	
Queuing Penalty (veh)	0	4	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 429

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-18 3:23:48 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - BG 2028						
Intersection 1Lane - Leg North	0.77	1.02	6.41	0.43	A	739.49	F
Intersection 1Lane - Leg West	15.21	62.00	49.83	0.96	E		
Intersection 1Lane - Leg East	420.33	202.92	1544.90	1.72	F		
Intersection 1Ln+C - Leg North	0.26	~1	3.50	0.20	A	8.04	A
Intersection 1Ln+C - Leg West	1.74	2.03	5.46	0.63	A		
Intersection 1Ln+C - Leg East	3.22	8.16	11.62	0.76	B		
Intersection 2Lane - Leg North	0.35	~1	2.91	0.26	A	6.51	A
Intersection 2Lane - Leg West	1.08	?	3.37	0.52	A		
Intersection 2Lane - Leg East	3.88	10.15	10.27	0.80	B		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - BG 2028, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - BG 2028, PM" model duration: 4:00 PM - 5:30 PM
 "D3 - BG 2033, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - BG 2033, PM" model duration: 4:00 PM - 5:30 PM
 "D5 - BG 2038, AM" model duration: 8:00 AM - 9:30 AM
 "D6 - BG 2038, PM" model duration: 4:00 PM - 5:30 PM
 "D7 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
 "D8 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
 "D9 - TT 2033, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - TT 2033, PM" model duration: 4:00 PM - 5:30 PM
 "D11 - TT 2038, AM" model duration: 8:00 AM - 9:30 AM
 "D12 - TT 2038, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-18 3:23:47 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2028, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2028, PM	BG 2028	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				739.49	F
1Ln+C	1Ln+C	Single Lane - Chanelized Rights	Roundabout	North,West,East				8.04	A
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				6.51	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	

2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	397.00	100.000
1Lane	West	ONE HOUR	✓	1053.00	100.000
1Lane	East	ONE HOUR	✓	1263.00	100.000
1Ln+C	North	ONE HOUR	✓	397.00	100.000
1Ln+C	West	ONE HOUR	✓	1053.00	100.000
1Ln+C	East	ONE HOUR	✓	1263.00	100.000
2Lane	North	ONE HOUR	✓	397.00	100.000
2Lane	West	ONE HOUR	✓	1053.00	100.000
2Lane	East	ONE HOUR	✓	1263.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
	North	0.000	158.000	239.000
	West	869.000	0.000	184.000
From	East	335.000	928.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.83	0.00	0.17
	East	0.27	0.73	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	158.000	239.000
	West	869.000	0.000	184.000
	East	335.000	928.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.83	0.00	0.17
	East	0.27	0.73	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.000	158.000	239.000
	West	869.000	0.000	184.000
	East	335.000	928.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.83	0.00	0.17
	East	0.27	0.73	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East

From	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.43	6.41	0.77	1.02	A	364.29	546.44	54.23	5.95	0.60	54.24	5.96
1Lane	West	0.96	49.83	15.21	62.00	E	966.25	1449.38	516.82	21.39	5.74	516.90	21.40
1Lane	East	1.72	1544.90	420.33	202.92	F	1158.95	1738.43	19210.51	663.03	213.45	24502.17	845.67
1Ln+C	North	0.20	3.50	0.26	~1	A	364.29	328.97	16.93	3.09	0.19	16.93	3.09
1Ln+C	West	0.63	5.46	1.74	2.03	A	966.25	1449.38	104.67	4.33	1.16	104.68	4.33
1Ln+C	East	0.76	11.62	3.22	8.16	B	1158.95	1277.32	156.98	7.37	1.74	157.00	7.37
2Lane	North	0.26	2.91	0.35	~1	A	364.29	546.44	23.46	2.58	0.26	23.46	2.58
2Lane	West	0.52	3.37	1.08	?	A	966.25	1449.38	69.58	2.88	0.77	69.58	2.88
2Lane	East	0.80	10.27	3.88	10.15	B	1158.95	1738.43	185.28	6.39	2.06	185.29	6.40

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	298.88		74.72			297.09	888.35	664.16	0.00	973.06	986.12	0.307	0.00	0.45	5.414	A
1Lane	West	792.75		198.19			785.93	782.39	178.85	0.00	1253.93	1013.86	0.632	0.00	1.71	7.711	A
1Lane	East	950.85		237.71			903.91	316.18	648.59	0.00	982.06	873.20	0.968	0.00	11.74	35.960	E
1Ln+C	North	298.88	179.93	44.98	118.95	252.21	179.40	651.82	695.34	0.00	1522.28	1098.72	0.118	0.00	0.13	2.679	A
1Ln+C	West	792.75	792.75	198.19	0.00	118.95	789.83	695.34	179.40	0.00	1888.75	1235.77	0.420	0.00	0.73	3.322	A
1Ln+C	East	950.85	698.65	174.66	252.21	0.00	695.34	317.41	651.82	0.00	1553.20	1291.80	0.450	0.00	0.83	4.264	A
2Lane	North	298.88		74.72			298.14	903.68	695.87	0.00	1933.26	1682.27	0.155	0.00	0.19	2.243	A
2Lane	West	792.75		198.19			790.63	814.53	179.48	0.00	2306.59	1704.18	0.344	0.00	0.53	2.411	A
2Lane	East	950.85		237.71			947.08	317.64	652.48	0.00	1964.64	1419.59	0.484	0.00	0.94	3.576	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	356.89		89.22			356.35	1016.22	664.47	0.00	972.88	986.12	0.367	0.45	0.58	5.947	A
1Lane	West	946.63		236.66			940.74	806.29	214.53	0.00	1233.29	1013.86	0.768	1.71	3.18	12.260	B
1Lane	East	1135.41		283.85			904.33	378.91	776.36	0.00	908.12	873.20	1.250	11.74	69.51	177.437	F
1Ln+C	North	356.89	214.86	53.71	142.04	301.16	214.68	780.19	832.22	0.00	1425.06	1098.71	0.151	0.13	0.18	2.974	A
1Ln+C	West	946.63	946.63	236.66	0.00	142.04	945.39	832.22	214.68	0.00	1863.68	1235.78	0.508	0.73	1.04	3.980	A
1Ln+C	East	1135.41	834.25	208.56	301.16	0.00	832.22	379.88	780.19	0.00	1462.01	1291.80	0.571	0.83	1.34	5.812	A
2Lane	North	356.89		89.22			356.66	1081.12	832.49	0.00	1834.49	1682.27	0.195	0.19	0.25	2.482	A
2Lane	West	946.63		236.66			945.88	974.44	214.71	0.00	2281.12	1704.18	0.415	0.53	0.72	2.739	A
2Lane	East	1135.41		283.85			1133.02	379.99	780.60	0.00	1872.01	1419.59	0.607	0.94	1.54	4.927	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	437.11		109.28			436.36	1144.64	603.12	0.00	1008.38	986.14	0.433	0.58	0.77	6.407	A

1Lane	West	1159.37		289.84			1123.19	776.79	262.70	0.00	1205.41	1013.85	0.962	3.18	12.22	34.706	D
1Lane	East	1390.59		347.65			820.85	458.96	926.92	0.00	820.98	873.20	1.694	69.51	211.94	628.685	F
1Ln+C	North	437.11	263.14	65.79	173.96	368.84	262.84	954.51	1014.56	0.00	1295.54	1098.69	0.203	0.18	0.25	3.486	A
1Ln+C	West	1159.37	1159.37	289.84	0.00	173.96	1156.61	1014.56	262.84	0.00	1829.48	1235.79	0.634	1.04	1.73	5.415	A
1Ln+C	East	1390.59	1021.75	255.44	368.84	0.00	1014.56	464.94	954.51	0.00	1338.20	1291.79	0.764	1.34	3.13	11.106	B
2Lane	North	437.11		109.28			436.68	1322.08	1015.19	0.00	1702.42	1682.26	0.257	0.25	0.35	2.899	A
2Lane	West	1159.37		289.84			1157.94	1188.98	262.89	0.00	2246.29	1704.18	0.516	0.72	1.08	3.357	A
2Lane	East	1390.59		347.65			1381.66	465.23	955.60	0.00	1745.49	1419.59	0.797	1.54	3.78	9.806	A

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	437.11		109.28			437.10	1161.62	594.69	0.00	1013.26	986.14	0.431	0.77	0.77	6.368	A
1Lane	West	1159.37		289.84			1147.44	768.65	263.14	0.00	1205.15	1013.85	0.962	12.22	15.21	49.835	E
1Lane	East	1390.59		347.65			809.37	463.65	946.94	0.00	809.39	873.20	1.718	211.94	357.25	1271.901	F
1Ln+C	North	437.11	263.14	65.79	173.96	368.84	263.14	956.74	1021.40	0.00	1290.69	1098.69	0.204	0.25	0.26	3.502	A
1Ln+C	West	1159.37	1159.37	289.84	0.00	173.96	1159.32	1021.40	263.14	0.00	1829.27	1235.79	0.634	1.73	1.74	5.461	A
1Ln+C	East	1390.59	1021.75	255.44	368.84	0.00	1021.40	465.72	956.74	0.00	1336.61	1291.79	0.764	3.13	3.22	11.615	B
2Lane	North	437.11		109.28			437.10	1325.51	1021.45	0.00	1697.89	1682.26	0.257	0.35	0.35	2.909	A
2Lane	West	1159.37		289.84			1159.36	1195.41	263.14	0.00	2246.11	1704.18	0.516	1.08	1.08	3.366	A
2Lane	East	1390.59		347.65			1390.18	465.72	956.77	0.00	1744.65	1419.59	0.797	3.78	3.88	10.273	B

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	356.89		89.22			357.63	1053.82	648.84	0.00	981.92	986.12	0.363	0.77	0.59	5.886	A
1Lane	West	946.63		236.66			993.14	791.17	215.30	0.00	1232.84	1013.86	0.768	15.21	3.58	17.826	C
1Lane	East	1135.41		283.85			883.07	388.84	819.60	0.00	883.10	873.20	1.286	357.25	420.33	1524.954	F
1Ln+C	North	356.89	214.86	53.71	142.04	301.16	215.16	783.48	841.61	0.00	1418.39	1098.71	0.151	0.26	0.18	2.994	A
1Ln+C	West	946.63	946.63	236.66	0.00	142.04	949.37	841.61	215.16	0.00	1863.34	1235.78	0.508	1.74	1.06	4.015	A
1Ln+C	East	1135.41	834.25	208.56	301.16	0.00	841.61	381.05	783.48	0.00	1459.68	1291.80	0.572	3.22	1.38	6.009	A
2Lane	North	356.89		89.22			357.31	1085.97	840.98	0.00	1828.36	1682.27	0.195	0.35	0.25	2.496	A
2Lane	West	946.63		236.66			948.05	983.18	215.11	0.00	2280.83	1704.18	0.415	1.08	0.72	2.747	A
2Lane	East	1135.41		283.85			1144.56	380.77	782.39	0.00	1870.72	1419.59	0.607	3.88	1.59	5.093	A

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	298.88		74.72			299.33	918.22	714.95	0.00	943.66	986.12	0.317	0.59	0.48	5.700	A
1Lane	West	792.75		198.19			799.91	834.07	180.20	0.00	1253.15	1013.86	0.633	3.58	1.79	8.197	A
1Lane	East	950.85		237.71			973.04	319.97	660.14	0.00	975.39	873.20	0.975	420.33	414.79	1544.897	F
1Ln+C	North	298.88	179.93	44.98	118.95	252.21	180.11	655.28	700.80	0.00	1518.41	1098.72	0.119	0.18	0.13	2.689	A
1Ln+C	West	792.75	792.75	198.19	0.00	118.95	794.03	700.80	180.11	0.00	1888.24	1235.77	0.420	1.06	0.74	3.347	A
1Ln+C	East	950.85	698.65	174.66	252.21	0.00	700.80	318.86	655.28	0.00	1550.73	1291.80	0.451	1.38	0.84	4.330	A
2Lane	North	298.88		74.72			299.13	907.73	700.49	0.00	1929.92	1682.27	0.155	0.25	0.19	2.251	A
2Lane	West	792.75		198.19			793.51	819.54	180.08	0.00	2306.16	1704.18	0.344	0.72	0.53	2.421	A
2Lane	East	950.85		237.71			953.36	318.74	654.86	0.00	1962.92	1419.59	0.484	1.59	0.96	3.628	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	6.51	0.43	5.414	A	A
1Lane	West	24.04	1.60	7.711	A	A
1Lane	East	122.82	8.19	35.960	E	D
1Ln+C	North	1.97	0.13	2.679	A	A
1Ln+C	West	10.69	0.71	3.322	A	A
1Ln+C	East	12.02	0.80	4.264	A	A
2Lane	North	2.75	0.18	2.243	A	A
2Lane	West	7.81	0.52	2.411	A	A
2Lane	East	13.76	0.92	3.576	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	8.56	0.57	5.947	A	A
1Lane	West	43.81	2.92	12.260	B	B

1Lane	East	612.64	40.84	177.437	F	F
1Ln+C	North	2.62	0.17	2.974	A	A
1Ln+C	West	15.24	1.02	3.980	A	A
1Ln+C	East	19.33	1.29	5.812	A	A
2Lane	North	3.64	0.24	2.482	A	A
2Lane	West	10.59	0.71	2.739	A	A
2Lane	East	22.36	1.49	4.927	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	11.25	0.75	6.407	A	A
1Lane	West	136.21	9.08	34.706	D	C
1Lane	East	2110.93	140.73	628.685	F	F
1Ln+C	North	3.75	0.25	3.486	A	A
1Ln+C	West	24.98	1.67	5.415	A	A
1Ln+C	East	43.03	2.87	11.106	B	B
2Lane	North	5.18	0.35	2.899	A	A
2Lane	West	15.79	1.05	3.357	A	A
2Lane	East	51.75	3.45	9.806	A	A

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	11.56	0.77	6.368	A	A
1Lane	West	208.08	13.87	49.835	E	D
1Lane	East	4268.91	284.59	1271.901	F	F
1Ln+C	North	3.82	0.25	3.502	A	A
1Ln+C	West	26.09	1.74	5.461	A	A
1Ln+C	East	47.79	3.19	11.615	B	B
2Lane	North	5.28	0.35	2.909	A	A
2Lane	West	16.18	1.08	3.366	A	A
2Lane	East	57.55	3.84	10.273	B	B

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	9.04	0.60	5.886	A	A
1Lane	West	76.21	5.08	17.826	C	B
1Lane	East	5831.83	388.79	1524.954	F	F
1Ln+C	North	2.73	0.18	2.994	A	A
1Ln+C	West	16.34	1.09	4.015	A	A
1Ln+C	East	21.80	1.45	6.009	A	A
2Lane	North	3.77	0.25	2.496	A	A
2Lane	West	11.07	0.74	2.747	A	A
2Lane	East	25.06	1.67	5.093	A	A

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	7.30	0.49	5.700	A	A
1Lane	West	28.48	1.90	8.197	A	A
1Lane	East	6263.38	417.56	1544.897	F	F
1Ln+C	North	2.05	0.14	2.689	A	A
1Ln+C	West	11.33	0.76	3.347	A	A
1Ln+C	East	13.01	0.87	4.330	A	A
2Lane	North	2.84	0.19	2.251	A	A
2Lane	West	8.13	0.54	2.421	A	A
2Lane	East	14.78	0.99	3.628	A	A

Queue Variation Results for each time segment

Queue Variation results: (16:00-16:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	1.71	0.00	1.02	2.03	2.03			N/A	N/A
1Lane	East	11.74	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.13	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.73	~1	~1	~1	~1	Percentiles could not be calculated. This may be		N/A	N/A

							because the mean queue is very small or very big.			
1Ln+C	East	0.83	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.94	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	3.18	0.00	0.00	7.12	11.18			N/A	N/A
1Lane	East	69.51	0.00	11.16	191.76	>199			N/A	N/A
1Ln+C	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.04	0.00	0.00	1.02	2.03			N/A	N/A
1Ln+C	East	1.34	0.00	0.00	2.04	4.08			N/A	N/A
2Lane	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.72	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	1.54	0.00	0.00	3.04	5.07			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.77	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	12.22	0.00	3.05	31.51	45.74			N/A	N/A
1Lane	East	211.94	44.64	181.62	>199	>199			N/A	N/A
1Ln+C	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.73	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	3.13	0.00	0.00	1.02	8.16			N/A	N/A
2Lane	North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.08	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	3.78	0.00	0.00	1.01	10.15			N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.77	0.00	0.00	0.00	1.02			N/A	N/A
1Lane	West	15.21	0.00	1.02	39.64	62.00			N/A	N/A
1Lane	East	357.25	161.32	>199	>199	>199			N/A	N/A
1Ln+C	North	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.74	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	3.22	0.00	0.00	0.00	4.08			N/A	N/A
2Lane	North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.08	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	3.88	0.00	0.00	0.00	4.06			N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.59	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	3.58	0.00	0.00	7.12	13.21			N/A	N/A
1Lane	East	420.33	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.06	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	1.38	0.00	0.00	2.04	4.08			N/A	N/A
2Lane	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.72	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	1.59	0.00	0.00	3.04	4.06			N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	1.79	0.00	0.00	1.02	5.08			N/A	N/A
1Lane	East	414.79	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.13	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.74	0.00	0.00	0.00	1.02			N/A	N/A
1Ln+C	East	0.84	0.00	0.00	1.02	2.04			N/A	N/A
2Lane	North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.96	0.00	0.00	1.01	2.03			N/A	N/A

Appendix F2

2035 Background Operations Synchro Reports



Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2035
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	667	155	34	511	27	124	130	30	20	116	90
Future Volume (vph)	74	667	155	34	511	27	124	130	30	20	116	90
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.993			0.972			0.934	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1315	0	1311	1203	0	1191	1163	0
Flt Permitted	0.333			0.237			0.539			0.616		
Satd. Flow (perm)	439	1582	1063	356	1315	0	744	1203	0	772	1163	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			66		4			16			52	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	80	725	168	37	555	29	135	141	33	22	126	98
Shared Lane Traffic (%)												
Lane Group Flow (vph)	80	725	168	37	584	0	135	174	0	22	224	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2035
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	38.8	38.8	38.8	38.8	38.8		20.5	20.5		20.5	20.5	
Actuated g/C Ratio	0.57	0.57	0.57	0.57	0.57		0.30	0.30		0.30	0.30	
v/c Ratio	0.32	0.80	0.26	0.18	0.77		0.60	0.46		0.09	0.58	
Control Delay (s/veh)	13.7	21.5	6.8	11.4	21.5		34.4	23.1		19.6	22.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	13.7	21.5	6.8	11.4	21.5		34.4	23.1		19.6	22.8	
LOS	B	C	A	B	C		C	C		B	C	
Approach Delay (s/veh)		18.3			20.9			28.0			22.5	
Approach LOS		B			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 67.7

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay (s/veh): 20.9

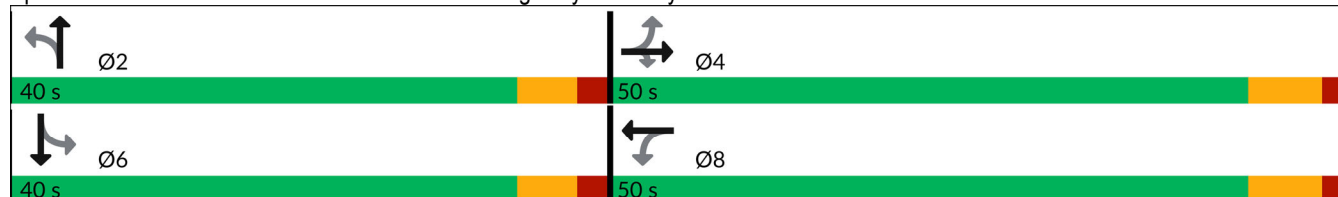
Intersection LOS: C

Intersection Capacity Utilization 95.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2035

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	80	725	168	37	584	135	174	22	224
v/c Ratio	0.32	0.80	0.26	0.18	0.77	0.60	0.46	0.09	0.58
Control Delay (s/veh)	13.7	21.5	6.8	11.4	21.5	34.4	23.1	19.6	22.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	13.7	21.5	6.8	11.4	21.5	34.4	23.1	19.6	22.8
Queue Length 50th (m)	4.8	65.5	5.5	2.0	51.0	16.8	18.5	2.3	20.8
Queue Length 95th (m)	18.9	#179.1	20.4	9.5	#148.9	36.0	37.0	7.6	43.5
Internal Link Dist (m)	912.7				557.5		759.0		2604.2
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	312	1126	775	253	937	418	684	434	677
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.26	0.64	0.22	0.15	0.62	0.32	0.25	0.05	0.33

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2035
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	74	667	155	34	511	27	124	130	30	20	116	90
Future Volume (vph)	74	667	155	34	511	27	124	130	30	20	116	90
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1314		1311	1203		1191	1163	
Flt Permitted	0.33	1.00	1.00	0.24	1.00		0.54	1.00		0.62	1.00	
Satd. Flow (perm)	440	1582	1063	356	1314		744	1203		772	1163	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	80	725	168	37	555	29	135	141	33	22	126	98
RTOR Reduction (vph)	0	0	28	0	2	0	0	11	0	0	36	0
Lane Group Flow (vph)	80	725	140	37	582	0	135	163	0	22	188	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	35.6	35.6	35.6	35.6	35.6		18.4	18.4		18.4	18.4	
Effective Green, g (s)	38.6	38.6	38.6	38.6	38.6		20.4	20.4		20.4	20.4	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58		0.30	0.30		0.30	0.30	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	253	911	612	205	757		226	366		235	354	
v/s Ratio Prot		c0.46			0.44			0.14			0.16	
v/s Ratio Perm	0.18		0.13	0.10			c0.18			0.03		
v/c Ratio	0.32	0.80	0.23	0.18	0.77		0.60	0.45		0.09	0.53	
Uniform Delay, d1	7.4	11.1	6.9	6.7	10.8		19.8	18.7		16.7	19.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	4.9	0.2	0.4	4.7		4.2	0.9		0.2	1.5	
Delay (s)	8.1	16.0	7.1	7.1	15.5		24.0	19.6		16.9	20.9	
Level of Service	A	B	A	A	B		C	B		B	C	
Approach Delay (s/veh)		13.8			15.0			21.5			20.5	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			16.0				HCM 2000 Level of Service			B		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			67.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			95.5%				ICU Level of Service			F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2035
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	119	37	54	233	34	39	237	83	8	202	93
Future Volume (vph)	99	119	37	54	233	34	39	237	83	8	202	93
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.986			0.969			0.959	
Flt Protected		0.981			0.992			0.995			0.999	
Satd. Flow (prot)	0	1380	0	0	1430	0	0	1290	0	0	1263	0
Flt Permitted		0.981			0.992			0.995			0.999	
Satd. Flow (perm)	0	1380	0	0	1430	0	0	1290	0	0	1263	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	108	129	40	59	253	37	42	258	90	9	220	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	277	0	0	349	0	0	390	0	0	330	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	90.2%											
Analysis Period (min)	15											
	ICU Level of Service E											

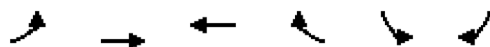
HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2035
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	99	119	37	54	233	34	39	237	83	8	202	93
Future Volume (vph)	99	119	37	54	233	34	39	237	83	8	202	93
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)	108	129	40	59	253	37	42	258	90	9	220	101
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	277	349	390	330								
Volume Left (vph)	108	59	42	9								
Volume Right (vph)	40	37	90	101								
Hadj (s)	0.05	-0.01	0.07	0.03								
Departure Headway (s)	8.1	7.8	7.6	7.8								
Degree Utilization, x	0.62	0.75	0.83	0.72								
Capacity (veh/h)	395	436	451	425								
Control Delay (s/veh)	23.5	30.8	37.9	28.3								
Approach Delay (s/veh)	23.5	30.8	37.9	28.3								
Approach LOS	C	D	E	D								
Intersection Summary												
Delay			30.7									
Level of Service			D									
Intersection Capacity Utilization			90.2%	ICU Level of Service					E			
Analysis Period (min)			15									

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2035
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	94	568	577	148	328	215
Future Volume (vph)	94	568	577	148	328	215
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.972		0.947	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1132	1265	0	1282	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1132	1265	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	102	617	627	161	357	234
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	719	788	0	591	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	158.3%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2035
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	94	568	577	148	328	215
Future Volume (veh/h)	94	568	577	148	328	215
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	102	617	627	161	357	234
Approach Volume (veh/h)		719	788		591	
Crossing Volume (veh/h)		357	102		627	
High Capacity (veh/h)		1046	1279		843	
High v/c (veh/h)		0.69	0.62		0.70	
Low Capacity (veh/h)		855	1065		674	
Low v/c (veh/h)		0.84	0.74		0.88	
Intersection Summary						
Maximum v/c High			0.70			
Maximum v/c Low			0.88			
Intersection Capacity Utilization			158.3%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	24.2		
Intersection LOS	C		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	719	788	591
Demand Flow Rate, veh/h	774	840	628
Vehicles Circulating, veh/h	371	126	665
Vehicles Exiting, veh/h	922	1019	301
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	23.8	13.4	39.1
Approach LOS	C	B	E
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	774	840	628
Cap Entry Lane, veh/h	945	1213	700
Entry HV Adj Factor	0.929	0.939	0.941
Flow Entry, veh/h	719	788	591
Cap Entry, veh/h	878	1139	659
V/C Ratio	0.819	0.692	0.897
Control Delay, s/veh	23.8	13.4	39.1
LOS	C	B	E
95th %tile Queue, veh	9	6	11

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	43.8	123.1	70.0	17.9	94.5	45.0	50.2	33.7	73.0
Average Queue (m)	15.0	61.9	20.6	6.1	48.9	21.9	21.0	5.2	29.5
95th Queue (m)	33.4	100.7	56.3	14.6	79.0	38.7	42.1	19.0	57.6
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)		31	1		5	18	9	1	19
Queuing Penalty (veh)		72	9		2	28	12	2	4

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	44.6	57.6	81.1	53.8
Average Queue (m)	19.7	22.0	35.2	25.8
95th Queue (m)	33.5	46.4	65.2	42.8
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	94.9	78.2	199.6
Average Queue (m)	37.8	21.5	94.7
95th Queue (m)	82.4	53.2	191.1
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 128

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-06 4:08:46 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - BG 2030						
Intersection 1Lane - Leg North	1.60	1.06	9.74	0.60	A	13.13	B
Intersection 1Lane - Leg West	1.85	2.16	9.27	0.63	A		
Intersection 1Lane - Leg East	4.09	13.86	19.19	0.80	C		
Intersection 1Ln+C - Leg North	0.31	~1	3.11	0.23	A	3.70	A
Intersection 1Ln+C - Leg West	0.76	1.08	3.78	0.41	A		
Intersection 1Ln+C - Leg East	0.72	1.06	4.07	0.40	A		
Intersection 2Lane - Leg North	0.46	~1	2.77	0.30	A	2.92	A
Intersection 2Lane - Leg West	0.54	1.08	2.69	0.34	A		
Intersection 2Lane - Leg East	0.72	1.07	3.23	0.40	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM

"D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM

"D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM

"D4 - BG 2030, PM" model duration: 4:00 PM - 5:30 PM

"D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM

"D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM

"D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM

"D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM

"D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM

"D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM

"D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM

"D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM

"D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM

"D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:08:45 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2030, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2030, AM	BG 2030	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				13.13	B
1Ln+C	1Ln+C	Single Lane - Chanelized Rights	Roundabout	North,West,East				3.70	A
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				2.92	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width	E - Entry width	I' - Effective flare length	R - Entry radius	D - Inscribed circle diameter	PHI - Conflict (entry) angle	Exit

		(m)	(m)	(m)	(m)	(m)	(deg)	Only
1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	543.00	100.000
1Lane	West	ONE HOUR	✓	662.00	100.000
1Lane	East	ONE HOUR	✓	725.00	100.000
1Ln+C	North	ONE HOUR	✓	543.00	100.000
1Ln+C	West	ONE HOUR	✓	662.00	100.000
1Ln+C	East	ONE HOUR	✓	725.00	100.000
2Lane	North	ONE HOUR	✓	543.00	100.000
2Lane	West	ONE HOUR	✓	662.00	100.000
2Lane	East	ONE HOUR	✓	725.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	215.000	328.000
	West	568.000	0.000	94.000
	East	148.000	577.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.20	0.80	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	215.000	328.000
	West	568.000	0.000	94.000
	East	148.000	577.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.20	0.80	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.000	215.000	328.000
	West	568.000	0.000	94.000
	East	148.000	577.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.20	0.80	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

From	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.60	9.74	1.60	1.06	A	498.27	747.40	92.23	7.40	1.02	92.24	7.40
1Lane	West	0.63	9.27	1.85	2.16	A	607.46	911.19	108.90	7.17	1.21	108.91	7.17
1Lane	East	0.80	19.19	4.09	13.86	C	665.27	997.91	194.74	11.71	2.16	194.77	11.71
1Ln+C	North	0.23	3.11	0.31	~1	A	498.27	451.47	21.33	2.83	0.24	21.33	2.83
1Ln+C	West	0.41	3.78	0.76	1.08	A	607.46	911.19	50.55	3.33	0.56	50.55	3.33
1Ln+C	East	0.40	4.07	0.72	1.06	A	665.27	794.20	46.54	3.52	0.52	46.54	3.52
2Lane	North	0.30	2.77	0.46	~1	A	498.27	747.40	31.17	2.50	0.35	31.17	2.50
2Lane	West	0.34	2.69	0.54	1.08	A	607.46	911.19	37.21	2.45	0.41	37.21	2.45
2Lane	East	0.40	3.23	0.72	1.07	A	665.27	997.91	46.98	2.82	0.52	46.98	2.82

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	408.80		102.20			406.34	535.66	431.17	0.00	1107.90	965.47	0.369	0.00	0.62	5.436	A
1Lane	West	498.39		124.60			495.41	592.06	245.45	0.00	1215.39	1019.91	0.410	0.00	0.74	5.386	A
1Lane	East	545.82		136.45			541.76	315.79	425.07	0.00	1111.43	850.98	0.491	0.00	1.01	6.691	A
1Ln+C	North	408.80	246.94	61.73	161.86	111.42	246.24	426.25	432.96	0.00	1708.64	1114.29	0.145	0.00	0.18	2.558	A
1Ln+C	West	498.39	498.39	124.60	0.00	161.86	496.79	432.96	246.24	0.00	1841.27	1224.71	0.271	0.00	0.40	2.891	A
1Ln+C	East	545.82	434.40	108.60	111.42	0.00	432.96	316.78	426.25	0.00	1713.41	1269.80	0.254	0.00	0.36	2.978	A
2Lane	North	408.80		102.20			407.79	537.70	433.23	0.00	2123.14	1647.33	0.193	0.00	0.25	2.230	A
2Lane	West	498.39		124.60			497.17	594.69	246.33	0.00	2258.26	1716.96	0.221	0.00	0.31	2.210	A
2Lane	East	545.82		136.45			544.35	316.92	426.57	0.00	2127.95	1371.32	0.257	0.00	0.37	2.421	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	488.15		122.04			487.02	642.03	516.69	0.00	1058.41	965.47	0.461	0.62	0.90	6.683	A
1Lane	West	595.12		148.78			593.81	709.52	294.18	0.00	1187.18	1019.91	0.501	0.74	1.07	6.546	A
1Lane	East	651.76		162.94			649.22	378.50	509.50	0.00	1062.57	850.98	0.613	1.01	1.65	9.226	A
1Ln+C	North	488.15	294.87	73.72	193.28	133.05	294.66	510.18	518.22	0.00	1648.09	1114.29	0.179	0.18	0.23	2.766	A
1Ln+C	West	595.12	595.12	148.78	0.00	193.28	594.61	518.22	294.66	0.00	1806.87	1224.71	0.329	0.40	0.53	3.209	A
1Ln+C	East	651.76	518.71	129.68	133.05	0.00	518.22	379.09	510.18	0.00	1653.80	1269.80	0.314	0.36	0.48	3.358	A
2Lane	North	488.15		122.04			487.84	643.27	518.32	0.00	2061.62	1647.33	0.237	0.25	0.33	2.431	A

2Lane	West	595.12		148.78			594.77	711.48	294.68	0.00	2223.30	1716.96	0.268	0.31	0.39	2.390	A
2Lane	East	651.76		162.94			651.27	379.14	510.32	0.00	2067.41	1371.32	0.315	0.37	0.49	2.710	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	597.85		149.46			595.19	783.90	628.11	0.00	993.92	965.47	0.602	0.90	1.56	9.532	A
1Lane	West	728.88		182.22			725.86	863.78	359.53	0.00	1149.37	1019.91	0.634	1.07	1.83	9.125	A
1Lane	East	798.24		199.56			789.22	462.59	622.79	0.00	997.00	850.98	0.801	1.65	3.90	17.738	C
1Ln+C	North	597.85	361.13	90.28	236.72	162.95	360.80	624.59	634.36	0.00	1565.59	1114.29	0.231	0.23	0.31	3.107	A
1Ln+C	West	728.88	728.88	182.22	0.00	236.72	727.95	634.36	360.80	0.00	1759.90	1224.71	0.414	0.53	0.76	3.769	A
1Ln+C	East	798.24	635.29	158.82	162.95	0.00	634.36	464.16	624.59	0.00	1572.54	1269.80	0.404	0.48	0.71	4.063	A
2Lane	North	597.85		149.46			597.33	787.64	634.57	0.00	1977.58	1647.33	0.302	0.33	0.46	2.772	A
2Lane	West	728.88		182.22			728.28	871.09	360.82	0.00	2175.49	1716.96	0.335	0.39	0.54	2.688	A
2Lane	East	798.24		199.56			797.34	464.23	624.87	0.00	1984.60	1371.32	0.402	0.49	0.71	3.231	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	597.85		149.46			597.73	788.08	634.68	0.00	990.12	965.47	0.604	1.56	1.60	9.745	A
1Lane	West	728.88		182.22			728.77	871.35	361.06	0.00	1148.48	1019.91	0.635	1.83	1.85	9.270	A
1Lane	East	798.24		199.56			797.48	464.54	625.29	0.00	995.55	850.98	0.802	3.90	4.09	19.188	C
1Ln+C	North	597.85	361.13	90.28	236.72	162.95	361.13	625.37	635.28	0.00	1564.94	1114.29	0.231	0.31	0.31	3.109	A
1Ln+C	West	728.88	728.88	182.22	0.00	236.72	728.86	635.28	361.13	0.00	1759.66	1224.71	0.414	0.76	0.76	3.775	A
1Ln+C	East	798.24	635.29	158.82	162.95	0.00	635.28	464.63	625.37	0.00	1571.98	1269.80	0.404	0.71	0.72	4.073	A
2Lane	North	597.85		149.46			597.85	788.32	635.28	0.00	1977.07	1647.33	0.302	0.46	0.46	2.773	A
2Lane	West	728.88		182.22			728.87	872.00	361.13	0.00	2175.26	1716.96	0.335	0.54	0.54	2.691	A
2Lane	East	798.24		199.56			798.23	464.63	625.38	0.00	1984.23	1371.32	0.402	0.71	0.72	3.234	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	488.15		122.04			490.80	648.15	526.19	0.00	1052.91	965.47	0.464	1.60	0.93	6.841	A
1Lane	West	595.12		148.78			598.11	720.52	296.47	0.00	1185.86	1019.91	0.502	1.85	1.11	6.658	A
1Lane	East	651.76		162.94			661.16	381.40	513.18	0.00	1060.43	850.98	0.615	4.09	1.74	9.827	A
1Ln+C	North	488.15	294.87	73.72	193.28	133.05	295.20	511.40	519.63	0.00	1647.09	1114.29	0.179	0.31	0.23	2.771	A
1Ln+C	West	595.12	595.12	148.78	0.00	193.28	596.04	519.63	295.20	0.00	1806.49	1224.71	0.329	0.76	0.53	3.217	A
1Ln+C	East	651.76	518.71	129.68	133.05	0.00	519.63	379.83	511.40	0.00	1652.93	1269.80	0.314	0.72	0.49	3.371	A
2Lane	North	488.15		122.04			488.66	644.36	519.42	0.00	2060.83	1647.33	0.237	0.46	0.33	2.434	A
2Lane	West	595.12		148.78			595.71	712.90	295.18	0.00	2222.95	1716.96	0.268	0.54	0.40	2.392	A
2Lane	East	651.76		162.94			652.65	379.76	511.12	0.00	2066.83	1371.32	0.315	0.72	0.49	2.714	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	408.80		102.20			410.00	540.79	436.62	0.00	1104.75	965.47	0.370	0.93	0.63	5.516	A
1Lane	West	498.39		124.60			499.77	598.96	247.66	0.00	1214.11	1019.91	0.411	1.11	0.76	5.459	A
1Lane	East	545.82		136.45			548.61	318.63	428.80	0.00	1109.27	850.98	0.492	1.74	1.05	6.880	A
1Ln+C	North	408.80	246.94	61.73	161.86	111.42	247.14	428.07	434.90	0.00	1707.27	1114.29	0.145	0.23	0.18	2.564	A
1Ln+C	West	498.39	498.39	124.60	0.00	161.86	498.91	434.90	247.14	0.00	1840.63	1224.71	0.271	0.53	0.40	2.902	A
1Ln+C	East	545.82	434.40	108.60	111.42	0.00	434.90	317.98	428.07	0.00	1712.12	1269.80	0.254	0.49	0.36	2.990	A
2Lane	North	408.80		102.20			409.11	539.45	434.79	0.00	2122.01	1647.33	0.193	0.33	0.25	2.234	A
2Lane	West	498.39		124.60			498.75	596.77	247.12	0.00	2257.69	1716.96	0.221	0.40	0.31	2.213	A
2Lane	East	545.82		136.45			546.31	317.94	427.93	0.00	2126.97	1371.32	0.257	0.49	0.37	2.430	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	8.92	0.59	5.436	A	A
1Lane	West	10.77	0.72	5.386	A	A
1Lane	East	14.52	0.97	6.691	A	A
1Ln+C	North	2.59	0.17	2.558	A	A
1Ln+C	West	5.88	0.39	2.891	A	A
1Ln+C	East	5.27	0.35	2.978	A	A

2Lane	North	3.74	0.25	2.230	A	A
2Lane	West	4.51	0.30	2.210	A	A
2Lane	East	5.41	0.36	2.421	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	13.05	0.87	6.683	A	A
1Lane	West	15.57	1.04	6.546	A	A
1Lane	East	23.51	1.57	9.226	A	A
1Ln+C	North	3.35	0.22	2.766	A	A
1Ln+C	West	7.80	0.52	3.209	A	A
1Ln+C	East	7.11	0.47	3.358	A	A
2Lane	North	4.87	0.32	2.431	A	A
2Lane	West	5.84	0.39	2.390	A	A
2Lane	East	7.23	0.48	2.710	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	22.25	1.48	9.532	A	A
1Lane	West	25.95	1.73	9.125	A	A
1Lane	East	51.82	3.45	17.738	C	B
1Ln+C	North	4.59	0.31	3.107	A	A
1Ln+C	West	11.16	0.74	3.769	A	A
1Ln+C	East	10.47	0.70	4.063	A	A
2Lane	North	6.78	0.45	2.772	A	A
2Lane	West	8.02	0.53	2.688	A	A
2Lane	East	10.50	0.70	3.231	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	23.76	1.58	9.745	A	A
1Lane	West	27.63	1.84	9.270	A	A
1Lane	East	60.28	4.02	19.188	C	B
1Ln+C	North	4.66	0.31	3.109	A	A
1Ln+C	West	11.41	0.76	3.775	A	A
1Ln+C	East	10.72	0.71	4.073	A	A
2Lane	North	6.89	0.46	2.773	A	A
2Lane	West	8.15	0.54	2.691	A	A
2Lane	East	10.72	0.71	3.234	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	14.53	0.97	6.841	A	A
1Lane	West	17.25	1.15	6.658	A	A
1Lane	East	28.25	1.88	9.827	A	A
1Ln+C	North	3.46	0.23	2.771	A	A
1Ln+C	West	8.16	0.54	3.217	A	A
1Ln+C	East	7.45	0.50	3.371	A	A
2Lane	North	5.03	0.34	2.434	A	A
2Lane	West	6.03	0.40	2.392	A	A
2Lane	East	7.51	0.50	2.714	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	9.72	0.65	5.516	A	A
1Lane	West	11.74	0.78	5.459	A	A
1Lane	East	16.35	1.09	6.880	A	A
1Ln+C	North	2.68	0.18	2.564	A	A
1Ln+C	West	6.14	0.41	2.902	A	A
1Ln+C	East	5.51	0.37	2.990	A	A
2Lane	North	3.86	0.26	2.234	A	A
2Lane	West	4.66	0.31	2.213	A	A
2Lane	East	5.61	0.37	2.430	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	1.01	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.40	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.90	0.00	0.00	1.06	1.06			N/A	N/A
1Lane	West	1.07	0.00	0.00	1.08	1.08			N/A	N/A
1Lane	East	1.65	0.00	0.00	3.20	4.26			N/A	N/A
1Ln+C	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.39	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.56	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	1.83	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	3.90	0.00	0.00	5.33	13.86			N/A	N/A
1Ln+C	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.76	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.60	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	1.85	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	4.09	0.00	0.00	1.07	9.59			N/A	N/A
1Ln+C	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.76	0.00	0.00	0.00	1.08			N/A	N/A
1Ln+C	East	0.72	0.00	0.00	0.00	1.06			N/A	N/A
2Lane	North	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.54	0.00	0.00	0.00	1.08			N/A	N/A
2Lane	East	0.72	0.00	0.00	0.00	1.07			N/A	N/A

Queue Variation results: (09:00-09:15)

		Mean	Q05	Q50	Q90	Q95		Marker	Probability Of Reaching	Probability Of Exactly

Intersection	Leg	(PCE)	(PCE)	(PCE)	(PCE)	(PCE)	Percentile Message	Message	Or Exceeding Marker	Reaching Marker
1Lane	North	0.93	0.00	0.00	1.06	1.06			N/A	N/A
1Lane	West	1.11	0.00	0.00	1.08	2.16			N/A	N/A
1Lane	East	1.74	0.00	0.00	3.20	5.33			N/A	N/A
1Ln+C	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.40	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.63	0.00	0.00	0.00	1.06			N/A	N/A
1Lane	West	0.76	0.00	0.00	1.08	1.08			N/A	N/A
1Lane	East	1.05	0.00	0.00	1.07	3.20			N/A	N/A
1Ln+C	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.40	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.37	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2035
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	912	225	48	932	35	249	149	57	31	213	216
Future Volume (vph)	92	912	225	48	932	35	249	149	57	31	213	216
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.995			0.958			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1367	0	1415	1292	0	1429	1240	0
Flt Permitted	0.087			0.087			0.290			0.555		
Satd. Flow (perm)	122	1613	1110	131	1367	0	432	1292	0	835	1240	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			71		3			26			68	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	100	991	245	52	1013	38	271	162	62	34	232	235
Shared Lane Traffic (%)												
Lane Group Flow (vph)	100	991	245	52	1051	0	271	224	0	34	467	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2035

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	1.61	1.20	0.41	0.79	1.50		1.58	0.42		0.10	0.87	
Control Delay (s/veh)	362.5	126.6	11.8	89.4	256.1		310.1	20.1		18.0	40.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	362.5	126.6	11.8	89.4	256.1		310.1	20.1		18.0	40.3	
LOS	F	F	B	F	F		F	C		B	D	
Approach Delay (s/veh)		123.2			248.3			178.9			38.8	
Approach LOS		F			F			F			D	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.61

Intersection Signal Delay (s/veh): 159.1

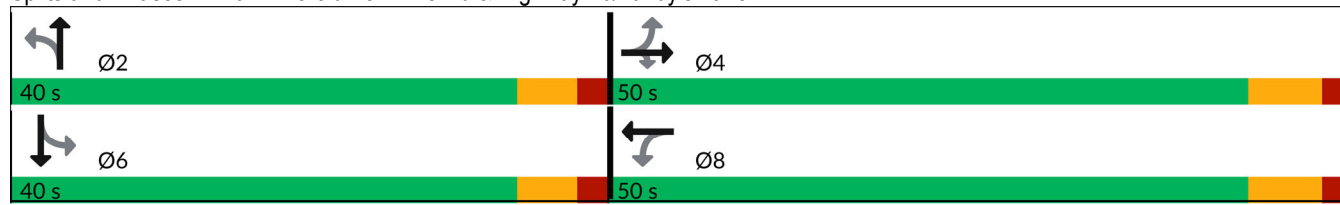
Intersection LOS: F

Intersection Capacity Utilization 150.9%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2035

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	100	991	245	52	1051	271	224	34	467
v/c Ratio	1.61	1.20	0.41	0.79	1.50	1.58	0.42	0.10	0.87
Control Delay (s/veh)	362.5	126.6	11.8	89.4	256.1	310.1	20.1	18.0	40.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	362.5	126.6	11.8	89.4	256.1	310.1	20.1	18.0	40.3
Queue Length 50th (m)	~26.3	~221.4	17.6	7.3	~270.9	~70.6	25.2	3.8	66.8
Queue Length 95th (m)	#48.1	#296.3	36.0	#30.8	#348.3	#119.2	45.4	10.2	#128.2
Internal Link Dist (m)		912.7			557.5		759.0		2604.2
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	602	66	700	172	532	334	536
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.61	1.20	0.41	0.79	1.50	1.58	0.42	0.10	0.87

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2035
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	92	912	225	48	932	35	249	149	57	31	213	216
Future Volume (vph)	92	912	225	48	932	35	249	149	57	31	213	216
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1366		1415	1293		1429	1240	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.29	1.00		0.56	1.00	
Satd. Flow (perm)	122	1613	1110	131	1366		432	1293		835	1240	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	100	991	245	52	1013	38	271	162	62	34	232	235
RTOR Reduction (vph)	0	0	35	0	1	0	0	16	0	0	41	0
Lane Group Flow (vph)	100	991	210	52	1050	0	271	208	0	34	426	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	698		172	517		334	496	
v/s Ratio Prot		0.61			0.77			0.16			0.34	
v/s Ratio Perm	c0.82		0.19	0.40			c0.63			0.04		
v/c Ratio	1.61	1.20	0.37	0.79	1.50		1.58	0.40		0.10	0.86	
Uniform Delay, d1	22.0	22.0	13.3	18.0	22.0		27.0	19.3		16.9	24.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	338.1	102.7	0.4	44.9	234.1		285.0	0.5		0.1	13.8	
Delay (s)	360.1	124.7	13.7	62.9	256.1		312.0	19.8		17.0	38.5	
Level of Service	F	F	B	E	F		F	B		B	D	
Approach Delay (s/veh)		122.0			247.0			179.8			37.0	
Approach LOS		F			F			F			D	
Intersection Summary												
HCM 2000 Control Delay (s/veh)	158.1			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.59											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)					8.0			
Intersection Capacity Utilization	150.9%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2035
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	273	83	120	269	35	44	219	94	35	379	210
Future Volume (vph)	111	273	83	120	269	35	44	219	94	35	379	210
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.976			0.989			0.965			0.955	
Flt Protected		0.988			0.986			0.994			0.997	
Satd. Flow (prot)	0	1380	0	0	1437	0	0	1340	0	0	1349	0
Flt Permitted		0.988			0.986			0.994			0.997	
Satd. Flow (perm)	0	1380	0	0	1437	0	0	1340	0	0	1349	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	121	297	90	130	292	38	48	238	102	38	412	228
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	508	0	0	460	0	0	388	0	0	678	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	99.0%											
Analysis Period (min)	15											
	ICU Level of Service F											

HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2035
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	111	273	83	120	269	35	44	219	94	35	379	210
Future Volume (vph)	111	273	83	120	269	35	44	219	94	35	379	210
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)	121	297	90	130	292	38	48	238	102	38	412	228
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	508	460	388	678								
Volume Left (vph)	121	130	48	38								
Volume Right (vph)	90	38	102	228								
Hadj (s)	0.00	0.02	-0.03	-0.11								
Departure Headway (s)	9.6	9.6	9.5	9.5								
Degree Utilization, x	1.35	1.22	1.03	1.78								
Capacity (veh/h)	385	381	388	385								
Control Delay (s/veh)	200.9	151.5	85.5	384.0								
Approach Delay (s/veh)	200.9	151.5	85.5	384.0								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				228.8								
Level of Service				F								
Intersection Capacity Utilization				99.0%	ICU Level of Service							F
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2035
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	190	974	1042	353	254	168
Future Volume (vph)	190	974	1042	353	254	168
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.966		0.946	
Flt Protected		0.992			0.971	
Satd. Flow (prot)	0	1198	1321	0	1336	0
Flt Permitted		0.992			0.971	
Satd. Flow (perm)	0	1198	1321	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	207	1059	1133	384	276	183
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1266	1517	0	459	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	241.2%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2035
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	190	974	1042	353	254	168
Future Volume (veh/h)	190	974	1042	353	254	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	207	1059	1133	384	276	183
Approach Volume (veh/h)		1266	1517		459	
Crossing Volume (veh/h)		276	207		1133	
High Capacity (veh/h)		1115	1178		558	
High v/c (veh/h)		1.14	1.29		0.82	
Low Capacity (veh/h)		917	973		428	
Low v/c (veh/h)		1.38	1.56		1.07	
Intersection Summary						
Maximum v/c High			1.29			
Maximum v/c Low			1.56			
Intersection Capacity Utilization			241.2%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	154.9		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1266	1517	459
Demand Flow Rate, veh/h	1287	1540	468
Vehicles Circulating, veh/h	276	207	1156
Vehicles Exiting, veh/h	1348	1356	591
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	130.7	189.7	106.2
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1287	1540	468
Cap Entry Lane, veh/h	1041	1117	424
Entry HV Adj Factor	0.984	0.985	0.981
Flow Entry, veh/h	1266	1517	459
Cap Entry, veh/h	1024	1101	416
V/C Ratio	1.236	1.378	1.103
Control Delay, s/veh	130.7	189.7	106.2
LOS	F	F	F
95th %tile Queue, veh	42	61	16

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	134.9	225.0	70.0	134.9	582.8	69.9	678.0	36.8	95.7
Average Queue (m)	37.7	124.4	48.5	60.7	574.5	69.3	503.7	5.6	47.3
95th Queue (m)	111.7	212.2	94.0	167.6	579.0	75.5	886.8	22.7	81.6
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)					98		29		
Queuing Penalty (veh)					0		0		
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)		45	2		71	95	27	0	38
Queuing Penalty (veh)		142	23		34	195	68	0	12

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	315.3	149.2	90.5	723.7
Average Queue (m)	196.2	73.3	37.9	650.1
95th Queue (m)	382.7	158.1	67.9	850.8
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)	4			69
Queuing Penalty (veh)	0			0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1009.9	902.6	67.9
Average Queue (m)	975.5	752.7	26.0
95th Queue (m)	1164.4	1092.3	54.6
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	71	0	
Queuing Penalty (veh)	0	4	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 477

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-06 4:09:06 PM

Summary of intersection performance

	PM					
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)
	A1 - BG 2030					
Intersection 1Lane - Leg North	0.85	203.86	6.63	0.46	A	1262.97
Intersection 1Lane - Leg West	55.66	116.92	143.14	1.07	F	
Intersection 1Lane - Leg East	665.43	?	2577.42	1.97	F	
Intersection 1Ln+C - Leg North	0.30	~1	3.89	0.23	A	17.54
Intersection 1Ln+C - Leg West	2.40	3.05	6.82	0.71	A	
Intersection 1Ln+C - Leg East	9.14	35.70	30.61	0.91	D	
Intersection 2Lane - Leg North	0.41	~1	3.20	0.29	A	14.24
Intersection 2Lane - Leg West	1.36	1.02	3.84	0.57	A	
Intersection 2Lane - Leg East	10.51	40.59	26.25	0.92	D	

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM
 "D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - BG 2030, PM " model duration: 4:00 PM - 5:30 PM
 "D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM
 "D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM
 "D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:09:05 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2030, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2030, PM	BG 2030	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				1262.97	F
1Ln+C	1Ln+C	Single Lane - Chanelized Rights	Roundabout	North,West,East				17.54	C
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				14.24	B

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only

1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	422.00	100.000
1Lane	West	ONE HOUR	✓	1164.00	100.000
1Lane	East	ONE HOUR	✓	1395.00	100.000
1Ln+C	North	ONE HOUR	✓	422.00	100.000
1Ln+C	West	ONE HOUR	✓	1164.00	100.000
1Ln+C	East	ONE HOUR	✓	1395.00	100.000
2Lane	North	ONE HOUR	✓	422.00	100.000
2Lane	West	ONE HOUR	✓	1164.00	100.000
2Lane	East	ONE HOUR	✓	1395.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	168.000	254.000
	West	974.000	0.000	190.000
	East	353.000	1042.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.84	0.00	0.16
	East	0.25	0.75	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	168.000	254.000
	West	974.000	0.000	190.000
	East	353.000	1042.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.84	0.00	0.16
	East	0.25	0.75	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.000	168.000	254.000
	West	974.000	0.000	190.000
	East	353.000	1042.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.84	0.00	0.16
	East	0.25	0.75	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

	To			
From				

From		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.46	6.63	0.85	203.86	A	387.23	580.85	58.59	6.05	0.65	58.60	6.05
1Lane	West	1.07	143.14	55.66	116.92	F	1068.11	1602.16	1666.34	62.40	18.51	1666.49	62.41
1Lane	East	1.97	2577.42	665.43	?	F	1280.08	1920.11	29454.63	920.40	327.27	44118.51	1378.62
1Ln+C	North	0.23	3.89	0.30	~1	A	387.23	349.61	19.54	3.35	0.22	19.54	3.35
1Ln+C	West	0.71	6.82	2.40	3.05	A	1068.11	1602.16	135.85	5.09	1.51	135.86	5.09
1Ln+C	East	0.91	30.61	9.14	35.70	D	1280.08	1434.24	328.30	13.73	3.65	328.33	13.74
2Lane	North	0.29	3.20	0.41	~1	A	387.23	580.85	26.89	2.78	0.30	26.89	2.78
2Lane	West	0.57	3.84	1.36	1.02	A	1068.11	1602.16	85.02	3.18	0.94	85.03	3.18
2Lane	East	0.92	26.25	10.51	40.59	D	1280.08	1920.11	374.47	11.70	4.16	374.49	11.70

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	317.70		79.43			315.72	956.04	680.46	0.00	963.62	983.11	0.330	0.00	0.50	5.647	A
1Lane	West	876.32		219.08			867.05	806.15	190.03	0.00	1247.46	1014.98	0.702	0.00	2.32	9.406	A
1Lane	East	1050.23		262.56			910.98	331.56	725.52	0.00	937.54	865.90	1.120	0.00	34.81	80.783	F
1Ln+C	North	317.70	191.22	47.81	126.48	265.76	190.62	730.33	780.04	0.00	1462.12	1104.23	0.131	0.00	0.15	2.829	A
1Ln+C	West	876.32	876.32	219.08	0.00	126.48	872.80	780.04	190.62	0.00	1880.77	1231.86	0.466	0.00	0.88	3.620	A
1Ln+C	East	1050.23	784.47	196.12	265.76	0.00	780.04	333.09	730.33	0.00	1497.43	1284.02	0.524	0.00	1.11	5.087	A
2Lane	North	317.70		79.43			316.87	995.70	780.80	0.00	1871.87	1678.05	0.170	0.00	0.21	2.358	A
2Lane	West	876.32		219.08			873.83	906.95	190.72	0.00	2298.46	1706.16	0.381	0.00	0.62	2.565	A
2Lane	East	1050.23		262.56			1045.31	333.36	731.19	0.00	1907.73	1404.22	0.551	0.00	1.23	4.213	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	379.37		94.84			378.84	1082.38	639.25	0.00	987.47	983.11	0.384	0.50	0.63	6.024	A
1Lane	West	1046.41		261.60			1034.71	790.07	228.02	0.00	1225.48	1014.98	0.854	2.32	5.24	18.137	C
1Lane	East	1254.08		313.52			855.81	396.92	865.82	0.00	856.34	865.90	1.464	34.81	134.38	375.320	F
1Ln+C	North	379.37	228.34	57.09	151.03	317.34	228.13	874.19	933.05	0.00	1353.44	1104.18	0.169	0.15	0.20	3.198	A
1Ln+C	West	1046.41	1046.41	261.60	0.00	151.03	1044.72	933.05	228.13	0.00	1854.13	1231.89	0.564	0.88	1.30	4.513	A
1Ln+C	East	1254.08	936.74	234.18	317.34	0.00	933.05	398.66	874.19	0.00	1395.25	1284.01	0.671	1.11	2.03	7.881	A
2Lane	North	379.37		94.84			379.09	1191.10	933.65	0.00	1761.36	1678.05	0.215	0.21	0.28	2.654	A
2Lane	West	1046.41		261.60			1045.45	1084.57	228.17	0.00	2271.39	1706.16	0.461	0.62	0.86	2.982	A
2Lane	East	1254.08		313.52			1249.95	398.82	874.80	0.00	1803.91	1404.22	0.695	1.23	2.26	6.549	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	464.63		116.16			463.76	1180.34	590.07	0.00	1015.94	983.13	0.457	0.63	0.85	6.634	A
1Lane	West	1281.59		320.40			1171.70	774.69	279.13	0.00	1195.89	1014.97	1.072	5.24	32.71	70.595	F
1Lane	East	1535.92		383.98			789.97	470.39	980.44	0.00	790.00	865.91	1.944	134.38	320.87	1051.558	F
1Ln+C	North	464.63	279.66	69.91	184.97	388.66	279.28	1068.82	1123.14	0.00	1218.43	1104.20	0.230	0.20	0.30	3.830	A
1Ln+C	West	1281.59	1281.59	320.40	0.00	184.97	1277.31	1123.14	279.28	0.00	1817.80	1231.88	0.705	1.30	2.37	6.718	A
1Ln+C	East	1535.92	1147.26	286.82	388.66	0.00	1123.14	487.78	1068.82	0.00	1257.01	1284.01	0.913	2.03	8.06	24.068	C
2Lane	North	464.63		116.16			464.12	1452.24	1126.10	0.00	1622.23	1678.03	0.286	0.28	0.41	3.166	A
2Lane	West	1281.59		320.40			1279.62	1310.87	279.35	0.00	2234.39	1706.17	0.574	0.86	1.35	3.826	A
2Lane	East	1535.92		383.98			1507.59	488.22	1070.75	0.00	1662.25	1404.21	0.924	2.26	9.34	20.693	C

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	464.63		116.16			464.62	1193.27	583.54	0.00	1019.71	983.13	0.456	0.85	0.85	6.610	A
1Lane	West	1281.59		320.40			1189.79	768.51	279.66	0.00	1195.59	1014.97	1.072	32.71	55.66	143.137	F
1Lane	East	1535.92		383.98			781.23	473.87	995.58	0.00	781.24	865.91	1.966	320.87	509.54	1919.041	F
1Ln+C	North	464.63	279.66	69.91	184.97	388.66	279.64	1072.30	1142.95	0.00	1204.35	1104.20	0.232	0.30	0.30	3.892	A
1Ln+C	West	1281.59	1281.59	320.40	0.00	184.97	1281.47	1142.95	279.64	0.00	1817.55	1231.88	0.705	2.37	2.40	6.822	A
1Ln+C	East	1535.92	1147.26	286.82	388.66	0.00	1142.95	488.81	1072.30	0.00	1254.54	1284.01	0.914	8.06	9.14	30.611	D
2Lane	North	464.63		116.16			464.61	1459.85	1143.77	0.00	1609.46	1678.03	0.289	0.41	0.41	3.204	A
2Lane	West	1281.59		320.40			1281.56	1328.73	279.65	0.00	2234.17	1706.17	0.574	1.35	1.36	3.841	A
2Lane	East	1535.92		383.98			1531.25	488.84	1072.37	0.00	1661.07	1404.21	0.925	9.34	10.51	26.249	D

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	379.37		94.84			380.34	1202.69	578.78	0.00	1022.47	983.11	0.371	0.85	0.61	5.724	A
1Lane	West	1046.41		261.60			1202.98	730.19	228.92	0.00	1224.95	1014.98	0.854	55.66	16.52	112.861	F
1Lane	East	1254.08		313.52			774.85	425.29	1006.62	0.00	774.86	865.90	1.618	509.54	629.35	2397.915	F
1Ln+C	North	379.37	228.34	57.09	151.03	317.34	228.71	879.18	964.67	0.00	1330.99	1104.18	0.172	0.30	0.21	3.266	A
1Ln+C	West	1046.41	1046.41	261.60	0.00	151.03	1050.68	964.67	228.71	0.00	1853.72	1231.89	0.564	2.40	1.33	4.581	A
1Ln+C	East	1254.08	936.74	234.18	317.34	0.00	964.67	400.22	879.18	0.00	1391.70	1284.01	0.673	9.14	2.16	9.137	A
2Lane	North	379.37		94.84			379.88	1202.81	961.04	0.00	1741.56	1678.05	0.218	0.41	0.28	2.697	A
2Lane	West	1046.41		261.60			1048.36	1112.27	228.65	0.00	2271.04	1706.16	0.461	1.36	0.87	2.997	A
2Lane	East	1254.08		313.52			1286.61	399.77	877.24	0.00	1802.15	1404.22	0.696	10.51	2.38	7.517	A

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	317.70		79.43			318.12	1009.42	676.65	0.00	965.83	983.11	0.329	0.61	0.50	5.668	A
1Lane	West	876.32		219.08			932.39	803.30	191.47	0.00	1246.63	1014.98	0.703	16.52	2.50	13.663	B
1Lane	East	1050.23		262.56			905.88	343.67	780.19	0.00	905.90	865.90	1.159	629.35	665.43	2577.421	F
1Ln+C	North	317.70	191.22	47.81	126.48	265.76	191.45	734.75	788.54	0.00	1456.08	1104.23	0.131	0.21	0.15	2.848	A
1Ln+C	West	876.32	876.32	219.08	0.00	126.48	878.07	788.54	191.45	0.00	1880.18	1231.86	0.466	1.33	0.89	3.660	A
1Ln+C	East	1050.23	784.47	196.12	265.76	0.00	788.54	334.78	734.75	0.00	1494.29	1284.02	0.525	2.16	1.14	5.232	A
2Lane	North	317.70		79.43			318.00	1000.99	787.82	0.00	1866.79	1678.05	0.170	0.28	0.21	2.371	A
2Lane	West	876.32		219.08			877.30	914.42	191.41	0.00	2297.97	1706.16	0.381	0.87	0.63	2.577	A
2Lane	East	1050.23		262.56			1054.71	334.61	734.10	0.00	1905.63	1404.22	0.551	2.38	1.26	4.317	A

Queueing Delay Results for each time segment**Queueing Delay results: (16:00-16:15)**

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	7.20	0.48	5.647	A	A
1Lane	West	32.02	2.13	9.406	A	A
1Lane	East	290.43	19.36	80.783	F	F
1Ln+C	North	2.21	0.15	2.829	A	A
1Ln+C	West	12.83	0.86	3.620	A	A
1Ln+C	East	15.99	1.07	5.087	A	A
2Lane	North	3.07	0.20	2.358	A	A
2Lane	West	9.17	0.61	2.565	A	A
2Lane	East	17.80	1.19	4.213	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	9.22	0.61	6.024	A	A
1Lane	West	68.45	4.56	18.137	C	B
1Lane	East	1269.32	84.62	375.320	F	F
1Ln+C	North	2.99	0.20	3.198	A	A
1Ln+C	West	18.99	1.27	4.513	A	A
1Ln+C	East	28.85	1.92	7.881	A	A
2Lane	North	4.13	0.28	2.654	A	A
2Lane	West	12.72	0.85	2.982	A	A
2Lane	East	32.25	2.15	6.549	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	12.36	0.82	6.634	A	A
1Lane	West	300.80	20.05	70.595	F	E
1Lane	East	3414.35	227.62	1051.558	F	F
1Ln+C	North	4.37	0.29	3.830	A	A
1Ln+C	West	33.75	2.25	6.718	A	A
1Ln+C	East	96.76	6.45	24.068	C	C
2Lane	North	6.01	0.40	3.166	A	A
2Lane	West	19.77	1.32	3.826	A	A
2Lane	East	112.12	7.47	20.693	C	C

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	12.73	0.85	6.610	A	A
1Lane	West	664.34	44.29	143.137	F	F
1Lane	East	6228.05	415.20	1919.041	F	F
1Ln+C	North	4.50	0.30	3.892	A	A
1Ln+C	West	35.84	2.39	6.822	A	A
1Ln+C	East	130.35	8.69	30.611	D	C
2Lane	North	6.16	0.41	3.204	A	A
2Lane	West	20.38	1.36	3.841	A	A
2Lane	East	150.35	10.02	26.249	D	C

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	9.36	0.62	5.724	A	A
1Lane	West	541.38	36.09	112.861	F	F
1Lane	East	8541.64	569.44	2397.915	F	F
1Ln+C	North	3.17	0.21	3.266	A	A
1Ln+C	West	20.70	1.38	4.581	A	A
1Ln+C	East	38.60	2.57	9.137	A	A
2Lane	North	4.34	0.29	2.697	A	A
2Lane	West	13.39	0.89	2.997	A	A
2Lane	East	42.43	2.83	7.517	A	A

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	7.72	0.51	5.668	A	A
1Lane	West	59.36	3.96	13.663	B	B
1Lane	East	9710.84	647.39	2577.421	F	F
1Ln+C	North	2.31	0.15	2.848	A	A
1Ln+C	West	13.73	0.92	3.660	A	A
1Ln+C	East	17.75	1.18	5.232	A	A
2Lane	North	3.18	0.21	2.371	A	A
2Lane	West	9.59	0.64	2.577	A	A
2Lane	East	19.53	1.30	4.317	A	A

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	2.32	0.00	1.02	4.07	5.08			N/A	N/A

1Lane	East	34.81	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.88	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	1.11	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.21	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	1.23	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.63	0.00	0.00	0.00	>199			N/A	N/A
1Lane	West	5.24	0.00	1.02	13.22	18.30			N/A	N/A
1Lane	East	134.38	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.20	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.30	0.00	0.00	2.03	3.05			N/A	N/A
1Ln+C	East	2.03	0.00	0.00	4.08	6.12			N/A	N/A
2Lane	North	0.28	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.86	0.00	0.00	1.02	1.02			N/A	N/A
2Lane	East	2.26	0.00	0.00	4.06	8.12			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.85	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	32.71	6.10	27.45	59.98	73.20			N/A	N/A
1Lane	East	320.87	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	2.37	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	8.06	0.00	0.00	19.38	31.62			N/A	N/A
2Lane	North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.35	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	9.34	0.00	0.00	22.33	37.55			N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.85	0.00	0.00	0.00	1.02			N/A	N/A
1Lane	West	55.66	13.22	48.80	98.62	116.92			N/A	N/A
1Lane	East	509.54	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	2.40	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	9.14	0.00	0.00	16.32	35.70			N/A	N/A
2Lane	North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.36	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	10.51	0.00	0.00	18.27	40.59			N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.61	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	16.52	0.00	10.17	36.60	48.80			N/A	N/A
1Lane	East	629.35	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.21	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.33	0.00	0.00	2.03	3.05			N/A	N/A
1Ln+C	East	2.16	0.00	0.00	4.08	7.14			N/A	N/A
							Percentiles could not be calculated. This may be			

2Lane	North	0.28	~1	~1	~1	~1	because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.87	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	2.38	0.00	0.00	4.06	8.12			N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	2.50	0.00	0.00	1.02	6.10			N/A	N/A
1Lane	East	665.43	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.15	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.89	0.00	0.00	1.02	2.03			N/A	N/A
1Ln+C	East	1.14	0.00	0.00	0.00	3.06			N/A	N/A
2Lane	North	0.21	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	1.26	0.00	0.00	1.01	3.04			N/A	N/A

Appendix F3

2040 Background Operations Synchro Reports



Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2040
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	713	169	38	551	29	136	144	34	21	128	97
Future Volume (vph)	80	713	169	38	551	29	136	144	34	21	128	97
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.992			0.971			0.935	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1313	0	1311	1202	0	1191	1163	0
Flt Permitted	0.303			0.208			0.498			0.574		
Satd. Flow (perm)	400	1582	1063	313	1313	0	687	1202	0	719	1163	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			68		4			16			50	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	87	775	184	41	599	32	148	157	37	23	139	105
Shared Lane Traffic (%)												
Lane Group Flow (vph)	87	775	184	41	631	0	148	194	0	23	244	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2040
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	43.1	43.1	43.1	43.1	43.1		22.4	22.4		22.4	22.4	
Actuated g/C Ratio	0.58	0.58	0.58	0.58	0.58		0.30	0.30		0.30	0.30	
v/c Ratio	0.37	0.84	0.28	0.23	0.82		0.71	0.52		0.11	0.63	
Control Delay (s/veh)	16.9	25.2	7.6	14.1	25.8		43.1	24.8		19.5	25.4	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	16.9	25.2	7.6	14.1	25.8		43.1	24.8		19.5	25.4	
LOS	B	C	A	B	C		D	C		B	C	
Approach Delay (s/veh)		21.4			25.1			32.8			24.9	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 73.8

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay (s/veh): 24.5

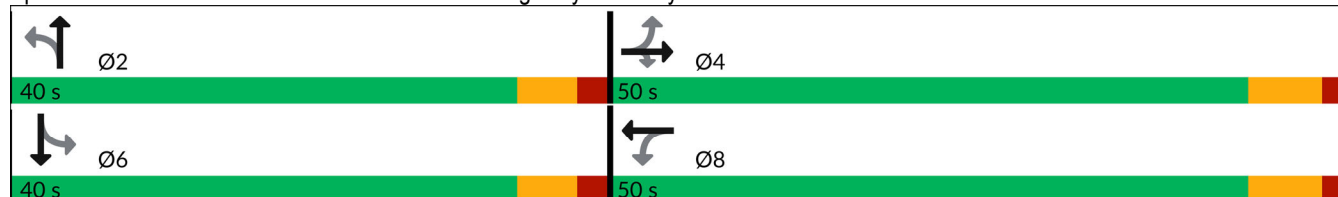
Intersection LOS: C

Intersection Capacity Utilization 100.6%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2040

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	87	775	184	41	631	148	194	23	244
v/c Ratio	0.37	0.84	0.28	0.23	0.82	0.71	0.52	0.11	0.63
Control Delay (s/veh)	16.9	25.2	7.6	14.1	25.8	43.1	24.8	19.5	25.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	16.9	25.2	7.6	14.1	25.8	43.1	24.8	19.5	25.4
Queue Length 50th (m)	6.0	81.9	7.0	2.5	64.9	20.2	22.4	2.5	25.3
Queue Length 95th (m)	24.0	#212.2	25.0	11.9	#179.2	41.5	41.0	7.8	48.2
Internal Link Dist (m)	912.7		557.5		759.0		2604.2		
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	258	1023	711	202	850	347	616	363	613
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.34	0.76	0.26	0.20	0.74	0.43	0.31	0.06	0.40

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2040
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	80	713	169	38	551	29	136	144	34	21	128	97
Future Volume (vph)	80	713	169	38	551	29	136	144	34	21	128	97
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1314		1311	1203		1191	1164	
Flt Permitted	0.30	1.00	1.00	0.21	1.00		0.50	1.00		0.57	1.00	
Satd. Flow (perm)	400	1582	1063	313	1314		688	1203		719	1164	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	87	775	184	41	599	32	148	157	37	23	139	105
RTOR Reduction (vph)	0	0	28	0	2	0	0	11	0	0	35	0
Lane Group Flow (vph)	87	775	156	41	629	0	148	183	0	23	209	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	40.0	40.0	40.0	40.0	40.0		20.3	20.3		20.3	20.3	
Effective Green, g (s)	43.0	43.0	43.0	43.0	43.0		22.3	22.3		22.3	22.3	
Actuated g/C Ratio	0.59	0.59	0.59	0.59	0.59		0.30	0.30		0.30	0.30	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	234	928	623	183	770		209	365		218	354	
v/s Ratio Prot		c0.49			0.48			0.15			0.18	
v/s Ratio Perm	0.22		0.15	0.13			c0.22			0.03		
v/c Ratio	0.37	0.84	0.25	0.22	0.82		0.71	0.50		0.11	0.59	
Uniform Delay, d1	8.0	12.3	7.3	7.2	12.0		22.6	20.9		18.3	21.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.0	6.6	0.2	0.6	6.7		10.5	1.1		0.2	2.6	
Delay (s)	9.0	18.8	7.6	7.8	18.8		33.1	22.0		18.5	24.3	
Level of Service	A	B	A	A	B		C	C		B	C	
Approach Delay (s/veh)		16.0			18.1			26.8			23.8	
Approach LOS		B			B			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			19.1			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			73.3			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			100.6%			ICU Level of Service				G		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2040
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	131	40	55	257	38	43	253	83	20	217	103
Future Volume (vph)	109	131	40	55	257	38	43	253	83	20	217	103
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.981			0.985			0.971			0.959	
Flt Protected		0.981			0.992			0.994			0.997	
Satd. Flow (prot)	0	1381	0	0	1428	0	0	1289	0	0	1262	0
Flt Permitted		0.981			0.992			0.994			0.997	
Satd. Flow (perm)	0	1381	0	0	1428	0	0	1289	0	0	1262	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	118	142	43	60	279	41	47	275	90	22	236	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	303	0	0	380	0	0	412	0	0	370	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	89.5%											
Analysis Period (min)	15											
ICU Level of Service E												

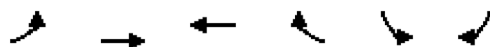
HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2040
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	109	131	40	55	257	38	43	253	83	20	217	103
Future Volume (vph)	109	131	40	55	257	38	43	253	83	20	217	103
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)	118	142	43	60	279	41	47	275	90	22	236	112
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	303	380	412	370								
Volume Left (vph)	118	60	47	22								
Volume Right (vph)	43	41	90	112								
Hadj (s)	0.05	-0.01	0.08	0.04								
Departure Headway (s)	9.3	8.8	9.0	8.9								
Degree Utilization, x	0.78	0.93	1.03	0.92								
Capacity (veh/h)	373	380	412	395								
Control Delay (s/veh)	38.4	59.4	82.4	56.8								
Approach Delay (s/veh)	38.4	59.4	82.4	56.8								
Approach LOS	E	F	F	F								
Intersection Summary												
Delay				60.9								
Level of Service				F								
Intersection Capacity Utilization				89.5%	ICU Level of Service	E						
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2040
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	99	619	629	156	342	224
Future Volume (vph)	99	619	629	156	342	224
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.973		0.947	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1133	1267	0	1282	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1133	1267	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	108	673	684	170	372	243
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	781	854	0	615	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	169.0%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2040
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	99	619	629	156	342	224
Future Volume (veh/h)	99	619	629	156	342	224
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	108	673	684	170	372	243
Approach Volume (veh/h)		781	854		615	
Crossing Volume (veh/h)		372	108		684	
High Capacity (veh/h)		1034	1273		805	
High v/c (veh/h)		0.76	0.67		0.76	
Low Capacity (veh/h)		844	1059		641	
Low v/c (veh/h)		0.93	0.81		0.96	
Intersection Summary						
Maximum v/c High			0.76			
Maximum v/c Low			0.96			
Intersection Capacity Utilization			169.0%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	34.2		
Intersection LOS	D		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	781	854	615
Demand Flow Rate, veh/h	841	910	654
Vehicles Circulating, veh/h	387	134	725
Vehicles Exiting, veh/h	992	1094	319
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	33.6	16.1	60.1
Approach LOS	D	C	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	841	910	654
Cap Entry Lane, veh/h	930	1204	659
Entry HV Adj Factor	0.929	0.938	0.940
Flow Entry, veh/h	781	854	615
Cap Entry, veh/h	864	1129	619
V/C Ratio	0.904	0.756	0.993
Control Delay, s/veh	33.6	16.1	60.1
LOS	D	C	F
95th %tile Queue, veh	13	8	15

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	59.7	119.4	70.0	67.4	144.3	52.6	53.7	27.4	72.6
Average Queue (m)	23.5	72.5	28.8	10.4	66.4	25.2	23.4	4.4	31.2
95th Queue (m)	51.2	118.0	71.6	41.7	118.0	44.7	43.6	16.8	58.2
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	0	34	1		14	23	11	0	24
Queuing Penalty (veh)	0	84	9		5	41	15	0	5

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	53.6	57.3	96.2	67.0
Average Queue (m)	24.4	23.8	42.6	31.7
95th Queue (m)	44.6	43.7	76.0	53.8
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	234.4	134.8	351.5
Average Queue (m)	107.2	41.3	272.9
95th Queue (m)	254.0	124.9	529.2
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)			29
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 160

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025							
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-06 4:09:34 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
A1 - BG 2035							
Intersection 1Lane - Leg North	1.93	2.13	11.39	0.65	B	20.28	C
Intersection 1Lane - Leg West	2.40	4.32	11.12	0.69	B		
Intersection 1Lane - Leg East	7.88	29.84	35.07	0.90	E		
Intersection 1Ln+C - Leg North	0.34	~1	3.26	0.25	A	4.02	A
Intersection 1Ln+C - Leg West	0.89	1.08	4.06	0.45	A		
Intersection 1Ln+C - Leg East	0.87	1.06	4.54	0.45	A		
Intersection 2Lane - Leg North	0.50	1.06	2.91	0.32	A	3.13	A
Intersection 2Lane - Leg West	0.62	1.08	2.83	0.37	A		
Intersection 2Lane - Leg East	0.85	1.07	3.55	0.44	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM
 "D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - BG 2030, PM" model duration: 4:00 PM - 5:30 PM
 "D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM
 "D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM
 "D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:09:33 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2035, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2035, AM	BG 2035	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				20.28	C
1Ln+C	1Ln+C	Single Lane - Chanelized Rights	Roundabout	North,West,East				4.02	A
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				3.13	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width	E - Entry width	I' - Effective flare length	R - Entry radius	D - Inscribed circle diameter	PHI - Conflict (entry) angle	Exit

		(m)	(m)	(m)	(m)	(m)	(deg)	Only
1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	566.00	100.000
1Lane	West	ONE HOUR	✓	718.00	100.000
1Lane	East	ONE HOUR	✓	785.00	100.000
1Ln+C	North	ONE HOUR	✓	566.00	100.000
1Ln+C	West	ONE HOUR	✓	718.00	100.000
1Ln+C	East	ONE HOUR	✓	785.00	100.000
2Lane	North	ONE HOUR	✓	566.00	100.000
2Lane	West	ONE HOUR	✓	718.00	100.000
2Lane	East	ONE HOUR	✓	785.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	224.000	342.000
	West	619.000	0.000	99.000
	East	156.000	629.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.20	0.80	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	224.000	342.000
	West	619.000	0.000	99.000
	East	156.000	629.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.20	0.80	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.000	224.000	342.000
	West	619.000	0.000	99.000
	East	156.000	629.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.20	0.80	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

From	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.65	11.39	1.93	2.13	B	519.37	779.06	107.28	8.26	1.19	107.30	8.26
1Lane	West	0.69	11.12	2.40	4.32	B	658.85	988.27	134.24	8.15	1.49	134.26	8.15
1Lane	East	0.90	35.07	7.88	29.84	E	720.33	1080.49	308.56	17.13	3.43	308.61	17.14
1Ln+C	North	0.25	3.26	0.34	~1	A	519.37	470.74	23.10	2.94	0.26	23.10	2.94
1Ln+C	West	0.45	4.06	0.89	1.08	A	658.85	988.27	57.97	3.52	0.64	57.97	3.52
1Ln+C	East	0.45	4.54	0.87	1.06	A	720.33	865.77	55.17	3.82	0.61	55.17	3.82
2Lane	North	0.32	2.91	0.50	1.06	A	519.37	779.06	33.79	2.60	0.38	33.79	2.60
2Lane	West	0.37	2.83	0.62	1.08	A	658.85	988.27	42.01	2.55	0.47	42.02	2.55
2Lane	East	0.44	3.55	0.85	1.07	A	720.33	1080.49	54.70	3.04	0.61	54.70	3.04

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	426.11		106.53			423.40	579.50	469.57	0.00	1085.68	964.03	0.392	0.00	0.68	5.755	A
1Lane	West	540.55		135.14			537.10	637.13	255.83	0.00	1209.38	1020.32	0.447	0.00	0.86	5.758	A
1Lane	East	590.99		147.75			586.03	329.89	463.04	0.00	1089.46	848.35	0.542	0.00	1.24	7.549	A
1Ln+C	North	426.11	257.48	64.37	168.64	117.44	256.73	464.47	471.90	0.00	1680.99	1116.23	0.153	0.00	0.19	2.627	A
1Ln+C	West	540.55	540.55	135.14	0.00	168.64	538.75	471.90	256.73	0.00	1833.82	1223.33	0.295	0.00	0.45	2.999	A
1Ln+C	East	590.99	473.54	118.39	117.44	0.00	471.90	331.01	464.47	0.00	1686.27	1267.07	0.281	0.00	0.41	3.138	A
2Lane	North	426.11		106.53			425.03	581.96	472.21	0.00	2094.96	1645.18	0.203	0.00	0.27	2.290	A
2Lane	West	540.55		135.14			539.19	640.42	256.82	0.00	2250.68	1717.67	0.240	0.00	0.34	2.270	A
2Lane	East	590.99		147.75			589.33	331.17	464.84	0.00	2100.29	1365.78	0.281	0.00	0.42	2.537	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	508.82		127.21			507.47	694.51	562.41	0.00	1031.95	964.03	0.493	0.68	1.02	7.276	A
1Lane	West	645.47		161.37			643.79	763.24	306.63	0.00	1179.98	1020.32	0.547	0.86	1.28	7.230	A
1Lane	East	705.70		176.42			701.89	395.40	555.02	0.00	1036.22	848.35	0.681	1.24	2.19	11.345	B
1Ln+C	North	508.82	307.45	76.86	201.37	140.24	307.23	555.94	564.85	0.00	1614.97	1116.23	0.190	0.19	0.24	2.862	A
1Ln+C	West	645.47	645.47	161.37	0.00	201.37	644.86	564.85	307.23	0.00	1797.95	1223.33	0.359	0.45	0.60	3.371	A
1Ln+C	East	705.70	565.46	141.36	140.24	0.00	564.85	396.14	555.94	0.00	1621.29	1267.07	0.349	0.41	0.56	3.610	A
2Lane	North	508.82		127.21			508.49	696.24	564.98	0.00	2027.89	1645.18	0.251	0.27	0.35	2.518	A

2Lane	West	645.47		161.37			645.06	766.22	307.25	0.00	2214.22	1717.67	0.292	0.34	0.44	2.479	A
2Lane	East	705.70		176.42			705.11	396.19	556.11	0.00	2034.30	1365.78	0.347	0.42	0.56	2.885	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	623.18		155.79			619.76	845.80	677.16	0.00	965.53	964.03	0.645	1.02	1.87	10.958	B
1Lane	West	790.53		197.63			786.26	922.44	374.48	0.00	1140.71	1020.32	0.693	1.28	2.35	10.842	B
1Lane	East	864.30		216.08			845.11	482.90	677.85	0.00	965.13	848.35	0.896	2.19	6.99	28.316	D
1Ln+C	North	623.18	376.55	94.14	246.63	171.76	376.17	680.56	691.34	0.00	1525.13	1116.23	0.247	0.24	0.34	3.258	A
1Ln+C	West	790.53	790.53	197.63	0.00	246.63	789.40	691.34	376.17	0.00	1748.98	1223.33	0.452	0.60	0.88	4.048	A
1Ln+C	East	864.30	692.54	173.14	171.76	0.00	691.34	485.01	680.56	0.00	1532.78	1267.07	0.452	0.56	0.87	4.528	A
2Lane	North	623.18		155.79			622.59	852.46	691.63	0.00	1936.33	1645.17	0.322	0.35	0.50	2.911	A
2Lane	West	790.53		197.63			789.83	938.03	376.19	0.00	2164.38	1717.68	0.365	0.44	0.62	2.828	A
2Lane	East	864.30		216.08			863.17	485.10	680.93	0.00	1944.07	1365.77	0.445	0.56	0.85	3.547	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	623.18		155.79			622.93	852.42	689.69	0.00	958.28	964.03	0.650	1.87	1.93	11.394	B
1Lane	West	790.53		197.63			790.34	936.22	376.40	0.00	1139.60	1020.32	0.694	2.35	2.40	11.120	B
1Lane	East	864.30		216.08			860.74	485.37	681.37	0.00	963.10	848.35	0.897	6.99	7.88	35.070	E
1Ln+C	North	623.18	376.55	94.14	246.63	171.76	376.55	681.52	692.52	0.00	1524.28	1116.23	0.247	0.34	0.34	3.261	A
1Ln+C	West	790.53	790.53	197.63	0.00	246.63	790.52	692.52	376.55	0.00	1748.72	1223.33	0.452	0.88	0.89	4.059	A
1Ln+C	East	864.30	692.54	173.14	171.76	0.00	692.52	485.54	681.52	0.00	1532.10	1267.07	0.452	0.87	0.87	4.544	A
2Lane	North	623.18		155.79			623.17	853.28	692.53	0.00	1935.68	1645.17	0.322	0.50	0.50	2.914	A
2Lane	West	790.53		197.63			790.53	939.16	376.55	0.00	2164.12	1717.68	0.365	0.62	0.62	2.831	A
2Lane	East	864.30		216.08			864.29	485.55	681.53	0.00	1943.64	1365.77	0.445	0.85	0.85	3.554	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	508.82		127.21			512.26	704.75	583.05	0.00	1020.00	964.03	0.499	1.93	1.08	7.585	A
1Lane	West	645.47		161.37			649.73	785.79	309.53	0.00	1178.30	1020.32	0.548	2.40	1.33	7.416	A
1Lane	East	705.70		176.42			727.66	399.11	560.15	0.00	1033.26	848.35	0.683	7.88	2.39	13.381	B
1Ln+C	North	508.82	307.45	76.86	201.37	140.24	307.83	557.43	566.65	0.00	1613.69	1116.23	0.191	0.34	0.25	2.867	A
1Ln+C	West	645.47	645.47	161.37	0.00	201.37	646.58	566.65	307.83	0.00	1797.52	1223.33	0.359	0.89	0.61	3.382	A
1Ln+C	East	705.70	565.46	141.36	140.24	0.00	566.65	396.98	557.43	0.00	1620.24	1267.07	0.349	0.87	0.57	3.627	A
2Lane	North	508.82		127.21			509.41	697.53	566.36	0.00	2026.90	1645.18	0.251	0.50	0.36	2.522	A
2Lane	West	645.47		161.37			646.16	767.96	307.80	0.00	2213.82	1717.67	0.292	0.62	0.45	2.483	A
2Lane	East	705.70		176.42			706.82	396.90	557.07	0.00	2033.61	1365.78	0.347	0.85	0.57	2.896	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	426.11		106.53			427.62	585.87	477.06	0.00	1081.34	964.03	0.394	1.08	0.70	5.868	A
1Lane	West	540.55		135.14			542.33	646.29	258.39	0.00	1207.90	1020.32	0.448	1.33	0.89	5.861	A
1Lane	East	590.99		147.75			595.38	333.16	467.56	0.00	1086.84	848.35	0.544	2.39	1.29	7.874	A
1Ln+C	North	426.11	257.48	64.37	168.64	117.44	257.70	466.55	474.17	0.00	1679.38	1116.23	0.153	0.25	0.19	2.633	A
1Ln+C	West	540.55	540.55	135.14	0.00	168.64	541.17	474.17	257.70	0.00	1833.13	1223.33	0.295	0.61	0.45	3.013	A
1Ln+C	East	590.99	473.54	118.39	117.44	0.00	474.17	332.32	466.55	0.00	1684.79	1267.07	0.281	0.57	0.42	3.155	A
2Lane	North	426.11		106.53			426.45	583.94	474.02	0.00	2093.65	1645.18	0.204	0.36	0.27	2.297	A
2Lane	West	540.55		135.14			540.96	642.80	257.68	0.00	2250.05	1717.67	0.240	0.45	0.34	2.277	A
2Lane	East	590.99		147.75			591.59	332.27	466.37	0.00	2099.18	1365.78	0.282	0.57	0.42	2.547	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	9.82	0.65	5.755	A	A
1Lane	West	12.45	0.83	5.758	A	A
1Lane	East	17.63	1.18	7.549	A	A
1Ln+C	North	2.77	0.18	2.627	A	A
1Ln+C	West	6.61	0.44	2.999	A	A
1Ln+C	East	6.05	0.40	3.138	A	A

2Lane	North	4.00	0.27	2.290	A	A
2Lane	West	5.03	0.34	2.270	A	A
2Lane	East	6.13	0.41	2.537	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	14.74	0.98	7.276	A	A
1Lane	West	18.54	1.24	7.230	A	A
1Lane	East	30.76	2.05	11.345	B	B
1Ln+C	North	3.61	0.24	2.862	A	A
1Ln+C	West	8.88	0.59	3.371	A	A
1Ln+C	East	8.32	0.55	3.610	A	A
2Lane	North	5.26	0.35	2.518	A	A
2Lane	West	6.56	0.44	2.479	A	A
2Lane	East	8.33	0.56	2.885	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	26.37	1.76	10.958	B	B
1Lane	West	32.94	2.20	10.842	B	B
1Lane	East	84.89	5.66	28.316	D	C
1Ln+C	North	5.01	0.33	3.258	A	A
1Ln+C	West	12.96	0.86	4.048	A	A
1Ln+C	East	12.66	0.84	4.528	A	A
2Lane	North	7.42	0.49	2.911	A	A
2Lane	West	9.14	0.61	2.828	A	A
2Lane	East	12.45	0.83	3.547	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	28.68	1.91	11.394	B	B
1Lane	West	35.69	2.38	11.120	B	B
1Lane	East	112.62	7.51	35.070	E	D
1Ln+C	North	5.10	0.34	3.261	A	A
1Ln+C	West	13.29	0.89	4.059	A	A
1Ln+C	East	13.03	0.87	4.544	A	A
2Lane	North	7.54	0.50	2.914	A	A
2Lane	West	9.30	0.62	2.831	A	A
2Lane	East	12.74	0.85	3.554	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	16.86	1.12	7.585	A	A
1Lane	West	20.93	1.40	7.416	A	A
1Lane	East	42.28	2.82	13.381	B	B
1Ln+C	North	3.74	0.25	2.867	A	A
1Ln+C	West	9.31	0.62	3.382	A	A
1Ln+C	East	8.76	0.58	3.627	A	A
2Lane	North	5.44	0.36	2.522	A	A
2Lane	West	6.79	0.45	2.483	A	A
2Lane	East	8.69	0.58	2.896	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	10.80	0.72	5.868	A	A
1Lane	West	13.71	0.91	5.861	A	A
1Lane	East	20.37	1.36	7.874	A	A
1Ln+C	North	2.87	0.19	2.633	A	A
1Ln+C	West	6.92	0.46	3.013	A	A
1Ln+C	East	6.35	0.42	3.155	A	A
2Lane	North	4.13	0.28	2.297	A	A
2Lane	West	5.20	0.35	2.277	A	A
2Lane	East	6.38	0.43	2.547	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.68	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	0.86	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	1.24	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.42	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.02	0.00	0.00	1.06	1.06			N/A	N/A
1Lane	West	1.28	0.00	0.00	2.16	3.24			N/A	N/A
1Lane	East	2.19	0.00	0.00	4.26	6.39			N/A	N/A
1Ln+C	North	0.24	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.60	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.44	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.87	0.00	0.00	0.00	2.13			N/A	N/A
1Lane	West	2.35	0.00	0.00	0.00	4.32			N/A	N/A
1Lane	East	6.99	0.00	0.00	15.99	26.65			N/A	N/A
1Ln+C	North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.88	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.87	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.62	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.85	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.93	0.00	0.00	0.00	2.13			N/A	N/A
1Lane	West	2.40	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	7.88	0.00	0.00	13.86	29.84			N/A	N/A
1Ln+C	North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.89	0.00	0.00	0.00	1.08			N/A	N/A
1Ln+C	East	0.87	0.00	0.00	0.00	1.06			N/A	N/A
2Lane	North	0.50	0.00	0.00	0.00	1.06			N/A	N/A
2Lane	West	0.62	0.00	0.00	0.00	1.08			N/A	N/A
2Lane	East	0.85	0.00	0.00	0.00	1.07			N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.08	0.00	0.00	1.06	2.13			N/A	N/A
1Lane	West	1.33	0.00	0.00	2.16	3.24			N/A	N/A

1Lane	East	2.39	0.00	0.00	4.26	8.53			N/A	N/A
1Ln+C	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.61	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.36	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.57	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.70	0.00	0.00	1.06	1.06			N/A	N/A
1Lane	West	0.89	0.00	0.00	1.08	2.16			N/A	N/A
1Lane	East	1.29	0.00	0.00	1.07	3.20			N/A	N/A
1Ln+C	North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.42	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.42	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2040
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	982	246	52	996	37	273	163	63	33	236	234
Future Volume (vph)	98	982	246	52	996	37	273	163	63	33	236	234
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.995			0.958			0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1367	0	1415	1292	0	1429	1241	0
Flt Permitted	0.087			0.087			0.245			0.531		
Satd. Flow (perm)	122	1613	1110	131	1367	0	365	1292	0	799	1241	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			72		3			26			63	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	107	1067	267	57	1083	40	297	177	68	36	257	254
Shared Lane Traffic (%)												
Lane Group Flow (vph)	107	1067	267	57	1123	0	297	245	0	36	511	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2040
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	1.73	1.29	0.44	0.86	1.60		2.03	0.46		0.11	0.96	
Control Delay (s/veh)	408.5	165.4	12.6	106.1	301.2		510.0	21.1		18.3	54.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	408.5	165.4	12.6	106.1	301.2		510.0	21.1		18.3	54.8	
LOS	F	F	B	F	F		F	C		B	D	
Approach Delay (s/veh)		155.1			291.8			289.0			52.4	
Approach LOS		F			F			F			D	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 2.03

Intersection Signal Delay (s/veh): 203.0

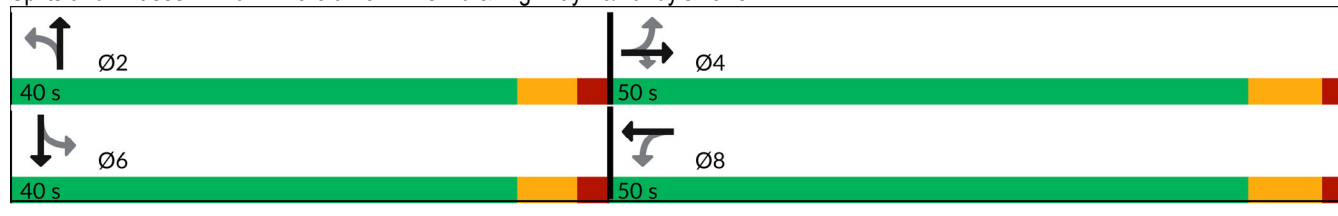
Intersection LOS: F

Intersection Capacity Utilization 160.5%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2040

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	107	1067	267	57	1123	297	245	36	511
v/c Ratio	1.73	1.29	0.44	0.86	1.60	2.03	0.46	0.11	0.96
Control Delay (s/veh)	408.5	165.4	12.6	106.1	301.2	510.0	21.1	18.3	54.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	408.5	165.4	12.6	106.1	301.2	510.0	21.1	18.3	54.8
Queue Length 50th (m)	~29.0	~250.4	20.4	8.5	~299.0	~85.7	28.4	4.0	79.9
Queue Length 95th (m)	#52.0	#326.5	40.5	#33.9	#378.1	#112.3	50.3	10.6	#148.1
Internal Link Dist (m)		912.7			557.5		759.0		2604.2
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	602	66	700	146	532	319	534
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.73	1.29	0.44	0.86	1.60	2.03	0.46	0.11	0.96

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2040
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	98	982	246	52	996	37	273	163	63	33	236	234
Future Volume (vph)	98	982	246	52	996	37	273	163	63	33	236	234
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1366		1415	1293		1429	1241	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.25	1.00		0.53	1.00	
Satd. Flow (perm)	122	1613	1110	131	1366		366	1293		798	1241	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	107	1067	267	57	1083	40	297	177	68	36	257	254
RTOR Reduction (vph)	0	0	35	0	1	0	0	16	0	0	38	0
Lane Group Flow (vph)	107	1067	232	57	1122	0	297	229	0	36	473	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	698		146	517		319	496	
v/s Ratio Prot		0.66			0.82			0.18			0.38	
v/s Ratio Perm	c0.88		0.21	0.44			c0.81			0.05		
v/c Ratio	1.73	1.29	0.41	0.86	1.61		2.03	0.44		0.11	0.95	
Uniform Delay, d1	22.0	22.0	13.6	19.3	22.0		27.0	19.7		17.0	26.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	385.2	141.7	0.5	65.1	279.7		488.5	0.6		0.2	28.9	
Delay (s)	407.2	163.7	14.1	84.3	301.7		515.5	20.3		17.1	55.1	
Level of Service	F	F	B	F	F		F	C		B	E	
Approach Delay (s/veh)		154.0			291.2			291.7			52.6	
Approach LOS		F			F			F			D	
Intersection Summary												
HCM 2000 Control Delay (s/veh)	202.8			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	1.85											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)					8.0			
Intersection Capacity Utilization	160.5%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2040
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	300	92	121	296	39	48	235	95	39	412	231
Future Volume (vph)	123	300	92	121	296	39	48	235	95	39	412	231
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.976			0.989			0.966			0.954	
Flt Protected		0.988			0.987			0.994			0.997	
Satd. Flow (prot)	0	1380	0	0	1438	0	0	1341	0	0	1348	0
Flt Permitted		0.988			0.987			0.994			0.997	
Satd. Flow (perm)	0	1380	0	0	1438	0	0	1341	0	0	1348	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	134	326	100	132	322	42	52	255	103	42	448	251
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	560	0	0	496	0	0	410	0	0	741	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	108.3%											
Analysis Period (min)	15											
	ICU Level of Service G											

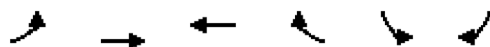
HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2040
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	123	300	92	121	296	39	48	235	95	39	412	231
Future Volume (vph)	123	300	92	121	296	39	48	235	95	39	412	231
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)	134	326	100	132	322	42	52	255	103	42	448	251
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	560	496	410	741								
Volume Left (vph)	134	132	52	42								
Volume Right (vph)	100	42	103	251								
Hadj (s)	0.00	0.01	-0.02	-0.11								
Departure Headway (s)	9.6	9.6	9.5	9.5								
Degree Utilization, x	1.49	1.32	1.09	1.95								
Capacity (veh/h)	388	383	385	387								
Control Delay (s/veh)	258.3	188.7	103.2	456.6								
Approach Delay (s/veh)	258.3	188.7	103.2	456.6								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				280.4								
Level of Service				F								
Intersection Capacity Utilization				108.3%	ICU Level of Service						G	
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2040
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	194	1059	1135	368	266	175
Future Volume (vph)	194	1059	1135	368	266	175
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.967		0.946	
Flt Protected		0.992			0.971	
Satd. Flow (prot)	0	1198	1322	0	1336	0
Flt Permitted		0.992			0.971	
Satd. Flow (perm)	0	1198	1322	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	211	1151	1234	400	289	190
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1362	1634	0	479	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	257.8%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2040
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	194	1059	1135	368	266	175
Future Volume (veh/h)	194	1059	1135	368	266	175
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	211	1151	1234	400	289	190
Approach Volume (veh/h)		1362	1634		479	
Crossing Volume (veh/h)		289	211		1234#	
High Capacity (veh/h)		1104	1174		513	
High v/c (veh/h)		1.23	1.39		0.93	
Low Capacity (veh/h)		907	970		390	
Low v/c (veh/h)		1.50	1.68		1.23	
Intersection Summary						
Maximum v/c High			1.39			
Maximum v/c Low			1.68			
Intersection Capacity Utilization			257.8%	ICU Level of Service		H
# Crossing flow exceeds 1200, method is not applicable						

Intersection			
Intersection Delay, s/veh	206.0		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1362	1634	479
Demand Flow Rate, veh/h	1385	1659	488
Vehicles Circulating, veh/h	289	211	1259
Vehicles Exiting, veh/h	1458	1463	611
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	177.8	238.8	173.9
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1385	1659	488
Cap Entry Lane, veh/h	1028	1113	382
Entry HV Adj Factor	0.983	0.985	0.982
Flow Entry, veh/h	1362	1634	479
Cap Entry, veh/h	1011	1096	375
V/C Ratio	1.348	1.491	1.277
Control Delay, s/veh	177.8	238.8	173.9
LOS	F	F	F
95th %tile Queue, veh	53	75	21

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	114.9	187.4	70.0	134.9	584.6	70.0	783.7	69.0	93.1
Average Queue (m)	36.5	109.3	44.9	59.8	574.6	69.7	637.2	7.4	48.7
95th Queue (m)	96.0	184.6	91.3	165.2	579.5	70.8	929.6	31.6	81.3
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)					98		48		
Queuing Penalty (veh)					0		0		
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	0	43	2		70	95	24	1	39
Queuing Penalty (veh)	0	149	25		36	215	66	3	13

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	381.9	278.1	80.5	723.7
Average Queue (m)	286.5	163.9	36.8	696.0
95th Queue (m)	514.6	417.7	68.2	788.3
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)	40	10		85
Queuing Penalty (veh)	0	0		0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1009.6	902.7	79.2
Average Queue (m)	994.6	735.1	28.7
95th Queue (m)	1066.0	1064.9	63.4
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	79	0	
Queuing Penalty (veh)	0	4	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 512

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-06 4:09:56 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - BG 2035						
Intersection 1Lane - Leg North	0.92	~1	6.89	0.48	A	1961.43	F
Intersection 1Lane - Leg West	107.00	169.81	288.97	1.16	F		
Intersection 1Lane - Leg East	872.18	?	3929.19	2.13	F		
Intersection 1Ln+C - Leg North	0.33	~1	4.06	0.25	A	58.91	F
Intersection 1Ln+C - Leg West	3.21	6.10	8.52	0.76	A		
Intersection 1Ln+C - Leg East	44.18	105.06	117.01	1.05	F		
Intersection 2Lane - Leg North	0.45	1.02	3.37	0.31	A	47.16	E
Intersection 2Lane - Leg West	1.65	2.03	4.33	0.62	A		
Intersection 2Lane - Leg East	47.71	119.77	95.72	1.04	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM
 "D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - BG 2030, PM" model duration: 4:00 PM - 5:30 PM
 "D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM
 "D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM
 "D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:09:55 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2035, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2035, PM	BG 2035	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				1961.43	F
1Ln+C	1Ln+C	Single Lane - Chanelized Rights	Roundabout	North,West,East				58.91	F
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				47.16	E

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only

1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	441.00	100.000
1Lane	West	ONE HOUR	✓	1253.00	100.000
1Lane	East	ONE HOUR	✓	1503.00	100.000
1Ln+C	North	ONE HOUR	✓	441.00	100.000
1Ln+C	West	ONE HOUR	✓	1253.00	100.000
1Ln+C	East	ONE HOUR	✓	1503.00	100.000
2Lane	North	ONE HOUR	✓	441.00	100.000
2Lane	West	ONE HOUR	✓	1253.00	100.000
2Lane	East	ONE HOUR	✓	1503.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

		To		
From		North	West	East
	North	0.000	175.000	266.000
	West	1059.000	0.000	194.000
	East	368.000	1135.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

		To		
From		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.24	0.76	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

		To		
From		North	West	East
	North	0.000	175.000	266.000
	West	1059.000	0.000	194.000
	East	368.000	1135.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

		To		
From		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.24	0.76	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

		To		
From		North	West	East
	North	0.000	175.000	266.000
	West	1059.000	0.000	194.000
	East	368.000	1135.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

		To		
From		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.24	0.76	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

		To		
From		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

		To		
From		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

		To		
From		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

		To		
From		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

From		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From		To		
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.48	6.89	0.92	~1	A	404.67	607.00	62.12	6.14	0.69	62.13	6.14
1Lane	West	1.16	288.97	107.00	169.81	F	1149.77	1724.66	4129.26	143.65	45.88	4135.37	143.87
1Lane	East	2.13	3929.19	872.18	?	F	1379.18	2068.77	37759.43	1095.13	419.55	67894.74	1969.13
1Ln+C	North	0.25	4.06	0.33	~1	A	404.67	366.13	21.88	3.58	0.24	21.88	3.58
1Ln+C	West	0.76	8.52	3.21	6.10	A	1149.77	1724.66	170.73	5.94	1.90	170.75	5.94
1Ln+C	East	1.05	117.01	44.18	105.06	F	1379.18	1562.24	1092.16	41.95	12.14	1092.21	41.95
2Lane	North	0.31	3.37	0.45	1.02	A	404.67	607.00	29.86	2.95	0.33	29.86	2.95
2Lane	West	0.62	4.33	1.65	2.03	A	1149.77	1724.66	100.10	3.48	1.11	100.10	3.48
2Lane	East	1.04	95.72	47.71	119.77	F	1379.18	2068.77	1165.04	33.79	12.94	1165.08	33.79

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	332.01		83.00			329.91	1004.21	669.99	0.00	969.68	981.15	0.342	0.00	0.53	5.717	A
1Lane	West	943.32		235.83			931.15	800.91	198.99	0.00	1242.28	1014.93	0.759	0.00	3.04	11.361	B
1Lane	East	1131.54		282.88			887.23	343.16	786.98	0.00	901.97	860.99	1.255	0.00	61.08	135.092	F
1Ln+C	North	332.01	200.26	50.06	131.75	277.05	199.60	793.82	848.75	0.00	1413.32	1108.19	0.142	0.00	0.16	2.964	A
1Ln+C	West	943.32	943.32	235.83	0.00	131.75	939.24	848.75	199.60	0.00	1874.40	1229.04	0.503	0.00	1.02	3.897	A
1Ln+C	East	1131.54	854.49	213.62	277.05	0.00	848.75	345.02	793.82	0.00	1452.33	1278.36	0.588	0.00	1.43	6.028	A
2Lane	North	332.01		83.00			331.10	1070.41	849.80	0.00	1821.98	1675.27	0.182	0.00	0.23	2.460	A
2Lane	West	943.32		235.83			940.49	981.19	199.71	0.00	2291.96	1705.82	0.412	0.00	0.71	2.703	A
2Lane	East	1131.54		282.88			1125.33	345.33	794.88	0.00	1861.69	1394.06	0.608	0.00	1.55	4.922	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	396.45		99.11			395.90	1132.70	617.39	0.00	1000.12	981.16	0.396	0.53	0.66	6.068	A
1Lane	West	1126.42		281.61			1103.35	774.50	238.80	0.00	1219.24	1014.93	0.924	3.04	8.81	27.272	D
1Lane	East	1351.17		337.79			817.57	409.63	932.52	0.00	817.74	860.99	1.652	61.08	194.48	582.388	F
1Ln+C	North	396.45	239.13	59.78	157.32	330.82	238.89	950.17	1013.73	0.00	1296.14	1108.21	0.184	0.16	0.23	3.405	A
1Ln+C	West	1126.42	1126.42	281.61	0.00	157.32	1124.23	1013.73	238.89	0.00	1846.49	1229.03	0.610	1.02	1.57	5.053	A
1Ln+C	East	1351.17	1020.34	255.09	330.82	0.00	1013.73	412.95	950.17	0.00	1341.28	1278.37	0.761	1.43	3.09	10.991	B
2Lane	North	396.45		99.11			396.12	1280.13	1015.03	0.00	1702.53	1675.26	0.233	0.23	0.31	2.808	A
2Lane	West	1126.42		281.61			1125.25	1172.23	238.93	0.00	2263.61	1705.82	0.498	0.71	1.00	3.213	A
2Lane	East	1351.17		337.79			1344.14	413.15	951.03	0.00	1748.80	1394.06	0.773	1.55	3.31	8.878	A

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	485.55		121.39			484.52	1188.06	589.33	0.00	1016.36	981.14	0.478	0.66	0.92	6.884	A
1Lane	West	1379.58		344.89			1179.63	781.60	292.25	0.00	1188.30	1014.94	1.161	8.81	58.80	114.337	F
1Lane	East	1654.83		413.71			780.41	474.89	996.99	0.00	780.43	860.99	2.120	194.48	413.08	1407.516	F
1Ln+C	North	485.55	292.87	73.22	192.68	405.18	292.48	1160.63	1156.30	0.00	1194.87	1108.18	0.245	0.23	0.32	3.987	A
1Ln+C	West	1379.58	1379.58	344.89	0.00	192.68	1373.25	1156.30	292.48	0.00	1808.42	1229.05	0.763	1.57	3.15	8.292	A
1Ln+C	East	1654.83	1249.66	312.41	405.18	0.00	1156.30	505.10	1160.63	0.00	1191.80	1278.36	1.049	3.09	26.43	58.128	F
2Lane	North	485.55		121.39			485.00	1543.62	1171.39	0.00	1589.49	1675.26	0.305	0.31	0.45	3.320	A
2Lane	West	1379.58		344.89			1377.02	1363.85	292.54	0.00	2224.85	1705.82	0.620	1.00	1.64	4.305	A
2Lane	East	1654.83		413.71			1551.19	505.74	1163.82	0.00	1594.96	1394.06	1.038	3.31	29.22	48.093	E

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	485.55		121.39			485.53	1193.25	586.70	0.00	1017.89	981.14	0.477	0.92	0.92	6.892	A
1Lane	West	1379.58		344.89			1186.77	779.37	292.86	0.00	1187.95	1014.94	1.161	58.80	107.00	257.879	F
1Lane	East	1654.83		413.71			776.93	476.61	1003.03	0.00	776.93	860.99	2.130	413.08	632.56	2456.275	F
1Ln+C	North	485.55	292.87	73.22	192.68	405.18	292.85	1165.78	1178.67	0.00	1178.98	1108.18	0.248	0.32	0.33	4.062	A
1Ln+C	West	1379.58	1379.58	344.89	0.00	192.68	1379.34	1178.67	292.85	0.00	1808.16	1229.05	0.763	3.15	3.21	8.524	A
1Ln+C	East	1654.83	1249.66	312.41	405.18	0.00	1178.67	506.41	1165.78	0.00	1188.14	1278.36	1.052	26.43	44.18	117.011	F
2Lane	North	485.55		121.39			485.52	1553.01	1193.81	0.00	1573.28	1675.26	0.309	0.45	0.45	3.372	A
2Lane	West	1379.58		344.89			1379.54	1386.48	292.85	0.00	2224.63	1705.82	0.620	1.64	1.65	4.331	A
2Lane	East	1654.83		413.71			1580.88	506.45	1165.95	0.00	1593.42	1394.06	1.039	29.22	47.71	95.720	F

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	396.45		99.11			397.54	1208.07	579.16	0.00	1022.25	981.16	0.388	0.92	0.65	5.883	A
1Lane	West	1126.42		281.61			1207.20	736.91	239.78	0.00	1218.67	1014.93	0.924	107.00	86.81	288.969	F
1Lane	East	1351.17		337.79			766.94	426.69	1020.29	0.00	766.94	860.99	1.762	632.56	778.62	3348.238	F
1Ln+C	North	396.45	239.13	59.78	157.32	330.82	239.42	957.41	1182.59	0.00	1176.19	1108.21	0.203	0.33	0.26	3.843	A
1Ln+C	West	1126.42	1126.42	281.61	0.00	157.32	1132.81	1182.59	239.42	0.00	1846.11	1229.03	0.610	3.21	1.61	5.176	A
1Ln+C	East	1351.17	1020.34	255.09	330.82	0.00	1182.59	414.81	957.41	0.00	1336.14	1278.37	0.764	44.18	3.61	43.711	E
2Lane	North	396.45		99.11			396.92	1328.07	1153.21	0.00	1602.63	1675.26	0.247	0.45	0.34	3.043	A
2Lane	West	1126.42		281.61			1128.96	1310.72	239.41	0.00	2263.26	1705.82	0.498	1.65	1.01	3.236	A
2Lane	East	1351.17		337.79			1527.11	414.21	954.17	0.00	1746.53	1394.06	0.774	47.71	3.72	29.972	D

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	332.01		83.00			332.65	1222.40	571.86	0.00	1026.47	981.15	0.323	0.65	0.49	5.293	A
1Lane	West	943.32		235.83			1226.95	703.87	200.65	0.00	1241.32	1014.93	0.760	86.81	15.90	155.224	F
1Lane	East	1131.54		282.88			757.28	390.61	1036.98	0.00	757.28	860.99	1.494	778.62	872.18	3929.186	F
1Ln+C	North	332.01	200.26	50.06	131.75	277.05	200.62	799.21	862.98	0.00	1403.21	1108.19	0.143	0.26	0.17	2.993	A
1Ln+C	West	943.32	943.32	235.83	0.00	131.75	945.62	862.98	200.62	0.00	1873.67	1229.04	0.503	1.61	1.04	3.953	A
1Ln+C	East	1131.54	854.49	213.62	277.05	0.00	862.98	347.03	799.21	0.00	1448.50	1278.36	0.590	3.61	1.49	6.361	A
2Lane	North	332.01		83.00			332.44	1077.41	860.89	0.00	1813.96	1675.27	0.183	0.34	0.23	2.476	A
2Lane	West	943.32		235.83			944.52	992.81	200.52	0.00	2291.38	1705.82	0.412	1.01	0.72	2.721	A
2Lane	East	1131.54		282.88			1140.02	346.76	798.28	0.00	1859.23	1394.06	0.609	3.72	1.60	5.140	A

Queueing Delay Results for each time segment**Queueing Delay results: (16:00-16:15)**

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	7.61	0.51	5.717	A	A
1Lane	West	41.09	2.74	11.361	B	B
1Lane	East	478.87	31.92	135.092	F	F
1Ln+C	North	2.42	0.16	2.964	A	A
1Ln+C	West	14.84	0.99	3.897	A	A
1Ln+C	East	20.48	1.37	6.028	A	A
2Lane	North	3.34	0.22	2.460	A	A
2Lane	West	10.39	0.69	2.703	A	A
2Lane	East	22.27	1.48	4.922	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	9.70	0.65	6.068	A	A
1Lane	West	105.82	7.05	27.272	D	C
1Lane	East	1916.77	127.78	582.388	F	F
1Ln+C	North	3.33	0.22	3.405	A	A
1Ln+C	West	22.75	1.52	5.053	A	A
1Ln+C	East	42.59	2.84	10.991	B	B
2Lane	North	4.56	0.30	2.808	A	A
2Lane	West	14.71	0.98	3.213	A	A
2Lane	East	45.97	3.06	8.878	A	A

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	13.37	0.89	6.884	A	A
1Lane	West	514.57	34.30	114.337	F	F
1Lane	East	4556.70	303.78	1407.516	F	F
1Ln+C	North	4.76	0.32	3.987	A	A
1Ln+C	West	44.06	2.94	8.292	A	A
1Ln+C	East	244.57	16.30	58.128	F	E
2Lane	North	6.58	0.44	3.320	A	A
2Lane	West	23.81	1.59	4.305	A	A
2Lane	East	272.13	18.14	48.093	E	D

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	13.83	0.92	6.892	A	A
1Lane	West	1243.90	82.93	257.879	F	F
1Lane	East	7842.31	522.82	2456.275	F	F
1Ln+C	North	4.91	0.33	4.062	A	A
1Ln+C	West	47.81	3.19	8.524	A	A
1Ln+C	East	531.72	35.45	117.011	F	F
2Lane	North	6.77	0.45	3.372	A	A
2Lane	West	24.68	1.65	4.331	A	A
2Lane	East	579.61	38.64	95.720	F	F

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	10.07	0.67	5.883	A	A
1Lane	West	1453.56	96.90	288.969	F	F
1Lane	East	10583.81	705.59	3348.238	F	F
1Ln+C	North	3.91	0.26	3.843	A	A
1Ln+C	West	25.25	1.68	5.176	A	A
1Ln+C	East	229.12	15.27	43.711	E	D
2Lane	North	5.12	0.34	3.043	A	A
2Lane	West	15.59	1.04	3.236	A	A
2Lane	East	219.86	14.66	29.972	D	C

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	7.54	0.50	5.293	A	A
1Lane	West	770.32	51.35	155.224	F	F
1Lane	East	12380.97	825.40	3929.186	F	F
1Ln+C	North	2.54	0.17	2.993	A	A
1Ln+C	West	16.02	1.07	3.953	A	A
1Ln+C	East	23.68	1.58	6.361	A	A
2Lane	North	3.48	0.23	2.476	A	A
2Lane	West	10.91	0.73	2.721	A	A
2Lane	East	25.20	1.68	5.140	A	A

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	3.04	0.00	1.02	6.10	9.15			N/A	N/A

1Lane	East	61.08	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.16	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.02	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	1.43	0.00	0.00	2.04	2.04			N/A	N/A
2Lane	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	1.55	0.00	0.00	2.03	3.05			N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	8.81	0.00	4.07	21.35	29.49			N/A	N/A
1Lane	East	194.48	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.57	0.00	0.00	3.05	5.08			N/A	N/A
1Ln+C	East	3.09	0.00	0.00	6.12	11.22			N/A	N/A
2Lane	North	0.31	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.00	0.00	0.00	1.02	2.03			N/A	N/A
2Lane	East	3.31	0.00	0.00	7.11	12.18			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.92	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	58.80	24.40	54.91	89.48	101.69			N/A	N/A
1Lane	East	413.08	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.32	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	3.15	0.00	0.00	0.00	6.10			N/A	N/A
1Ln+C	East	26.43	3.06	20.40	53.04	65.28			N/A	N/A
2Lane	North	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.64	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	29.22	2.03	22.33	59.89	75.11			N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.92	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	107.00	55.93	101.69	152.53	169.81			N/A	N/A
1Lane	East	632.56	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	3.21	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	44.18	6.12	35.70	85.68	105.06			N/A	N/A
2Lane	North	0.45	0.00	0.00	0.00	1.02			N/A	N/A
2Lane	West	1.65	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	47.71	5.08	37.56	96.43	119.77			N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	86.81	43.72	82.36	125.07	139.31			N/A	N/A
1Lane	East	778.62	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.61	0.00	0.00	3.05	4.07			N/A	N/A
1Ln+C	East	3.61	0.00	0.00	6.12	13.26			N/A	N/A
2Lane	North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

2Lane	West	1.01	0.00	0.00	1.02	1.02			N/A	N/A
2Lane	East	3.72	0.00	0.00	6.09	13.20			N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	15.90	0.00	9.15	37.62	49.83			N/A	N/A
1Lane	East	872.18	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.17	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.04	0.00	0.00	2.03	3.05			N/A	N/A
1Ln+C	East	1.49	0.00	0.00	0.00	2.04			N/A	N/A
2Lane	North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.72	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	1.60	0.00	0.00	0.00	2.03			N/A	N/A

Appendix F4

2045 Background Operations Synchro Reports



Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2045
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	763	184	42	596	31	149	159	37	21	141	105
Future Volume (vph)	85	763	184	42	596	31	149	159	37	21	141	105
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.993			0.972			0.936	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1315	0	1311	1203	0	1191	1164	0
Flt Permitted	0.268			0.174			0.461			0.540		
Satd. Flow (perm)	354	1582	1063	262	1315	0	636	1203	0	677	1164	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			69		4			15			50	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	92	829	200	46	648	34	162	173	40	23	153	114
Shared Lane Traffic (%)												
Lane Group Flow (vph)	92	829	200	46	682	0	162	213	0	23	267	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2045
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.5	46.5	46.5	46.5	46.5		24.5	24.5		24.5	24.5	
Actuated g/C Ratio	0.59	0.59	0.59	0.59	0.59		0.31	0.31		0.31	0.31	
v/c Ratio	0.44	0.89	0.31	0.30	0.88		0.83	0.56		0.11	0.68	
Control Delay (s/veh)	21.3	31.2	8.4	18.2	32.3		56.9	26.2		19.2	27.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	21.3	31.2	8.4	18.2	32.3		56.9	26.2		19.2	27.7	
LOS	C	C	A	B	C		E	C		B	C	
Approach Delay (s/veh)		26.3			31.4			39.4			27.0	
Approach LOS		C			C			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 79.1

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay (s/veh): 29.8

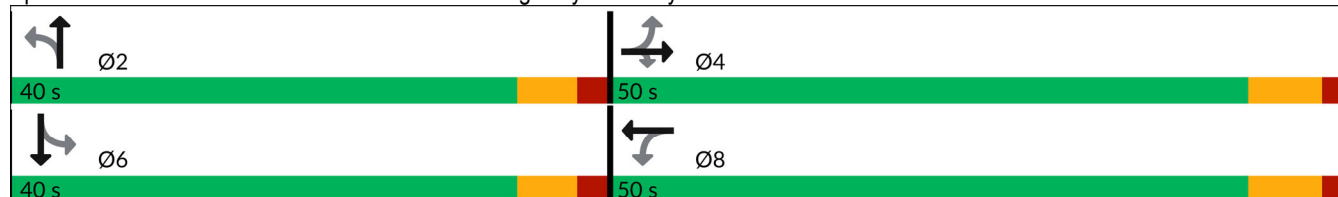
Intersection LOS: C

Intersection Capacity Utilization 106.2%

ICU Level of Service G

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2045

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	92	829	200	46	682	162	213	23	267
v/c Ratio	0.44	0.89	0.31	0.30	0.88	0.83	0.56	0.11	0.68
Control Delay (s/veh)	21.3	31.2	8.4	18.2	32.3	56.9	26.2	19.2	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	21.3	31.2	8.4	18.2	32.3	56.9	26.2	19.2	27.7
Queue Length 50th (m)	7.5	105.3	9.0	3.4	85.1	23.2	25.4	2.5	29.2
Queue Length 95th (m)	28.6	#234.0	27.8	14.8	#200.9	#52.7	45.9	7.8	54.3
Internal Link Dist (m)		912.7			557.5		759.0		2604.2
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	208	930	653	154	775	293	562	311	562
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.44	0.89	0.31	0.30	0.88	0.55	0.38	0.07	0.48

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2045
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	85	763	184	42	596	31	149	159	37	21	141	105
Future Volume (vph)	85	763	184	42	596	31	149	159	37	21	141	105
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.94	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1314		1311	1203		1191	1164	
Flt Permitted	0.27	1.00	1.00	0.17	1.00		0.46	1.00		0.54	1.00	
Satd. Flow (perm)	354	1582	1063	261	1314		636	1203		677	1164	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	829	200	46	648	34	162	173	40	23	153	114
RTOR Reduction (vph)	0	0	28	0	2	0	0	10	0	0	35	0
Lane Group Flow (vph)	92	829	172	46	680	0	162	203	0	23	232	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.5	43.5	43.5	43.5	43.5		22.4	22.4		22.4	22.4	
Effective Green, g (s)	46.5	46.5	46.5	46.5	46.5		24.4	24.4		24.4	24.4	
Actuated g/C Ratio	0.59	0.59	0.59	0.59	0.59		0.31	0.31		0.31	0.31	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	208	932	626	153	774		196	372		209	359	
v/s Ratio Prot		c0.52			0.52			0.17			0.20	
v/s Ratio Perm	0.26		0.16	0.18			c0.25			0.03		
v/c Ratio	0.44	0.89	0.27	0.30	0.88		0.83	0.54		0.11	0.65	
Uniform Delay, d1	9.0	14.0	7.9	8.1	13.8		25.3	22.6		19.5	23.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	10.4	0.2	1.1	11.1		23.9	1.6		0.2	4.0	
Delay (s)	10.5	24.4	8.2	9.2	24.9		49.1	24.3		19.7	27.5	
Level of Service	B	C	A	A	C		D	C		B	C	
Approach Delay (s/veh)		20.3			23.9			35.0			26.9	
Approach LOS		C			C			D			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			24.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			78.9				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			106.2%				ICU Level of Service			G		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2045
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	119	143	45	56	284	42	48	271	84	22	233	113
Future Volume (vph)	119	143	45	56	284	42	48	271	84	22	233	113
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.980			0.985			0.972			0.958	
Flt Protected		0.981			0.993			0.994			0.997	
Satd. Flow (prot)	0	1379	0	0	1429	0	0	1288	0	0	1261	0
Flt Permitted		0.981			0.993			0.994			0.997	
Satd. Flow (perm)	0	1379	0	0	1429	0	0	1288	0	0	1261	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	129	155	49	61	309	46	52	295	91	24	253	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	333	0	0	416	0	0	438	0	0	400	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	98.4%											
Analysis Period (min)	15											
	ICU Level of Service F											

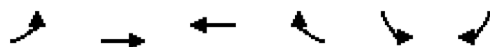
HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2045
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	119	143	45	56	284	42	48	271	84	22	233	113
Future Volume (vph)	119	143	45	56	284	42	48	271	84	22	233	113
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)	129	155	49	61	309	46	52	295	91	24	253	123
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	333	416	438	400								
Volume Left (vph)	129	61	52	24								
Volume Right (vph)	49	46	91	123								
Hadj (s)	0.05	-0.01	0.09	0.04								
Departure Headway (s)	9.6	9.3	9.4	9.3								
Degree Utilization, x	0.89	1.07	1.14	1.04								
Capacity (veh/h)	364	389	388	390								
Control Delay (s/veh)	54.5	97.0	120.0	86.6								
Approach Delay (s/veh)	54.5	97.0	120.0	86.6								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				91.8								
Level of Service				F								
Intersection Capacity Utilization				98.4%	ICU Level of Service	F						
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2045
AM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	104	675	686	165	358	234
Future Volume (vph)	104	675	686	165	358	234
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.974		0.947	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1134	1268	0	1282	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1134	1268	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	113	734	746	179	389	254
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	847	925	0	643	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	180.8%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2045
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	104	675	686	165	358	234
Future Volume (veh/h)	104	675	686	165	358	234
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	734	746	179	389	254
Approach Volume (veh/h)		847	925		643	
Crossing Volume (veh/h)		389	113		746	
High Capacity (veh/h)		1020	1268		766	
High v/c (veh/h)		0.83	0.73		0.84	
Low Capacity (veh/h)		831	1055		607	
Low v/c (veh/h)		1.02	0.88		1.06	
Intersection Summary						
Maximum v/c High			0.84			
Maximum v/c Low			1.06			
Intersection Capacity Utilization			180.8%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	52.0		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	847	925	643
Demand Flow Rate, veh/h	911	986	684
Vehicles Circulating, veh/h	405	140	791
Vehicles Exiting, veh/h	1070	1176	335
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	52.4	20.3	97.2
Approach LOS	F	C	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	911	986	684
Cap Entry Lane, veh/h	913	1196	616
Entry HV Adj Factor	0.930	0.938	0.940
Flow Entry, veh/h	847	925	643
Cap Entry, veh/h	849	1123	579
V/C Ratio	0.998	0.824	1.111
Control Delay, s/veh	52.4	20.3	97.2
LOS	F	C	F
95th %tile Queue, veh	18	10	20

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	95.2	154.9	70.0	89.2	182.7	60.6	76.9	28.6	78.4
Average Queue (m)	31.4	83.1	30.9	12.6	89.5	29.2	29.8	5.4	35.5
95th Queue (m)	76.5	150.1	74.8	47.6	172.5	54.5	61.9	18.9	65.2
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	1	36	2		23	38	15	1	26
Queuing Penalty (veh)	6	96	14		10	74	22	2	5

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	55.8	80.4	97.3	122.0
Average Queue (m)	29.2	34.8	52.5	45.8
95th Queue (m)	51.4	72.2	91.1	93.4
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	505.1	191.0	433.7
Average Queue (m)	322.4	67.3	370.9
95th Queue (m)	700.8	170.6	583.1
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)			56
Queuing Penalty (veh)			0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 228

Junctions 8
ARCADY 8 - Roundabout Module
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-06 4:13:22 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - BG 2040						
Intersection 1Lane - Leg North	2.37	4.25	13.46	0.70	B	43.97	E
Intersection 1Lane - Leg West	3.30	8.64	14.22	0.76	B		
Intersection 1Lane - Leg East	24.29	77.80	92.42	1.01	F		
Intersection 1Ln+C - Leg North	0.38	~1	3.47	0.27	A	4.50	A
Intersection 1Ln+C - Leg West	1.05	?	4.42	0.49	A		
Intersection 1Ln+C - Leg East	1.11	?	5.28	0.51	A		
Intersection 2Lane - Leg North	0.56	1.06	3.09	0.34	A	3.40	A
Intersection 2Lane - Leg West	0.71	1.08	3.00	0.40	A		
Intersection 2Lane - Leg East	1.03	?	3.99	0.49	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM

"D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM

"D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM

"D4 - BG 2030, PM" model duration: 4:00 PM - 5:30 PM

"D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM

"D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM

"D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM

"D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM

"D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM

"D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM

"D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM

"D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM

"D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM

"D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:13:21 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2040, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2040, AM	BG 2040	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				43.97	E
1Ln+C	1Ln+C	Single Lane - Chanelized Rights	Roundabout	North,West,East				4.50	A
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				3.40	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width	E - Entry width	I' - Effective flare length	R - Entry radius	D - Inscribed circle diameter	PHI - Conflict (entry) angle	Exit

		(m)	(m)	(m)	(m)	(m)	(deg)	Only
1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	592.00	100.000
1Lane	West	ONE HOUR	✓	779.00	100.000
1Lane	East	ONE HOUR	✓	851.00	100.000
1Ln+C	North	ONE HOUR	✓	592.00	100.000
1Ln+C	West	ONE HOUR	✓	779.00	100.000
1Ln+C	East	ONE HOUR	✓	865.00	100.000
2Lane	North	ONE HOUR	✓	592.00	100.000
2Lane	West	ONE HOUR	✓	779.00	100.000
2Lane	East	ONE HOUR	✓	851.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	234.000	358.000
	West	675.000	0.000	104.000
	East	165.000	686.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.87	0.00	0.13
	East	0.19	0.81	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.000	234.000	358.000
	West	675.000	0.000	104.000
	East	165.000	686.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.87	0.00	0.13
	East	0.19	0.81	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.000	234.000	358.000
	West	675.000	0.000	104.000
	East	170.000	695.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
From	North	0.00	0.40	0.60
	West	0.87	0.00	0.13
	East	0.20	0.80	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

	To			
		North	West	East
From	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

	To			
		North	West	East
From	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

From	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.70	13.46	2.37	4.25	B	543.23	814.84	127.90	9.42	1.42	127.92	9.42
1Lane	West	0.76	14.22	3.30	8.64	B	714.82	1072.24	172.08	9.63	1.91	172.11	9.63
1Lane	East	1.01	92.42	24.29	77.80	F	780.89	1171.34	691.72	35.43	7.69	691.80	35.44
1Ln+C	North	0.27	3.47	0.38	~1	A	543.23	492.76	25.39	3.09	0.28	25.40	3.09
1Ln+C	West	0.49	4.42	1.05	?	A	714.82	1072.24	67.16	3.76	0.75	67.16	3.76
1Ln+C	East	0.51	5.28	1.11	?	A	793.74	956.62	68.19	4.28	0.76	68.20	4.28
2Lane	North	0.34	3.09	0.56	1.06	A	543.23	814.84	36.99	2.72	0.41	36.99	2.72
2Lane	West	0.40	3.00	0.71	1.08	A	714.82	1072.24	47.74	2.67	0.53	47.75	2.67
2Lane	East	0.49	3.99	1.03	?	A	780.89	1171.34	64.72	3.32	0.72	64.72	3.32

Main Results for each time segment

Main results: (08:00-08:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	445.69		111.42			442.65	627.67	511.40	0.00	1061.47	962.89	0.420	0.00	0.76	6.155	A
1Lane	West	586.47		146.62			582.42	686.36	267.68	0.00	1202.52	1020.44	0.488	0.00	1.01	6.228	A
1Lane	East	640.68		160.17			634.40	345.44	504.66	0.00	1065.37	845.70	0.601	0.00	1.57	8.780	A
1Ln+C	North	445.69	269.52	67.38	176.17	127.98	268.71	506.41	521.29	0.00	1645.91	1118.29	0.164	0.00	0.20	2.717	A
1Ln+C	West	586.47	586.47	146.62	0.00	176.17	584.44	521.29	268.71	0.00	1825.31	1221.87	0.321	0.00	0.51	3.126	A
1Ln+C	East	651.22	523.23	130.81	127.98	0.00	521.29	346.73	506.41	0.00	1656.47	1264.16	0.316	0.00	0.49	3.356	A
2Lane	North	445.69		111.42			444.52	630.71	514.92	0.00	2064.08	1643.61	0.216	0.00	0.29	2.362	A
2Lane	West	586.47		146.62			584.95	690.63	268.82	0.00	2242.00	1717.78	0.262	0.00	0.38	2.343	A
2Lane	East	640.68		160.17			638.77	346.91	506.85	0.00	2069.91	1360.27	0.310	0.00	0.48	2.677	A

Main results: (08:15-08:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	532.20		133.05			530.52	751.99	611.59	0.00	1003.48	962.89	0.530	0.76	1.18	8.061	A
1Lane	West	700.31		175.08			698.08	821.29	320.82	0.00	1171.77	1020.44	0.598	1.01	1.57	8.165	A
1Lane	East	765.03		191.26			758.70	414.02	604.89	0.00	1007.36	845.70	0.759	1.57	3.15	15.049	C
1Ln+C	North	532.20	321.83	80.46	210.36	152.83	321.58	606.18	624.00	0.00	1572.95	1118.29	0.205	0.20	0.27	2.991	A
1Ln+C	West	700.31	700.31	175.08	0.00	210.36	699.58	624.00	321.58	0.00	1787.76	1221.87	0.392	0.51	0.69	3.569	A
1Ln+C	East	777.62	624.79	156.20	152.83	0.00	624.00	414.98	606.18	0.00	1585.61	1264.16	0.394	0.49	0.68	3.965	A
2Lane	North	532.20		133.05			531.82	754.59	616.11	0.00	1990.93	1643.60	0.267	0.29	0.39	2.622	A

2Lane	West	700.31		175.08			699.83	826.32	321.61	0.00	2203.84	1717.78	0.318	0.38	0.50	2.584	A
2Lane	East	765.03		191.26			764.30	415.04	606.40	0.00	1997.95	1360.27	0.383	0.48	0.66	3.108	A

Main results: (08:30-08:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	651.80		162.95			647.47	908.85	712.21	0.00	945.25	962.89	0.690	1.18	2.26	12.667	B
1Lane	West	857.69		214.42			851.19	968.13	391.55	0.00	1130.83	1020.44	0.758	1.57	3.20	13.584	B
1Lane	East	936.97		234.24			883.51	505.18	737.55	0.00	930.58	845.70	1.007	3.15	16.52	53.865	F
1Ln+C	North	651.80	394.17	98.54	257.64	187.17	393.72	741.97	763.52	0.00	1473.86	1118.33	0.267	0.27	0.38	3.464	A
1Ln+C	West	857.69	857.69	214.42	0.00	257.64	856.28	763.52	393.72	0.00	1736.52	1221.84	0.494	0.69	1.04	4.407	A
1Ln+C	East	952.38	765.21	191.30	187.17	0.00	763.52	508.04	741.97	0.00	1489.16	1264.18	0.514	0.68	1.11	5.250	A
2Lane	North	651.80		162.95			651.12	923.84	754.10	0.00	1891.17	1643.64	0.345	0.39	0.56	3.084	A
2Lane	West	857.69		214.42			856.85	1011.47	393.75	0.00	2151.68	1717.76	0.399	0.50	0.71	3.000	A
2Lane	East	936.97		234.24			935.49	508.15	742.46	0.00	1899.58	1360.28	0.493	0.66	1.03	3.974	A

Main results: (08:45-09:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	651.80		162.95			651.35	918.48	730.24	0.00	934.81	962.89	0.697	2.26	2.37	13.456	B
1Lane	West	857.69		214.42			857.29	987.70	393.89	0.00	1129.48	1020.44	0.759	3.20	3.30	14.222	B
1Lane	East	936.97		234.24			905.88	508.34	742.84	0.00	927.52	845.70	1.010	16.52	24.29	92.420	F
1Ln+C	North	651.80	394.17	98.54	257.64	187.17	394.16	743.17	765.18	0.00	1472.68	1118.33	0.268	0.38	0.38	3.470	A
1Ln+C	West	857.69	857.69	214.42	0.00	257.64	857.67	765.18	394.16	0.00	1736.20	1221.84	0.494	1.04	1.05	4.423	A
1Ln+C	East	952.38	765.21	191.30	187.17	0.00	765.18	508.66	743.17	0.00	1488.31	1264.18	0.514	1.11	1.11	5.276	A
2Lane	North	651.80		162.95			651.80	924.85	755.28	0.00	1890.31	1643.64	0.345	0.56	0.56	3.088	A
2Lane	West	857.69		214.42			857.69	1012.92	394.16	0.00	2151.39	1717.76	0.399	0.71	0.71	3.003	A
2Lane	East	936.97		234.24			936.95	508.67	743.18	0.00	1899.06	1360.28	0.493	1.03	1.03	3.987	A

Main results: (09:00-09:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	532.20		133.05			536.32	776.79	682.89	0.00	962.22	962.89	0.553	2.37	1.34	9.070	A
1Lane	West	700.31		175.08			706.91	894.88	324.33	0.00	1169.74	1020.44	0.599	3.30	1.65	8.513	A
1Lane	East	765.03		191.26			847.14	418.70	612.54	0.00	1002.93	845.70	0.763	24.29	3.76	34.363	D
1Ln+C	North	532.20	321.83	80.46	210.36	152.83	322.27	608.02	626.47	0.00	1571.20	1118.29	0.205	0.38	0.27	2.998	A
1Ln+C	West	700.31	700.31	175.08	0.00	210.36	701.70	626.47	322.27	0.00	1787.26	1221.87	0.392	1.05	0.70	3.586	A
1Ln+C	East	777.62	624.79	156.20	152.83	0.00	626.47	415.95	608.02	0.00	1584.30	1264.16	0.394	1.11	0.70	3.992	A
2Lane	North	532.20		133.05			532.87	756.15	617.89	0.00	1989.64	1643.60	0.267	0.56	0.39	2.629	A
2Lane	West	700.31		175.08			701.14	828.51	322.24	0.00	2203.38	1717.78	0.318	0.71	0.51	2.587	A
2Lane	East	765.03		191.26			766.50	415.85	607.53	0.00	1997.13	1360.27	0.383	1.03	0.67	3.122	A

Main results: (09:15-09:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	445.69		111.42			447.91	636.11	523.24	0.00	1054.62	962.89	0.423	1.34	0.79	6.329	A
1Lane	West	586.47		146.62			588.88	700.28	270.87	0.00	1200.68	1020.44	0.488	1.65	1.04	6.376	A
1Lane	East	640.68		160.17			649.09	349.48	510.26	0.00	1062.13	845.70	0.603	3.76	1.66	9.470	A
1Ln+C	North	445.69	269.52	67.38	176.17	127.98	269.78	508.82	524.04	0.00	1643.95	1118.29	0.164	0.27	0.20	2.724	A
1Ln+C	West	586.47	586.47	146.62	0.00	176.17	587.22	524.04	269.78	0.00	1824.55	1221.87	0.321	0.70	0.51	3.144	A
1Ln+C	East	651.22	523.23	130.81	127.98	0.00	524.04	348.17	508.82	0.00	1654.76	1264.16	0.316	0.70	0.49	3.376	A
2Lane	North	445.69		111.42			446.07	632.96	517.05	0.00	2062.54	1643.61	0.216	0.39	0.29	2.367	A
2Lane	West	586.47		146.62			586.96	693.37	269.75	0.00	2241.33	1717.78	0.262	0.51	0.38	2.349	A
2Lane	East	640.68		160.17			641.42	348.11	508.60	0.00	2068.66	1360.27	0.310	0.67	0.48	2.690	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	10.96	0.73	6.155	A	A
1Lane	West	14.56	0.97	6.228	A	A
1Lane	East	22.04	1.47	8.780	A	A
1Ln+C	North	2.99	0.20	2.717	A	A
1Ln+C	West	7.46	0.50	3.126	A	A
1Ln+C	East	7.14	0.48	3.356	A	A

2Lane	North	4.31	0.29	2.362	A	A
2Lane	West	5.62	0.37	2.343	A	A
2Lane	East	7.00	0.47	2.677	A	A

Queueing Delay results: (08:15-08:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	16.98	1.13	8.061	A	A
1Lane	West	22.52	1.50	8.165	A	A
1Lane	East	42.97	2.86	15.049	C	B
1Ln+C	North	3.94	0.26	2.991	A	A
1Ln+C	West	10.17	0.68	3.569	A	A
1Ln+C	East	10.06	0.67	3.965	A	A
2Lane	North	5.72	0.38	2.622	A	A
2Lane	West	7.41	0.49	2.584	A	A
2Lane	East	9.70	0.65	3.108	A	A

Queueing Delay results: (08:30-08:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	31.46	2.10	12.667	B	B
1Lane	West	43.75	2.92	13.584	B	B
1Lane	East	167.33	11.16	53.865	F	D
1Ln+C	North	5.57	0.37	3.464	A	A
1Ln+C	West	15.26	1.02	4.407	A	A
1Ln+C	East	16.10	1.07	5.250	A	A
2Lane	North	8.21	0.55	3.084	A	A
2Lane	West	10.49	0.70	3.000	A	A
2Lane	East	15.05	1.00	3.974	A	A

Queueing Delay results: (08:45-09:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	35.03	2.34	13.456	B	B
1Lane	West	48.87	3.26	14.222	B	B
1Lane	East	308.80	20.59	92.420	F	F
1Ln+C	North	5.68	0.38	3.470	A	A
1Ln+C	West	15.70	1.05	4.423	A	A
1Ln+C	East	16.68	1.11	5.276	A	A
2Lane	North	8.36	0.56	3.088	A	A
2Lane	West	10.69	0.71	3.003	A	A
2Lane	East	15.47	1.03	3.987	A	A

Queueing Delay results: (09:00-09:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	21.24	1.42	9.070	A	A
1Lane	West	26.14	1.74	8.513	A	A
1Lane	East	123.87	8.26	34.363	D	C
1Ln+C	North	4.10	0.27	2.998	A	A
1Ln+C	West	10.73	0.72	3.586	A	A
1Ln+C	East	10.68	0.71	3.992	A	A
2Lane	North	5.93	0.40	2.629	A	A
2Lane	West	7.69	0.51	2.587	A	A
2Lane	East	10.18	0.68	3.122	A	A

Queueing Delay results: (09:15-09:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	12.23	0.82	6.329	A	A
1Lane	West	16.25	1.08	6.376	A	A
1Lane	East	26.72	1.78	9.470	A	A
1Ln+C	North	3.11	0.21	2.724	A	A
1Ln+C	West	7.84	0.52	3.144	A	A
1Ln+C	East	7.53	0.50	3.376	A	A
2Lane	North	4.46	0.30	2.367	A	A
2Lane	West	5.83	0.39	2.349	A	A
2Lane	East	7.31	0.49	2.690	A	A

Queue Variation Results for each time segment

Queue Variation results: (08:00-08:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.76	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	1.01	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	East	1.57	0.00	0.00	1.07	2.13			N/A	N/A
1Ln+C	North	0.20	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.51	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.18	0.00	0.00	1.06	2.13			N/A	N/A
1Lane	West	1.57	0.00	0.00	3.24	4.32			N/A	N/A
1Lane	East	3.15	0.00	0.00	7.46	10.66			N/A	N/A
1Ln+C	North	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.69	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.68	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.39	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	2.26	0.00	0.00	0.00	4.25			N/A	N/A
1Lane	West	3.20	0.00	0.00	1.08	8.64			N/A	N/A
1Lane	East	16.52	0.00	9.59	38.36	50.09			N/A	N/A
1Ln+C	North	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.04	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	1.11	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	1.03	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	2.37	0.00	0.00	0.00	3.19			N/A	N/A
1Lane	West	3.30	0.00	0.00	0.00	4.32			N/A	N/A
1Lane	East	24.29	0.00	13.85	58.61	77.80			N/A	N/A
1Ln+C	North	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.05	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	1.11	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.56	0.00	0.00	0.00	1.06			N/A	N/A
2Lane	West	0.71	0.00	0.00	0.00	1.08			N/A	N/A
2Lane	East	1.03	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:00-09:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.34	0.00	0.00	2.13	3.19			N/A	N/A

1Lane	West	1.65	0.00	0.00	3.24	4.32			N/A	N/A
1Lane	East	3.76	0.00	0.00	7.46	13.85			N/A	N/A
1Ln+C	North	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.39	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.51	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.79	0.00	0.00	1.06	1.06			N/A	N/A
1Lane	West	1.04	0.00	0.00	1.08	2.16			N/A	N/A
1Lane	East	1.66	0.00	0.00	0.00	4.26			N/A	N/A
1Ln+C	North	0.20	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	0.51	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.38	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2045
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	1059	269	58	1068	38	299	179	70	34	260	254
Future Volume (vph)	104	1059	269	58	1068	38	299	179	70	34	260	254
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.995			0.958			0.926	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1367	0	1415	1293	0	1429	1242	0
Flt Permitted	0.087			0.087			0.198			0.501		
Satd. Flow (perm)	122	1613	1110	131	1367	0	295	1293	0	754	1242	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		3			26			51	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			2628.2	
Travel Time (s)		67.4			41.9			56.4			189.2	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	113	1151	292	63	1161	41	325	195	76	37	283	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	113	1151	292	63	1202	0	325	271	0	37	559	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings
101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2045
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	1.82	1.40	0.48	0.95	1.72		2.75	0.51		0.12	1.06	
Control Delay (s/veh)	448.6	209.4	13.7	129.4	350.8		830.1	22.4		18.5	82.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	448.6	209.4	13.7	129.4	350.8		830.1	22.4		18.5	82.7	
LOS	F	F	B	F	F		F	C		B	F	
Approach Delay (s/veh)		190.1			339.7			462.8			78.7	
Approach LOS		F			F			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 115

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 2.75

Intersection Signal Delay (s/veh): 261.2

Intersection LOS: F

Intersection Capacity Utilization 171.0%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Background - 2045

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	113	1151	292	63	1202	325	271	37	559
v/c Ratio	1.82	1.40	0.48	0.95	1.72	2.75	0.51	0.12	1.06
Control Delay (s/veh)	448.6	209.4	13.7	129.4	350.8	830.1	22.4	18.5	82.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	448.6	209.4	13.7	129.4	350.8	830.1	22.4	18.5	82.7
Queue Length 50th (m)	~31.3	~282.6	23.8	10.3	~329.9	~82.6	32.6	4.1	~107.1
Queue Length 95th (m)	#55.2	#360.2	46.3	#25.6	#410.1	#136.2	56.9	10.9	#172.0
Internal Link Dist (m)		912.7			557.5		759.0		2604.2
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	603	66	700	118	532	301	527
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.82	1.40	0.48	0.95	1.72	2.75	0.51	0.12	1.06

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Background - 2045
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	104	1059	269	58	1068	38	299	179	70	34	260	254
Future Volume (vph)	104	1059	269	58	1068	38	299	179	70	34	260	254
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1367		1415	1292		1429	1242	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.20	1.00		0.50	1.00	
Satd. Flow (perm)	122	1613	1110	131	1367		295	1292		753	1242	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	113	1151	292	63	1161	41	325	195	76	37	283	276
RTOR Reduction (vph)	0	0	36	0	1	0	0	16	0	0	31	0
Lane Group Flow (vph)	113	1151	256	63	1201	0	325	255	0	37	528	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	698		118	516		301	496	
v/s Ratio Prot		0.71			0.88			0.20			0.43	
v/s Ratio Perm	c0.92		0.23	0.48			c1.10			0.05		
v/c Ratio	1.82	1.40	0.45	0.95	1.72		2.75	0.49		0.12	1.07	
Uniform Delay, d1	22.0	22.0	14.0	21.0	22.0		27.0	20.2		17.0	27.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	426.0	186.0	0.6	94.1	330.0		812.7	0.7		0.2	58.9	
Delay (s)	448.0	208.0	14.6	115.1	352.0		839.7	20.9		17.2	85.9	
Level of Service	F	F	B	F	F		F	C		B	F	
Approach Delay (s/veh)		189.1			340.2			467.4			81.7	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay (s/veh)	262.1			HCM 2000 Level of Service					F			
HCM 2000 Volume to Capacity ratio	2.23											
Actuated Cycle Length (s)	90.0			Sum of lost time (s)					8.0			
Intersection Capacity Utilization	171.0%			ICU Level of Service					H			
Analysis Period (min)	15											
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Background - 2045
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	330	101	122	326	43	53	253	96	43	447	254
Future Volume (vph)	135	330	101	122	326	43	53	253	96	43	447	254
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.976			0.988			0.968			0.954	
Flt Protected		0.988			0.988			0.993			0.997	
Satd. Flow (prot)	0	1380	0	0	1438	0	0	1341	0	0	1348	0
Flt Permitted		0.988			0.988			0.993			0.997	
Satd. Flow (perm)	0	1380	0	0	1438	0	0	1341	0	0	1348	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2628.2			714.3	
Travel Time (s)		30.1			38.7			189.2			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	147	359	110	133	354	47	58	275	104	47	486	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	616	0	0	534	0	0	437	0	0	809	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	118.9%						ICU Level of Service H					
Analysis Period (min)	15											

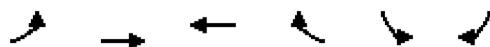
HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Background - 2045
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	135	330	101	122	326	43	53	253	96	43	447	254
Future Volume (vph)	135	330	101	122	326	43	53	253	96	43	447	254
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)	147	359	110	133	354	47	58	275	104	47	486	276
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	616	534	437	809								
Volume Left (vph)	147	133	58	47								
Volume Right (vph)	110	47	104	276								
Hadj (s)	0.00	0.01	-0.01	-0.11								
Departure Headway (s)	9.6	9.6	9.6	9.5								
Degree Utilization, x	1.64	1.42	1.16	2.12								
Capacity (veh/h)	380	386	381	388								
Control Delay (s/veh)	322.0	229.7	127.8	535.4								
Approach Delay (s/veh)	322.0	229.7	127.8	535.4								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay			338.1									
Level of Service			F									
Intersection Capacity Utilization			118.9%		ICU Level of Service					H		
Analysis Period (min)			15									

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Background - 2045
PM Peak Hour



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	199	1153	1237	384	280	184
Future Volume (vph)	199	1153	1237	384	280	184
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.968		0.946	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1199	1323	0	1336	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1199	1323	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	216	1253	1345	417	304	200
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1469	1762	0	504	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	276.3%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Background - 2045
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	199	1153	1237	384	280	184
Future Volume (veh/h)	199	1153	1237	384	280	184
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	216	1253	1345	417	304	200
Approach Volume (veh/h)		1469	1762		504	
Crossing Volume (veh/h)		304	216		1345#	
High Capacity (veh/h)		1091	1169		468	
High v/c (veh/h)		1.35	1.51		1.08	
Low Capacity (veh/h)		895	966		352	
Low v/c (veh/h)		1.64	1.82		1.43	
Intersection Summary						
Maximum v/c High			1.51			
Maximum v/c Low			1.82			
Intersection Capacity Utilization			276.3%		ICU Level of Service	H
# Crossing flow exceeds 1200, method is not applicable						

Intersection			
Intersection Delay, s/veh	267.5		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1469	1762	504
Demand Flow Rate, veh/h	1494	1789	514
Vehicles Circulating, veh/h	304	216	1372
Vehicles Exiting, veh/h	1582	1582	633
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	233.6	293.9	273.5
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1494	1789	514
Cap Entry Lane, veh/h	1012	1107	341
Entry HV Adj Factor	0.983	0.985	0.981
Flow Entry, veh/h	1469	1762	504
Cap Entry, veh/h	995	1090	334
V/C Ratio	1.476	1.616	1.509
Control Delay, s/veh	233.6	293.9	273.5
LOS	F	F	F
95th %tile Queue, veh	67	91	28

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	90.5	191.3	70.0	134.9	584.7	70.0	783.7	27.0	84.5
Average Queue (m)	34.9	116.5	51.2	66.4	574.9	69.7	713.1	5.5	47.6
95th Queue (m)	80.0	188.7	93.3	172.1	580.0	71.0	940.0	20.6	80.0
Link Distance (m)		902.4			568.8		768.8		2603.3
Upstream Blk Time (%)					98		75		
Queuing Penalty (veh)					0		0		
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	0	45	3		68	95	20	0	38
Queuing Penalty (veh)	4	168	39		39	237	60	2	13

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	424.8	473.6	74.1	723.7
Average Queue (m)	395.6	315.1	32.8	709.9
95th Queue (m)	495.2	535.5	59.5	754.3
Link Distance (m)	408.4	523.0	2603.3	705.9
Upstream Blk Time (%)	85	5		93
Queuing Penalty (veh)	0	0		0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1010.4	901.3	79.3
Average Queue (m)	994.0	729.2	34.3
95th Queue (m)	1068.4	1044.9	70.2
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	83	0	
Queuing Penalty (veh)	0	2	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 564

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025							
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Filename: Barker and Hwy 20.arc8

Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady

Report generation date: 2025-08-06 4:14:21 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
	A1 - BG 2040						
Intersection 1Lane - Leg North	1.03	?	7.28	0.50	A	2460.51	F
Intersection 1Lane - Leg West	175.26	203.40	520.00	1.26	F		
Intersection 1Lane - Leg East	1055.35	?	4781.22	2.30	F		
Intersection 1Ln+C - Leg North	0.34	~1	4.15	0.25	A	154.70	F
Intersection 1Ln+C - Leg West	4.73	14.24	11.78	0.83	B		
Intersection 1Ln+C - Leg East	129.99	190.74	317.01	1.22	F		
Intersection 2Lane - Leg North	0.48	1.02	3.37	0.32	A	123.40	F
Intersection 2Lane - Leg West	2.07	3.05	5.05	0.67	A		
Intersection 2Lane - Leg East	141.20	203.04	256.47	1.18	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - Existing, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - Existing, PM" model duration: 4:00 PM - 5:30 PM
 "D3 - BG 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - BG 2030, PM" model duration: 4:00 PM - 5:30 PM
 "D5 - BG 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D6 - BG 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D7 - BG 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D8 - BG 2040, PM" model duration: 4:00 PM - 5:30 PM
 "D9 - TT 2030, AM" model duration: 8:00 AM - 9:30 AM
 "D10 - TT 2030, PM" model duration: 4:00 PM - 5:30 PM
 "D11 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D12 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D13 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D14 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-06 4:14:20 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

(Default Analysis Set) - BG 2040, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
(Default Analysis Set)	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
BG 2040, PM	BG 2040	PM		ONE HOUR	16:00	17:30	90	15				✓		

Intersection Network

Intersections

Junction	Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1Lane	1Lane	Single Lane	Roundabout	North,West,East				2460.51	F
1Ln+C	1Ln+C	Single Lane - Chaneled Rights	Roundabout	North,West,East				154.70	F
2Lane	2Lane	Dual Lane	Roundabout	North,West,East				123.40	F

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Intersection	Leg	Leg	Name	Description
1Lane	North	North	Barker Pkwy	
1Lane	West	West	Hwy 20	
1Lane	East	East	Hwy 20	
1Ln+C	North	North	Barker Pkwy	
1Ln+C	West	West	Hwy 20	
1Ln+C	East	East	Hwy 20	
2Lane	North	North	Barker Pkwy	
2Lane	West	West	Hwy 20	
2Lane	East	East	Hwy 20	

Capacity Options

Intersection	Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
1Lane	North	0.00	99999.00		0.00
1Lane	West	0.00	99999.00		0.00
1Lane	East	0.00	99999.00		0.00
1Ln+C	North	0.00	99999.00		0.00
1Ln+C	West	0.00	99999.00		0.00
1Ln+C	East	0.00	99999.00		0.00
2Lane	North	0.00	99999.00		0.00
2Lane	West	0.00	99999.00		0.00
2Lane	East	0.00	99999.00		0.00

Roundabout Geometry

Intersection	Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
1Lane	North	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	West	3.50	4.50	30.00	20.00	40.00	25.00	
1Lane	East	3.50	4.50	30.00	20.00	40.00	25.00	
1Ln+C	North	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	West	3.50	8.00	30.00	20.00	40.00	25.00	
1Ln+C	East	3.50	8.00	30.00	20.00	40.00	25.00	
2Lane	North	7.00	8.00	30.00	20.00	55.00	25.00	

2Lane	West	7.00	8.00	30.00	20.00	55.00	25.00	
2Lane	East	7.00	8.00	30.00	20.00	55.00	25.00	

Bypass

Intersection	Leg	Leg Has Bypass	Bypass Utilisation (%)
1Lane	North		
1Lane	West		
1Lane	East		
1Ln+C	North	✓	100
1Ln+C	West		
1Ln+C	East	✓	100
2Lane	North		
2Lane	West		
2Lane	East		

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Intersection	Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
1Lane	North		(calculated)	(calculated)	0.579	1357.445
1Lane	West		(calculated)	(calculated)	0.579	1357.445
1Lane	East		(calculated)	(calculated)	0.579	1357.445
1Ln+C	North		(calculated)	(calculated)	0.710	2016.168
1Ln+C	West		(calculated)	(calculated)	0.710	2016.168
1Ln+C	East		(calculated)	(calculated)	0.710	2016.168
2Lane	North		(calculated)	(calculated)	0.723	2436.345
2Lane	West		(calculated)	(calculated)	0.723	2436.345
2Lane	East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Intersection	Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
1Lane	North	ONE HOUR	✓	464.00	100.000
1Lane	West	ONE HOUR	✓	1352.00	100.000
1Lane	East	ONE HOUR	✓	1621.00	100.000
1Ln+C	North	ONE HOUR	✓	464.00	100.000
1Ln+C	West	ONE HOUR	✓	1352.00	100.000
1Ln+C	East	ONE HOUR	✓	1621.00	100.000
2Lane	North	ONE HOUR	✓	464.00	100.000
2Lane	West	ONE HOUR	✓	1352.00	100.000
2Lane	East	ONE HOUR	✓	1621.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 Lane (for whole period)

	To			
From		North	West	East
	North	0.000	184.000	280.000
	West	1153.000	0.000	199.000
	East	384.000	1237.000	0.000

Turning Proportions (PCE) - Intersection 1 Lane (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.24	0.76	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
	North	0.000	184.000	280.000
	West	1153.000	0.000	199.000
	East	384.000	1237.000	0.000

Turning Proportions (PCE) - Intersection 2 Lane (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.24	0.76	0.00

Turning Counts / Proportions (PCE/hr) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
	North	0.000	184.000	280.000
	West	1153.000	0.000	199.000
	East	384.000	1237.000	0.000

Turning Proportions (PCE) - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.24	0.76	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 Lane (for whole period)

	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Lane (for whole period)

	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 2 Lane (for whole period)

	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 2 Lane (for whole period)

	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Average PCE Per Vehicle - Intersection 1 Ln+ C (for whole period)

	To			
		North	West	East

From	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 Ln+ C (for whole period)

From	To			
	North	West	East	
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Intersection	Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
1Lane	North	0.50	7.28	1.03	?	A	425.77	638.66	67.70	6.36	0.75	67.71	6.36
1Lane	West	1.26	520.00	175.26	203.40	F	1240.62	1860.93	7976.72	257.19	88.63	8342.43	268.98
1Lane	East	2.30	4781.22	1055.35	?	F	1487.46	2231.19	46405.51	1247.91	515.62	90878.30	2443.86
1Ln+C	North	0.25	4.15	0.34	~1	A	425.77	385.40	24.47	3.81	0.27	24.47	3.81
1Ln+C	West	0.83	11.78	4.73	14.24	B	1240.62	1860.93	228.83	7.38	2.54	228.86	7.38
1Ln+C	East	1.22	317.01	129.99	190.74	F	1487.46	1702.64	4387.20	154.60	48.75	4387.31	154.61
2Lane	North	0.32	3.37	0.48	1.02	A	425.77	638.66	33.31	3.13	0.37	33.31	3.13
2Lane	West	0.67	5.05	2.07	3.05	A	1240.62	1860.93	120.84	3.90	1.34	120.85	3.90
2Lane	East	1.18	256.47	141.20	203.04	F	1487.46	2231.19	4466.49	120.11	49.63	4466.57	120.11

Main Results for each time segment

Main results: (16:00-16:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	349.32		87.33			347.09	1055.64	651.78	0.00	980.22	979.29	0.356	0.00	0.56	5.776	A
1Lane	West	1017.86		254.46			1000.58	789.42	209.45	0.00	1236.22	1015.43	0.823	0.00	4.32	14.622	B
1Lane	East	1220.37		305.09			854.12	356.73	853.31	0.00	863.58	856.26	1.413	0.00	91.56	205.467	F
1Ln+C	North	349.32	210.80	52.70	138.52	289.10	210.07	863.92	923.42	0.00	1360.28	1111.84	0.155	0.00	0.18	3.128	A
1Ln+C	West	1017.86	1017.86	254.46	0.00	138.52	1013.03	923.42	210.07	0.00	1866.96	1226.45	0.545	0.00	1.21	4.264	A
1Ln+C	East	1220.37	931.28	232.82	289.10	0.00	923.42	359.18	863.92	0.00	1402.54	1273.27	0.664	0.00	1.97	7.546	A
2Lane	North	349.32		87.33			348.32	1152.41	925.00	0.00	1767.61	1672.71	0.198	0.00	0.25	2.584	A
2Lane	West	1017.86		254.46			1014.61	1063.13	210.19	0.00	2284.38	1706.60	0.446	0.00	0.81	2.876	A
2Lane	East	1220.37		305.09			1212.15	359.53	865.27	0.00	1810.80	1384.16	0.674	0.00	2.06	6.024	A

Main results: (16:15-16:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	417.13		104.28			416.53	1175.19	598.90	0.00	1010.82	979.29	0.413	0.56	0.71	6.167	A
1Lane	West	1215.42		303.86			1160.02	764.08	251.35	0.00	1211.97	1015.43	1.003	4.32	18.17	46.467	E
1Lane	East	1457.25		364.31			784.82	422.10	989.27	0.00	784.89	856.26	1.857	91.56	259.67	817.321	F
1Ln+C	North	417.13	251.71	62.93	165.41	345.21	251.43	1033.99	1096.77	0.00	1237.15	1111.82	0.203	0.18	0.25	3.652	A
1Ln+C	West	1215.42	1215.42	303.86	0.00	165.41	1212.44	1096.77	251.43	0.00	1837.58	1226.46	0.661	1.21	1.95	5.828	A
1Ln+C	East	1457.25	1112.04	278.01	345.21	0.00	1096.77	429.89	1033.99	0.00	1281.75	1273.26	0.868	1.97	5.78	18.498	C
2Lane	North	417.13		104.28			416.74	1376.97	1100.75	0.00	1640.56	1672.70	0.254	0.25	0.35	2.998	A
2Lane	West	1215.42		303.86			1213.95	1266.01	251.48	0.00	2254.54	1706.61	0.539	0.81	1.18	3.514	A
2Lane	East	1457.25		364.31			1442.45	430.16	1035.27	0.00	1687.90	1384.15	0.863	2.06	5.75	14.110	B

Main results: (16:30-16:45)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	510.87		127.72			509.63	1187.64	592.59	0.00	1014.48	979.27	0.504	0.71	1.02	7.250	A
1Lane	West	1488.58		372.14			1176.91	794.68	307.54	0.00	1179.45	1015.43	1.262	18.17	96.09	184.106	F
1Lane	East	1784.75		446.19			776.54	480.77	1003.68	0.00	776.55	856.26	2.298	259.67	511.72	1795.051	F
1Ln+C	North	510.87	308.29	77.07	202.59	422.79	307.97	1260.51	1112.87	0.00	1225.72	1111.80	0.252	0.25	0.33	3.922	A

1Ln+C	West	1488.58	1488.58	372.14	0.00	202.59	1478.07	1112.87	307.97	0.00	1797.43	1226.48	0.828	1.95	4.58	11.112	B
1Ln+C	East	1784.75	1361.96	340.49	422.79	0.00	1112.87	525.52	1260.51	0.00	1120.85	1273.25	1.215	5.78	68.06	130.118	F
2Lane	North	510.87		127.72			510.36	1624.20	1152.28	0.00	1603.30	1672.72	0.319	0.35	0.47	3.355	A
2Lane	West	1488.58		372.14			1485.08	1354.67	307.98	0.00	2213.69	1706.60	0.672	1.18	2.05	5.001	A
2Lane	East	1784.75		446.19			1509.98	526.57	1266.50	0.00	1520.73	1384.16	1.174	5.75	74.45	104.524	F

Main results: (16:45-17:00)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	510.87		127.72			510.84	1188.96	591.92	0.00	1014.87	979.27	0.503	1.02	1.03	7.279	A
1Lane	West	1488.58		372.14			1178.71	794.49	308.27	0.00	1179.03	1015.43	1.263	96.09	173.55	414.613	F
1Lane	East	1784.75		446.19			775.66	481.76	1005.21	0.00	775.67	856.26	2.301	511.72	764.00	3021.294	F
1Ln+C	North	510.87	308.29	77.07	202.59	422.79	308.28	1268.96	1114.21	0.00	1224.77	1111.80	0.252	0.33	0.34	3.927	A
1Ln+C	West	1488.58	1488.58	372.14	0.00	202.59	1487.97	1114.21	308.28	0.00	1797.20	1226.48	0.828	4.58	4.73	11.776	B
1Ln+C	East	1784.75	1361.96	340.49	422.79	0.00	1114.21	527.29	1268.96	0.00	1114.85	1273.25	1.222	68.06	129.99	317.006	F
2Lane	North	510.87		127.72			510.86	1628.96	1158.20	0.00	1599.02	1672.72	0.319	0.47	0.48	3.371	A
2Lane	West	1488.58		372.14			1488.51	1360.79	308.28	0.00	2213.47	1706.60	0.673	2.05	2.07	5.050	A
2Lane	East	1784.75		446.19			1517.74	527.37	1269.42	0.00	1518.62	1384.16	1.175	74.45	141.20	256.465	F

Main results: (17:00-17:15)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	417.13		104.28			418.38	1210.95	580.66	0.00	1021.38	979.29	0.408	1.03	0.71	6.099	A
1Lane	West	1215.42		303.86			1208.59	746.57	252.47	0.00	1211.32	1015.43	1.003	173.55	175.26	520.001	F
1Lane	East	1457.25		364.31			760.92	430.36	1030.70	0.00	760.92	856.26	1.915	764.00	938.08	4071.766	F
1Ln+C	North	417.13	251.71	62.93	165.41	345.21	251.89	1045.75	1263.48	0.00	1118.74	1111.82	0.225	0.34	0.29	4.153	A
1Ln+C	West	1215.42	1215.42	303.86	0.00	165.41	1226.24	1263.48	251.89	0.00	1837.26	1226.46	0.662	4.73	2.03	6.096	A
1Ln+C	East	1457.25	1112.04	278.01	345.21	0.00	1263.48	432.38	1045.75	0.00	1273.39	1273.26	0.873	129.99	92.13	313.588	F
2Lane	North	417.13		104.28			417.48	1435.77	1276.54	0.00	1513.47	1672.70	0.276	0.48	0.39	3.350	A
2Lane	West	1215.42		303.86			1218.90	1442.09	251.92	0.00	2254.22	1706.61	0.539	2.07	1.20	3.550	A
2Lane	East	1457.25		364.31			1672.82	431.33	1039.49	0.00	1684.84	1384.15	0.865	141.20	87.31	245.494	F

Main results: (17:15-17:30)

Intersection	Leg	Total Demand (PCE/hr)	Intersection Demand (PCE/hr)	Intersection Arrivals (PCE)	Bypass Demand (PCE/hr)	Bypass Exit Flow (PCE/hr)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
1Lane	North	349.32		87.33			350.04	1225.28	573.33	0.00	1025.63	979.29	0.341	0.71	0.53	5.436	A
1Lane	West	1017.86		254.46			1228.07	712.14	211.23	0.00	1235.19	1015.43	0.824	175.26	122.71	437.640	F
1Lane	East	1220.37		305.09			751.30	391.99	1047.31	0.00	751.31	856.26	1.624	938.08	1055.35	4781.225	F
1Ln+C	North	349.32	210.80	52.70	138.52	289.10	211.01	870.74	1290.85	0.00	1099.30	1111.84	0.192	0.29	0.24	4.053	A
1Ln+C	West	1017.86	1017.86	254.46	0.00	138.52	1021.03	1290.85	211.01	0.00	1866.29	1226.45	0.545	2.03	1.23	4.348	A
1Ln+C	East	1220.37	931.28	232.82	289.10	0.00	1290.85	361.30	870.74	0.00	1397.70	1273.27	0.666	92.13	2.24	101.425	F
2Lane	North	349.32		87.33			349.72	1239.06	1191.04	0.00	1575.28	1672.71	0.222	0.39	0.29	2.994	A
2Lane	West	1017.86		254.46			1019.37	1329.72	211.04	0.00	2283.78	1706.60	0.446	1.20	0.82	2.898	A
2Lane	East	1220.37		305.09			1560.77	361.08	869.33	0.00	1807.87	1384.16	0.675	87.31	2.21	48.427	E

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	8.09	0.54	5.776	A	A
1Lane	West	56.03	3.74	14.622	B	B
1Lane	East	701.60	46.77	205.467	F	F
1Ln+C	North	2.69	0.18	3.128	A	A
1Ln+C	West	17.46	1.16	4.264	A	A
1Ln+C	East	27.61	1.84	7.546	A	A
2Lane	North	3.69	0.25	2.584	A	A
2Lane	West	11.91	0.79	2.876	A	A
2Lane	East	29.11	1.94	6.024	A	A

Queueing Delay results: (16:15-16:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	10.37	0.69	6.167	A	A
1Lane	West	188.21	12.55	46.467	E	D
1Lane	East	2634.31	175.62	817.321	F	F
1Ln+C	North	3.75	0.25	3.652	A	A
1Ln+C	West	28.07	1.87	5.828	A	A
1Ln+C	East	73.90	4.93	18.498	C	B

2Lane	North	5.12	0.34	2.998	A	A
2Lane	West	17.29	1.15	3.514	A	A
2Lane	East	75.21	5.01	14.110	B	B

Queueing Delay results: (16:30-16:45)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	14.75	0.98	7.250	A	A
1Lane	West	859.13	57.28	184.106	F	F
1Lane	East	5785.46	385.70	1795.051	F	F
1Ln+C	North	4.93	0.33	3.922	A	A
1Ln+C	West	61.90	4.13	11.112	B	B
1Ln+C	East	562.39	37.49	130.118	F	F
2Lane	North	7.00	0.47	3.355	A	A
2Lane	West	29.59	1.97	5.001	A	A
2Lane	East	613.20	40.88	104.524	F	F

Queueing Delay results: (16:45-17:00)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	15.33	1.02	7.279	A	A
1Lane	West	2022.42	134.83	414.613	F	F
1Lane	East	9567.90	637.86	3021.294	F	F
1Ln+C	North	5.02	0.33	3.927	A	A
1Ln+C	West	70.05	4.67	11.776	B	B
1Ln+C	East	1485.63	99.04	317.006	F	F
2Lane	North	7.14	0.48	3.371	A	A
2Lane	West	30.96	2.06	5.050	A	A
2Lane	East	1617.68	107.85	256.465	F	F

Queueing Delay results: (17:00-17:15)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	11.00	0.73	6.099	A	A
1Lane	West	2616.14	174.41	520.001	F	F
1Lane	East	12765.56	851.04	4071.766	F	F
1Ln+C	North	4.44	0.30	4.153	A	A
1Ln+C	West	32.27	2.15	6.096	A	A
1Ln+C	East	1665.97	111.06	313.588	F	F
2Lane	North	5.93	0.40	3.350	A	A
2Lane	West	18.51	1.23	3.550	A	A
2Lane	East	1713.81	114.25	245.494	F	F

Queueing Delay results: (17:15-17:30)

Intersection	Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
1Lane	North	8.16	0.54	5.436	A	A
1Lane	West	2234.79	148.99	437.640	F	F
1Lane	East	14950.68	996.71	4781.225	F	F
1Ln+C	North	3.63	0.24	4.053	A	A
1Ln+C	West	19.08	1.27	4.348	A	A
1Ln+C	East	571.69	38.11	101.425	F	F
2Lane	North	4.44	0.30	2.994	A	A
2Lane	West	12.58	0.84	2.898	A	A
2Lane	East	417.48	27.83	48.427	E	D

Queue Variation Results for each time segment

Queue Variation results: (16:00-16:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	4.32	0.00	0.00	8.14	16.27			N/A	N/A
1Lane	East	91.56	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.18	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.21	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	East	1.97	0.00	0.00	4.08	6.12			N/A	N/A
2Lane	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.81	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

2Lane	East	2.06	0.00	0.00	4.06	6.09			N/A	N/A

Queue Variation results: (16:15-16:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	18.17	0.00	10.17	43.73	58.99			N/A	N/A
1Lane	East	259.67	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.95	0.00	0.00	4.07	6.10			N/A	N/A
1Ln+C	East	5.78	0.00	0.00	14.28	21.42			N/A	N/A
2Lane	North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.18	0.00	0.00	2.03	3.05			N/A	N/A
2Lane	East	5.75	0.00	0.00	14.21	21.32			N/A	N/A

Queue Variation results: (16:30-16:45)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.02	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	96.09	50.85	91.53	136.28	151.53			N/A	N/A
1Lane	East	511.72	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	4.58	0.00	0.00	3.05	14.24			N/A	N/A
1Ln+C	East	68.06	33.66	64.26	97.92	110.16			N/A	N/A
2Lane	North	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	2.05	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	74.45	35.53	70.05	109.64	122.84			N/A	N/A

Queue Variation results: (16:45-17:00)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	1.03	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	173.55	110.85	169.84	>199	>199			N/A	N/A
1Lane	East	764.00	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	4.73	0.00	0.00	0.00	7.12			N/A	N/A
1Ln+C	East	129.99	77.52	125.46	175.44	190.74			N/A	N/A
2Lane	North	0.48	0.00	0.00	0.00	1.02			N/A	N/A
2Lane	West	2.07	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	East	141.20	81.22	136.04	192.89	>199			N/A	N/A

Queue Variation results: (17:00-17:15)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	175.26	104.75	169.84	>199	>199			N/A	N/A
1Lane	East	938.08	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
1Ln+C	North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	2.03	0.00	0.00	4.07	6.10			N/A	N/A
1Ln+C	East	92.13	60.18	89.76	118.32	127.50			N/A	N/A
2Lane	North	0.39	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	1.20	0.00	0.00	1.02	2.03			N/A	N/A
2Lane	East	87.31	55.84	84.26	112.69	121.82			N/A	N/A

Queue Variation results: (17:15-17:30)

Intersection	Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
1Lane	North	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
1Lane	West	122.71	54.92	115.94	186.11	>199			N/A	N/A
1Lane	East	1055.35	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A
							Percentiles could not be calculated. This may be			

1Ln+C	North	0.24	~1	~1	~1	~1	because the mean queue is very small or very big.		N/A	N/A
1Ln+C	West	1.23	0.00	0.00	2.03	4.07			N/A	N/A
1Ln+C	East	2.24	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	North	0.29	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
2Lane	West	0.82	0.00	0.00	1.02	1.02			N/A	N/A
2Lane	East	2.21	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Appendix G1

2028 Total Operations Synchro Reports



Lanes, Volumes, Timings

Total - 2028 (Phase 1)

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Future Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.990			0.972			0.929	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1307	0	1311	1203	0	1191	1160	0
Flt Permitted	0.364			0.272			0.527			0.653		
Satd. Flow (perm)	480	1582	1063	409	1307	0	727	1203	0	818	1160	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			65		6			15			60	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			238.0	
Travel Time (s)		67.4			41.9			56.4			17.1	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	83	663	150	33	500	36	120	129	29	45	126	114
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	663	150	33	536	0	120	158	0	45	240	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings

Total - 2028 (Phase 1)

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effct Green (s)	35.0	35.0	35.0	35.0	35.0		19.4	19.4		19.4	19.4	
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56		0.31	0.31		0.31	0.31	
v/c Ratio	0.31	0.75	0.24	0.15	0.73		0.54	0.42		0.18	0.60	
Control Delay (s/veh)	12.7	18.3	6.2	10.0	18.8		30.4	21.1		20.1	22.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	12.7	18.3	6.2	10.0	18.8		30.4	21.1		20.1	22.2	
LOS	B	B	A	B	B		C	C		C	C	
Approach Delay (s/veh)		15.8			18.3			25.1			21.9	
Approach LOS		B			B			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 62.9

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.75

Intersection Signal Delay (s/veh): 18.6

Intersection LOS: B

Intersection Capacity Utilization 92.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Total - 2028 (Phase 1)

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	83	663	150	33	536	120	158	45	240
v/c Ratio	0.31	0.75	0.24	0.15	0.73	0.54	0.42	0.18	0.60
Control Delay (s/veh)	12.7	18.3	6.2	10.0	18.8	30.4	21.1	20.1	22.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	12.7	18.3	6.2	10.0	18.8	30.4	21.1	20.1	22.2
Queue Length 50th (m)	4.7	53.1	4.3	1.7	41.6	11.6	13.2	3.9	17.4
Queue Length 95th (m)	17.8	131.1	16.8	7.9	109.9	32.4	33.8	12.9	46.4
Internal Link Dist (m)		912.7			557.5		759.0		214.0
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	367	1210	828	312	1001	443	739	498	730
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.23	0.55	0.18	0.11	0.54	0.27	0.21	0.09	0.33
Intersection Summary									

HCM Signalized Intersection Capacity Analysis 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2028 (Phase 1)
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Future Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	0.93	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1307		1311	1203		1191	1159	
Flt Permitted	0.36	1.00	1.00	0.27	1.00		0.53	1.00		0.65	1.00	
Satd. Flow (perm)	480	1582	1063	409	1307		728	1203		818	1159	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	663	150	33	500	36	120	129	29	45	126	114
RTOR Reduction (vph)	0	0	29	0	3	0	0	10	0	0	41	0
Lane Group Flow (vph)	83	663	121	33	533	0	120	148	0	45	199	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	31.8	31.8	31.8	31.8	31.8		17.2	17.2		17.2	17.2	
Effective Green, g (s)	34.8	34.8	34.8	34.8	34.8		19.2	19.2		19.2	19.2	
Actuated g/C Ratio	0.56	0.56	0.56	0.56	0.56		0.31	0.31		0.31	0.31	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	269	887	596	229	733		225	372		253	358	
v/s Ratio Prot		c0.42			0.41			0.12			c0.17	
v/s Ratio Perm	0.17		0.11	0.08			0.16			0.06		
v/c Ratio	0.31	0.75	0.20	0.14	0.73		0.53	0.40		0.18	0.55	
Uniform Delay, d1	7.2	10.3	6.7	6.5	10.1		17.7	16.8		15.6	17.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.7	3.5	0.2	0.3	3.6		2.4	0.7		0.3	1.9	
Delay (s)	7.9	13.8	6.9	6.8	13.7		20.1	17.5		16.0	19.7	
Level of Service	A	B	A	A	B		C	B		B	B	
Approach Delay (s/veh)		12.1			13.3			18.7			19.1	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			14.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.68									
Actuated Cycle Length (s)			62.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			92.9%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 (Phase 1)
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
Future Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.979			0.986			0.966			0.961	
Flt Protected		0.981			0.991			0.994			0.997	
Satd. Flow (prot)	0	1376	0	0	1429	0	0	1288	0	0	1264	0
Flt Permitted		0.981			0.991			0.994			0.997	
Satd. Flow (perm)	0	1376	0	0	1429	0	0	1288	0	0	1264	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2177.2			714.3	
Travel Time (s)		30.1			38.7			156.8			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	95	114	39	60	222	33	50	247	100	17	203	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	248	0	0	315	0	0	397	0	0	309	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	79.5%											
Analysis Period (min)	15											
	ICU Level of Service D											

HCM Unsignalized Intersection Capacity Analysis
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 (Phase 1)
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
Future Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
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)	95	114	39	60	222	33	50	247	100	17	203	89
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	248	315	397	309								
Volume Left (vph)	95	60	50	17								
Volume Right (vph)	39	33	100	89								
Hadj (s)	0.04	0.00	0.05	0.05								
Departure Headway (s)	7.5	7.2	7.0	7.2								
Degree Utilization, x	0.52	0.63	0.77	0.62								
Capacity (veh/h)	421	454	487	457								
Control Delay (s/veh)	18.2	21.8	29.3	21.1								
Approach Delay (s/veh)	18.2	21.8	29.3	21.1								
Approach LOS	C	C	D	C								
Intersection Summary												
Delay			23.3									
Level of Service			C									
Intersection Capacity Utilization			79.5%	ICU Level of Service					D			
Analysis Period (min)			15									

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2028 (Phase 1)
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	513	537	138	310	203
Future Volume (vph)	88	513	537	138	310	203
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.972		0.947	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1131	1265	0	1282	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1131	1265	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	96	558	584	150	337	221
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	654	734	0	558	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	147.4%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2028 (Phase 1)
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	88	513	537	138	310	203
Future Volume (veh/h)	88	513	537	138	310	203
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	558	584	150	337	221
Approach Volume (veh/h)		654	734		558	
Crossing Volume (veh/h)		337	96		584	
High Capacity (veh/h)		1063	1285		873	
High v/c (veh/h)		0.62	0.57		0.64	
Low Capacity (veh/h)		870	1070		701	
Low v/c (veh/h)		0.75	0.69		0.80	
Intersection Summary						
Maximum v/c High			0.64			
Maximum v/c Low			0.80			
Intersection Capacity Utilization			147.4%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	18.2		
Intersection LOS	C		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	654	734	558
Demand Flow Rate, veh/h	705	783	593
Vehicles Circulating, veh/h	350	119	619
Vehicles Exiting, veh/h	862	936	283
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	17.7	11.8	27.4
Approach LOS	C	B	D
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	705	783	593
Cap Entry Lane, veh/h	966	1222	734
Entry HV Adj Factor	0.928	0.937	0.941
Flow Entry, veh/h	654	734	558
Cap Entry, veh/h	896	1146	691
V/C Ratio	0.730	0.641	0.808
Control Delay, s/veh	17.7	11.8	27.4
LOS	C	B	D
95th %tile Queue, veh	7	5	8

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2028 (Phase 1)
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	16	31	11	222	207	5
Future Volume (vph)	16	31	11	222	207	5
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.910				0.997	
Flt Protected	0.984				0.998	
Satd. Flow (prot)	1302	0	0	1202	1357	0
Flt Permitted	0.984				0.998	
Satd. Flow (perm)	1302	0	0	1202	1357	0
Link Speed (k/h)	50				50	50
Link Distance (m)	182.8				213.0	2177.2
Travel Time (s)	13.2				15.3	156.8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	34	12	241	225	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	0	0	253	230	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6				0.0	0.0
Link Offset(m)	0.0				0.0	0.0
Crosswalk Width(m)	4.8				4.8	4.8
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25	15		
Sign Control	Stop				Free	Free
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	42.2%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2028 (Phase 1)
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	31	11	222	207	5
Future Volume (Veh/h)	16	31	11	222	207	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	34	12	241	225	5
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	493	228	230			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	493	228	230			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	99			
cM capacity (veh/h)	531	812	1338			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	51	253	230			
Volume Left	17	12	0			
Volume Right	34	0	5			
cSH	690	1338	1700			
Volume to Capacity	0.07	0.01	0.14			
Queue Length 95th (m)	1.9	0.2	0.0			
Control Delay (s/veh)	10.6	0.4	0.0			
Lane LOS	B	A				
Approach Delay (s/veh)	10.6	0.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.2			
Intersection Capacity Utilization		42.2%		ICU Level of Service		A
Analysis Period (min)			15			

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2028 (Phase 1)
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	16	30	10	217	233	5
Future Volume (vph)	16	30	10	217	233	5
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.997	
Flt Protected	0.983			0.998		
Satd. Flow (prot)	1328	0	0	1203	1357	0
Flt Permitted	0.983			0.998		
Satd. Flow (perm)	1328	0	0	1203	1357	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	219.5			238.0	213.0	
Travel Time (s)	15.8			17.1	15.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	17	33	11	236	253	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	0	247	258	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	40.4%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2028 (Phase 1)
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	30	10	217	233	5
Future Volume (Veh/h)	16	30	10	217	233	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	33	11	236	253	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				238		
pX, platoon unblocked						
vC, conflicting volume	514	256	258			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	256	258			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	99			
cM capacity (veh/h)	520	788	1318			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	50	247	258			
Volume Left	17	11	0			
Volume Right	33	0	5			
cSH	671	1318	1700			
Volume to Capacity	0.07	0.01	0.15			
Queue Length 95th (m)	1.9	0.2	0.0			
Control Delay (s/veh)	10.8	0.4	0.0			
Lane LOS	B	A				
Approach Delay (s/veh)	10.8	0.4	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay		1.2				
Intersection Capacity Utilization		40.4%		ICU Level of Service		A
Analysis Period (min)		15				

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	49.1	99.0	69.9	21.7	82.6	52.4	49.8	41.4	59.5
Average Queue (m)	18.8	52.9	17.6	6.3	44.1	21.1	17.5	9.1	26.8
95th Queue (m)	37.9	87.9	47.5	16.0	71.8	41.1	37.3	25.2	48.1
Link Distance (m)		902.4			568.8		768.8		218.5
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)		29	1		3	18	6	2	16
Queuing Penalty (veh)		62	5		1	26	7	4	7

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	34.1	36.3	70.2	44.2
Average Queue (m)	17.0	16.3	32.4	22.1
95th Queue (m)	27.9	28.0	54.8	35.1
Link Distance (m)	410.2	524.9	2155.2	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	110.6	73.3	119.2
Average Queue (m)	31.1	21.3	48.9
95th Queue (m)	74.7	55.0	103.7
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	18.4	13.5
Average Queue (m)	7.5	1.0
95th Queue (m)	15.0	6.4
Link Distance (m)	174.4	196.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	14.4	6.8
Average Queue (m)	7.3	0.4
95th Queue (m)	13.8	3.8
Link Distance (m)	209.1	218.5
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 112

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025							
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:12:57 PM

Summary of intersection performance

AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Single Lane - TT 2028							
Leg North	1.32	?	8.49	0.56	A	10.08	B
Leg West	1.42	1.08	7.82	0.57	A		
Leg East	2.69	6.40	13.31	0.72	B		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:12:57 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2028, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	513.00	100.000
West	ONE HOUR	✓	601.00	100.000
East	ONE HOUR	✓	675.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	203.000	310.000
	West	513.000	0.000	88.000
	East	138.000	537.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.20	0.80	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.56	8.49	1.32	?	A	470.74	706.11	78.92	6.71	0.88	78.93	6.71
West	0.57	7.82	1.42	1.08	A	551.49	827.23	87.39	6.34	0.97	87.40	6.34
East	0.72	13.31	2.69	6.40	B	619.39	929.09	142.41	9.20	1.58	142.43	9.20

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	386.21	96.55	384.01	487.26	401.57	0.00	1125.04	964.48	0.343	0.00	0.55	5.148	A
West	452.46	113.12	449.94	553.52	232.05	0.00	1223.14	1020.13	0.370	0.00	0.63	5.024	A
East	508.18	127.04	504.76	297.93	384.06	0.00	1135.17	853.48	0.448	0.00	0.85	6.055	A

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	461.18	115.29	460.24	584.00	481.30	0.00	1078.89	964.48	0.427	0.55	0.78	6.177	A
West	540.29	135.07	539.28	663.42	278.12	0.00	1196.48	1020.13	0.452	0.63	0.88	5.921	A
East	606.81	151.70	604.98	357.08	460.32	0.00	1091.03	853.48	0.556	0.85	1.31	7.866	A

Main results: (08:30-08:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	564.82	141.21	562.76	713.90	587.09	0.00	1017.66	964.48	0.555	0.78	1.30	8.374	A
West	661.71	165.43	659.60	809.78	340.07	0.00	1160.63	1020.13	0.570	0.88	1.41	7.744	A
East	743.19	185.80	737.96	436.65	563.02	0.00	1031.59	853.48	0.720	1.31	2.62	12.843	B

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	564.82	141.21	564.75	716.66	591.03	0.00	1015.38	964.48	0.556	1.30	1.32	8.489	A
West	661.71	165.43	661.65	814.51	341.27	0.00	1159.93	1020.13	0.570	1.41	1.42	7.817	A
East	743.19	185.80	742.92	438.15	564.77	0.00	1030.58	853.48	0.721	2.62	2.69	13.308	B

Main results: (09:00-09:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	461.18	115.29	463.22	588.09	486.95	0.00	1075.62	964.48	0.429	1.32	0.81	6.270	A
West	540.29	135.07	542.37	670.25	279.92	0.00	1195.44	1020.13	0.452	1.42	0.90	5.987	A
East	606.81	151.70	612.09	359.33	462.95	0.00	1089.51	853.48	0.557	2.69	1.37	8.125	A

Main results: (09:15-09:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	386.21	96.55	387.19	491.40	405.84	0.00	1122.56	964.48	0.344	0.81	0.56	5.212	A
West	452.46	113.12	453.51	559.06	233.98	0.00	1222.03	1020.13	0.370	0.90	0.64	5.076	A
East	508.18	127.04	510.13	300.38	387.11	0.00	1133.40	853.48	0.448	1.37	0.88	6.178	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	8.00	0.53	5.148	A	A
West	9.15	0.61	5.024	A	A
East	12.29	0.82	6.055	A	A

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	11.44	0.76	6.177	A	A
West	12.85	0.86	5.921	A	A
East					

East	18.88	1.26	7.866	A	A

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	18.64	1.24	8.374	A	A
West	20.25	1.35	7.744	A	A
East	36.18	2.41	12.843	B	B

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	19.66	1.31	8.489	A	A
West	21.26	1.42	7.817	A	A
East	39.88	2.66	13.308	B	B

Queueing Delay results: (09:00-09:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	12.53	0.84	6.270	A	A
West	14.01	0.93	5.987	A	A
East	21.57	1.44	8.125	A	A

Queueing Delay results: (09:15-09:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	8.65	0.58	5.212	A	A
West	9.87	0.66	5.076	A	A
East	13.61	0.91	6.178	A	A

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.55	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.85	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.78	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.88	0.00	0.00	0.00	1.08			N/A	N/A
East	1.31	0.00	0.00	2.13	3.20			N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.30	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.41	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	2.62	0.00	0.00	0.00	6.40			N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
						Percentiles could not be calculated. This may			

North	1.32	?	?	?	?	be because the mean queue is very small or very big.		N/A	N/A
West	1.42	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	2.69	0.00	0.00	0.00	3.20			N/A	N/A

Queue Variation results: (09:00-09:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.81	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.90	0.00	0.00	0.00	1.08			N/A	N/A
East	1.37	0.00	0.00	2.13	3.20			N/A	N/A

Queue Variation results: (09:15-09:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.64	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.88	0.00	0.00	1.07	2.13			N/A	N/A

Lanes, Volumes, Timings

Total - 2028 (Phase 1)

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Future Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.991			0.962			0.922	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1361	0	1415	1297	0	1429	1236	0
Flt Permitted	0.087			0.087			0.320			0.570		
Satd. Flow (perm)	122	1613	1110	131	1361	0	477	1297	0	857	1236	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			69		5			23			72	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			204.0	
Travel Time (s)		67.4			41.9			56.4			14.7	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	121	897	215	45	925	61	238	158	54	48	211	227
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	897	215	45	986	0	238	212	0	48	438	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

Total - 2028 (Phase 1)

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	1.95	1.09	0.36	0.68	1.41		1.25	0.40		0.14	0.82	
Control Delay (s/veh)	502.7	82.2	10.7	69.9	217.5		177.5	19.8		18.6	34.3	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	502.7	82.2	10.7	69.9	217.5		177.5	19.8		18.6	34.3	
LOS	F	F	B	E	F		F	B		B	C	
Approach Delay (s/veh)		111.0			211.0			103.2			32.7	
Approach LOS		F			F			F			C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.95

Intersection Signal Delay (s/veh): 130.2

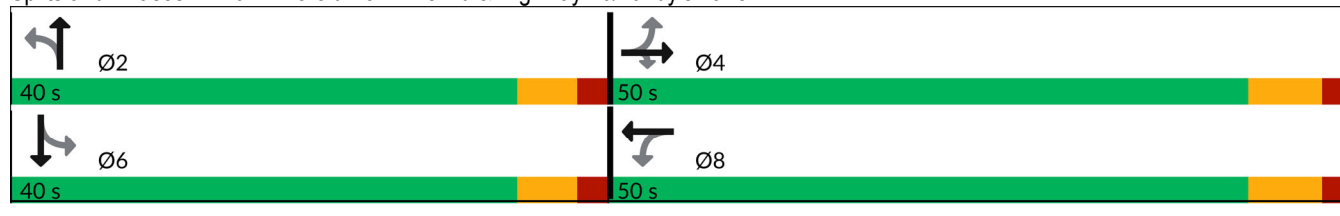
Intersection LOS: F

Intersection Capacity Utilization 142.8%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Total - 2028 (Phase 1)

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	121	897	215	45	986	238	212	48	438
v/c Ratio	1.95	1.09	0.36	0.68	1.41	1.25	0.40	0.14	0.82
Control Delay (s/veh)	502.7	82.2	10.7	69.9	217.5	177.5	19.8	18.6	34.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	502.7	82.2	10.7	69.9	217.5	177.5	19.8	18.6	34.3
Queue Length 50th (m)	~34.4	~185.4	14.2	5.8	~245.7	~54.6	23.8	5.5	59.0
Queue Length 95th (m)	#59.1	#258.5	30.2	#27.0	#322.3	#100.8	43.0	13.2	#114.7
Internal Link Dist (m)		912.7			557.5		759.0		180.0
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	601	66	698	190	532	342	537
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.95	1.09	0.36	0.68	1.41	1.25	0.40	0.14	0.82

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2028 (Phase 1)
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Future Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1360		1415	1296		1429	1237	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.32	1.00		0.57	1.00	
Satd. Flow (perm)	122	1613	1110	131	1360		476	1296		857	1237	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	897	215	45	925	61	238	158	54	48	211	227
RTOR Reduction (vph)	0	0	34	0	2	0	0	14	0	0	43	0
Lane Group Flow (vph)	121	897	181	45	984	0	238	198	0	48	395	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	695		190	518		342	494	
v/s Ratio Prot		0.56			0.72			0.15			0.32	
v/s Ratio Perm	c0.99		0.16	0.34			c0.50			0.06		
v/c Ratio	1.95	1.09	0.32	0.68	1.42		1.25	0.38		0.14	0.80	
Uniform Delay, d1	22.0	22.0	12.9	16.5	22.0		27.0	19.1		17.2	23.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	481.2	58.2	0.3	25.2	195.3		149.4	0.5		0.2	8.8	
Delay (s)	503.2	80.2	13.2	41.7	217.3		176.4	19.6		17.4	32.6	
Level of Service	F	F	B	D	F		F	B		B	C	
Approach Delay (s/veh)		110.1			209.6			102.5			31.1	
Approach LOS		F			F			F			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			129.1			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.64									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			142.8%			ICU Level of Service				H		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 (Phase 1)
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
Future Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.973			0.989			0.962			0.956	
Flt Protected		0.989			0.984			0.993			0.997	
Satd. Flow (prot)	0	1378	0	0	1435	0	0	1338	0	0	1350	0
Flt Permitted		0.989			0.984			0.993			0.997	
Satd. Flow (perm)	0	1378	0	0	1435	0	0	1338	0	0	1350	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2181.2			714.3	
Travel Time (s)		30.1			38.7			157.0			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	105	259	93	140	257	34	51	225	108	34	384	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	457	0	0	431	0	0	384	0	0	617	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	94.1%											
Analysis Period (min)	15											
	ICU Level of Service F											

HCM Unsignalized Intersection Capacity Analysis
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 (Phase 1)
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
Future Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
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)	105	259	93	140	257	34	51	225	108	34	384	199
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	457	431	384	617								
Volume Left (vph)	105	140	51	34								
Volume Right (vph)	93	34	108	199								
Hadj (s)	-0.02	0.03	-0.04	-0.10								
Departure Headway (s)	9.5	9.6	9.5	9.5								
Degree Utilization, x	1.21	1.15	1.02	1.62								
Capacity (veh/h)	382	379	384	384								
Control Delay (s/veh)	146.8	123.9	82.1	315.1								
Approach Delay (s/veh)	146.8	123.9	82.1	315.1								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				183.4								
Level of Service				F								
Intersection Capacity Utilization				94.1%	ICU Level of Service		F					
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2028 (Phase 1)
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	184	895	944	335	239	158
Future Volume (vph)	184	895	944	335	239	158
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.965		0.946	
Flt Protected		0.992			0.971	
Satd. Flow (prot)	0	1198	1320	0	1336	0
Flt Permitted		0.992			0.971	
Satd. Flow (perm)	0	1198	1320	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	200	973	1026	364	260	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1173	1390	0	432	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	223.9%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2028 (Phase 1)
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	184	895	944	335	239	158
Future Volume (veh/h)	184	895	944	335	239	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	200	973	1026	364	260	172
Approach Volume (veh/h)		1173	1390		432	
Crossing Volume (veh/h)		260	200		1026	
High Capacity (veh/h)		1129	1184		609	
High v/c (veh/h)		1.04	1.17		0.71	
Low Capacity (veh/h)		930	979		471	
Low v/c (veh/h)		1.26	1.42		0.92	
Intersection Summary						
Maximum v/c High			1.17			
Maximum v/c Low			1.42			
Intersection Capacity Utilization			223.9%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	105.8		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1173	1390	432
Demand Flow Rate, veh/h	1192	1411	441
Vehicles Circulating, veh/h	260	200	1047
Vehicles Exiting, veh/h	1228	1252	564
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	87.4	136.8	55.7
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1192	1411	441
Cap Entry Lane, veh/h	1058	1125	474
Entry HV Adj Factor	0.984	0.985	0.980
Flow Entry, veh/h	1173	1390	432
Cap Entry, veh/h	1041	1109	465
V/C Ratio	1.126	1.254	0.930
Control Delay, s/veh	87.4	136.8	55.7
LOS	F	F	F
95th %tile Queue, veh	31	46	11

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2028 (Phase 1)
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	12	19	31	260	427	19
Future Volume (vph)	12	19	31	260	427	19
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.917				0.994	
Flt Protected	0.981			0.995		
Satd. Flow (prot)	1334	0	0	1200	1354	0
Flt Permitted	0.981			0.995		
Satd. Flow (perm)	1334	0	0	1200	1354	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	252.7			243.0	2181.2	
Travel Time (s)	18.2			17.5	157.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	13	21	34	283	464	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	34	0	0	317	485	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	69.5%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2028 (Phase 1)
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	19	31	260	427	19
Future Volume (Veh/h)	12	19	31	260	427	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	21	34	283	464	21
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	826	475	485			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	826	475	485			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	96	97			
cM capacity (veh/h)	334	594	1088			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	34	317	485			
Volume Left	13	34	0			
Volume Right	21	0	21			
cSH	458	1088	1700			
Volume to Capacity	0.07	0.03	0.29			
Queue Length 95th (m)	1.9	0.8	0.0			
Control Delay (s/veh)	13.5	1.2	0.0			
Lane LOS	B	A				
Approach Delay (s/veh)	13.5	1.2	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay	1.0					
Intersection Capacity Utilization	69.5%			ICU Level of Service	C	
Analysis Period (min)	15					

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2028 (Phase 1)
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	19	31	280	427	19
Future Volume (vph)	11	19	31	280	427	19
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.914				0.994	
Flt Protected	0.982			0.995		
Satd. Flow (prot)	1331	0	0	1200	1354	0
Flt Permitted	0.982			0.995		
Satd. Flow (perm)	1331	0	0	1200	1354	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	258.3			204.0	243.0	
Travel Time (s)	18.6			14.7	17.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	12	21	34	304	464	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	33	0	0	338	485	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	71.1%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
202: Thorold Townline Rd & Street H

Total - 2028 (Phase 1)
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	19	31	280	427	19
Future Volume (Veh/h)	11	19	31	280	427	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	21	34	304	464	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				204		
pX, platoon unblocked						
vC, conflicting volume	847	475	485			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	847	475	485			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	96	97			
cM capacity (veh/h)	325	594	1088			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	33	338	485			
Volume Left	12	34	0			
Volume Right	21	0	21			
cSH	456	1088	1700			
Volume to Capacity	0.07	0.03	0.29			
Queue Length 95th (m)	1.9	0.8	0.0			
Control Delay (s/veh)	13.5	1.1	0.0			
Lane LOS	B	A				
Approach Delay (s/veh)	13.5	1.1	0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			1.0			
Intersection Capacity Utilization		71.1%		ICU Level of Service		C
Analysis Period (min)			15			

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	136.4	310.4	70.0	134.9	583.0	69.9	699.7	60.0	132.0
Average Queue (m)	77.4	153.3	42.3	62.6	565.9	67.5	474.9	10.4	58.1
95th Queue (m)	159.7	438.9	89.9	169.7	652.2	81.4	879.2	36.8	106.3
Link Distance (m)		902.4			568.8		768.8		184.8
Upstream Blk Time (%)		1			94		21		0
Queuing Penalty (veh)		6			0		0		0
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	26	43	1		71	95	20	1	44
Queuing Penalty (veh)	263	133	12		29	185	43	3	19

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	88.1	88.6	69.5	558.8
Average Queue (m)	43.2	43.0	30.7	371.2
95th Queue (m)	80.9	83.3	56.1	700.7
Link Distance (m)	410.2	524.9	2159.2	705.9
Upstream Blk Time (%)				9
Queuing Penalty (veh)				0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1009.5	903.0	59.8
Average Queue (m)	892.7	739.5	22.6
95th Queue (m)	1206.1	1062.5	44.7
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	49	0	
Queuing Penalty (veh)	0	4	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	10.5	18.2
Average Queue (m)	6.1	2.6
95th Queue (m)	12.9	11.2
Link Distance (m)	244.3	226.2
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	14.6	25.5	1.2
Average Queue (m)	5.9	4.1	0.0
95th Queue (m)	13.5	16.2	0.9
Link Distance (m)	248.1	184.8	226.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 698

Junctions 8						
ARCADY 8 - Roundabout Module						
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:12:38 PM

Summary of intersection performance

	PM					
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)
Single Lane - TT 2028						
Leg North	0.77	1.02	6.37	0.43	A	814.49
Leg West	20.46	77.26	63.63	0.99	F	
Leg East	453.55	202.94	1698.77	1.77	F	

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:12:37 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2028, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	397.00	100.000
West	ONE HOUR	✓	1079.00	100.000
East	ONE HOUR	✓	1279.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	158.000	239.000
	West	895.000	0.000	184.000
	East	335.000	944.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.83	0.00	0.17
	East	0.26	0.74	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.43	6.37	0.77	1.02	A	364.29	546.44	53.94	5.92	0.60	53.94	5.92
West	0.99	63.63	20.46	77.26	F	990.11	1485.16	641.03	25.90	7.12	641.12	25.90
East	1.77	1698.77	453.55	202.94	F	1173.63	1760.45	20768.90	707.85	230.77	27174.87	926.18

Main Results for each time segment

Main results: (16:00-16:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	298.88	74.72	297.08	905.10	668.81	0.00	970.36	985.56	0.308	0.00	0.45	5.436	A
West	812.33	203.08	805.04	787.05	178.85	0.00	1253.93	1014.05	0.648	0.00	1.82	8.029	A
East	962.90	240.72	906.16	316.13	667.75	0.00	970.98	870.63	0.992	0.00	14.19	41.155	E

Main results: (16:15-16:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	356.89	89.22	356.37	1032.70	658.61	0.00	976.27	985.57	0.366	0.45	0.58	5.914	A
West	970.00	242.50	963.24	800.44	214.54	0.00	1233.28	1014.05	0.787	1.82	3.51	13.220	B
East	1149.79	287.45	892.33	378.80	798.98	0.00	895.03	870.63	1.285	14.19	78.55	203.309	F

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	437.11	109.28	436.37	1158.47	597.54	0.00	1011.61	985.56	0.432	0.58	0.77	6.371	A
West	1188.00	297.00	1140.99	771.21	262.70	0.00	1205.41	1014.06	0.986	3.51	15.27	40.644	E
East	1408.21	352.05	809.59	457.27	946.42	0.00	809.70	870.63	1.739	78.55	228.20	694.135	F

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	437.11	109.28	437.10	1176.96	588.30	0.00	1016.96	985.56	0.430	0.77	0.77	6.327	A
West	1188.00	297.00	1167.23	762.27	263.14	0.00	1205.15	1014.06	0.986	15.27	20.46	63.633	F
East	1408.21	352.05	797.08	462.19	968.18	0.00	797.10	870.63	1.767	228.20	380.99	1381.727	F

Main results: (17:00-17:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	356.89	89.22	357.64	1084.31	634.95	0.00	989.96	985.57	0.361	0.77	0.58	5.809	A
West	970.00	242.50	1035.58	777.29	215.31	0.00	1232.84	1014.05	0.787	20.46	4.06	23.532	C
East	1149.79	287.45	860.28	391.90	858.98	0.00	860.30	870.63	1.337	380.99	453.36	1660.044	F

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	298.88	74.72	299.30	932.92	710.14	0.00	946.44	985.56	0.316	0.58	0.47	5.675	A
West	812.33	203.08	820.90	829.26	180.19	0.00	1253.16	1014.05	0.648	4.06	1.92	8.626	A
East	962.90	240.72	962.15	320.17	680.91	0.00	963.36	870.63	1.000	453.36	453.55	1698.771	F

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.53	0.44	5.436	A	A
West	25.58	1.71	8.029	A	A
East	141.87	9.46	41.155	E	D

Queueing Delay results: (16:15-16:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	8.52	0.57	5.914	A	A
West	48.00	3.20	13.220	B	B

East	697.88	46.53	203.309	F	F

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	11.19	0.75	6.371	A	A
West	162.18	10.81	40.644	E	D
East	2300.73	153.38	694.135	F	F

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	11.50	0.77	6.327	A	A
West	270.77	18.05	63.633	F	E
East	4568.93	304.60	1381.727	F	F

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	8.92	0.59	5.809	A	A
West	103.72	6.91	23.532	C	C
East	6257.63	417.18	1660.044	F	F

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.27	0.48	5.675	A	A
West	30.77	2.05	8.626	A	A
East	6801.87	453.46	1698.771	F	F

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.82	0.00	1.02	2.03	3.05			N/A	N/A
East	14.19	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	3.51	0.00	0.00	8.13	12.20			N/A	N/A
East	78.55	0.00	19.28	>199	>199			N/A	N/A

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.77	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	15.27	0.00	7.12	37.61	52.86			N/A	N/A
East	228.20	53.78	198.88	>199	>199			N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.77	0.00	0.00	0.00	1.02			N/A	N/A
West	20.46	0.00	7.12	53.88	77.26			N/A	N/A
East	380.99	179.60	>199	>199	>199			N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.58	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	4.06	0.00	0.00	8.13	15.25			N/A	N/A
East	453.36	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.92	0.00	0.00	1.02	5.08			N/A	N/A
East	453.55	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Appendix G2

2035 Total Operations Synchro Reports



Lanes, Volumes, Timings

Total - 2035

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Future Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.977			0.978			0.921	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1272	0	1311	1207	0	1191	1154	0
Flt Permitted	0.232			0.180			0.281			0.556		
Satd. Flow (perm)	306	1582	1063	271	1272	0	388	1207	0	697	1154	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			66		15			12			75	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			238.0	
Travel Time (s)		67.4			41.9			56.4			17.1	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	157	725	168	37	555	100	135	188	33	161	220	248
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	725	168	37	655	0	135	221	0	161	468	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings

Total - 2035

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		34.6	34.6		34.6	34.6	
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.39	0.39		0.39	0.39	
v/c Ratio	0.99	0.88	0.29	0.26	0.98		0.89	0.46		0.59	0.95	
Control Delay (s/veh)	96.5	34.2	9.1	18.7	53.7		79.0	22.6		32.0	52.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	96.5	34.2	9.1	18.7	53.7		79.0	22.6		32.0	52.6	
LOS	F	C	A	B	D		E	C		C	D	
Approach Delay (s/veh)		39.5			51.8			44.0			47.3	
Approach LOS		D			D			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 88.6

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.99

Intersection Signal Delay (s/veh): 45.0

Intersection LOS: D

Intersection Capacity Utilization 116.8%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2035

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	157	725	168	37	655	135	221	161	468
v/c Ratio	0.99	0.88	0.29	0.26	0.98	0.89	0.46	0.59	0.95
Control Delay (s/veh)	96.5	34.2	9.1	18.7	53.7	79.0	22.6	32.0	52.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	96.5	34.2	9.1	18.7	53.7	79.0	22.6	32.0	52.6
Queue Length 50th (m)	~27.5	113.0	9.6	3.6	111.1	22.1	27.1	22.4	68.9
Queue Length 95th (m)	#68.8	#191.5	22.4	11.4	#191.4	#58.3	48.1	45.4	#133.8
Internal Link Dist (m)		912.7			557.5		759.0		214.0
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	159	821	583	140	667	157	498	283	513
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.99	0.88	0.29	0.26	0.98	0.86	0.44	0.57	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2035
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Future Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1272		1311	1206		1191	1154	
Flt Permitted	0.23	1.00	1.00	0.18	1.00		0.28	1.00		0.56	1.00	
Satd. Flow (perm)	306	1582	1063	271	1272		387	1206		697	1154	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	725	168	37	555	100	135	188	33	161	220	248
RTOR Reduction (vph)	0	0	32	0	7	0	0	7	0	0	46	0
Lane Group Flow (vph)	157	725	136	37	648	0	135	214	0	161	422	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		32.6	32.6		32.6	32.6	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		34.6	34.6		34.6	34.6	
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.39	0.39		0.39	0.39	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	158	821	551	140	660		151	470		272	450	
v/s Ratio Prot		0.46			0.51			0.18			c0.37	
v/s Ratio Perm	c0.51		0.13	0.14			0.35			0.23		
v/c Ratio	0.99	0.88	0.25	0.26	0.98		0.89	0.45		0.59	0.94	
Uniform Delay, d1	21.2	18.9	11.7	11.9	20.9		25.3	20.0		21.4	26.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	69.4	11.1	0.2	1.0	30.2		43.4	0.7		3.4	27.3	
Delay (s)	90.5	30.0	12.0	12.9	51.1		68.7	20.7		24.8	53.3	
Level of Service	F	C	B	B	D		E	C		C	D	
Approach Delay (s/veh)		36.1			49.1			38.9			46.0	
Approach LOS		D			D			D			D	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			42.1			HCM 2000 Level of Service				D		
HCM 2000 Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			88.6			Sum of lost time (s)			8.0			
Intersection Capacity Utilization			116.8%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2035
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
Future Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.967			0.987			0.966			0.962	
Flt Protected		0.983			0.988			0.990			0.999	
Satd. Flow (prot)	0	1353	0	0	1427	0	0	1282	0	0	1266	0
Flt Permitted		0.983			0.988			0.990			0.999	
Satd. Flow (perm)	0	1353	0	0	1427	0	0	1282	0	0	1266	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2177.2			714.3	
Travel Time (s)		30.1			38.7			156.8			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	108	129	78	93	253	37	117	322	149	9	251	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	315	0	0	383	0	0	588	0	0	361	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	103.4%				ICU Level of Service G							
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2035
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
Future Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
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)	108	129	78	93	253	37	117	322	149	9	251	101
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	315	383	588	361								
Volume Left (vph)	108	93	117	9								
Volume Right (vph)	78	37	149	101								
Hadj (s)	-0.01	0.01	0.07	0.05								
Departure Headway (s)	9.1	8.8	8.9	9.0								
Degree Utilization, x	0.80	0.94	1.46	0.90								
Capacity (veh/h)	379	383	405	386								
Control Delay (s/veh)	40.1	60.7	243.0	53.7								
Approach Delay (s/veh)	40.1	60.7	243.0	53.7								
Approach LOS	E	F	F	F								
Intersection Summary												
Delay				120.3								
Level of Service				F								
Intersection Capacity Utilization				103.4%	ICU Level of Service							G
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2035
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	94	638	715	148	328	215
Future Volume (vph)	94	638	715	148	328	215
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.977		0.947	
Flt Protected		0.994			0.971	
Satd. Flow (prot)	0	1136	1273	0	1282	0
Flt Permitted		0.994			0.971	
Satd. Flow (perm)	0	1136	1273	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	102	693	777	161	357	234
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	795	938	0	591	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	174.0%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2035
AM Peak Hour

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	94	638	715	148	328	215
Future Volume (veh/h)	94	638	715	148	328	215
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	102	693	777	161	357	234
Approach Volume (veh/h)		795	938		591	
Crossing Volume (veh/h)		357	102		777	
High Capacity (veh/h)		1046	1279		747	
High v/c (veh/h)		0.76	0.73		0.79	
Low Capacity (veh/h)		855	1065		590	
Low v/c (veh/h)		0.93	0.88		1.00	
Intersection Summary						
Maximum v/c High			0.79			
Maximum v/c Low			1.00			
Intersection Capacity Utilization			174.0%		ICU Level of Service	H

HCM 6th Roundabout
103: Highway 20 & Barker Parkway

Total - 2035
AM Peak Hour

Intersection			
Intersection Delay, s/veh	39.8		
Intersection LOS	E		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	795	938	591
Demand Flow Rate, veh/h	854	999	628
Vehicles Circulating, veh/h	371	126	824
Vehicles Exiting, veh/h	1081	1099	301
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	33.1	20.0	80.3
Approach LOS	D	C	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	854	999	628
Cap Entry Lane, veh/h	945	1213	595
Entry HV Adj Factor	0.931	0.939	0.941
Flow Entry, veh/h	795	938	591
Cap Entry, veh/h	880	1140	560
V/C Ratio	0.904	0.823	1.055
Control Delay, s/veh	33.1	20.0	80.3
LOS	D	C	F
95th %tile Queue, veh	13	10	17

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2035
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	64	123	62	350	286	31
Future Volume (vph)	64	123	62	350	286	31
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.987	
Flt Protected	0.983			0.993		
Satd. Flow (prot)	1302	0	0	1195	1343	0
Flt Permitted	0.983			0.993		
Satd. Flow (perm)	1302	0	0	1195	1343	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	182.8			213.0	2177.2	
Travel Time (s)	13.2			15.3	156.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	134	67	380	311	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	204	0	0	447	345	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type: Unsignalized						
Intersection Capacity Utilization 81.2%				ICU Level of Service D		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2035
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	64	123	62	350	286	31
Future Volume (Veh/h)	64	123	62	350	286	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	134	67	380	311	34
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	842	328	345			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	842	328	345			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	81	94			
cM capacity (veh/h)	316	713	1214			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	204	447	345			
Volume Left	70	67	0			
Volume Right	134	0	34			
cSH	498	1214	1700			
Volume to Capacity	0.41	0.06	0.20			
Queue Length 95th (m)	15.8	1.4	0.0			
Control Delay (s/veh)	17.1	1.7	0.0			
Lane LOS	C	A				
Approach Delay (s/veh)	17.1	1.7	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay			4.3			
Intersection Capacity Utilization		81.2%		ICU Level of Service		D
Analysis Period (min)		15				

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2035
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	118	229	116	294	349	60
Future Volume (vph)	118	229	116	294	349	60
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.980	
Flt Protected	0.983			0.986		
Satd. Flow (prot)	1328	0	0	1194	1337	0
Flt Permitted	0.983			0.986		
Satd. Flow (perm)	1328	0	0	1194	1337	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	219.5			238.0	213.0	
Travel Time (s)	15.8			17.1	15.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	128	249	126	320	379	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	377	0	0	446	444	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	100.4%			ICU Level of Service G		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2035
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	118	229	116	294	349	60
Future Volume (Veh/h)	118	229	116	294	349	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	249	126	320	379	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				238		
pX, platoon unblocked						
vC, conflicting volume	984	412	444			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	984	412	444			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	48	61	89			
cM capacity (veh/h)	247	645	1127			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	377	446	444			
Volume Left	128	126	0			
Volume Right	249	0	65			
cSH	417	1127	1700			
Volume to Capacity	0.90	0.11	0.26			
Queue Length 95th (m)	77.3	3.0	0.0			
Control Delay (s/veh)	55.2	3.3	0.0			
Lane LOS	F	A				
Approach Delay (s/veh)	55.2	3.3	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		17.6				
Intersection Capacity Utilization		100.4%		ICU Level of Service		G
Analysis Period (min)		15				

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	189.9	925.7	70.0	89.0	219.8	70.0	485.8	69.9	161.7
Average Queue (m)	159.9	645.6	34.0	12.5	108.1	60.3	219.6	40.3	78.0
95th Queue (m)	225.6	1177.4	85.8	61.3	194.9	86.4	559.3	78.4	143.6
Link Distance (m)		902.4			568.8		768.8		218.5
Upstream Blk Time (%)		28					4		
Queuing Penalty (veh)		272					0		
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	77	31	3		36	91	26	27	50
Queuing Penalty (veh)	629	92	21		12	185	32	117	74

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	54.0	70.1	221.2	79.3
Average Queue (m)	24.1	30.0	96.6	33.3
95th Queue (m)	42.6	58.9	236.3	64.6
Link Distance (m)	410.2	524.9	2155.2	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1011.1	325.4	459.8
Average Queue (m)	549.7	136.7	334.7
95th Queue (m)	1176.2	482.5	584.0
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	22	0	44
Queuing Penalty (veh)	0	3	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	29.4	28.0
Average Queue (m)	14.9	5.6
95th Queue (m)	24.0	18.5
Link Distance (m)	174.4	196.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	107.4	40.5	7.9
Average Queue (m)	39.3	10.8	0.4
95th Queue (m)	82.5	28.1	3.1
Link Distance (m)	209.1	218.5	196.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 1437

Junctions 8						
ARCADY 8 - Roundabout Module						
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025						
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:12:23 PM

Summary of intersection performance

AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Single Lane - TT 2035							
Leg North	1.96	2.13	12.06	0.65	B	40.58	E
Leg West	2.48	4.31	11.31	0.70	B		
Leg East	21.86	75.62	83.35	1.00	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM " model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:12:23 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2035, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	543.00	100.000
West	ONE HOUR	✓	732.00	100.000
East	ONE HOUR	✓	863.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	215.000	328.000
	West	638.000	0.000	94.000
	East	148.000	715.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.87	0.00	0.13
	East	0.17	0.83	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.65	12.06	1.96	2.13	B	498.27	747.40	108.50	8.71	1.21	108.51	8.71
West	0.70	11.31	2.48	4.31	B	671.70	1007.54	138.34	8.24	1.54	138.36	8.24
East	1.00	83.35	21.86	75.62	F	791.90	1187.86	639.44	32.30	7.10	639.51	32.30

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	408.80	102.20	406.11	587.59	533.10	0.00	1048.91	954.21	0.390	0.00	0.67	5.928	A
West	551.09	137.77	547.55	693.90	245.31	0.00	1215.47	1023.85	0.453	0.00	0.88	5.783	A
East	649.71	162.43	643.45	315.63	477.24	0.00	1081.24	840.98	0.601	0.00	1.57	8.639	A

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	488.15	122.04	486.75	704.03	637.69	0.00	988.38	954.21	0.494	0.67	1.02	7.606	A
West	658.05	164.51	656.32	830.41	294.02	0.00	1187.28	1023.85	0.554	0.88	1.32	7.288	A
East	775.82	193.95	769.68	378.30	572.04	0.00	1026.37	840.98	0.756	1.57	3.10	14.590	B

Main results: (08:30-08:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	597.85	149.46	594.44	853.07	746.42	0.00	925.45	954.21	0.646	1.02	1.87	11.440	B
West	805.95	201.49	801.49	981.79	359.07	0.00	1149.63	1023.85	0.701	1.32	2.43	11.006	B
East	950.18	237.55	900.92	462.00	698.57	0.00	953.14	840.98	0.997	3.10	15.41	50.315	F

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	597.85	149.46	597.51	860.80	765.86	0.00	914.19	954.21	0.654	1.87	1.96	12.058	B
West	805.95	201.49	805.74	1002.45	360.93	0.00	1148.55	1023.85	0.702	2.43	2.48	11.305	B
East	950.18	237.55	924.39	464.40	702.27	0.00	951.00	840.98	0.999	15.41	21.86	83.348	F

Main results: (09:00-09:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	488.15	122.04	491.41	722.99	703.19	0.00	950.47	954.21	0.514	1.96	1.14	8.395	A
West	658.05	164.51	662.51	897.76	296.84	0.00	1185.65	1023.85	0.555	2.48	1.37	7.484	A
East	775.82	193.95	848.74	381.92	577.44	0.00	1023.25	840.98	0.758	21.86	3.63	29.333	D

Main results: (09:15-09:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	408.80	102.20	410.60	594.71	544.84	0.00	1042.11	954.21	0.392	1.14	0.69	6.078	A
West	551.09	137.77	552.94	707.42	248.02	0.00	1213.90	1023.85	0.454	1.37	0.91	5.891	A
East	649.71	162.43	657.62	319.03	481.93	0.00	1078.52	840.98	0.602	3.63	1.65	9.272	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	9.70	0.65	5.928	A	A
West	12.74	0.85	5.783	A	A
East	22.01	1.47	8.639	A	A

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	14.76	0.98	7.606	A	A
West	19.03	1.27	7.288	A	A

East	42.36	2.82	14.590	B	B

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	26.36	1.76	11.440	B	B
West	34.03	2.27	11.006	B	B
East	158.96	10.60	50.315	F	D

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	28.96	1.93	12.058	B	B
West	36.96	2.46	11.305	B	B
East	282.34	18.82	83.348	F	F

Queueing Delay results: (09:00-09:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	17.97	1.20	8.395	A	A
West	21.53	1.44	7.484	A	A
East	107.26	7.15	29.333	D	C

Queueing Delay results: (09:15-09:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	10.75	0.72	6.078	A	A
West	14.05	0.94	5.891	A	A
East	26.51	1.77	9.272	A	A

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.88	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	1.57	0.00	0.00	1.07	2.13			N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.02	0.00	0.00	1.06	1.06			N/A	N/A
West	1.32	0.00	0.00	2.16	3.23			N/A	N/A
East	3.10	0.00	0.00	7.46	10.65			N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.87	0.00	0.00	0.00	2.13			N/A	N/A
West	2.43	0.00	0.00	0.00	4.31			N/A	N/A
East	15.41	0.00	8.52	36.21	48.99			N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.96	0.00	0.00	0.00	2.13			N/A	N/A
West	2.48	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	21.86	0.00	10.65	55.38	75.62			N/A	N/A

Queue Variation results: (09:00-09:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.14	0.00	0.00	1.06	2.13			N/A	N/A
West	1.37	0.00	0.00	2.16	3.23			N/A	N/A
East	3.63	0.00	0.00	6.39	12.78			N/A	N/A

Queue Variation results: (09:15-09:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.69	0.00	0.00	1.06	1.06			N/A	N/A
West	0.91	0.00	0.00	1.08	2.16			N/A	N/A
East	1.65	0.00	0.00	0.00	4.26			N/A	N/A

Lanes, Volumes, Timings

Total - 2035

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Future Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.973			0.971			0.914	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1334	0	1415	1306	0	1429	1225	0
Flt Permitted	0.087			0.087			0.111			0.449		
Satd. Flow (perm)	122	1613	1110	131	1334	0	165	1306	0	675	1225	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			73		18			16			83	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			204.0	
Travel Time (s)		67.4			41.9			56.4			14.7	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	327	957	245	52	987	215	271	255	62	178	300	401
Shared Lane Traffic (%)												
Lane Group Flow (vph)	327	957	245	52	1202	0	271	317	0	178	701	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2035

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	5.27	1.16	0.41	0.79	1.74		4.11	0.60		0.66	1.30	
Control Delay (s/veh)	Error	109.8	11.6	89.4	361.7		Error	25.8		36.1	172.8	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	Error	109.8	11.6	89.4	361.7		Error	25.8		36.1	172.8	
LOS	F	F	B	F	F		F	C		D	F	
Approach Delay (s/veh)		491.6			350.4			680.1			145.1	
Approach LOS		F			F			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 5.27

Intersection Signal Delay (s/veh): 404.4

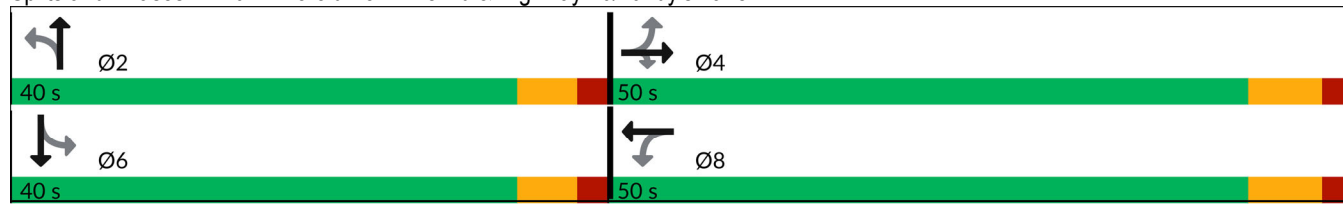
Intersection LOS: F

Intersection Capacity Utilization 184.6%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Thorold Townline & Highway 20, Thorold
PTSL (210565)

Synchro 12 Report
Page 2

Queues

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2035

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	327	957	245	52	1202	271	317	178	701
v/c Ratio	5.27	1.16	0.41	0.79	1.74	4.11	0.60	0.66	1.30
Control Delay (s/veh)	Error	109.8	11.6	89.4	361.7	Error	25.8	36.1	172.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	Error	109.8	11.6	89.4	361.7	Error	25.8	36.1	172.8
Queue Length 50th (m)	~104.1	~208.4	17.4	7.3	~330.4	~81.1	42.2	25.8	~156.3
Queue Length 95th (m)	#157.7	#282.6	35.7	#30.8	#410.6	#130.8	70.9	#57.4	#225.6
Internal Link Dist (m)		912.7			557.5		759.0		180.0
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	603	66	690	66	532	270	539
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	5.27	1.16	0.41	0.79	1.74	4.11	0.60	0.66	1.30

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2035
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Future Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.97		1.00	0.91	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1334		1415	1305		1429	1225	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.11	1.00		0.45	1.00	
Satd. Flow (perm)	122	1613	1110	131	1334		165	1305		675	1225	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	327	957	245	52	987	215	271	255	62	178	300	401
RTOR Reduction (vph)	0	0	36	0	9	0	0	10	0	0	50	0
Lane Group Flow (vph)	327	957	209	52	1193	0	271	307	0	178	651	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	681		66	522		270	490	
v/s Ratio Prot		0.59			0.89			0.24			0.53	
v/s Ratio Perm	c2.68		0.19	0.40			c1.64			0.26		
v/c Ratio	5.27	1.16	0.37	0.79	1.75		4.11	0.59		0.66	1.33	
Uniform Delay, d1	22.0	22.0	13.3	18.0	22.0		27.0	21.2		22.0	27.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1958.6	85.9	0.4	44.9	344.5		1432.9	1.7		5.7	161.6	
Delay (s)	1980.6	107.9	13.7	62.9	366.5		1459.9	22.9		27.7	188.6	
Level of Service	F	F	B	E	F		F	C		C	F	
Approach Delay (s/veh)		493.3			353.9			685.2			156.0	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			409.0			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			4.74									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			184.6%			ICU Level of Service				H		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2035
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
Future Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.958			0.990			0.965			0.960	
Flt Protected		0.990			0.982			0.989			0.998	
Satd. Flow (prot)	0	1359	0	0	1434	0	0	1344	0	0	1356	0
Flt Permitted		0.990			0.982			0.989			0.998	
Satd. Flow (perm)	0	1359	0	0	1434	0	0	1344	0	0	1356	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2181.2			714.3	
Travel Time (s)		30.1			38.7			157.0			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	121	297	192	195	292	38	123	305	149	38	504	228
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	610	0	0	525	0	0	577	0	0	770	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	154.6%											
Analysis Period (min)	15											
	ICU Level of Service H											

HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2035
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
Future Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
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)	121	297	192	195	292	38	123	305	149	38	504	228
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	610	525	577	770								
Volume Left (vph)	121	195	123	38								
Volume Right (vph)	192	38	149	228								
Hadj (s)	-0.09	0.04	-0.02	-0.09								
Departure Headway (s)	9.5	9.6	9.5	9.5								
Degree Utilization, x	1.61	1.40	1.53	2.03								
Capacity (veh/h)	384	384	390	386								
Control Delay (s/veh)	308.1	221.8	275.7	492.8								
Approach Delay (s/veh)	308.1	221.8	275.7	492.8								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay			339.6									
Level of Service			F									
Intersection Capacity Utilization			154.6%	ICU Level of Service					H			
Analysis Period (min)			15									

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2035
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	190	1151	1171	353	254	168
Future Volume (vph)	190	1151	1171	353	254	168
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.969		0.946	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1199	1325	0	1336	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1199	1325	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	207	1251	1273	384	276	183
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1458	1657	0	459	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	264.9%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2035
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	190	1151	1171	353	254	168
Future Volume (veh/h)	190	1151	1171	353	254	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	207	1251	1273	384	276	183
Approach Volume (veh/h)		1458	1657		459	
Crossing Volume (veh/h)		276	207		1273#	
High Capacity (veh/h)		1115	1178		497	
High v/c (veh/h)		1.31	1.41		0.92	
Low Capacity (veh/h)		917	973		376	
Low v/c (veh/h)		1.59	1.70		1.22	
Intersection Summary						
Maximum v/c High			1.41			
Maximum v/c Low			1.70			
Intersection Capacity Utilization			264.9%		ICU Level of Service	H
# Crossing flow exceeds 1200, method is not applicable						

Intersection			
Intersection Delay, s/veh	221.9		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1458	1657	459
Demand Flow Rate, veh/h	1483	1682	468
Vehicles Circulating, veh/h	276	207	1298
Vehicles Exiting, veh/h	1490	1552	591
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	210.5	245.1	174.5
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1483	1682	468
Cap Entry Lane, veh/h	1041	1117	367
Entry HV Adj Factor	0.983	0.985	0.981
Flow Entry, veh/h	1458	1657	459
Cap Entry, veh/h	1024	1100	360
V/C Ratio	1.424	1.506	1.274
Control Delay, s/veh	210.5	245.1	174.5
LOS	F	F	F
95th %tile Queue, veh	63	78	21

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2035
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	61	102	140	389	614	84
Future Volume (vph)	61	102	140	389	614	84
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.915				0.984	
Flt Protected	0.982			0.987		
Satd. Flow (prot)	1333	0	0	1194	1342	0
Flt Permitted	0.982			0.987		
Satd. Flow (perm)	1333	0	0	1194	1342	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	252.7			243.0	2181.2	
Travel Time (s)	18.2			17.5	157.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	66	111	152	423	667	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	177	0	0	575	758	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	117.2%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2035
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	102	140	389	614	84
Future Volume (Veh/h)	61	102	140	389	614	84
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	111	152	423	667	91
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	1440	713	758			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1440	713	758			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	46	75	82			
cM capacity (veh/h)	122	436	862			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	177	575	758			
Volume Left	66	152	0			
Volume Right	111	0	91			
cSH	222	862	1700			
Volume to Capacity	0.80	0.18	0.45			
Queue Length 95th (m)	46.4	5.1	0.0			
Control Delay (s/veh)	64.4	4.4	0.0			
Lane LOS	F	A				
Approach Delay (s/veh)	64.4	4.4	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		9.2				
Intersection Capacity Utilization		117.2%		ICU Level of Service		H
Analysis Period (min)		15				

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2035
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	128	261	333	401	548	168
Future Volume (vph)	128	261	333	401	548	168
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.909				0.968	
Flt Protected	0.984			0.978		
Satd. Flow (prot)	1326	0	0	1188	1323	0
Flt Permitted	0.984			0.978		
Satd. Flow (perm)	1326	0	0	1188	1323	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	258.3			204.0	243.0	
Travel Time (s)	18.6			14.7	17.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	139	284	362	436	596	183
Shared Lane Traffic (%)						
Lane Group Flow (vph)	423	0	0	798	779	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	154.3%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2035
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	128	261	333	401	548	168
Future Volume (Veh/h)	128	261	333	401	548	168
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	284	362	436	596	183
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				204		
pX, platoon unblocked	0.86					
vC, conflicting volume	1848	688	779			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1904	688	779			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	37	57			
cM capacity (veh/h)	38	450	847			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	423	798	779			
Volume Left	139	362	0			
Volume Right	284	0	183			
cSH	98	847	1700			
Volume to Capacity	4.32	0.43	0.46			
Queue Length 95th (m)	Err	17.3	0.0			
Control Delay (s/veh)	Err	9.5	0.0			
Lane LOS	F	A				
Approach Delay (s/veh)	Err	9.5	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		2118.6				
Intersection Capacity Utilization		154.3%		ICU Level of Service		H
Analysis Period (min)		15				

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	190.0	924.3	70.0	134.9	583.8	69.9	781.9	69.9	189.3
Average Queue (m)	178.7	870.3	16.5	51.7	574.8	69.0	759.4	55.6	148.0
95th Queue (m)	212.6	1089.7	61.1	156.0	579.8	71.5	840.8	93.6	221.1
Link Distance (m)		902.4			568.8		768.8		184.8
Upstream Blk Time (%)		76			99		88		7
Queuing Penalty (veh)		1073			0		0		55
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	97	14	1		64	100	10	20	64
Queuing Penalty (veh)	1071	71	6		31	291	26	132	105

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	426.0	427.8	89.3	724.4
Average Queue (m)	401.5	327.7	37.3	710.9
95th Queue (m)	479.3	549.7	68.8	745.6
Link Distance (m)	410.2	524.9	2159.2	705.9
Upstream Blk Time (%)	83	11		94
Queuing Penalty (veh)	0	0		0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1007.8	581.6	457.3
Average Queue (m)	993.4	356.4	296.7
95th Queue (m)	1054.1	883.5	568.6
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	95	1	27
Queuing Penalty (veh)	0	10	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	39.2	30.4	4.0
Average Queue (m)	15.7	9.4	0.1
95th Queue (m)	27.9	24.1	1.7
Link Distance (m)	244.3	226.2	2159.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	252.7	55.0	65.1
Average Queue (m)	164.6	18.3	11.0
95th Queue (m)	310.1	40.4	39.4
Link Distance (m)	248.1	184.8	226.2
Upstream Blk Time (%)	29		
Queuing Penalty (veh)	0		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 2872

Junctions 8						
ARCADY 8 - Roundabout Module						
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025						
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk						
The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution						

Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:12:03 PM

Summary of intersection performance

	PM					
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)
Single Lane - TT 2035						
Leg North	0.85	203.86	6.63	0.46	A	2174.93
Leg West	156.55	203.42	456.87	1.23	F	
Leg East	933.46	?	4287.09	2.20	F	

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM " model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:12:03 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2035, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	422.00	100.000
West	ONE HOUR	✓	1341.00	100.000
East	ONE HOUR	✓	1524.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	168.000	254.000
	West	1151.000	0.000	190.000
	East	353.000	1171.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.23	0.77	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.46	6.63	0.85	203.86	A	387.23	580.85	57.41	5.93	0.64	57.42	5.93
West	1.23	456.87	156.55	203.42	F	1230.53	1845.79	7003.42	227.66	77.82	7227.40	234.94
East	2.20	4287.09	933.46	?	F	1398.45	2097.67	40833.74	1167.97	453.71	76050.16	2175.27

Main Results for each time segment

Main results: (16:00-16:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	317.70	79.43	315.76	1050.24	654.75	0.00	978.50	978.40	0.325	0.00	0.49	5.522	A
West	1009.58	252.39	993.65	780.45	190.06	0.00	1247.45	1016.62	0.809	0.00	3.98	13.680	B
East	1147.35	286.84	852.12	330.84	852.86	0.00	863.84	852.43	1.328	0.00	73.81	167.793	F

Main results: (16:15-16:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	379.37	94.84	378.88	1177.03	599.93	0.00	1010.23	978.38	0.376	0.49	0.61	5.807	A
West	1205.53	301.38	1160.62	750.77	228.05	0.00	1225.46	1016.62	0.984	3.98	15.21	40.568	E
East	1370.04	342.51	780.79	392.49	996.18	0.00	780.90	852.43	1.754	73.81	221.12	694.394	F

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	464.63	116.16	463.67	1200.69	587.87	0.00	1017.21	978.36	0.457	0.61	0.85	6.619	A
West	1476.47	369.12	1192.42	772.46	279.08	0.00	1195.92	1016.63	1.235	15.21	86.22	162.877	F
East	1677.96	419.49	765.09	448.03	1023.47	0.00	765.10	852.43	2.193	221.12	449.34	1583.892	F

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	464.63	116.16	464.61	1202.72	586.83	0.00	1017.81	978.36	0.457	0.85	0.85	6.632	A
West	1476.47	369.12	1195.16	771.80	279.65	0.00	1195.60	1016.63	1.235	86.22	156.55	369.639	F
East	1677.96	419.49	763.74	448.98	1025.82	0.00	763.74	852.43	2.197	449.34	677.89	2700.382	F

Main results: (17:00-17:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	379.37	94.84	380.34	1218.99	578.48	0.00	1022.64	978.38	0.371	0.85	0.61	5.723	A
West	1205.53	301.38	1217.04	729.90	228.93	0.00	1224.95	1016.62	0.984	156.55	153.67	456.869	F
East	1370.04	342.51	752.87	401.36	1044.61	0.00	752.87	852.43	1.820	677.89	832.19	3654.599	F

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	317.70	79.43	318.29	1234.84	570.34	0.00	1027.35	978.40	0.309	0.61	0.46	5.179	A
West	1009.58	252.39	1238.37	697.05	191.58	0.00	1246.57	1016.62	0.810	153.67	96.47	364.800	F
East	1147.35	286.84	742.27	367.04	1062.91	0.00	742.27	852.43	1.546	832.19	933.46	4287.091	F

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.05	0.47	5.522	A	A
West	52.24	3.48	13.680	B	B
East	571.07	38.07	167.793	F	F

Queueing Delay results: (16:15-16:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	8.91	0.59	5.807	A	A
West	163.72	10.91	40.568	E	D

East	2212.03	147.47	694.394	F	F

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	12.32	0.82	6.619	A	A
West	763.81	50.92	162.877	F	F
East	5028.45	335.23	1583.892	F	F

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	12.73	0.85	6.632	A	A
West	1820.93	121.40	369.639	F	F
East	8454.24	563.62	2700.382	F	F

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	9.35	0.62	5.723	A	A
West	2326.65	155.11	456.869	F	F
East	11325.61	755.04	3654.599	F	F

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.06	0.47	5.179	A	A
West	1876.07	125.07	364.800	F	F
East	13242.34	882.82	4287.091	F	F

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	3.98	0.00	0.00	8.14	14.24			N/A	N/A
East	73.81	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:15-16:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.61	0.00	0.00	0.00	>199			N/A	N/A
West	15.21	0.00	8.14	36.62	49.84			N/A	N/A
East	221.12	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.85	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	86.22	43.74	82.39	123.07	137.31			N/A	N/A
East	449.34	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.85	0.00	0.00	0.00	1.02			N/A	N/A
West	156.55	96.63	152.57	>199	>199			N/A	N/A
East	677.89	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.61	0.00	0.00	0.00	>199			N/A	N/A
West	153.67	86.46	148.50	>199	>199			N/A	N/A
East	832.19	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	96.47	38.65	89.51	150.53	171.89			N/A	N/A
East	933.46	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Appendix G3

2040 Total Operations Synchro Reports



Lanes, Volumes, Timings

Total - 2040

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	713	169	38	551	94	136	187	34	149	214	235
Future Volume (vph)	150	713	169	38	551	94	136	187	34	149	214	235
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.978			0.977			0.922	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1275	0	1311	1206	0	1191	1155	0
Flt Permitted	0.190			0.135			0.269			0.537		
Satd. Flow (perm)	251	1582	1063	203	1275	0	371	1206	0	673	1155	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			68		14			12			73	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			238.0	
Travel Time (s)		67.4			41.9			56.4			17.1	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	163	775	184	41	599	102	148	203	37	162	233	255
Shared Lane Traffic (%)												
Lane Group Flow (vph)	163	775	184	41	701	0	148	240	0	162	488	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings

Total - 2040

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	1.27	0.96	0.32	0.40	1.07		1.00	0.49		0.60	0.97	
Control Delay (s/veh)	196.2	46.1	9.6	27.7	77.6		106.0	23.3		32.7	57.2	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	196.2	46.1	9.6	27.7	77.6		106.0	23.3		32.7	57.2	
LOS	F	D	A	C	E		F	C		C	E	
Approach Delay (s/veh)		61.9			74.8			54.8			51.1	
Approach LOS		E			E			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 95

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.27

Intersection Signal Delay (s/veh): 61.8

Intersection LOS: E

Intersection Capacity Utilization 122.1%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2040

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	163	775	184	41	701	148	240	162	488
v/c Ratio	1.27	0.96	0.32	0.40	1.07	1.00	0.49	0.60	0.97
Control Delay (s/veh)	196.2	46.1	9.6	27.7	77.6	106.0	23.3	32.7	57.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	196.2	46.1	9.6	27.7	77.6	106.0	23.3	32.7	57.2
Queue Length 50th (m)	~37.8	128.4	11.0	4.4	~141.2	26.3	30.2	22.8	74.9
Queue Length 95th (m)	#55.0	#212.2	25.0	15.7	#210.4	#66.5	53.0	46.6	#142.8
Internal Link Dist (m)	912.7				557.5		759.0		214.0
Turn Bay Length (m)	90.0			20.0	55.0			20.0	20.0
Base Capacity (vph)	128	808	576	103	658	148	489	269	505
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.27	0.96	0.32	0.40	1.07	1.00	0.49	0.60	0.97

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2040
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	150	713	169	38	551	94	136	187	34	149	214	235
Future Volume (vph)	150	713	169	38	551	94	136	187	34	149	214	235
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1275		1311	1206		1191	1154	
Flt Permitted	0.19	1.00	1.00	0.14	1.00		0.27	1.00		0.54	1.00	
Satd. Flow (perm)	251	1582	1063	203	1275		371	1206		673	1154	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	163	775	184	41	599	102	148	203	37	162	233	255
RTOR Reduction (vph)	0	0	33	0	7	0	0	7	0	0	44	0
Lane Group Flow (vph)	163	775	151	41	694	0	148	233	0	162	444	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	128	808	543	103	651		148	482		269	461	
v/s Ratio Prot		0.49			0.54			0.19			0.38	
v/s Ratio Perm	c0.65		0.14	0.20			c0.40			0.24		
v/c Ratio	1.27	0.96	0.28	0.40	1.07		1.00	0.48		0.60	0.96	
Uniform Delay, d1	22.0	21.1	12.5	13.5	22.0		27.0	20.1		21.3	26.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	170.4	21.9	0.3	2.5	54.3		74.0	0.8		3.8	32.4	
Delay (s)	192.4	43.0	12.8	16.0	76.3		101.0	20.8		25.1	58.8	
Level of Service	F	D	B	B	E		F	C		C	E	
Approach Delay (s/veh)		59.8			72.9			51.4			50.4	
Approach LOS		E			E			D			D	
Intersection Summary												
HCM 2000 Control Delay (s/veh)		59.9										
HCM 2000 Volume to Capacity ratio		1.15										
Actuated Cycle Length (s)		90.0								8.0		
Intersection Capacity Utilization		122.1%										
Analysis Period (min)		15										
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2040
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	109	131	75	87	257	38	112	312	137	20	246	103
Future Volume (vph)	109	131	75	87	257	38	112	312	137	20	246	103
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.968			0.987			0.967			0.962	
Flt Protected		0.983			0.989			0.990			0.997	
Satd. Flow (prot)	0	1355	0	0	1428	0	0	1282	0	0	1266	0
Flt Permitted		0.983			0.989			0.990			0.997	
Satd. Flow (perm)	0	1355	0	0	1428	0	0	1282	0	0	1266	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2177.2			714.3	
Travel Time (s)		30.1			38.7			156.8			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	118	142	82	95	279	41	122	339	149	22	267	112
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	342	0	0	415	0	0	610	0	0	401	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	111.4%											
Analysis Period (min)	15											
	ICU Level of Service H											

HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2040
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	109	131	75	87	257	38	112	312	137	20	246	103
Future Volume (vph)	109	131	75	87	257	38	112	312	137	20	246	103
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)	118	142	82	95	279	41	122	339	149	22	267	112
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	342	415	610	401								
Volume Left (vph)	118	95	122	22								
Volume Right (vph)	82	41	149	112								
Hadj (s)	0.00	0.01	0.08	0.05								
Departure Headway (s)	9.6	9.3	9.4	9.4								
Degree Utilization, x	0.91	1.08	1.59	1.05								
Capacity (veh/h)	368	387	386	388								
Control Delay (s/veh)	57.7	99.0	302.9	89.8								
Approach Delay (s/veh)	57.7	99.0	302.9	89.8								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				159.3								
Level of Service				F								
Intersection Capacity Utilization				111.4%	ICU Level of Service	H						
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2040
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	99	689	767	156	342	224
Future Volume (vph)	99	689	767	156	342	224
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.977		0.947	
Flt Protected		0.994			0.971	
Satd. Flow (prot)	0	1137	1273	0	1282	0
Flt Permitted		0.994			0.971	
Satd. Flow (perm)	0	1137	1273	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	108	749	834	170	372	243
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	857	1004	0	615	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	184.6%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2040
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	99	689	767	156	342	224
Future Volume (veh/h)	99	689	767	156	342	224
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	108	749	834	170	372	243
Approach Volume (veh/h)		857	1004		615	
Crossing Volume (veh/h)		372	108		834	
High Capacity (veh/h)		1034	1273		713	
High v/c (veh/h)		0.83	0.79		0.86	
Low Capacity (veh/h)		844	1059		561	
Low v/c (veh/h)		1.02	0.95		1.10	
Intersection Summary						
Maximum v/c High			0.86			
Maximum v/c Low			1.10			
Intersection Capacity Utilization		184.6%		ICU Level of Service		H

Intersection			
Intersection Delay, s/veh	57.7		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	857	1004	615
Demand Flow Rate, veh/h	920	1069	654
Vehicles Circulating, veh/h	387	134	884
Vehicles Exiting, veh/h	1151	1173	319
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	49.8	26.1	120.3
Approach LOS	E	D	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	920	1069	654
Cap Entry Lane, veh/h	930	1204	560
Entry HV Adj Factor	0.931	0.939	0.940
Flow Entry, veh/h	857	1004	615
Cap Entry, veh/h	866	1130	527
V/C Ratio	0.989	0.888	1.168
Control Delay, s/veh	49.8	26.1	120.3
LOS	E	D	F
95th %tile Queue, veh	17	13	22

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2040
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	64	123	62	370	306	31
Future Volume (vph)	64	123	62	370	306	31
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.987	
Flt Protected	0.983			0.993		
Satd. Flow (prot)	1302	0	0	1195	1343	0
Flt Permitted	0.983			0.993		
Satd. Flow (perm)	1302	0	0	1195	1343	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	182.8			213.0	2177.2	
Travel Time (s)	13.2			15.3	156.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	134	67	402	333	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	204	0	0	469	367	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	84.3%			ICU Level of Service E		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2040
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	64	123	62	370	306	31
Future Volume (Veh/h)	64	123	62	370	306	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	134	67	402	333	34
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	886	350	367			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	886	350	367			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	76	81	94			
cM capacity (veh/h)	297	693	1192			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	204	469	367			
Volume Left	70	67	0			
Volume Right	134	0	34			
cSH	476	1192	1700			
Volume to Capacity	0.43	0.06	0.22			
Queue Length 95th (m)	17.0	1.4	0.0			
Control Delay (s/veh)	18.1	1.7	0.0			
Lane LOS	C	A				
Approach Delay (s/veh)	18.1	1.7	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		4.3				
Intersection Capacity Utilization		84.3%		ICU Level of Service	E	
Analysis Period (min)		15				

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2040
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	118	229	116	314	369	60
Future Volume (vph)	118	229	116	314	369	60
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.981	
Flt Protected	0.983			0.987		
Satd. Flow (prot)	1328	0	0	1195	1339	0
Flt Permitted	0.983			0.987		
Satd. Flow (perm)	1328	0	0	1195	1339	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	219.5			238.0	213.0	
Travel Time (s)	15.8			17.1	15.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	128	249	126	341	401	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	377	0	0	467	466	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	103.5%			ICU Level of Service G		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2040
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	118	229	116	314	369	60
Future Volume (Veh/h)	118	229	116	314	369	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	249	126	341	401	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				238		
pX, platoon unblocked						
vC, conflicting volume	1027	434	466			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1027	434	466			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	45	60	89			
cM capacity (veh/h)	232	627	1106			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	377	467	466			
Volume Left	128	126	0			
Volume Right	249	0	65			
cSH	397	1106	1700			
Volume to Capacity	0.95	0.11	0.27			
Queue Length 95th (m)	85.4	3.1	0.0			
Control Delay (s/veh)	65.7	3.2	0.0			
Lane LOS	F	A				
Approach Delay (s/veh)	65.7	3.2	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		20.1				
Intersection Capacity Utilization		103.5%		ICU Level of Service		G
Analysis Period (min)		15				

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	189.9	930.5	70.0	134.8	286.2	70.0	762.7	70.0	180.6
Average Queue (m)	157.3	676.2	29.3	28.0	150.0	65.9	458.0	46.7	93.3
95th Queue (m)	230.8	1209.0	80.6	107.3	295.1	81.9	903.0	86.6	161.8
Link Distance (m)		902.4			568.8		768.8		218.5
Upstream Blk Time (%)		42					26		0
Queuing Penalty (veh)		438					0		2
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	85	25	3		42	97	26	30	53
Queuing Penalty (veh)	751	79	22		16	214	36	135	78

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	75.1	91.4	278.3	112.2
Average Queue (m)	30.9	39.1	149.2	46.8
95th Queue (m)	60.1	77.1	316.0	89.5
Link Distance (m)	410.2	524.9	2155.2	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1007.3	308.4	464.1
Average Queue (m)	613.8	71.2	346.7
95th Queue (m)	1247.1	240.8	579.9
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	41		51
Queuing Penalty (veh)	0		0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB
Directions Served	LR	LT
Maximum Queue (m)	32.6	21.2
Average Queue (m)	14.9	5.1
95th Queue (m)	26.2	16.3
Link Distance (m)	174.4	196.3
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	81.8	32.2	12.2
Average Queue (m)	37.9	8.5	0.5
95th Queue (m)	71.3	24.0	6.2
Link Distance (m)	209.1	218.5	196.3
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 1771

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025							
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk							
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:11:25 PM

Summary of intersection performance

	AM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Single Lane - TT 2040							
Leg North	2.19	4.25	12.96	0.68	B	84.65	F
Leg West	3.33	8.62	14.18	0.76	B		
Leg East	58.29	112.88	188.77	1.11	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM " model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:11:24 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2040, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	566.00	100.000
West	ONE HOUR	✓	788.00	100.000
East	ONE HOUR	✓	923.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	224.000	342.000
	West	689.000	0.000	99.000
	East	156.000	767.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.87	0.00	0.13
	East	0.17	0.83	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.68	12.96	2.19	4.25	B	519.37	779.06	125.57	9.67	1.40	125.59	9.67
West	0.76	14.18	3.33	8.62	B	723.08	1084.62	173.64	9.61	1.93	173.67	9.61
East	1.11	188.77	58.29	112.88	F	846.96	1270.44	1734.63	81.92	19.27	1734.76	81.93

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	426.11	106.53	423.14	631.25	570.91	0.00	1027.03	953.81	0.415	0.00	0.74	6.307	A
West	593.25	148.31	589.15	738.37	255.68	0.00	1209.47	1023.89	0.491	0.00	1.02	6.214	A
East	694.88	173.72	687.02	329.69	515.14	0.00	1059.31	839.31	0.656	0.00	1.97	10.098	B

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	508.82	127.21	507.13	755.90	680.76	0.00	963.45	953.81	0.528	0.74	1.17	8.354	A
West	708.40	177.10	706.15	881.46	306.43	0.00	1180.10	1023.89	0.600	1.02	1.58	8.147	A
East	829.76	207.44	819.22	395.15	617.44	0.00	1000.10	839.31	0.830	1.97	4.60	20.097	C

Main results: (08:30-08:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	623.18	155.79	619.37	905.45	750.21	0.00	923.25	953.82	0.675	1.17	2.12	12.435	B
West	867.60	216.90	861.04	995.33	374.25	0.00	1140.85	1023.88	0.760	1.58	3.23	13.551	B
East	1016.24	254.06	902.80	482.42	752.86	0.00	921.72	839.31	1.103	4.60	32.96	89.281	F

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	623.18	155.79	622.88	912.88	760.29	0.00	917.42	953.82	0.679	2.12	2.19	12.963	B
West	867.60	216.90	867.20	1006.80	376.37	0.00	1139.62	1023.88	0.761	3.23	3.33	14.184	B
East	1016.24	254.06	914.92	485.32	758.25	0.00	918.60	839.31	1.106	32.96	58.29	188.774	F

Main results: (09:00-09:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	508.82	127.21	511.74	790.48	812.48	0.00	887.22	953.81	0.574	2.19	1.46	10.271	B
West	708.40	177.10	715.07	1015.00	309.21	0.00	1178.48	1023.89	0.601	3.33	1.66	8.487	A
East	829.76	207.44	977.73	399.05	625.23	0.00	995.59	839.31	0.833	58.29	21.30	150.881	F

Main results: (09:15-09:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	426.11	106.53	428.70	651.24	641.15	0.00	986.37	953.81	0.432	1.46	0.82	6.892	A
West	593.25	148.31	595.67	810.81	259.04	0.00	1207.53	1023.89	0.491	1.66	1.05	6.367	A
East	694.88	173.72	771.55	333.87	520.83	0.00	1056.01	839.31	0.658	21.30	2.13	17.223	C

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	10.73	0.72	6.307	A	A
West	14.69	0.98	6.214	A	A
East	27.24	1.82	10.098	B	B

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	16.80	1.12	8.354	A	A
West	22.72	1.51	8.147	A	A

East	60.12	4.01	20.097	C	C

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	29.64	1.98	12.435	B	B
West	44.14	2.94	13.551	B	B
East	295.69	19.71	89.281	F	F

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	32.51	2.17	12.963	B	B
West	49.31	3.29	14.184	B	B
East	685.49	45.70	188.774	F	F

Queueing Delay results: (09:00-09:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	23.13	1.54	10.271	B	B
West	26.37	1.76	8.487	A	A
East	596.95	39.80	150.881	F	F

Queueing Delay results: (09:15-09:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	12.77	0.85	6.892	A	A
West	16.41	1.09	6.367	A	A
East	69.13	4.61	17.223	C	B

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.74	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.02	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	1.97	0.00	0.00	3.19	4.26			N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.17	0.00	0.00	1.06	2.13			N/A	N/A
West	1.58	0.00	0.00	3.23	4.31			N/A	N/A
East	4.60	0.00	0.00	10.65	15.97			N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	2.12	0.00	0.00	0.00	4.25			N/A	N/A
West	3.23	0.00	0.00	2.16	8.62			N/A	N/A
East	32.96	7.45	28.75	57.51	68.16			N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	2.19	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	3.33	0.00	0.00	0.00	4.31			N/A	N/A
East	58.29	18.10	52.18	96.91	112.88			N/A	N/A

Queue Variation results: (09:00-09:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.46	0.00	0.00	2.13	3.19			N/A	N/A
West	1.66	0.00	0.00	3.23	4.31			N/A	N/A
East	21.30	2.13	17.04	41.53	50.05			N/A	N/A

Queue Variation results: (09:15-09:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.82	0.00	0.00	1.06	2.13			N/A	N/A
West	1.05	0.00	0.00	1.08	3.23			N/A	N/A
East	2.13	0.00	0.00	0.00	4.26			N/A	N/A

Lanes, Volumes, Timings

Total - 2040

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	307	950	246	52	972	200	273	249	63	166	299	387
Future Volume (vph)	307	950	246	52	972	200	273	249	63	166	299	387
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.974			0.970			0.915	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1335	0	1415	1305	0	1429	1226	0
Flt Permitted	0.087			0.087			0.111			0.425		
Satd. Flow (perm)	122	1613	1110	131	1335	0	165	1305	0	639	1226	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			74		17			17			68	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			204.0	
Travel Time (s)		67.4			41.9			56.4			14.7	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	334	1033	267	57	1057	217	297	271	68	180	325	421
Shared Lane Traffic (%)												
Lane Group Flow (vph)	334	1033	267	57	1274	0	297	339	0	180	746	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2040

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	5.39	1.25	0.44	0.86	1.85		4.50	0.64		0.71	1.40	
Control Delay (s/veh)	Error	147.9	12.5	106.1	407.7		Error	27.2		40.4	217.5	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	Error	147.9	12.5	106.1	407.7		Error	27.2		40.4	217.5	
LOS	F	F	B	F	F		F	C		D	F	
Approach Delay (s/veh)		508.2			394.7			771.5			183.1	
Approach LOS		F			F			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 5.39

Intersection Signal Delay (s/veh): 445.3

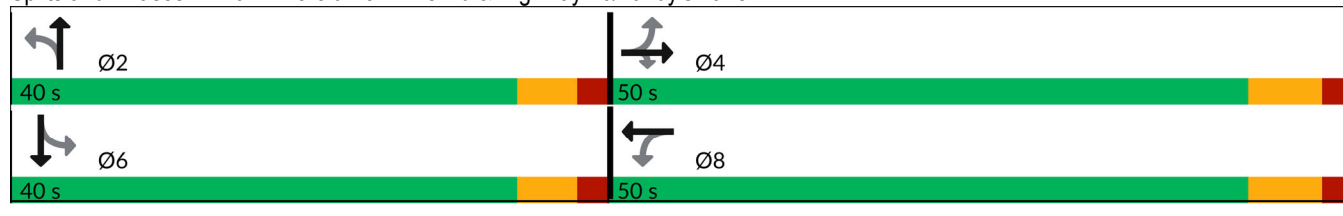
Intersection LOS: F

Intersection Capacity Utilization 194.6%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Thorold Townline & Highway 20, Thorold
PTSL (210565)

Synchro 12 Report
Page 2

Queues

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2040

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	334	1033	267	57	1274	297	339	180	746
v/c Ratio	5.39	1.25	0.44	0.86	1.85	4.50	0.64	0.71	1.40
Control Delay (s/veh)	Error	147.9	12.5	106.1	407.7	Error	27.2	40.4	217.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	Error	147.9	12.5	106.1	407.7	Error	27.2	40.4	217.5
Queue Length 50th (m)	~106.8	~237.4	20.2	8.5	~358.6	~91.2	46.2	26.8	~177.5
Queue Length 95th (m)	#160.8	#312.8	40.2	#33.9	#439.6	#142.5	77.4	#61.3	#248.3
Internal Link Dist (m)		912.7			557.5		759.0		180.0
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	603	66	690	66	532	255	531
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	5.39	1.25	0.44	0.86	1.85	4.50	0.64	0.71	1.40

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2040
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	307	950	246	52	972	200	273	249	63	166	299	387
Future Volume (vph)	307	950	246	52	972	200	273	249	63	166	299	387
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.97		1.00	0.97		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1336		1415	1305		1429	1227	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.11	1.00		0.42	1.00	
Satd. Flow (perm)	122	1613	1110	131	1336		165	1305		639	1227	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	334	1033	267	57	1057	217	297	271	68	180	325	421
RTOR Reduction (vph)	0	0	36	0	8	0	0	10	0	0	41	0
Lane Group Flow (vph)	334	1033	231	57	1266	0	297	329	0	180	705	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	682		66	522		255	490	
v/s Ratio Prot		0.64			0.95			0.25			0.57	
v/s Ratio Perm	c2.73		0.21	0.44			c1.80			0.28		
v/c Ratio	5.39	1.25	0.41	0.86	1.86		4.50	0.63		0.71	1.44	
Uniform Delay, d1	22.0	22.0	13.6	19.3	22.0		27.0	21.7		22.6	27.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2009.2	124.1	0.5	65.1	390.8		1609.3	2.4		8.6	209.0	
Delay (s)	2031.2	146.1	14.1	84.3	412.8		1636.3	24.0		31.2	236.0	
Level of Service	F	F	B	F	F		F	C		C	F	
Approach Delay (s/veh)		509.8			398.7			776.9			196.2	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			450.5			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			4.98									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			194.6%			ICU Level of Service				H		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2040
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	123	300	186	180	296	39	117	297	138	39	497	231
Future Volume (vph)	123	300	186	180	296	39	117	297	138	39	497	231
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.959			0.990			0.966			0.959	
Flt Protected		0.990			0.983			0.990			0.997	
Satd. Flow (prot)	0	1360	0	0	1435	0	0	1346	0	0	1353	0
Flt Permitted		0.990			0.983			0.990			0.997	
Satd. Flow (perm)	0	1360	0	0	1435	0	0	1346	0	0	1353	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2181.2			714.3	
Travel Time (s)		30.1			38.7			157.0			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	134	326	202	196	322	42	127	323	150	42	540	251
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	662	0	0	560	0	0	600	0	0	833	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	157.9%											
Analysis Period (min)	15											
	ICU Level of Service H											

HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2040
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	123	300	186	180	296	39	117	297	138	39	497	231
Future Volume (vph)	123	300	186	180	296	39	117	297	138	39	497	231
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)	134	326	202	196	322	42	127	323	150	42	540	251
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	662	560	600	833								
Volume Left (vph)	134	196	127	42								
Volume Right (vph)	202	42	150	251								
Hadj (s)	-0.08	0.03	-0.02	-0.09								
Departure Headway (s)	9.5	9.6	9.5	9.5								
Degree Utilization, x	1.74	1.49	1.59	2.19								
Capacity (veh/h)	384	387	381	387								
Control Delay (s/veh)	368.0	260.5	302.3	566.0								
Approach Delay (s/veh)	368.0	260.5	302.3	566.0								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				392.6								
Level of Service				F								
Intersection Capacity Utilization				157.9%	ICU Level of Service				H			
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2040
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	194	1236	1264	368	266	175
Future Volume (vph)	194	1236	1264	368	266	175
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.970		0.946	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	1199	1326	0	1336	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	1199	1326	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	211	1343	1374	400	289	190
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1554	1774	0	479	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	281.5%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2040
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	194	1236	1264	368	266	175
Future Volume (veh/h)	194	1236	1264	368	266	175
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	211	1343	1374	400	289	190
Approach Volume (veh/h)		1554	1774		479	
Crossing Volume (veh/h)		289	211		1374#	
High Capacity (veh/h)		1104	1174		457	
High v/c (veh/h)		1.41	1.51		1.05	
Low Capacity (veh/h)		907	970		342	
Low v/c (veh/h)		1.71	1.83		1.40	
Intersection Summary						
Maximum v/c High			1.51			
Maximum v/c Low			1.83			
Intersection Capacity Utilization			281.5%		ICU Level of Service	H
# Crossing flow exceeds 1200, method is not applicable						

Intersection			
Intersection Delay, s/veh	276.7		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1554	1774	479
Demand Flow Rate, veh/h	1581	1801	488
Vehicles Circulating, veh/h	289	211	1401
Vehicles Exiting, veh/h	1600	1659	611
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	260.7	295.0	260.5
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1581	1801	488
Cap Entry Lane, veh/h	1028	1113	331
Entry HV Adj Factor	0.983	0.985	0.982
Flow Entry, veh/h	1554	1774	479
Cap Entry, veh/h	1010	1096	324
V/C Ratio	1.539	1.619	1.476
Control Delay, s/veh	260.7	295.0	260.5
LOS	F	F	F
95th %tile Queue, veh	76	92	26

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2040
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	61	102	140	410	656	84
Future Volume (vph)	61	102	140	410	656	84
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.915				0.985	
Flt Protected	0.982			0.987		
Satd. Flow (prot)	1333	0	0	1194	1343	0
Flt Permitted	0.982			0.987		
Satd. Flow (perm)	1333	0	0	1194	1343	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	252.7			243.0	2181.2	
Travel Time (s)	18.2			17.5	157.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	66	111	152	446	713	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	177	0	0	598	804	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	122.0%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2040
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	102	140	410	656	84
Future Volume (Veh/h)	61	102	140	410	656	84
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	111	152	446	713	91
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	1509	759	804			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1509	759	804			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	40	73	82			
cM capacity (veh/h)	110	410	829			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	177	598	804			
Volume Left	66	152	0			
Volume Right	111	0	91			
cSH	203	829	1700			
Volume to Capacity	0.87	0.18	0.47			
Queue Length 95th (m)	53.6	5.3	0.0			
Control Delay (s/veh)	82.4	4.5	0.0			
Lane LOS	F	A				
Approach Delay (s/veh)	82.4	4.5	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			11.0			
Intersection Capacity Utilization		122.0%		ICU Level of Service		H
Analysis Period (min)			15			

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2040
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	128	261	333	422	590	168
Future Volume (vph)	128	261	333	422	590	168
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.909				0.970	
Flt Protected	0.984			0.978		
Satd. Flow (prot)	1326	0	0	1188	1326	0
Flt Permitted	0.984			0.978		
Satd. Flow (perm)	1326	0	0	1188	1326	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	258.3			204.0	243.0	
Travel Time (s)	18.6			14.7	17.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	139	284	362	459	641	183
Shared Lane Traffic (%)						
Lane Group Flow (vph)	423	0	0	821	824	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	159.0%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2040
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	128	261	333	422	590	168
Future Volume (Veh/h)	128	261	333	422	590	168
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	284	362	459	641	183
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				204		
pX, platoon unblocked	0.85					
vC, conflicting volume	1916	733	824			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1991	733	824			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	33	56			
cM capacity (veh/h)	32	424	815			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	423	821	824			
Volume Left	139	362	0			
Volume Right	284	0	183			
cSH	84	815	1700			
Volume to Capacity	5.05	0.44	0.48			
Queue Length 95th (m)	Err	18.4	0.0			
Control Delay (s/veh)	Err	10.1	0.0			
Lane LOS	F	B				
Approach Delay (s/veh)	Err	10.1	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay	2049.3					
Intersection Capacity Utilization	159.0%			ICU Level of Service	H	
Analysis Period (min)	15					

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	190.0	921.5	70.0	134.9	583.2	69.9	778.3	70.0	189.3
Average Queue (m)	176.4	884.1	19.1	57.7	574.8	68.7	764.5	59.3	171.6
95th Queue (m)	212.5	1044.4	66.8	163.1	579.9	71.9	839.8	94.4	209.1
Link Distance (m)		902.4			568.8		768.8		184.8
Upstream Blk Time (%)		78			99		94		8
Queuing Penalty (veh)		1168			0		0		70
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	99	13	1		62	100	7	18	66
Queuing Penalty (veh)	1187	74	8		32	312	19	127	109

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	427.4	532.9	85.0	723.8
Average Queue (m)	413.7	449.5	38.2	714.6
95th Queue (m)	448.7	653.7	71.1	721.7
Link Distance (m)	410.2	524.9	2159.2	705.9
Upstream Blk Time (%)	92	47		99
Queuing Penalty (veh)	0	0		0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1008.6	547.2	456.2
Average Queue (m)	991.3	268.9	282.9
95th Queue (m)	1087.1	726.2	565.9
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	96	0	39
Queuing Penalty (veh)	0	6	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	37.8	24.5	5.3
Average Queue (m)	16.3	7.9	0.3
95th Queue (m)	28.7	19.4	2.6
Link Distance (m)	244.3	226.2	2159.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	252.7	40.0	81.9
Average Queue (m)	167.2	14.1	17.1
95th Queue (m)	282.6	30.7	55.1
Link Distance (m)	248.1	184.8	226.2
Upstream Blk Time (%)	23		
Queuing Penalty (veh)	0		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 3112

Junctions 8						
ARCADY 8 - Roundabout Module						
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025						
For sales and distribution information, program advice and maintenance, contact TRL: Tel: +44 (0)1344 770758 email: software@trl.co.uk Web: http://www.trlsoftware.co.uk						
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:11:06 PM

Summary of intersection performance

	PM					
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)
Single Lane - TT 2040						
Leg North	0.93	1.02	6.93	0.48	A	2632.48
Leg West	239.56	203.45	682.79	1.33	F	
Leg East	1096.96	?	5050.33	2.35	F	

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM " model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:11:05 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2040, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	441.00	100.000
West	ONE HOUR	✓	1430.00	100.000
East	ONE HOUR	✓	1632.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	175.000	266.000
	West	1236.000	0.000	194.000
	East	368.000	1264.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.23	0.77	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.48	6.93	0.93	1.02	A	404.67	607.00	61.73	6.10	0.69	61.74	6.10
West	1.33	682.79	239.56	203.45	F	1312.19	1968.29	10892.58	332.04	121.03	11856.25	361.42
East	2.35	5050.33	1096.96	?	F	1497.55	2246.33	48522.66	1296.05	539.14	97364.96	2600.64

Main Results for each time segment

Main results: (16:00-16:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	332.01	83.00	329.97	1096.22	636.70	0.00	988.95	976.90	0.336	0.00	0.51	5.552	A
West	1076.58	269.14	1053.82	767.64	199.03	0.00	1242.26	1016.42	0.867	0.00	5.69	17.734	C
East	1228.66	307.16	822.07	341.99	910.86	0.00	830.28	848.99	1.480	0.00	101.65	235.600	F

Main results: (16:15-16:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	396.45	99.11	395.91	1201.38	589.75	0.00	1016.12	976.88	0.390	0.51	0.65	5.911	A
West	1285.54	321.39	1191.30	746.86	238.80	0.00	1219.24	1016.42	1.054	5.69	29.25	65.172	F
East	1467.13	366.78	761.45	400.42	1029.68	0.00	761.51	848.99	1.927	101.65	278.07	903.364	F

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	485.55	121.39	484.45	1198.29	591.39	0.00	1015.17	976.88	0.478	0.65	0.92	6.900	A
West	1574.46	393.61	1187.17	783.63	292.21	0.00	1188.33	1016.42	1.325	29.25	126.07	243.626	F
East	1796.87	449.22	763.56	453.26	1026.11	0.00	763.57	848.99	2.353	278.07	536.39	1927.519	F

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	485.55	121.39	485.53	1198.75	591.15	0.00	1015.31	976.88	0.478	0.92	0.93	6.925	A
West	1574.46	393.61	1187.78	783.82	292.86	0.00	1187.95	1016.42	1.325	126.07	222.74	529.256	F
East	1796.87	449.22	763.26	454.00	1026.64	0.00	763.27	848.99	2.354	536.39	794.80	3207.311	F

Main results: (17:00-17:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	396.45	99.11	397.55	1221.67	579.34	0.00	1022.15	976.88	0.388	0.93	0.65	5.886	A
West	1285.54	321.39	1218.27	737.10	239.79	0.00	1218.66	1016.42	1.055	222.74	239.56	682.786	F
East	1467.13	366.78	748.01	405.07	1053.00	0.00	748.01	848.99	1.961	794.80	974.58	4303.682	F

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	332.01	83.00	332.65	1235.04	572.45	0.00	1026.14	976.90	0.324	0.65	0.49	5.295	A
West	1076.58	269.14	1236.07	704.45	200.65	0.00	1241.32	1016.42	0.867	239.56	199.68	640.053	F
East	1228.66	307.16	739.11	368.34	1068.38	0.00	739.11	848.99	1.662	974.58	1096.96	5050.333	F

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.40	0.49	5.552	A	A
West	70.93	4.73	17.734	C	B
East	775.54	51.70	235.600	F	F

Queueing Delay results: (16:15-16:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	9.46	0.63	5.911	A	A
West	278.09	18.54	65.172	F	E

East	2847.90	189.86	903.364	F	F

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	13.38	0.89	6.900	A	A
West	1165.84	77.72	243.626	F	F
East	6108.47	407.23	1927.519	F	F

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	13.88	0.93	6.925	A	A
West	2616.15	174.41	529.256	F	F
East	9983.92	665.59	3207.311	F	F

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	10.07	0.67	5.886	A	A
West	3467.25	231.15	682.786	F	F
East	13270.28	884.69	4303.682	F	F

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.55	0.50	5.295	A	A
West	3294.32	219.62	640.053	F	F
East	15536.54	1035.77	5050.333	F	F

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.51	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	5.69	0.00	0.00	5.09	18.31			N/A	N/A
East	101.65	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:15-16:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	29.25	0.00	17.29	70.19	93.59			N/A	N/A
East	278.07	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.92	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	126.07	66.12	121.05	180.05	>199			N/A	N/A
East	536.39	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.93	0.00	0.00	0.00	1.02			N/A	N/A
West	222.74	147.50	>199	>199	>199			N/A	N/A
						No excess capacity in final time			

East	794.80	?	?	?	?	segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.65	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	239.56	154.62	>199	>199	>199			N/A	N/A
East	974.58	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.49	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	199.68	111.90	193.28	>199	>199			N/A	N/A
East	1096.96	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Appendix G4

2045 Total Operations Synchro Reports



Lanes, Volumes, Timings

Total - 2045

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	763	184	42	596	96	149	202	37	149	227	243
Future Volume (vph)	155	763	184	42	596	96	149	202	37	149	227	243
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.979			0.977			0.923	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	1582	1063	1429	1278	0	1311	1206	0	1191	1156	0
Flt Permitted	0.152			0.096			0.245			0.513		
Satd. Flow (perm)	201	1582	1063	144	1278	0	338	1206	0	643	1156	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			69		13			12			71	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			238.0	
Travel Time (s)		67.4			41.9			56.4			17.1	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	168	829	200	46	648	104	162	220	40	162	247	264
Shared Lane Traffic (%)												
Lane Group Flow (vph)	168	829	200	46	752	0	162	260	0	162	511	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2045

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	1.65	1.03	0.35	0.63	1.14		1.20	0.53		0.63	1.01	
Control Delay (s/veh)	353.9	62.4	10.3	58.7	104.6		170.5	24.4		34.9	68.6	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	353.9	62.4	10.3	58.7	104.6		170.5	24.4		34.9	68.6	
LOS	F	E	B	E	F		F	C		C	E	
Approach Delay (s/veh)		94.6			101.9			80.5			60.5	
Approach LOS		F			F			F			E	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 105

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.65

Intersection Signal Delay (s/veh): 87.1

Intersection LOS: F

Intersection Capacity Utilization 128.1%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2045

AM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	168	829	200	46	752	162	260	162	511
v/c Ratio	1.65	1.03	0.35	0.63	1.14	1.20	0.53	0.63	1.01
Control Delay (s/veh)	353.9	62.4	10.3	58.7	104.6	170.5	24.4	34.9	68.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	353.9	62.4	10.3	58.7	104.6	170.5	24.4	34.9	68.6
Queue Length 50th (m)	~44.6	~162.4	12.6	5.7	~161.0	~36.1	33.6	23.1	~84.7
Queue Length 95th (m)	#67.5	#234.0	27.8	#26.1	#231.8	#75.5	58.3	#52.2	#153.0
Internal Link Dist (m)		912.7			557.5		759.0		214.0
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	102	808	577	73	659	135	489	257	505
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	1.65	1.03	0.35	0.63	1.14	1.20	0.53	0.63	1.01

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2045
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	155	763	184	42	596	96	149	202	37	149	227	243
Future Volume (vph)	155	763	184	42	596	96	149	202	37	149	227	243
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.98		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1253	1582	1063	1429	1278		1311	1206		1191	1155	
Flt Permitted	0.15	1.00	1.00	0.10	1.00		0.25	1.00		0.51	1.00	
Satd. Flow (perm)	201	1582	1063	144	1278		339	1206		644	1155	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	168	829	200	46	648	104	162	220	40	162	247	264
RTOR Reduction (vph)	0	0	34	0	6	0	0	7	0	0	43	0
Lane Group Flow (vph)	168	829	166	46	746	0	162	253	0	162	468	0
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	102	808	543	73	653		135	482		257	462	
v/s Ratio Prot		0.52			0.58			0.21			0.41	
v/s Ratio Perm	c0.84		0.16	0.32			c0.48			0.25		
v/c Ratio	1.65	1.03	0.31	0.63	1.14		1.20	0.52		0.63	1.01	
Uniform Delay, d1	22.0	22.0	12.8	15.9	22.0		27.0	20.5		21.7	27.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	330.7	38.4	0.3	16.4	81.3		141.0	1.0		5.0	45.4	
Delay (s)	352.7	60.4	13.1	32.2	103.3		168.0	21.5		26.6	72.4	
Level of Service	F	E	B	C	F		F	C		C	E	
Approach Delay (s/veh)		93.6			99.2			77.8			61.4	
Approach LOS		F			F			E			E	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			85.8			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			1.44									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			128.1%			ICU Level of Service				H		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2045
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	119	143	80	88	284	42	117	330	138	22	262	113
Future Volume (vph)	119	143	80	88	284	42	117	330	138	22	262	113
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.968			0.986			0.968			0.962	
Flt Protected		0.983			0.989			0.990			0.997	
Satd. Flow (prot)	0	1356	0	0	1427	0	0	1282	0	0	1266	0
Flt Permitted		0.983			0.989			0.990			0.997	
Satd. Flow (perm)	0	1356	0	0	1427	0	0	1282	0	0	1266	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2177.2			714.3	
Travel Time (s)		30.1			38.7			156.8			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	129	155	87	96	309	46	127	359	150	24	285	123
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	371	0	0	451	0	0	636	0	0	432	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	119.6%						ICU Level of Service H					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2045
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	119	143	80	88	284	42	117	330	138	22	262	113
Future Volume (vph)	119	143	80	88	284	42	117	330	138	22	262	113
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)	129	155	87	96	309	46	127	359	150	24	285	123
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	371	451	636	432								
Volume Left (vph)	129	96	127	24								
Volume Right (vph)	87	46	150	123								
Hadj (s)	0.00	0.00	0.08	0.05								
Departure Headway (s)	9.6	9.5	9.6	9.6								
Degree Utilization, x	0.99	1.19	1.70	1.15								
Capacity (veh/h)	371	382	379	379								
Control Delay (s/veh)	74.5	140.2	348.7	124.3								
Approach Delay (s/veh)	74.5	140.2	348.7	124.3								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				193.8								
Level of Service				F								
Intersection Capacity Utilization				119.6%	ICU Level of Service		H					
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2045
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	104	745	824	165	358	234
Future Volume (vph)	104	745	824	165	358	234
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.978		0.947	
Flt Protected		0.994			0.971	
Satd. Flow (prot)	0	1137	1275	0	1282	0
Flt Permitted		0.994			0.971	
Satd. Flow (perm)	0	1137	1275	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	113	810	896	179	389	254
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	923	1075	0	643	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	196.4%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2045
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	104	745	824	165	358	234
Future Volume (veh/h)	104	745	824	165	358	234
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	113	810	896	179	389	254
Approach Volume (veh/h)		923	1075		643	
Crossing Volume (veh/h)		389	113		896	
High Capacity (veh/h)		1020	1268		678	
High v/c (veh/h)		0.91	0.85		0.95	
Low Capacity (veh/h)		831	1055		530	
Low v/c (veh/h)		1.11	1.02		1.21	
Intersection Summary						
Maximum v/c High			0.95			
Maximum v/c Low			1.21			
Intersection Capacity Utilization			196.4%		ICU Level of Service	H

Intersection			
Intersection Delay, s/veh	84.9		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	923	1075	643
Demand Flow Rate, veh/h	990	1145	684
Vehicles Circulating, veh/h	405	140	950
Vehicles Exiting, veh/h	1229	1255	335
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	77.5	36.7	176.3
Approach LOS	F	E	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	990	1145	684
Cap Entry Lane, veh/h	913	1196	524
Entry HV Adj Factor	0.932	0.939	0.940
Flow Entry, veh/h	923	1075	643
Cap Entry, veh/h	851	1123	492
V/C Ratio	1.084	0.957	1.306
Control Delay, s/veh	77.5	36.7	176.3
LOS	F	E	F
95th %tile Queue, veh	24	17	28

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2045
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	64	123	62	393	328	31
Future Volume (vph)	64	123	62	393	328	31
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.988	
Flt Protected	0.983			0.993		
Satd. Flow (prot)	1302	0	0	1195	1344	0
Flt Permitted	0.983			0.993		
Satd. Flow (perm)	1302	0	0	1195	1344	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	182.8			213.0	2177.2	
Travel Time (s)	13.2			15.3	156.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	134	67	427	357	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	204	0	0	494	391	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	87.7%			ICU Level of Service E		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2045
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	64	123	62	393	328	31
Future Volume (Veh/h)	64	123	62	393	328	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	134	67	427	357	34
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	935	374	391			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	935	374	391			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	75	80	94			
cM capacity (veh/h)	278	672	1168			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	204	494	391			
Volume Left	70	67	0			
Volume Right	134	0	34			
cSH	452	1168	1700			
Volume to Capacity	0.45	0.06	0.23			
Queue Length 95th (m)	18.4	1.5	0.0			
Control Delay (s/veh)	19.4	1.7	0.0			
Lane LOS	C	A				
Approach Delay (s/veh)	19.4	1.7	0.0			
Approach LOS	C					
Intersection Summary						
Average Delay		4.4				
Intersection Capacity Utilization		87.7%		ICU Level of Service		E
Analysis Period (min)		15				

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2045
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	118	229	116	337	391	60
Future Volume (vph)	118	229	116	337	391	60
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.982	
Flt Protected	0.983			0.987		
Satd. Flow (prot)	1328	0	0	1194	1340	0
Flt Permitted	0.983			0.987		
Satd. Flow (perm)	1328	0	0	1194	1340	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	219.5			238.0	213.0	
Travel Time (s)	15.8			17.1	15.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	128	249	126	366	425	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	377	0	0	492	490	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	106.9%			ICU Level of Service G		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2045
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			W	W	
Traffic Volume (veh/h)	118	229	116	337	391	60
Future Volume (Veh/h)	118	229	116	337	391	60
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	128	249	126	366	425	65
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				238		
pX, platoon unblocked						
vC, conflicting volume	1076	458	490			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1076	458	490			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	41	59	88			
cM capacity (veh/h)	217	607	1084			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	377	492	490			
Volume Left	128	126	0			
Volume Right	249	0	65			
cSH	377	1084	1700			
Volume to Capacity	1.00	0.12	0.29			
Queue Length 95th (m)	95.3	3.1	0.0			
Control Delay (s/veh)	80.4	3.2	0.0			
Lane LOS	F	A				
Approach Delay (s/veh)	80.4	3.2	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		23.5				
Intersection Capacity Utilization		106.9%		ICU Level of Service		G
Analysis Period (min)		15				

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	189.9	923.2	70.0	134.9	510.2	70.0	784.5	69.9	189.3
Average Queue (m)	153.9	661.0	29.3	51.2	332.8	67.7	540.7	54.6	124.8
95th Queue (m)	220.3	1226.8	81.4	151.9	587.5	76.8	957.9	89.6	215.7
Link Distance (m)		902.4			568.8		768.8		218.5
Upstream Blk Time (%)		46			10		34		2
Queuing Penalty (veh)		503			0		0		15
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	84	25	2		57	97	22	35	57
Queuing Penalty (veh)	795	84	22		24	233	32	163	84

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	109.2	138.4	424.8	121.9
Average Queue (m)	40.8	62.2	252.4	68.2
95th Queue (m)	89.2	143.5	516.3	130.3
Link Distance (m)	410.2	524.9	2155.2	705.9
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1006.3	416.5	462.8
Average Queue (m)	727.8	147.5	407.7
95th Queue (m)	1270.8	471.9	542.1
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	49	0	66
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	33.0	24.4	1.3
Average Queue (m)	14.7	5.3	0.0
95th Queue (m)	25.3	17.2	0.9
Link Distance (m)	174.4	196.3	2155.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	97.6	37.0	43.0
Average Queue (m)	55.8	10.9	5.8
95th Queue (m)	160.4	29.5	43.5
Link Distance (m)	209.1	218.5	196.3
Upstream Blk Time (%)	12		
Queuing Penalty (veh)	0		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 1955

Junctions 8						
ARCADY 8 - Roundabout Module						
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025						
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:10:37 PM

Summary of intersection performance

AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Single Lane - TT 2045							
Leg North	2.41	5.31	13.62	0.70	B	166.70	F
Leg West	4.87	16.15	19.57	0.83	C		
Leg East	111.43	167.19	384.65	1.23	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM " model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:10:36 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2045, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	592.00	100.000
West	ONE HOUR	✓	849.00	100.000
East	ONE HOUR	✓	989.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	234.000	358.000
	West	745.000	0.000	104.000
	East	165.000	824.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.88	0.00	0.12
	East	0.17	0.83	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.70	13.62	2.41	5.31	B	543.23	814.84	143.42	10.56	1.59	143.47	10.56
West	0.83	19.57	4.87	16.15	C	779.06	1168.59	230.70	11.85	2.56	230.74	11.85
East	1.23	384.65	111.43	167.19	F	907.52	1361.29	4387.32	193.38	48.75	4407.23	194.25

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	445.69	111.42	442.34	679.14	611.70	0.00	1003.42	953.60	0.444	0.00	0.84	6.778	A
West	639.17	159.79	634.36	786.54	267.49	0.00	1202.63	1023.69	0.531	0.00	1.20	6.767	A
East	744.57	186.14	734.18	345.20	556.66	0.00	1035.28	837.55	0.719	0.00	2.60	12.344	B

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	532.20	133.05	530.12	811.76	722.46	0.00	939.31	953.59	0.567	0.84	1.36	9.303	A
West	763.23	190.81	760.22	932.00	320.58	0.00	1171.91	1023.69	0.651	1.20	1.96	9.347	A
East	889.09	222.27	867.13	413.70	667.10	0.00	971.36	837.55	0.915	2.60	8.09	31.622	D

Main results: (08:30-08:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	651.80	162.95	647.79	958.04	734.80	0.00	932.17	953.61	0.699	1.36	2.36	13.266	B
West	934.77	233.69	924.11	990.85	391.74	0.00	1130.72	1023.69	0.827	1.96	4.62	17.895	C
East	1088.91	272.23	881.93	504.94	810.91	0.00	888.12	837.55	1.226	8.09	59.83	151.803	F

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	651.80	162.95	651.59	966.61	735.29	0.00	931.89	953.61	0.699	2.36	2.41	13.623	B
West	934.77	233.69	933.76	992.85	394.04	0.00	1129.39	1023.69	0.828	4.62	4.87	19.566	C
East	1088.91	272.23	882.53	508.42	819.38	0.00	883.22	837.55	1.233	59.83	111.43	350.348	F

Main results: (09:00-09:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	532.20	133.05	535.48	838.87	795.70	0.00	896.93	953.59	0.593	2.41	1.59	10.683	B
West	763.23	190.81	774.40	1007.36	323.82	0.00	1170.03	1023.69	0.652	4.87	2.08	10.060	B
East	889.09	222.27	955.03	418.68	679.54	0.00	964.16	837.55	0.922	111.43	94.94	384.646	F

Main results: (09:15-09:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	445.69	111.42	447.46	733.93	849.58	0.00	865.74	953.60	0.515	1.59	1.15	9.189	A
West	639.17	159.79	642.51	1026.45	270.59	0.00	1200.84	1023.69	0.532	2.08	1.25	6.987	A
East	744.57	186.14	1019.70	349.30	563.81	0.00	1031.14	837.55	0.722	94.94	26.16	217.808	F

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	12.03	0.80	6.778	A	A
West	17.17	1.14	6.767	A	A
East	35.19	2.35	12.344	B	B

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	19.43	1.30	9.303	A	A
West	27.79	1.85	9.347	A	A

East	96.29	6.42	31.622	D	C

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	32.88	2.19	13.266	B	B
West	60.82	4.05	17.895	C	B
East	515.13	34.34	151.803	F	F

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	35.90	2.39	13.623	B	B
West	71.57	4.77	19.566	C	B
East	1284.68	85.65	350.348	F	F

Queueing Delay results: (09:00-09:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	25.22	1.68	10.683	B	B
West	33.88	2.26	10.060	B	B
East	1547.76	103.18	384.646	F	F

Queueing Delay results: (09:15-09:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	17.97	1.20	9.189	A	A
West	19.48	1.30	6.987	A	A
East	908.26	60.55	217.808	F	F

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.84	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.20	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	2.60	0.00	0.00	5.32	8.52			N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.36	0.00	0.00	2.13	3.19			N/A	N/A
West	1.96	0.00	0.00	4.31	5.38			N/A	N/A
East	8.09	0.00	3.19	20.23	27.69			N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	2.36	0.00	0.00	0.00	5.31			N/A	N/A
West	4.62	0.00	0.00	6.46	16.15			N/A	N/A
East	59.83	27.69	56.44	88.39	99.03			N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	2.41	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	4.87	0.00	0.00	2.15	12.92			N/A	N/A
East	111.43	63.89	107.55	152.28	167.19			N/A	N/A

Queue Variation results: (09:00-09:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.59	0.00	0.00	3.19	4.25			N/A	N/A
West	2.08	0.00	0.00	4.31	6.46			N/A	N/A
East	94.94	50.05	90.52	134.18	149.08			N/A	N/A

Queue Variation results: (09:15-09:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.15	0.00	0.00	2.13	3.19			N/A	N/A
West	1.25	0.00	0.00	1.08	3.23			N/A	N/A
East	26.16	3.19	21.30	50.05	61.76			N/A	N/A

Lanes, Volumes, Timings

Total - 2045

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	313	1027	269	58	1044	201	299	265	70	167	323	407
Future Volume (vph)	313	1027	269	58	1044	201	299	265	70	167	323	407
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	90.0		20.0	55.0		0.0	20.0		0.0	20.0		0.0
Storage Lanes	1		1	1		0	1		0	1		0
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor			0.98		1.00							
Frt			0.850		0.976			0.969			0.916	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	1613	1137	1429	1338	0	1415	1304	0	1429	1228	0
Flt Permitted	0.087			0.087			0.111			0.398		
Satd. Flow (perm)	122	1613	1110	131	1338	0	165	1304	0	599	1228	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			75		16			18			55	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			204.0	
Travel Time (s)		67.4			41.9			56.4			14.7	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	340	1116	292	63	1135	218	325	288	76	182	351	442
Shared Lane Traffic (%)												
Lane Group Flow (vph)	340	1116	292	63	1353	0	325	364	0	182	793	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2045

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Detector Phase	4	4	4	8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	
Total Split (s)	50.0	50.0	50.0	50.0	50.0		40.0	40.0		40.0	40.0	
Total Split (%)	55.6%	55.6%	55.6%	55.6%	55.6%		44.4%	44.4%		44.4%	44.4%	
Maximum Green (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
v/c Ratio	5.48	1.35	0.48	0.95	1.96		4.92	0.68		0.76	1.51	
Control Delay (s/veh)	Error	191.0	13.5	129.4	457.0		Error	29.1		46.5	264.7	
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	Error	191.0	13.5	129.4	457.0		Error	29.1		46.5	264.7	
LOS	F	F	B	F	F		F	C		D	F	
Approach Delay (s/veh)		525.3			442.4			869.3			224.0	
Approach LOS		F			F			F			F	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 5.48

Intersection Signal Delay (s/veh): 489.2

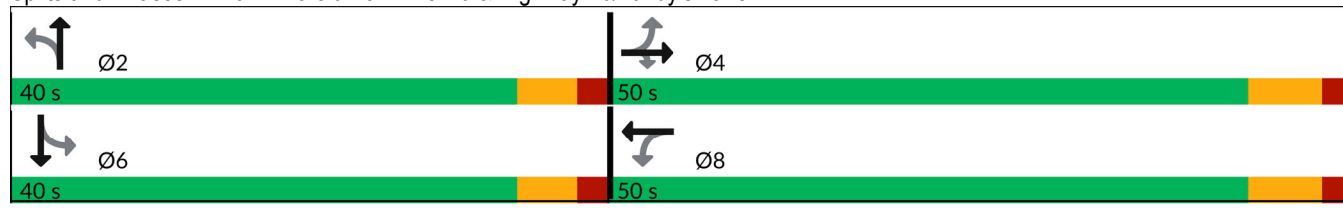
Intersection LOS: F

Intersection Capacity Utilization 205.5%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Thorold Townline & Highway 20, Thorold
PTSL (210565)

Synchro 12 Report
Page 2

Queues

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2045

PM Peak Hour

									
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	340	1116	292	63	1353	325	364	182	793
v/c Ratio	5.48	1.35	0.48	0.95	1.96	4.92	0.68	0.76	1.51
Control Delay (s/veh)	Error	191.0	13.5	129.4	457.0	Error	29.1	46.5	264.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	Error	191.0	13.5	129.4	457.0	Error	29.1	46.5	264.7
Queue Length 50th (m)	~109.1	~269.2	23.5	10.3	~389.4	~102.2	50.9	27.9	~198.8
Queue Length 95th (m)	#163.5	#346.4	45.9	#25.6	#471.2	#155.8	84.7	#65.1	#270.8
Internal Link Dist (m)		912.7			557.5		759.0		180.0
Turn Bay Length (m)	90.0		20.0	55.0		20.0		20.0	
Base Capacity (vph)	62	824	604	66	691	66	532	239	524
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	5.48	1.35	0.48	0.95	1.96	4.92	0.68	0.76	1.51

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2045
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	313	1027	269	58	1044	201	299	265	70	167	323	407
Future Volume (vph)	313	1027	269	58	1044	201	299	265	70	167	323	407
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.98		1.00	0.97		1.00	0.92	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1335	1613	1110	1429	1338		1415	1303		1429	1228	
Flt Permitted	0.09	1.00	1.00	0.09	1.00		0.11	1.00		0.40	1.00	
Satd. Flow (perm)	122	1613	1110	131	1338		165	1303		598	1228	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	340	1116	292	63	1135	218	325	288	76	182	351	442
RTOR Reduction (vph)	0	0	37	0	8	0	0	11	0	0	33	0
Lane Group Flow (vph)	340	1116	255	63	1345	0	325	353	0	182	760	0
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		
Actuated Green, G (s)	43.0	43.0	43.0	43.0	43.0		34.0	34.0		34.0	34.0	
Effective Green, g (s)	46.0	46.0	46.0	46.0	46.0		36.0	36.0		36.0	36.0	
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51		0.40	0.40		0.40	0.40	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	62	824	567	66	683		66	521		239	491	
v/s Ratio Prot		0.69			1.01			0.27			0.62	
v/s Ratio Perm	c2.78		0.23	0.48			c1.96			0.30		
v/c Ratio	5.48	1.35	0.45	0.95	1.97		4.92	0.68		0.76	1.55	
Uniform Delay, d1	22.0	22.0	14.0	21.0	22.0		27.0	22.2		23.3	27.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2052.6	167.4	0.6	94.1	441.6		1799.5	3.5		13.3	256.5	
Delay (s)	2074.6	189.4	14.5	115.1	463.6		1826.5	25.7		36.6	283.5	
Level of Service	F	F	B	F	F		F	C		D	F	
Approach Delay (s/veh)		526.9			448.1			875.1			237.4	
Approach LOS		F			F			F			F	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			495.0			HCM 2000 Level of Service				F		
HCM 2000 Volume to Capacity ratio			5.22									
Actuated Cycle Length (s)			90.0			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			205.5%			ICU Level of Service				H		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2045
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	135	330	195	181	326	43	122	315	139	43	532	254
Future Volume (vph)	135	330	195	181	326	43	122	315	139	43	532	254
Ideal Flow (vphpl)	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960			0.989			0.967			0.959	
Flt Protected		0.990			0.984			0.989			0.997	
Satd. Flow (prot)	0	1361	0	0	1435	0	0	1345	0	0	1353	0
Flt Permitted		0.990			0.984			0.989			0.997	
Satd. Flow (perm)	0	1361	0	0	1435	0	0	1345	0	0	1353	0
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2181.2			714.3	
Travel Time (s)		30.1			38.7			157.0			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	147	359	212	197	354	47	133	342	151	47	578	276
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	718	0	0	598	0	0	626	0	0	901	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		0.0			0.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37	1.37
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Sign Control		Stop			Stop			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	162.6%						ICU Level of Service H					
Analysis Period (min)	15											

HCM Unsignalized Intersection Capacity Analysis
102: Thorold Townline Rd & Beaverdams Rd

Total - 2045
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Traffic Volume (vph)	135	330	195	181	326	43	122	315	139	43	532	254
Future Volume (vph)	135	330	195	181	326	43	122	315	139	43	532	254
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)	147	359	212	197	354	47	133	342	151	47	578	276
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	718	598	626	901								
Volume Left (vph)	147	197	133	47								
Volume Right (vph)	212	47	151	276								
Hadj (s)	-0.08	0.03	-0.01	-0.09								
Departure Headway (s)	9.5	9.6	9.6	9.5								
Degree Utilization, x	1.89	1.59	1.66	2.37								
Capacity (veh/h)	385	379	381	388								
Control Delay (s/veh)	433.3	303.3	332.6	645.3								
Approach Delay (s/veh)	433.3	303.3	332.6	645.3								
Approach LOS	F	F	F	F								
Intersection Summary												
Delay				451.0								
Level of Service				F								
Intersection Capacity Utilization				162.6%	ICU Level of Service	H						
Analysis Period (min)				15								

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2045
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	199	1332	1363	384	280	184
Future Volume (vph)	199	1332	1363	384	280	184
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.970		0.946	
Flt Protected		0.994			0.971	
Satd. Flow (prot)	0	1200	1326	0	1336	0
Flt Permitted		0.994			0.971	
Satd. Flow (perm)	0	1200	1326	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	216	1448	1482	417	304	200
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1664	1899	0	504	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	299.9%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2045
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	199	1332	1363	384	280	184
Future Volume (veh/h)	199	1332	1363	384	280	184
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	216	1448	1482	417	304	200
Approach Volume (veh/h)		1664	1899		504	
Crossing Volume (veh/h)		304	216		1482#	
High Capacity (veh/h)		1091	1169		417	
High v/c (veh/h)		1.53	1.62		1.21	
Low Capacity (veh/h)		895	966		309	
Low v/c (veh/h)		1.86	1.97		1.63	
Intersection Summary						
Maximum v/c High			1.62			
Maximum v/c Low			1.97			
Intersection Capacity Utilization			299.9%		ICU Level of Service	H
# Crossing flow exceeds 1200, method is not applicable						

Intersection			
Intersection Delay, s/veh	341.3		
Intersection LOS	F		
Approach	EB	WB	SB
Entry Lanes	1	1	1
Conflicting Circle Lanes	1	1	1
Adj Approach Flow, veh/h	1664	1899	504
Demand Flow Rate, veh/h	1693	1929	514
Vehicles Circulating, veh/h	304	216	1512
Vehicles Exiting, veh/h	1722	1781	633
Ped Vol Crossing Leg, #/h	0	0	0
Ped Cap Adj	1.000	1.000	1.000
Approach Delay, s/veh	320.2	350.0	378.0
Approach LOS	F	F	F
Lane	Left	Left	Left
Designated Moves	LT	TR	LR
Assumed Moves	LT	TR	LR
RT Channelized			
Lane Util	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976
Entry Flow, veh/h	1693	1929	514
Cap Entry Lane, veh/h	1012	1107	295
Entry HV Adj Factor	0.983	0.985	0.981
Flow Entry, veh/h	1664	1899	504
Cap Entry, veh/h	995	1090	289
V/C Ratio	1.673	1.743	1.741
Control Delay, s/veh	320.2	350.0	378.0
LOS	F	F	F
95th %tile Queue, veh	91	108	33

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2045
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	61	102	140	434	702	84
Future Volume (vph)	61	102	140	434	702	84
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.915				0.986	
Flt Protected	0.982			0.988		
Satd. Flow (prot)	1333	0	0	1195	1345	0
Flt Permitted	0.982			0.988		
Satd. Flow (perm)	1333	0	0	1195	1345	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	252.7			243.0	2181.2	
Travel Time (s)	18.2			17.5	157.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	66	111	152	472	763	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	177	0	0	624	854	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	127.2%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2045
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	102	140	434	702	84
Future Volume (Veh/h)	61	102	140	434	702	84
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	111	152	472	763	91
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	1585	809	854			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1585	809	854			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	32	71	81			
cM capacity (veh/h)	97	384	794			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	177	624	854			
Volume Left	66	152	0			
Volume Right	111	0	91			
cSH	183	794	1700			
Volume to Capacity	0.97	0.19	0.50			
Queue Length 95th (m)	62.1	5.6	0.0			
Control Delay (s/veh)	109.8	4.7	0.0			
Lane LOS	F	A				
Approach Delay (s/veh)	109.8	4.7	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay			13.5			
Intersection Capacity Utilization			127.2%	ICU Level of Service		H
Analysis Period (min)			15			

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2045
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	128	261	333	446	636	168
Future Volume (vph)	128	261	333	446	636	168
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.909				0.972	
Flt Protected	0.984			0.979		
Satd. Flow (prot)	1326	0	0	1189	1328	0
Flt Permitted	0.984			0.979		
Satd. Flow (perm)	1326	0	0	1189	1328	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	258.3			204.0	243.0	
Travel Time (s)	18.6			14.7	17.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	139	284	362	485	691	183
Shared Lane Traffic (%)						
Lane Group Flow (vph)	423	0	0	847	874	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	164.3%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2045
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	W			W	W	
Traffic Volume (veh/h)	128	261	333	446	636	168
Future Volume (Veh/h)	128	261	333	446	636	168
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	139	284	362	485	691	183
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				204		
pX, platoon unblocked	0.83					
vC, conflicting volume	1992	783	874			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2089	783	874			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	0	28	54			
cM capacity (veh/h)	26	397	781			
Direction, Lane #	EB 1	NB 1	SB 1			
Volume Total	423	847	874			
Volume Left	139	362	0			
Volume Right	284	0	183			
cSH	70	781	1700			
Volume to Capacity	6.02	0.46	0.51			
Queue Length 95th (m)	Err	19.8	0.0			
Control Delay (s/veh)	Err	10.8	0.0			
Lane LOS	F	B				
Approach Delay (s/veh)	Err	10.8	0.0			
Approach LOS	F					
Intersection Summary						
Average Delay		1977.0				
Intersection Capacity Utilization		164.3%		ICU Level of Service		H
Analysis Period (min)		15				

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	R	L	TR	L	TR	L	TR
Maximum Queue (m)	190.0	920.6	70.0	134.9	582.4	69.9	782.1	69.9	188.5
Average Queue (m)	179.8	855.6	16.2	63.4	574.4	68.7	772.7	57.7	168.6
95th Queue (m)	211.7	1137.8	60.1	170.6	578.8	71.8	787.7	94.2	217.8
Link Distance (m)		902.4			568.8		768.8		184.8
Upstream Blk Time (%)		77			99		98		7
Queuing Penalty (veh)		1239			0		0		64
Storage Bay Dist (m)	90.0		20.0	55.0		20.0		20.0	
Storage Blk Time (%)	99	13	1		62	100	7	19	65
Queuing Penalty (veh)	1279	74	10		36	335	21	137	109

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (m)	428.8	534.8	84.9	724.4
Average Queue (m)	413.6	455.5	41.7	714.8
95th Queue (m)	456.1	640.7	72.6	722.1
Link Distance (m)	410.2	524.9	2159.2	705.9
Upstream Blk Time (%)	95	55		99
Queuing Penalty (veh)	0	0		0
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	SB
Directions Served	LT	TR	LR
Maximum Queue (m)	1010.2	450.6	457.0
Average Queue (m)	986.0	135.9	304.1
95th Queue (m)	1123.9	422.7	586.5
Link Distance (m)	993.2	902.4	445.6
Upstream Blk Time (%)	94	0	45
Queuing Penalty (veh)	0	0	0
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	32.2	24.8	2.5
Average Queue (m)	14.5	7.9	0.1
95th Queue (m)	24.7	19.9	1.3
Link Distance (m)	244.3	226.2	2159.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	LT	TR
Maximum Queue (m)	247.9	51.9	69.6
Average Queue (m)	182.4	15.0	14.8
95th Queue (m)	313.1	34.0	48.3
Link Distance (m)	248.1	184.8	226.2
Upstream Blk Time (%)	38		
Queuing Penalty (veh)	0		
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 3303

Junctions 8						
ARCADY 8 - Roundabout Module						
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025						
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:09:10 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Single Lane - TT 2045							
Leg North	1.03	?	7.32	0.50	A	3136.76	F
Leg West	345.55	203.47	980.80	1.43	F		
Leg East	1269.78	?	5850.19	2.52	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:09:09 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Single Lane - TT 2045, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	464.00	100.000
West	ONE HOUR	✓	1529.00	100.000
East	ONE HOUR	✓	1750.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

From	To			
		North	West	East
	North	0.000	184.000	280.000
	West	1330.000	0.000	199.000
	East	384.000	1366.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

From	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.87	0.00	0.13
	East	0.22	0.78	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

From	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

From	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.50	7.32	1.03	?	A	425.77	638.66	67.52	6.34	0.75	67.52	6.34
West	1.43	980.80	345.55	203.47	F	1403.04	2104.56	15844.38	451.72	176.05	18416.62	525.05
East	2.52	5850.19	1269.78	?	F	1605.83	2408.75	56625.95	1410.51	629.18	122218.93	3044.38

Main Results for each time segment

Main results: (16:00-16:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	349.32	87.33	347.16	1142.48	617.06	0.00	1000.32	975.46	0.349	0.00	0.54	5.600	A
West	1151.11	287.78	1114.01	754.72	209.49	0.00	1236.20	1016.76	0.931	0.00	9.28	25.102	D
East	1317.49	329.37	790.52	354.48	969.02	0.00	796.61	845.57	1.654	0.00	131.74	312.612	F

Main results: (16:15-16:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	417.13	104.28	416.49	1210.37	587.35	0.00	1017.51	975.44	0.410	0.54	0.70	6.098	A
West	1374.54	343.63	1201.66	752.51	251.33	0.00	1211.98	1016.77	1.134	9.28	52.50	104.370	F
East	1573.21	393.30	752.46	407.73	1045.26	0.00	752.49	845.57	2.091	131.74	336.93	1117.515	F

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	510.87	127.72	509.59	1193.23	596.24	0.00	1012.36	975.44	0.505	0.70	1.02	7.278	A
West	1683.46	420.87	1179.07	798.32	307.51	0.00	1179.47	1016.77	1.427	52.50	178.59	359.551	F
East	1926.79	481.70	763.85	460.97	1025.61	0.00	763.86	845.57	2.522	336.93	627.66	2283.124	F

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	510.87	127.72	510.84	1193.14	596.29	0.00	1012.34	975.44	0.505	1.02	1.03	7.316	A
West	1683.46	420.87	1178.96	798.86	308.27	0.00	1179.03	1016.77	1.428	178.59	304.72	733.759	F
East	1926.79	481.70	763.91	461.71	1025.52	0.00	763.92	845.57	2.522	627.66	918.38	3734.479	F

Main results: (17:00-17:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	417.13	104.28	418.39	1217.64	583.61	0.00	1019.67	975.44	0.409	1.03	0.71	6.117	A
West	1374.54	343.63	1211.23	749.53	252.48	0.00	1211.32	1016.77	1.135	304.72	345.55	969.308	F
East	1573.21	393.30	747.67	410.12	1053.58	0.00	747.67	845.57	2.104	918.38	1124.77	4980.030	F

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	349.32	87.33	350.05	1233.09	575.62	0.00	1024.30	975.46	0.341	0.71	0.53	5.449	A
West	1151.11	287.78	1231.56	714.43	211.24	0.00	1235.19	1016.76	0.932	345.55	325.43	980.803	F
East	1317.49	329.37	737.43	371.52	1071.28	0.00	737.43	845.57	1.787	1124.77	1269.78	5850.191	F

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.85	0.52	5.600	A	A
West	105.38	7.03	25.102	D	C
East	998.26	66.55	312.612	F	F

Queueing Delay results: (16:15-16:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	10.25	0.68	6.098	A	A
West	471.32	31.42	104.370	F	F

East	3515.08	234.34	1117.515	F	F

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	14.80	0.99	7.278	A	A
West	1733.45	115.56	359.551	F	F
East	7234.48	482.30	2283.124	F	F

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	15.40	1.03	7.316	A	A
West	3624.86	241.66	733.759	F	F
East	11595.36	773.02	3734.479	F	F

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	11.03	0.74	6.117	A	A
West	4877.00	325.13	969.308	F	F
East	15323.63	1021.58	4980.030	F	F

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	8.18	0.55	5.449	A	A
West	5032.36	335.49	980.803	F	F
East	17959.14	1197.28	5850.191	F	F

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.54	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	9.28	0.00	0.00	0.00	10.17			N/A	N/A
East	131.74	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:15-16:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.70	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	52.50	0.00	23.40	138.36	195.33			N/A	N/A
East	336.93	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.02	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	178.59	71.21	166.85	>199	>199			N/A	N/A
East	627.66	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	1.03	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

West	304.72	182.11	>199	>199	>199			N/A	N/A
East	918.38	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.71	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	345.55	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	1124.77	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.53	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	325.43	192.28	>199	>199	>199			N/A	N/A
East	1269.78	?	?	?	?	No excess capacity in final time segment - unable to calculate queue statistics		N/A	N/A

Appendix H

Traffic Control Signal Warrants



Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: Background 2028
Region/City/Township: Thorold, Niagara Region

Major Street: Thorold Townline Road
Minor Street: Beaverdams Road

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: N
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	Yes	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Thorold Townline Road						Beaverdams Road						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	34	217	82	16	183	82	87	105	32	52	204	30	0
PM Peak Hour	38	199	93	31	339	183	97	238	72	119	236	31	0
Average Hourly Volume	18	104	44	12	131	66	46	86	26	43	110	15	0

Warrant	AHV
1A - All	700
1B - Minor	326
2A - Major	374
2B - Cross	199

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	
% Fulfilled						145.8%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	120	170	120	170	
% Fulfilled						271.5%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	
% Fulfilled						78.0%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						397.5%

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: Background 2035
Region/City/Township: Thorold, Niagara Region

Major Street: Thorold Townline Road
Minor Street: Beaverdams Road

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: N
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	Yes	Justification for new intersections with forecast traffic
120% Satisfied	Yes	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Thorold Townline Road						Beaverdams Road						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	39	237	83	18	202	93	99	119	37	54	233	34	0
PM Peak Hour	44	219	94	35	379	210	111	273	83	120	269	35	0
Average Hourly Volume	21	114	44	13	145	76	53	98	30	44	126	17	0

Warrant	AHV
1A - All	780
1B - Minor	367
2A - Major	413
2B - Cross	222

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	
% Fulfilled						162.5%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	120	170	120	170	
% Fulfilled						305.6%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	
% Fulfilled						86.1%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						443.0%

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: Total 2028 (Phase 1)
Region/City/Township: Thorold, Niagara Region

Major Street: Thorold Townline Road
Minor Street: Street A

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: Y
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Thorold Townline Road						Street A						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	11	222			207	5	16		31				0
PM Peak Hour	31	260			427	19	12		19				0
Average Hourly Volume	11	121	0	0	159	6	7	0	13	0	0	0	0

Warrant	AHV
1A - All	315
1B - Minor	20
2A - Major	296
2B - Cross	7

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	
% Fulfilled						65.6%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	180	255	180	255	
% Fulfilled						10.8%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	
% Fulfilled						61.6%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						14.0%

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: Total 2028 (Phase 1)
Region/City/Township: Thorold, Niagara Region

Major Street: Thorold Townline Road
Minor Street: Street H

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: Y
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Thorold Townline Road						Street H						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	10	217			233	5	16		30				0
PM Peak Hour	31	280			427	19	11		19				0
Average Hourly Volume	10	124	0	0	165	6	7	0	12	0	0	0	0

Warrant	AHV
1A - All	325
1B - Minor	19
2A - Major	306
2B - Cross	7

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	
% Fulfilled						67.6%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	180	255	180	255	
% Fulfilled						10.6%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	
% Fulfilled						63.6%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						13.5%

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: Total 2045 (Full Build-Out)
Region/City/Township: Thorold, Niagara Region

Major Street: Thorold Townline Road
Minor Street: Street A

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: Y
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	No	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Thorold Townline Road						Street A						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	62	393			328	31	24		123				0
PM Peak Hour	140	434			702	84	61		102				0
Average Hourly Volume	51	207	0	0	258	29	21	0	56	0	0	0	0

Warrant	AHV
1A - All	621
1B - Minor	78
2A - Major	544
2B - Cross	21

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	
% Fulfilled						129.4%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	180	255	180	255	
% Fulfilled						43.1%

Warrant 2 - Delay To Cross Traffic

2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	
% Fulfilled						113.2%

2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						42.5%

Signal Justification Calculation for Forecasted Volumes (OTM Book 12 - Justification 7)



Horizon Year: Total 2045 (Full Build-Out)
Region/City/Township: Thorold, Niagara Region

Major Street: Thorold Townline Road
Minor Street: Street H

North/South?: Y

Number of Approach Lanes: 1
Tee Intersection?: Y
Flow Conditions: Free

PM Forecast Only? N

Warrant Results		
150% Satisfied	No	Justification for new intersections with forecast traffic
120% Satisfied	Yes	Justification for existing intersections with forecast traffic

Time Period	Major Street						Minor Street						Peds Crossing Main Road
	Thorold Townline Road						Street H						
	Northbound			Southbound			Eastbound			Westbound			
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
AM Peak Hour	116	337			391	60	118		229				0
PM Peak Hour	333	446			636	168	128		261				0
Average Hourly Volume	112	196	0	0	257	57	62	0	123	0	0	0	0

Warrant	AHV
1A - All	806
1B - Minor	184
2A - Major	622
2B - Cross	62

Warrant 1 - Minimum Vehicular Volume

1A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	All Approaches	480	720	600	900	
% Fulfilled						167.9%

1B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Minor Street Approaches	180	255	180	255	
% Fulfilled						102.2%

Warrant 2 - Delay To Cross Traffic

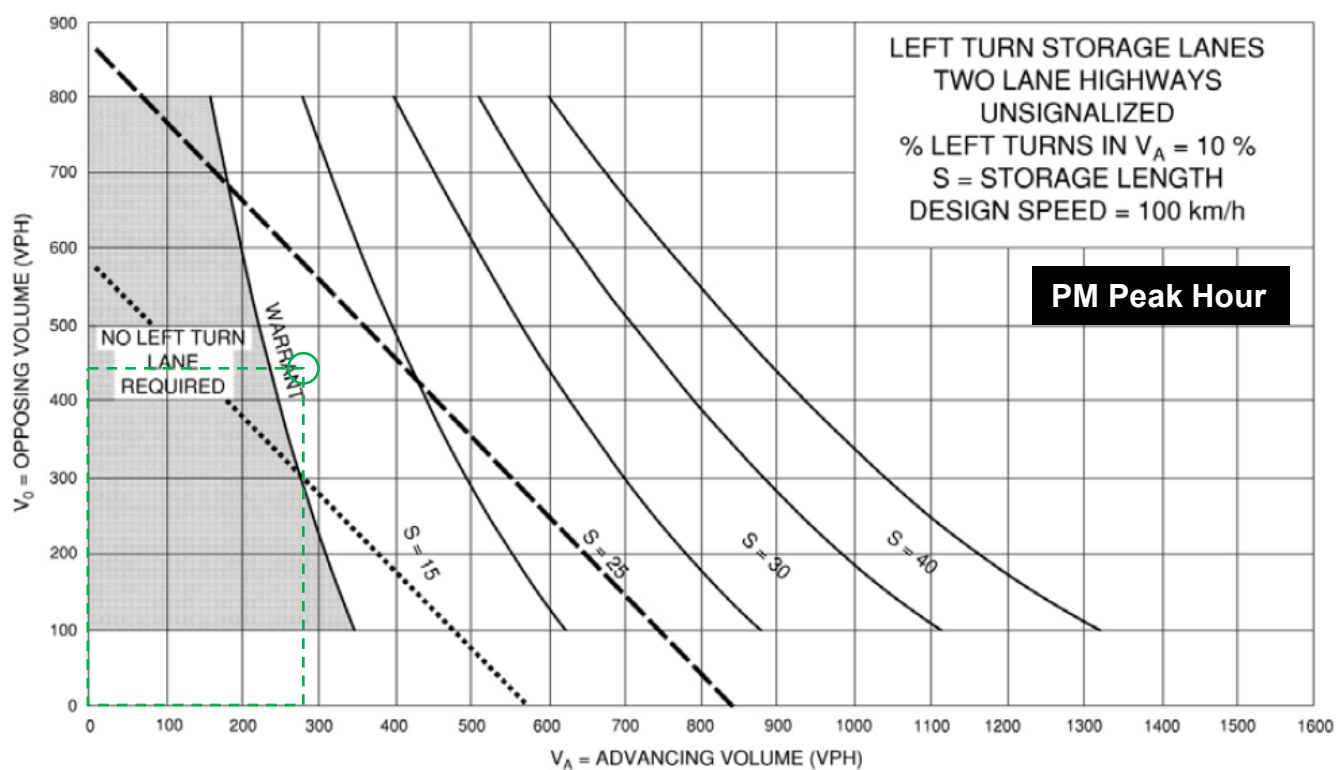
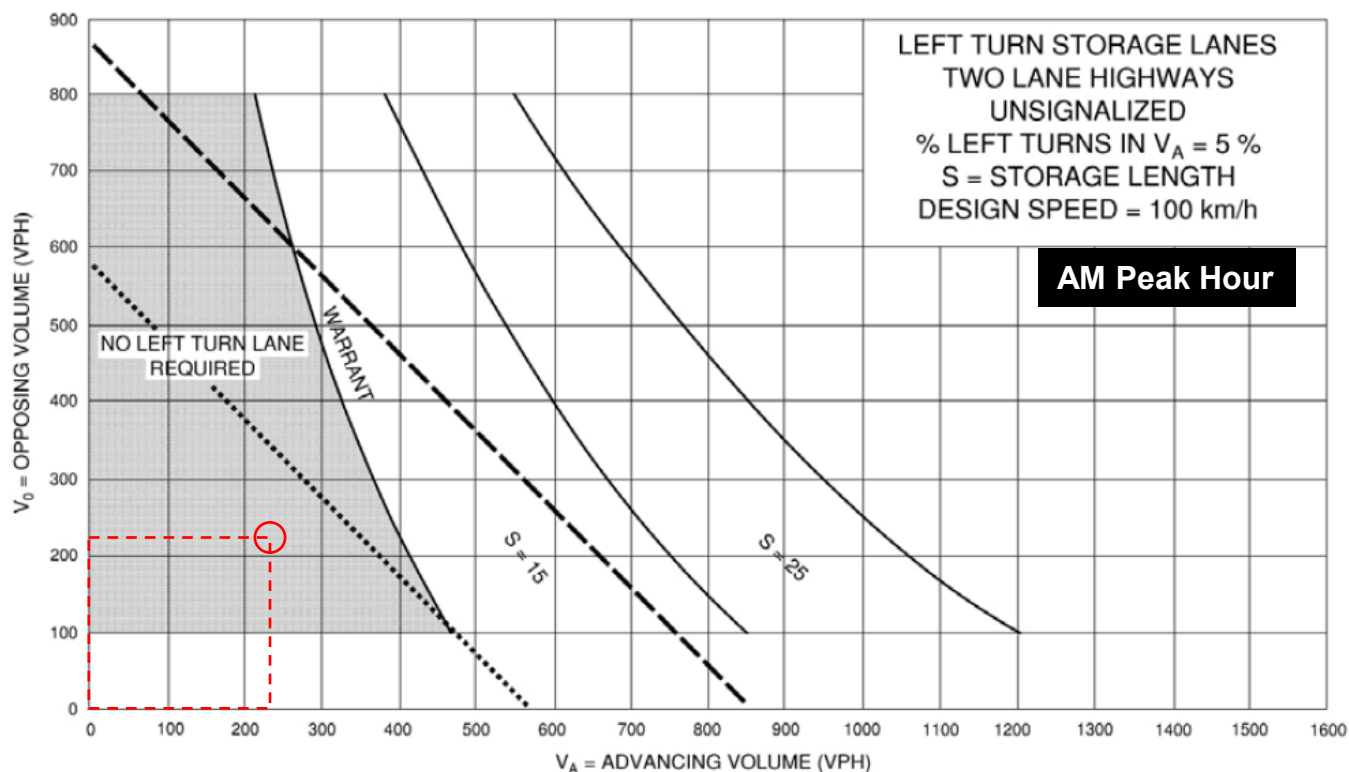
2A	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Major Street Approaches	480	720	600	900	
% Fulfilled						129.5%

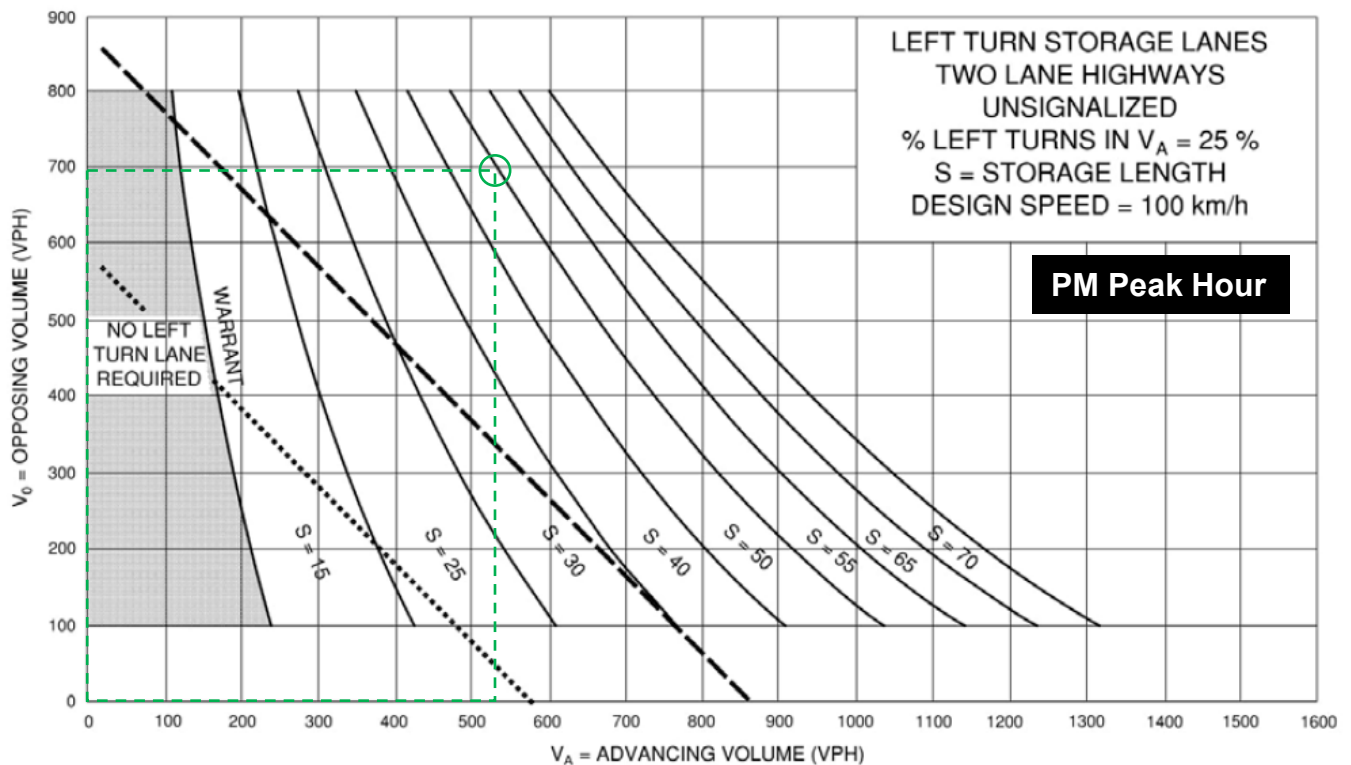
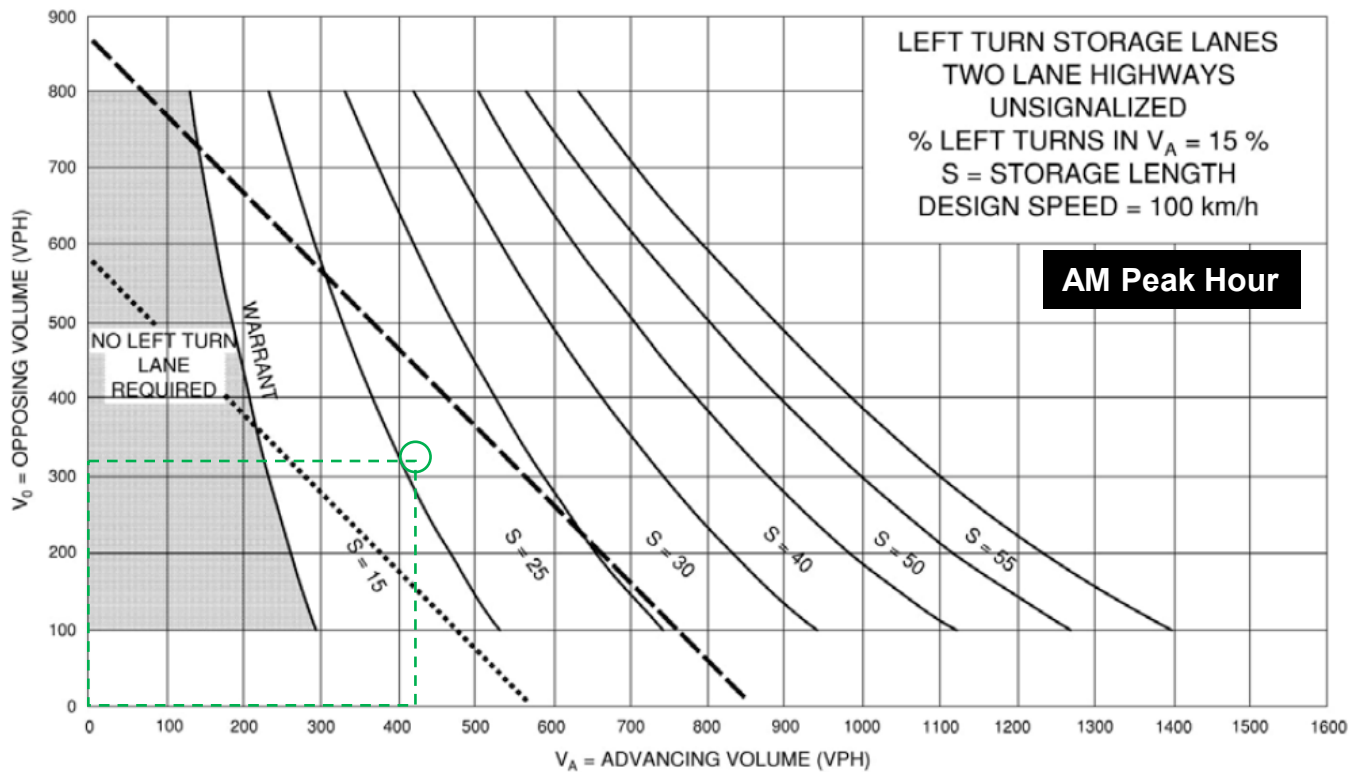
2B	Approach Lanes	1		2 or more		Average Hourly Volume
	Flow Conditions	Free	Restricted	Free	Restricted	
		X				
	Traffic Crossing Major Street	50	75	50	75	
% Fulfilled						123.0%

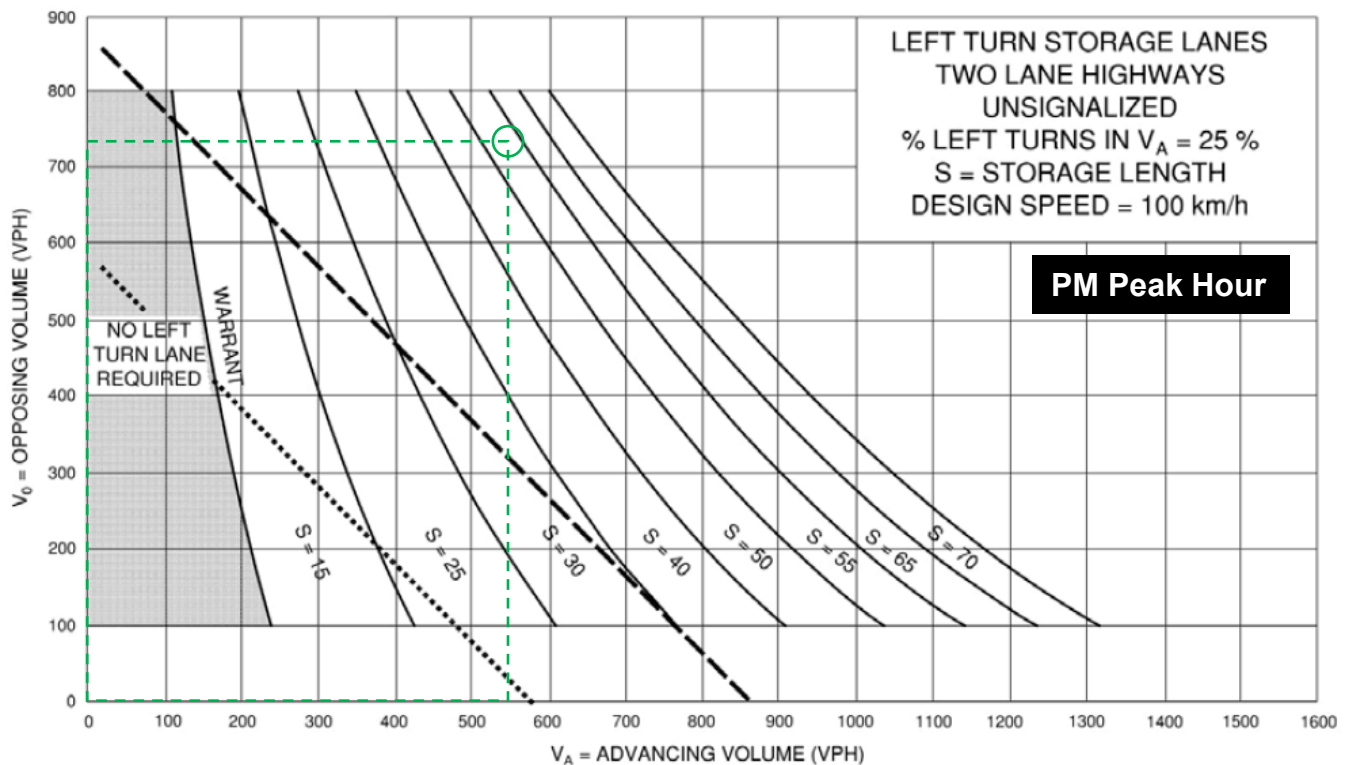
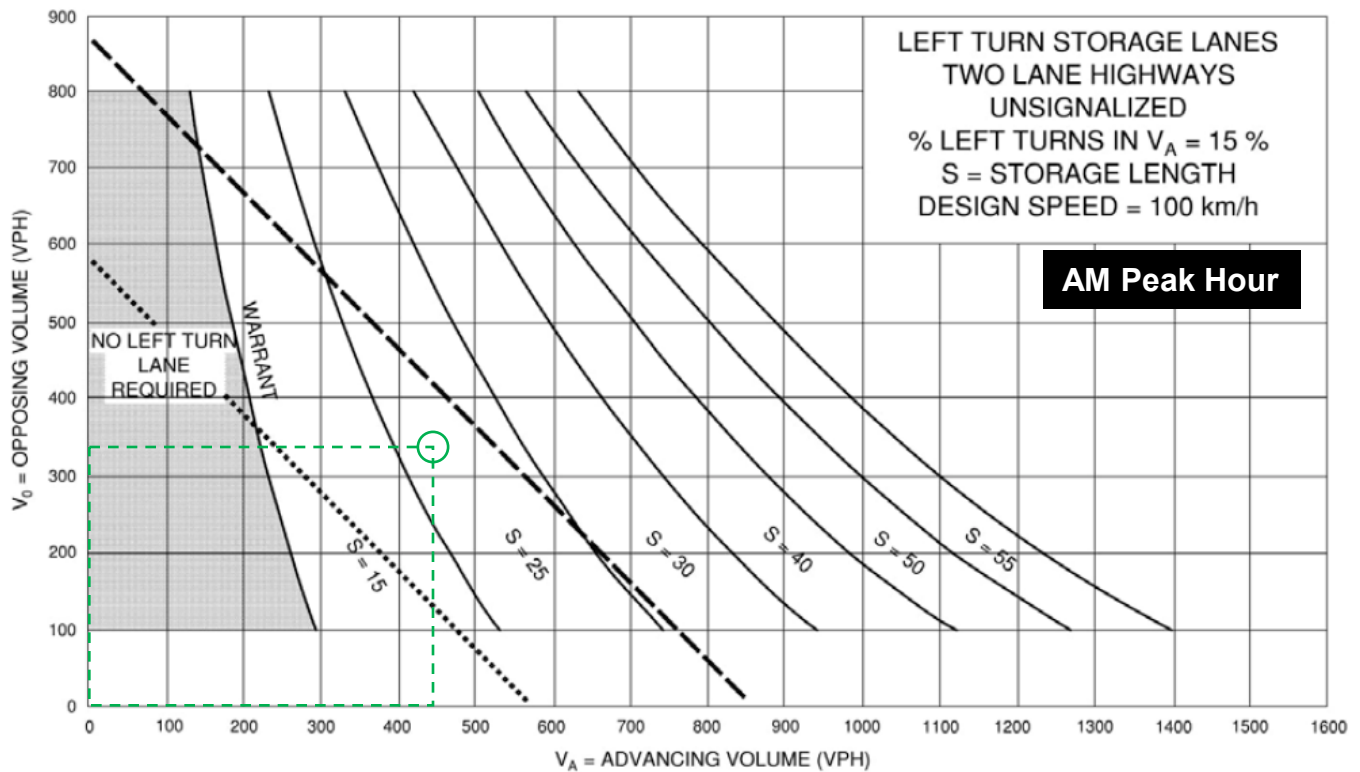
Appendix I

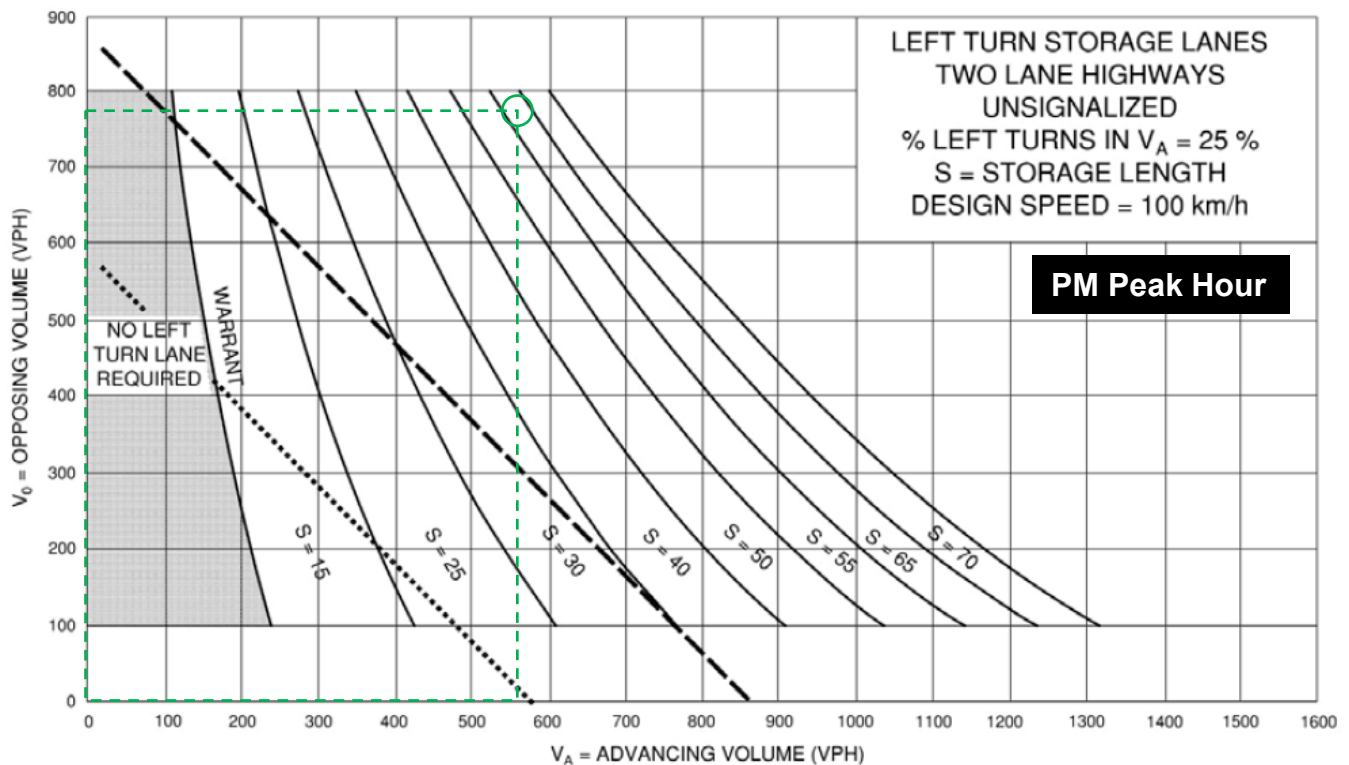
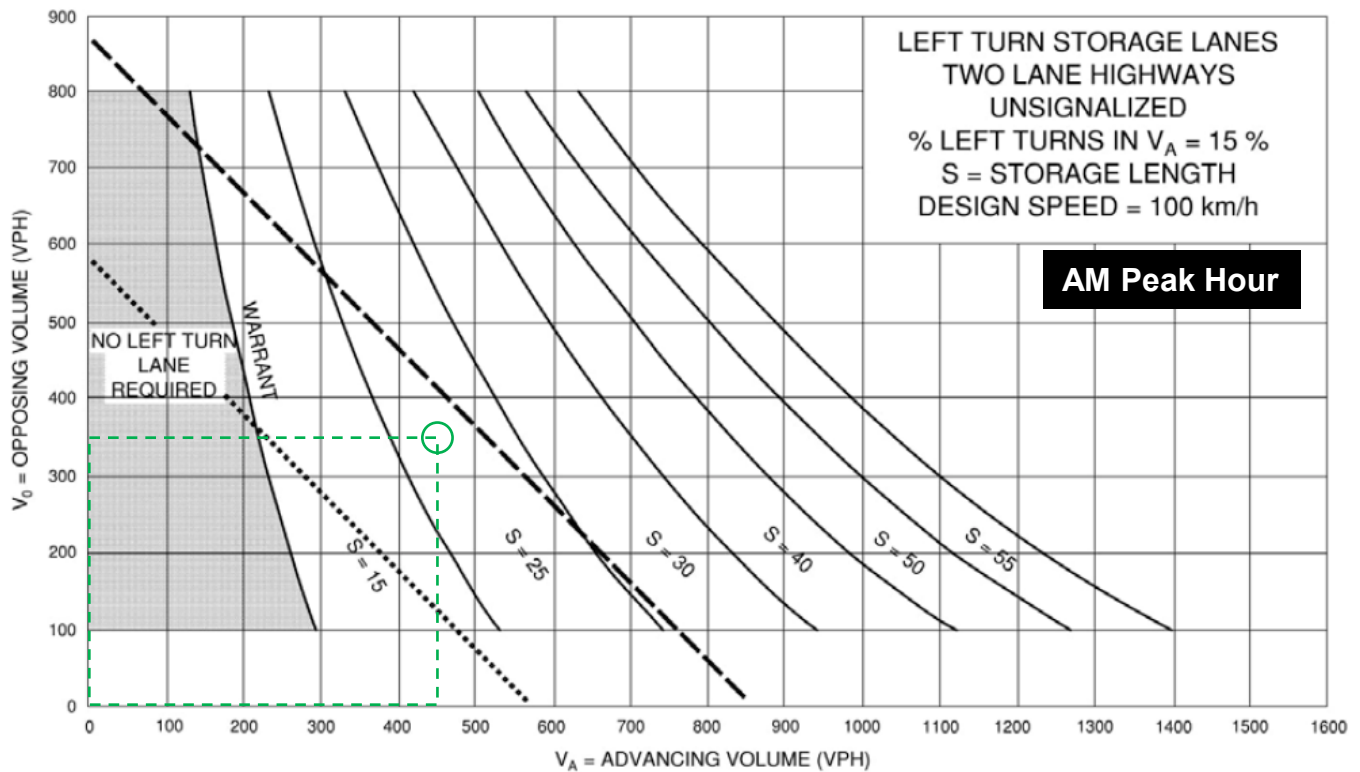
Left-Turn Lane Warrant Nomographs

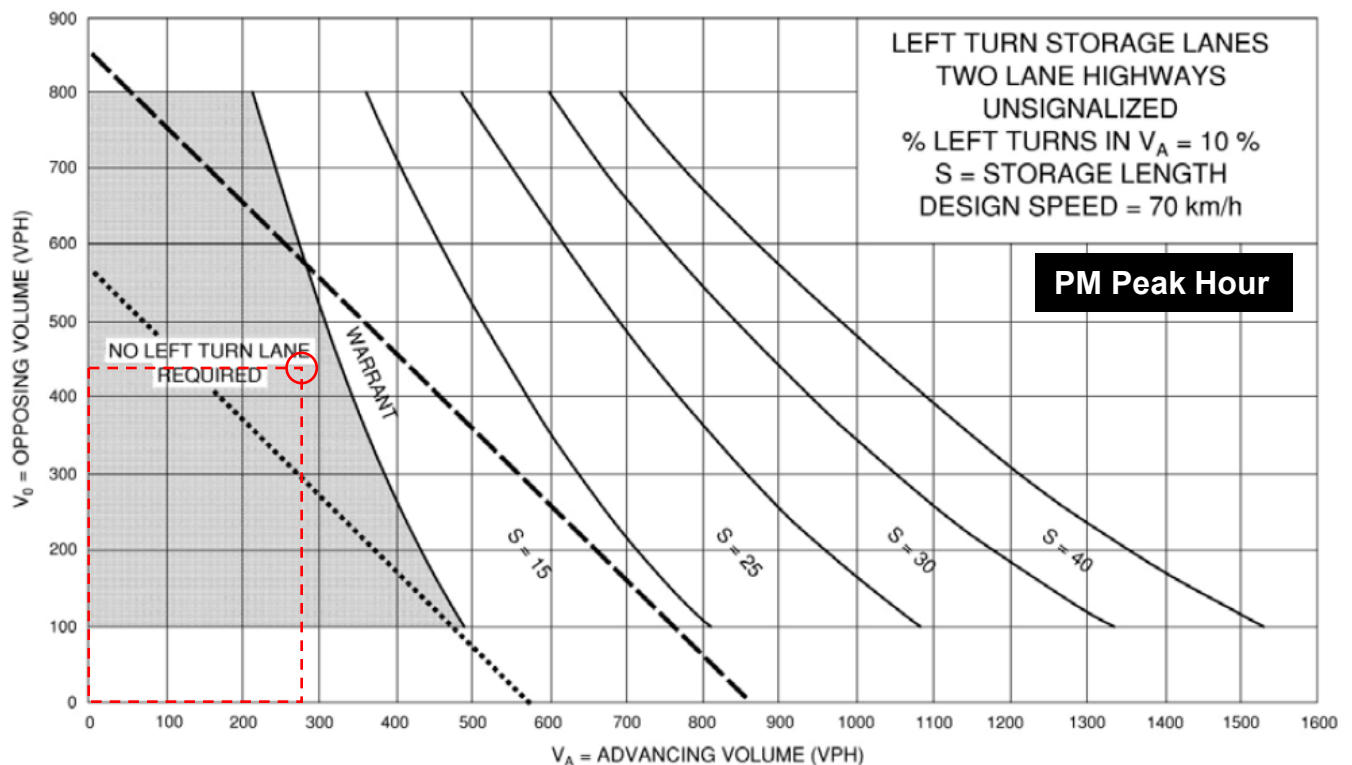
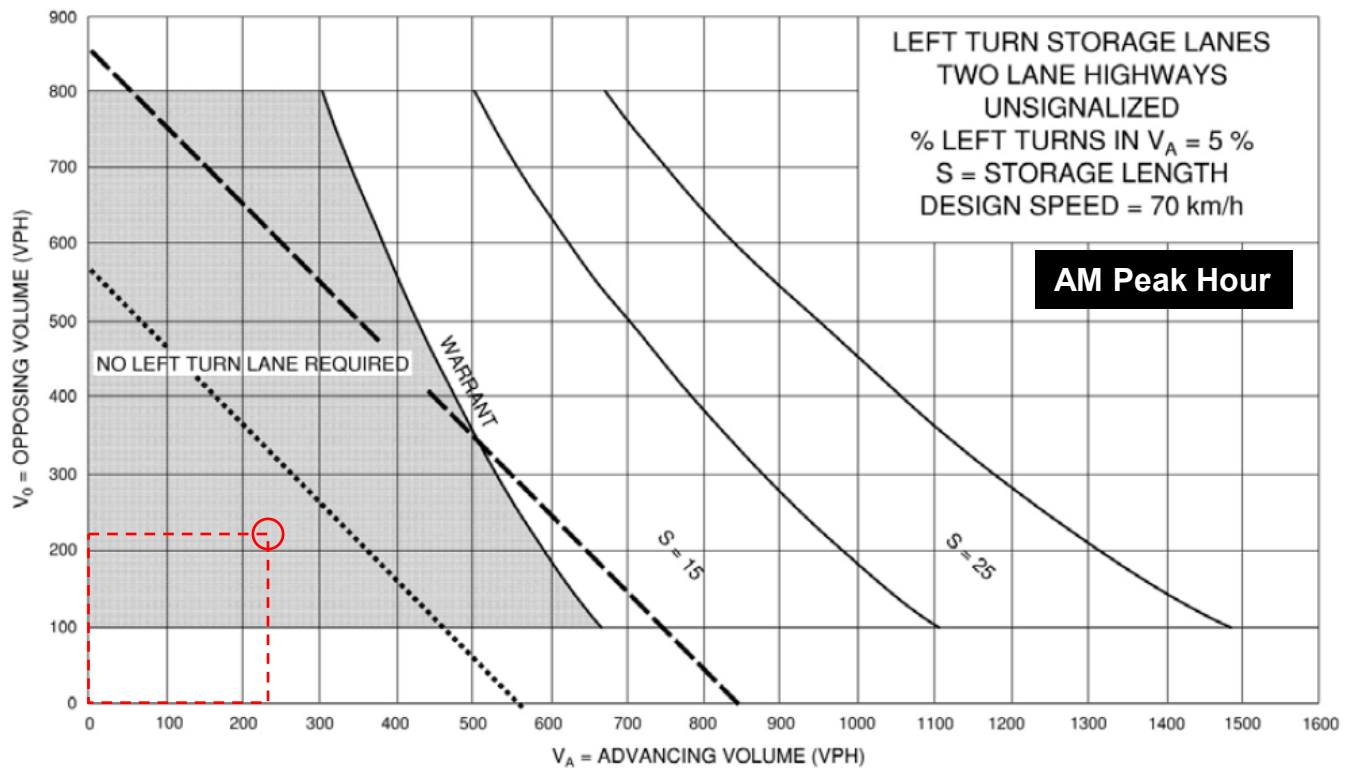


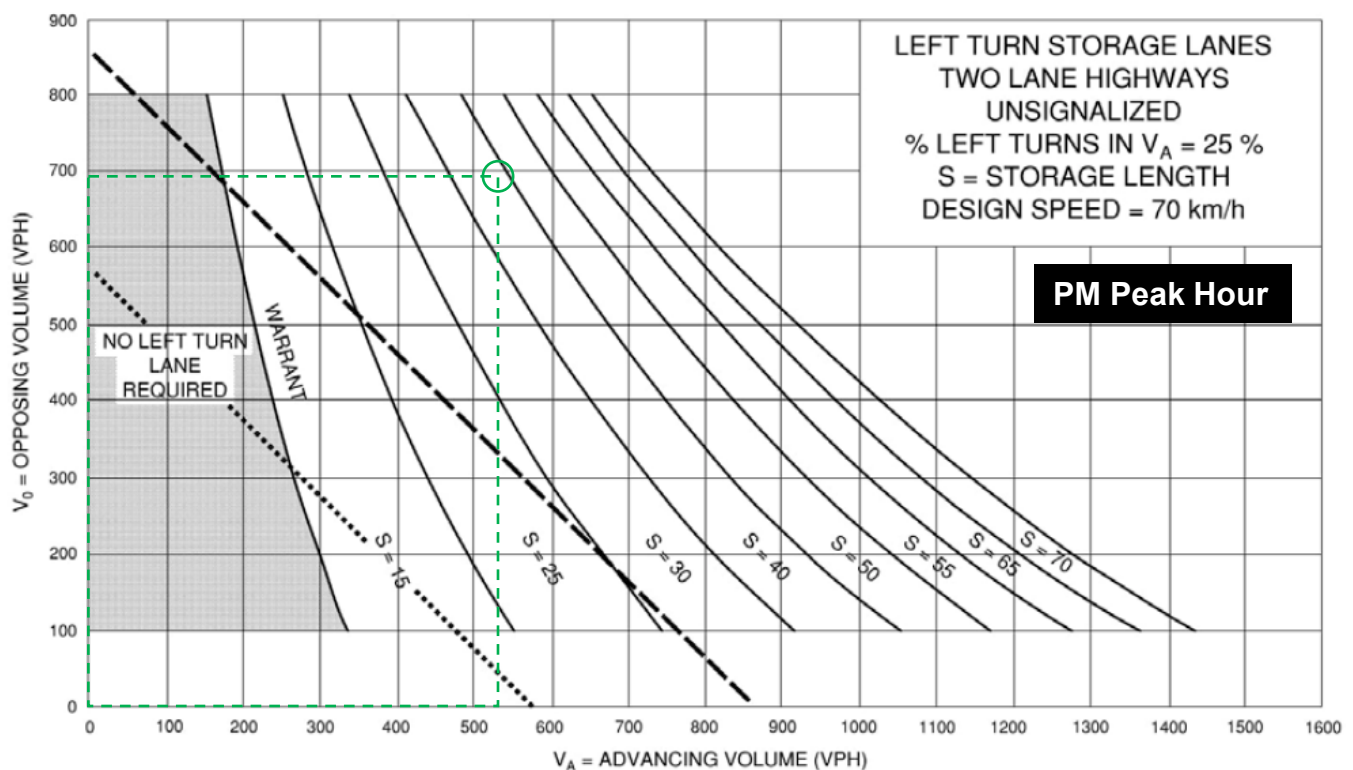
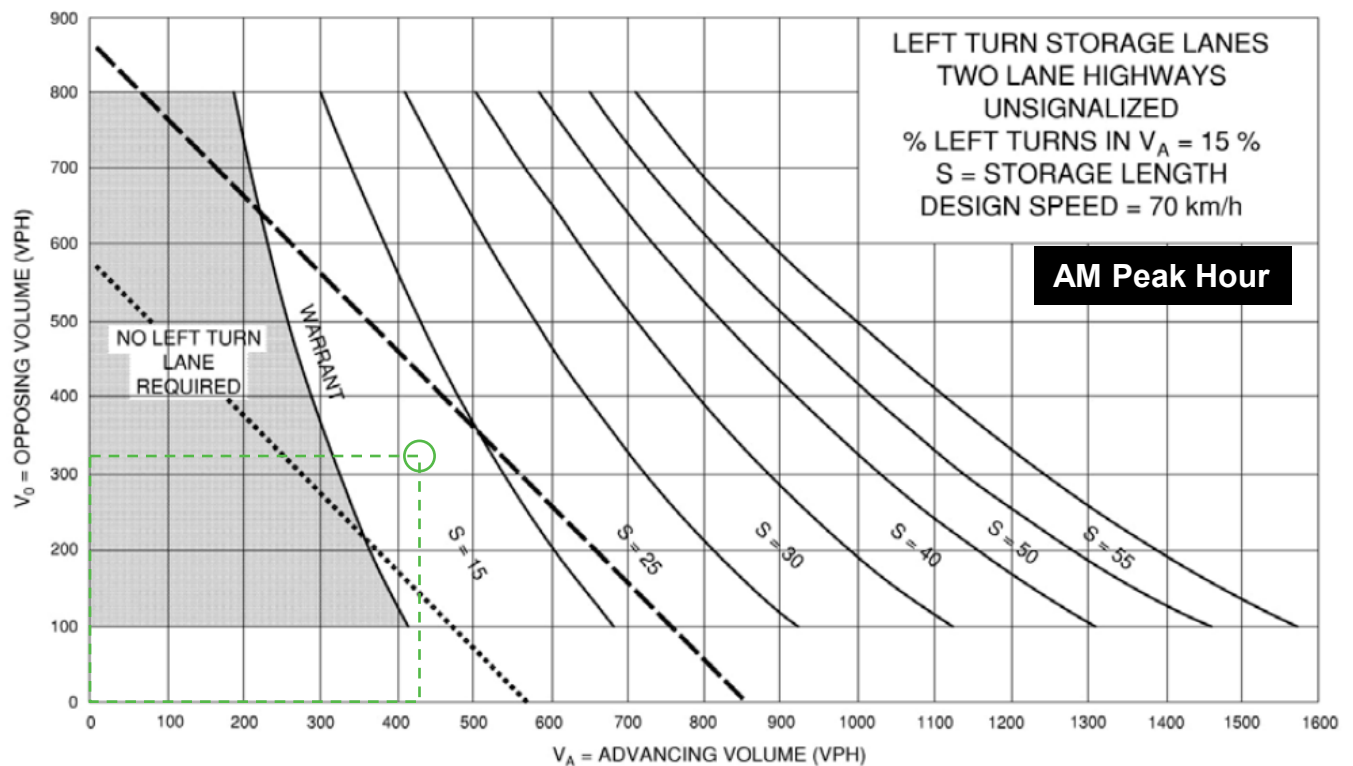


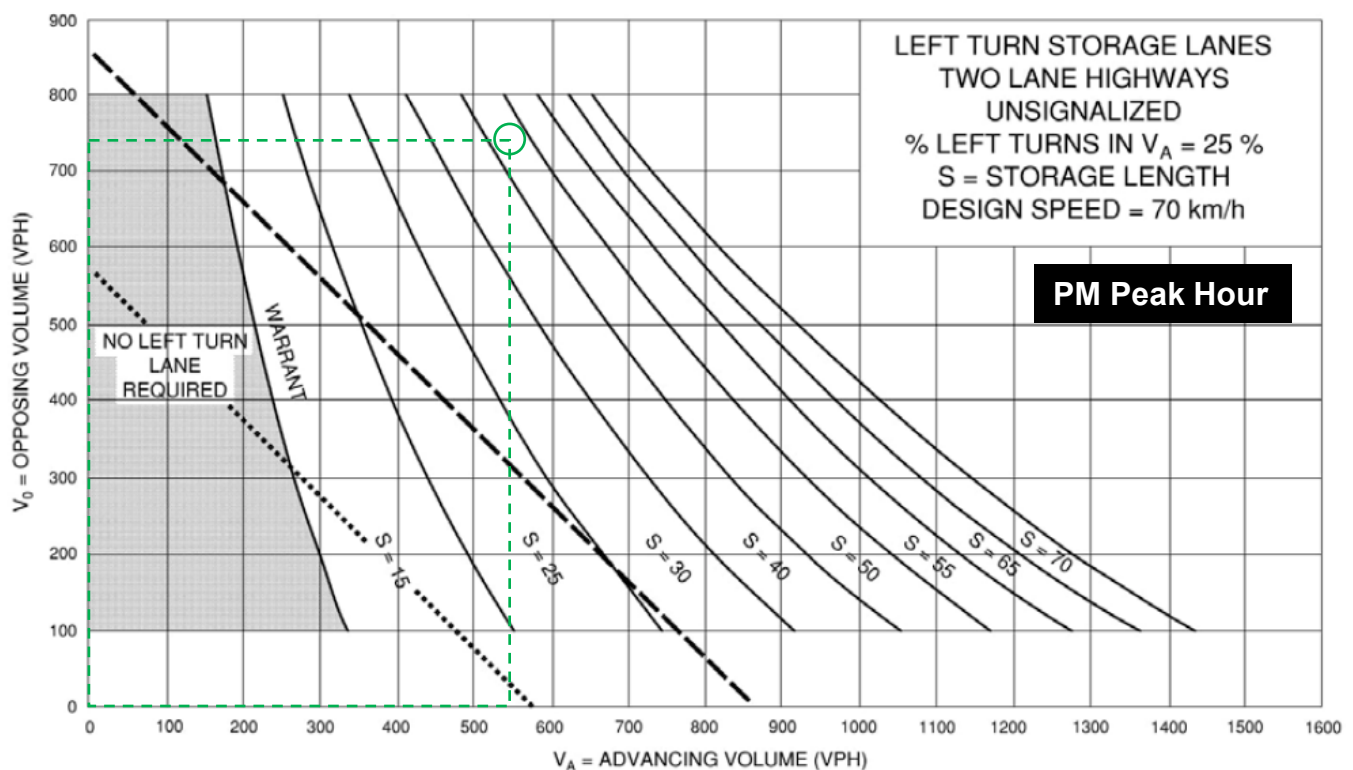
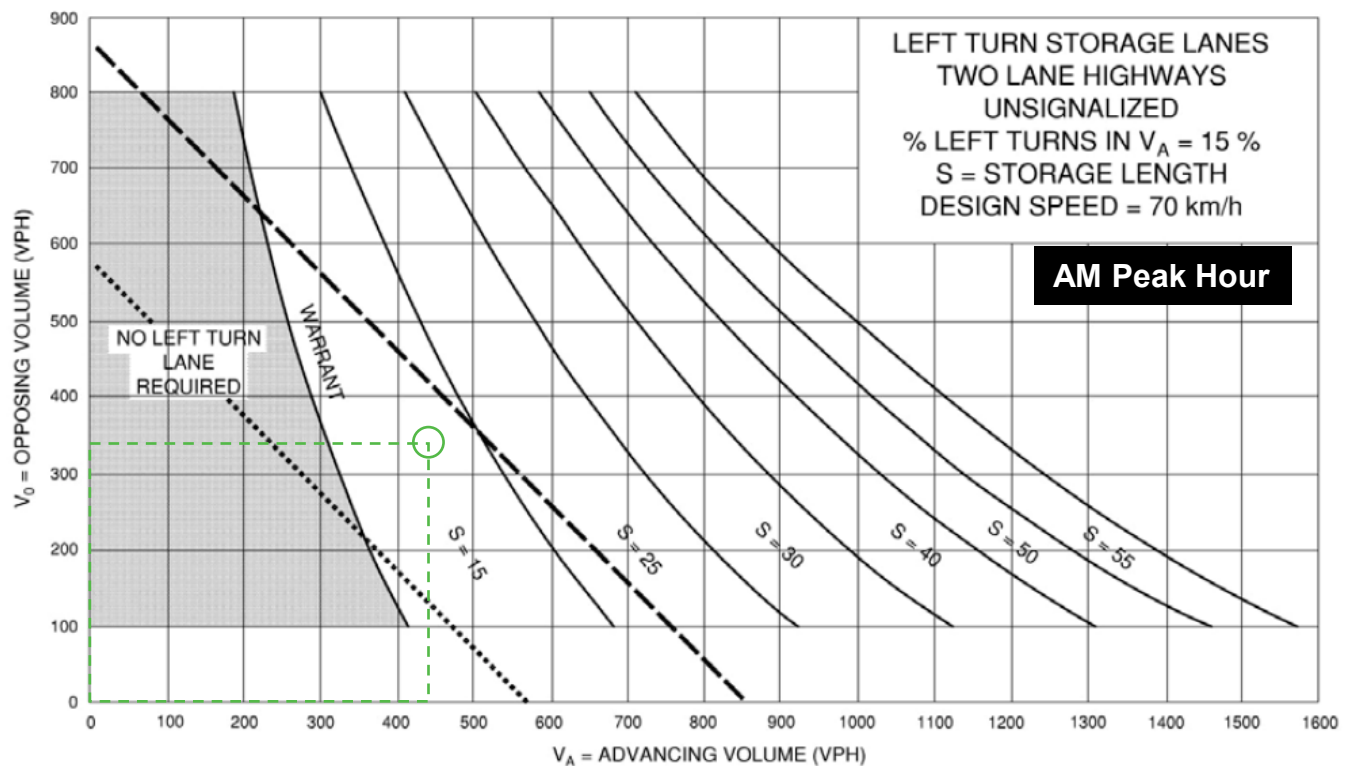


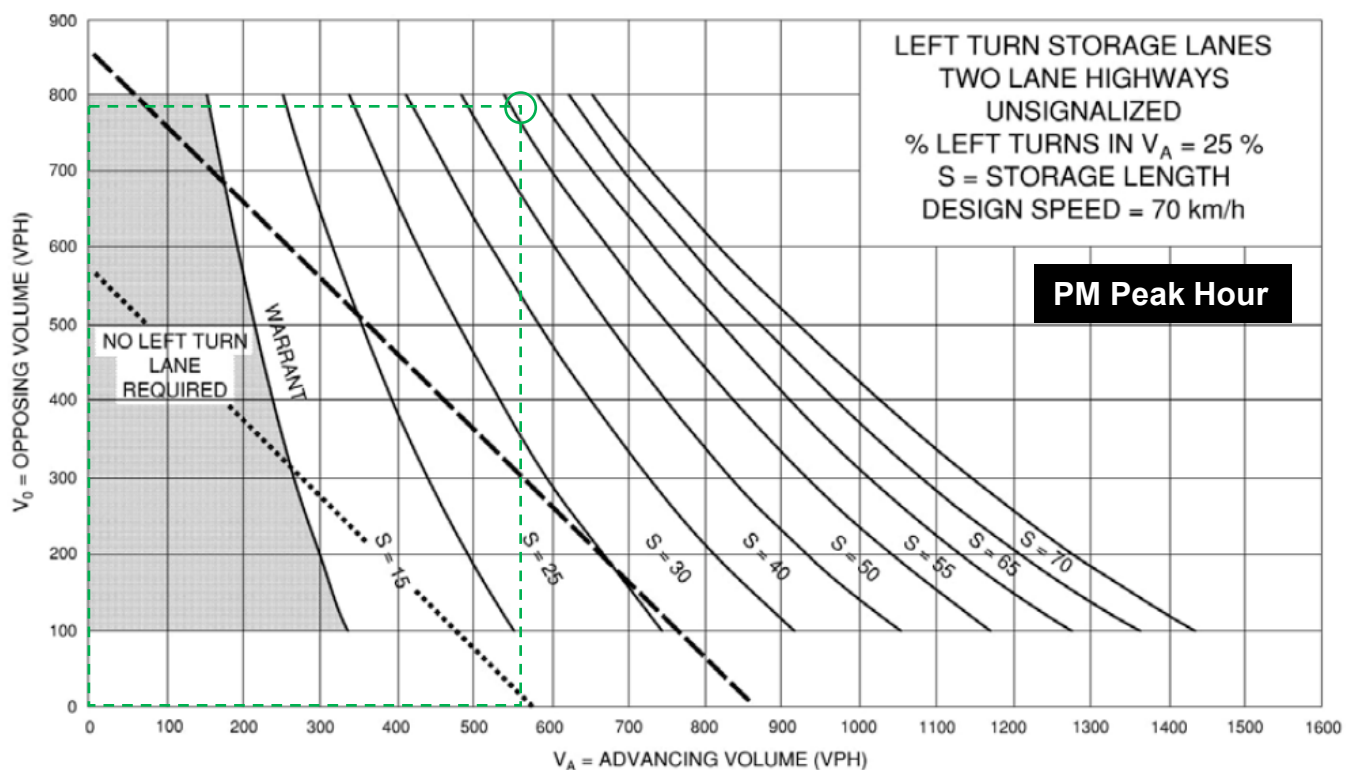
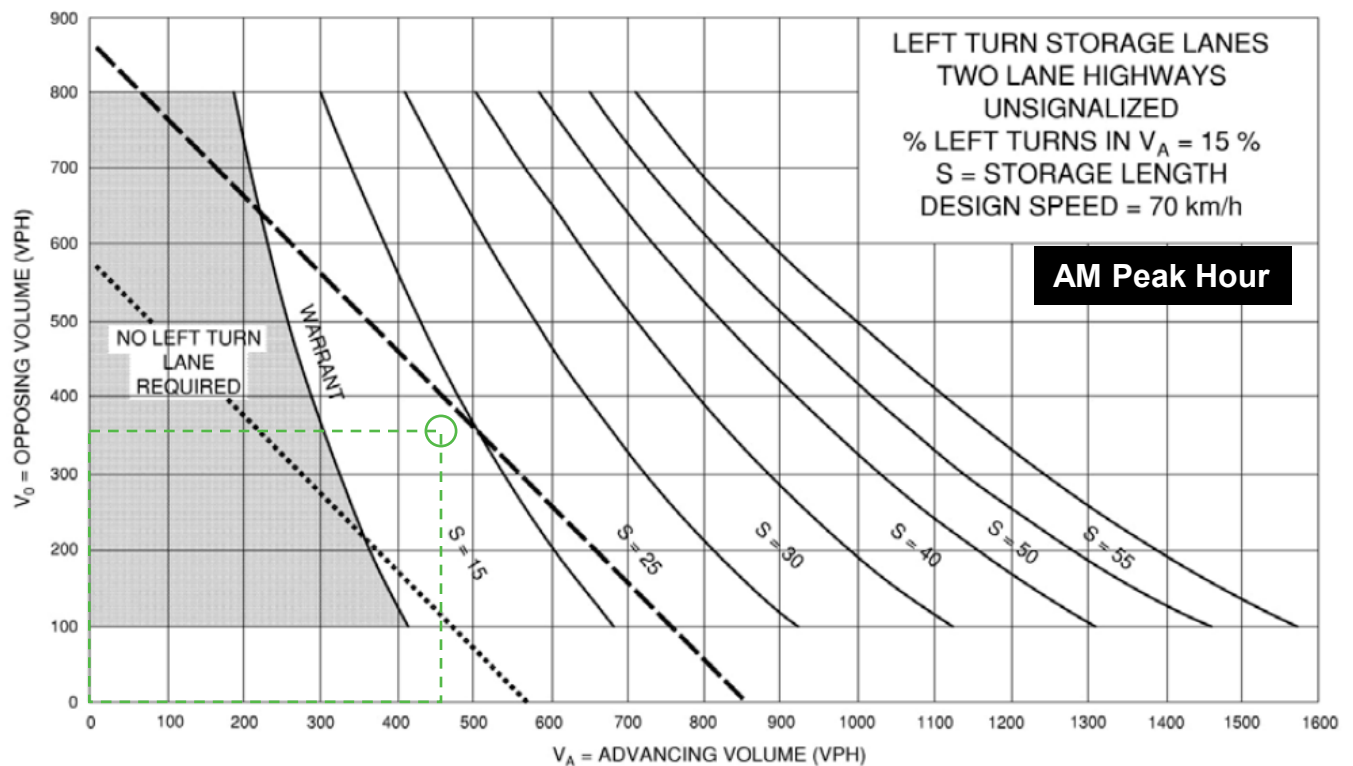


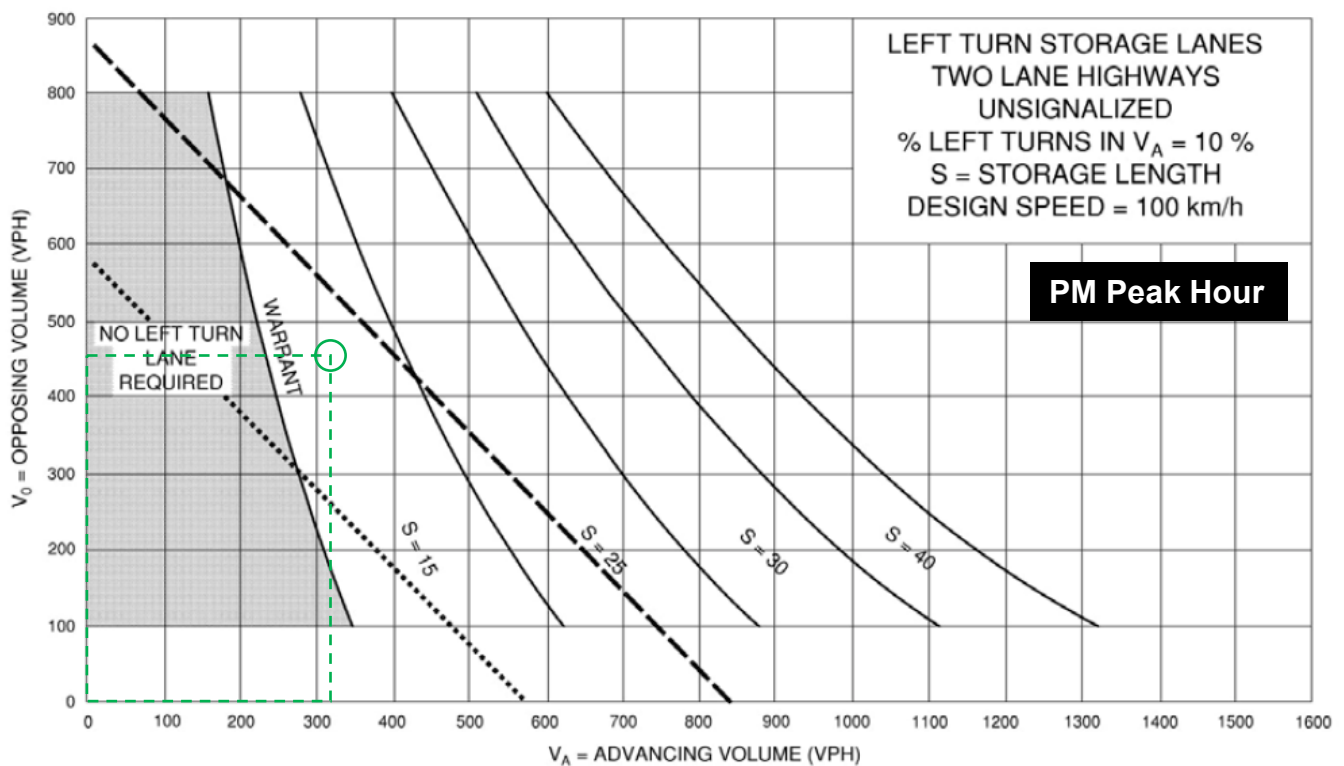
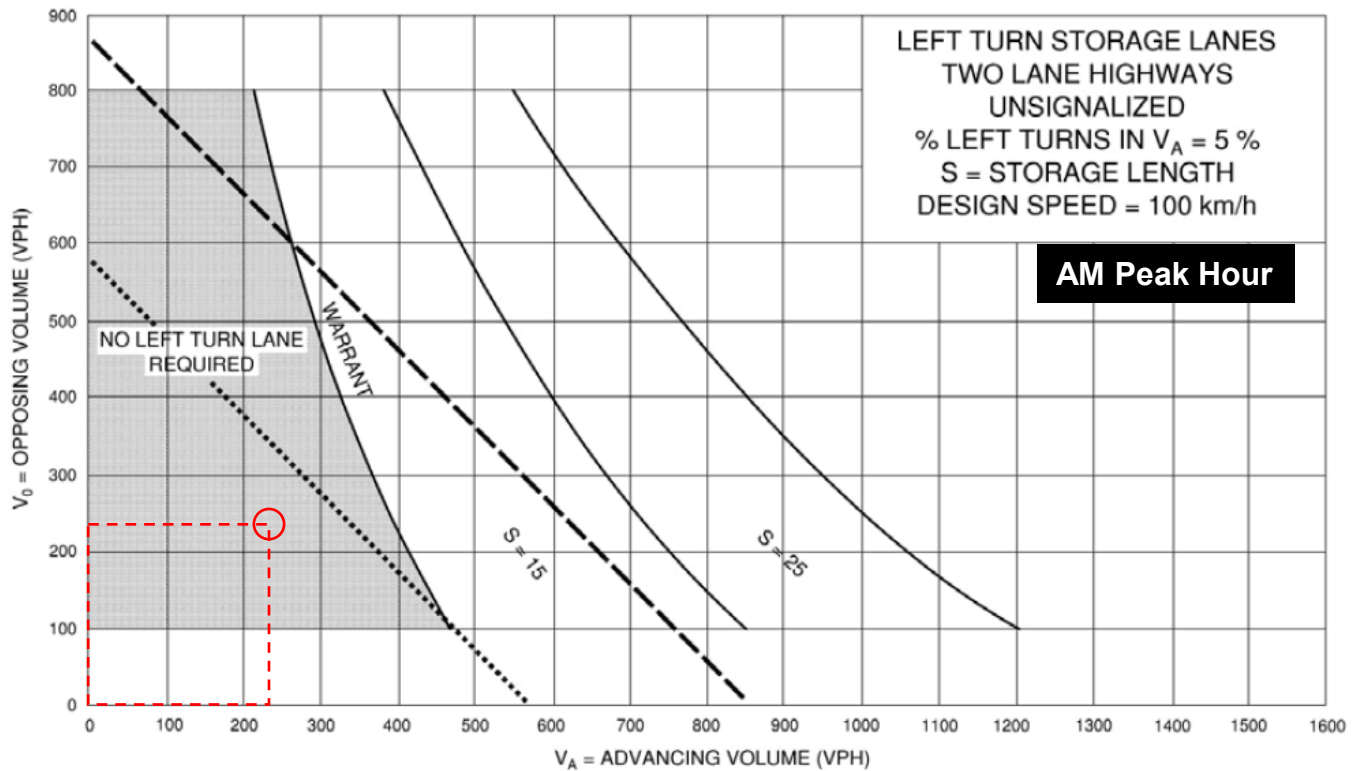


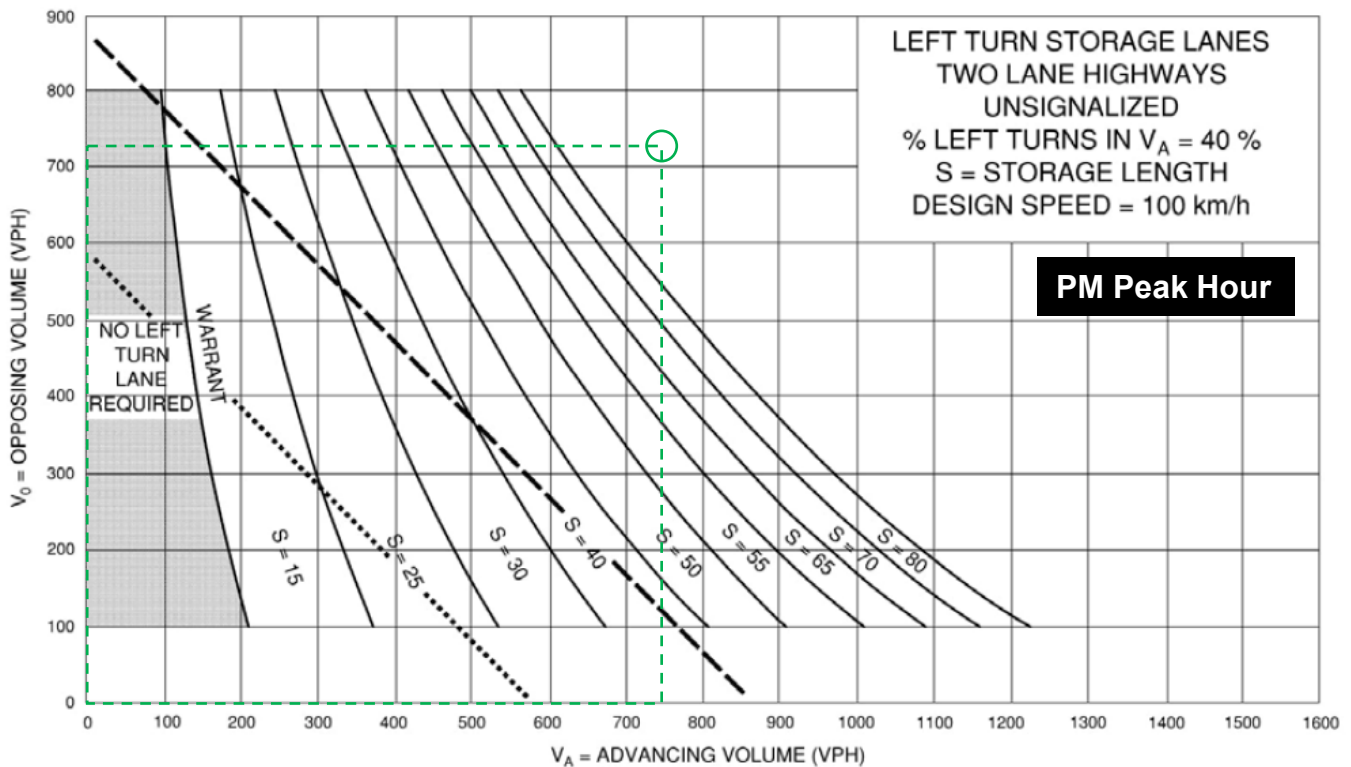
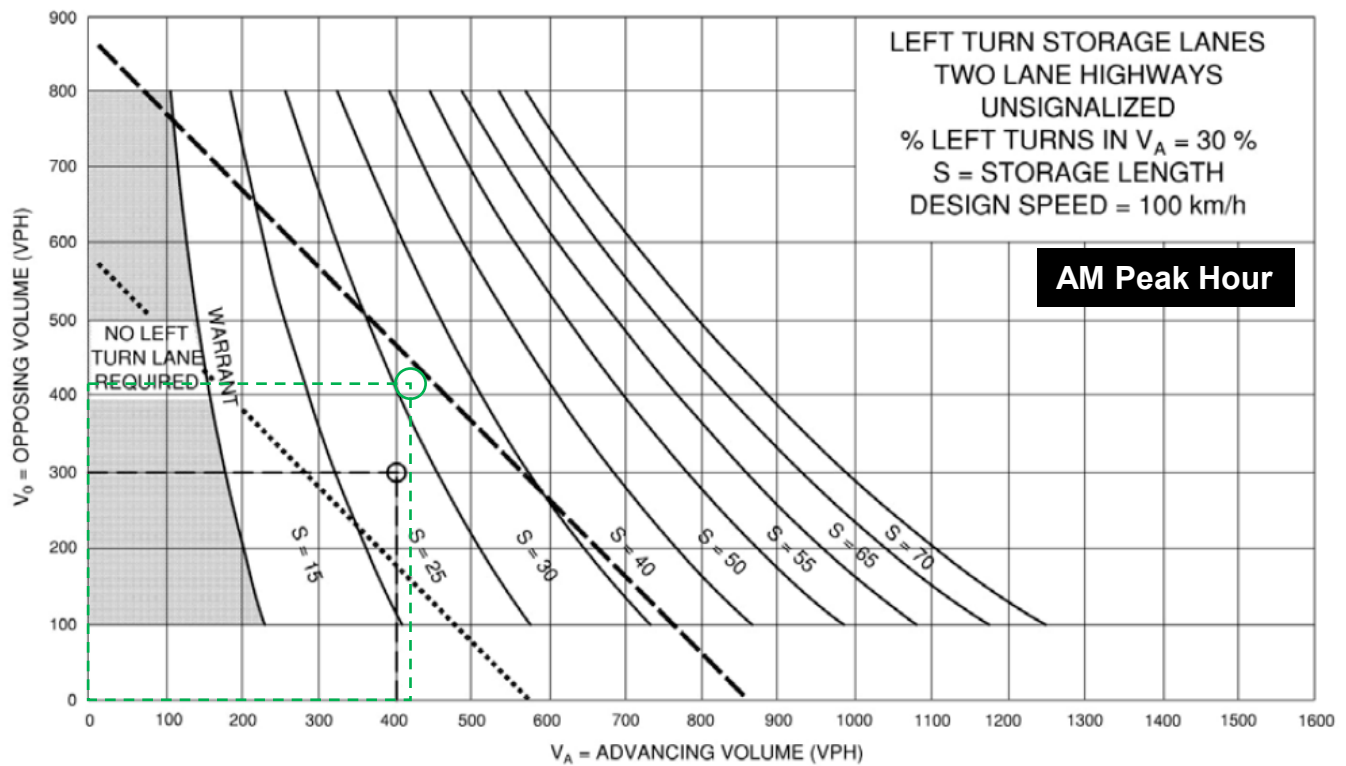


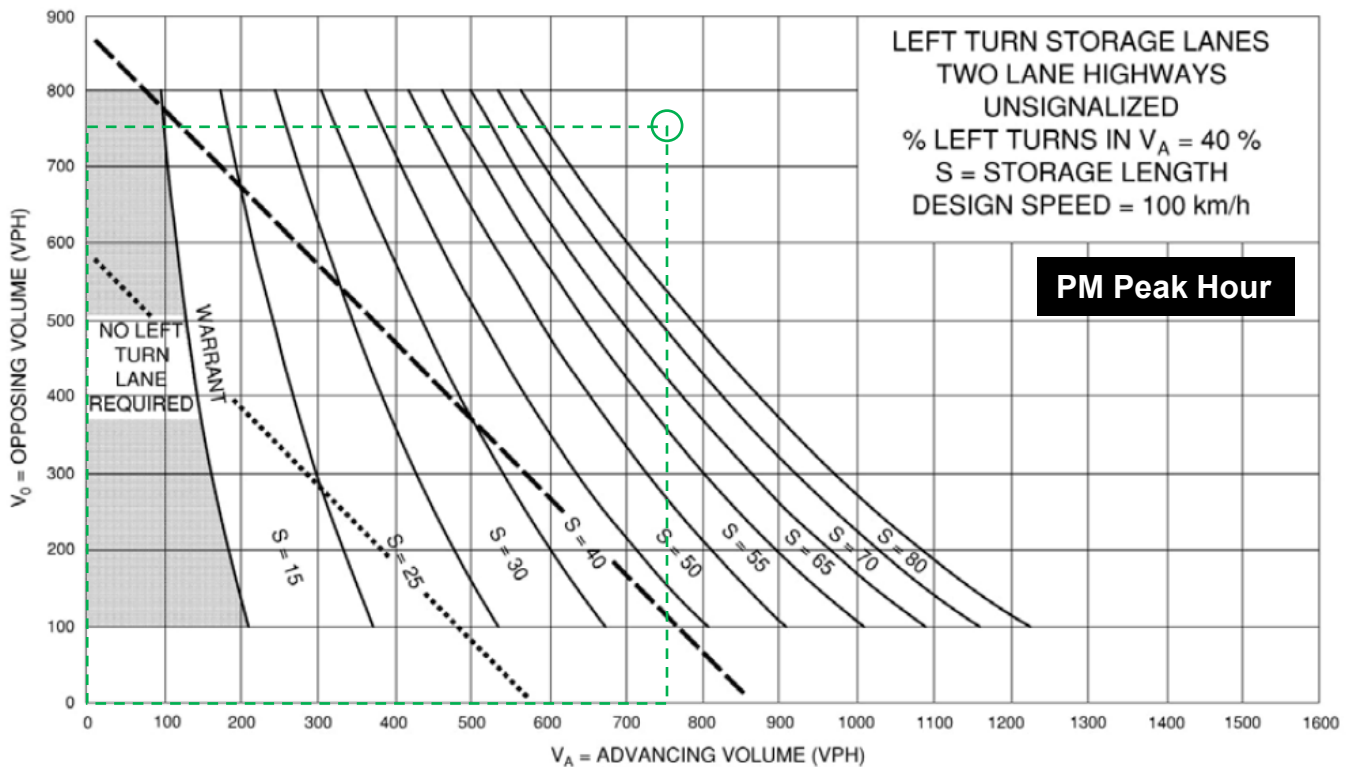
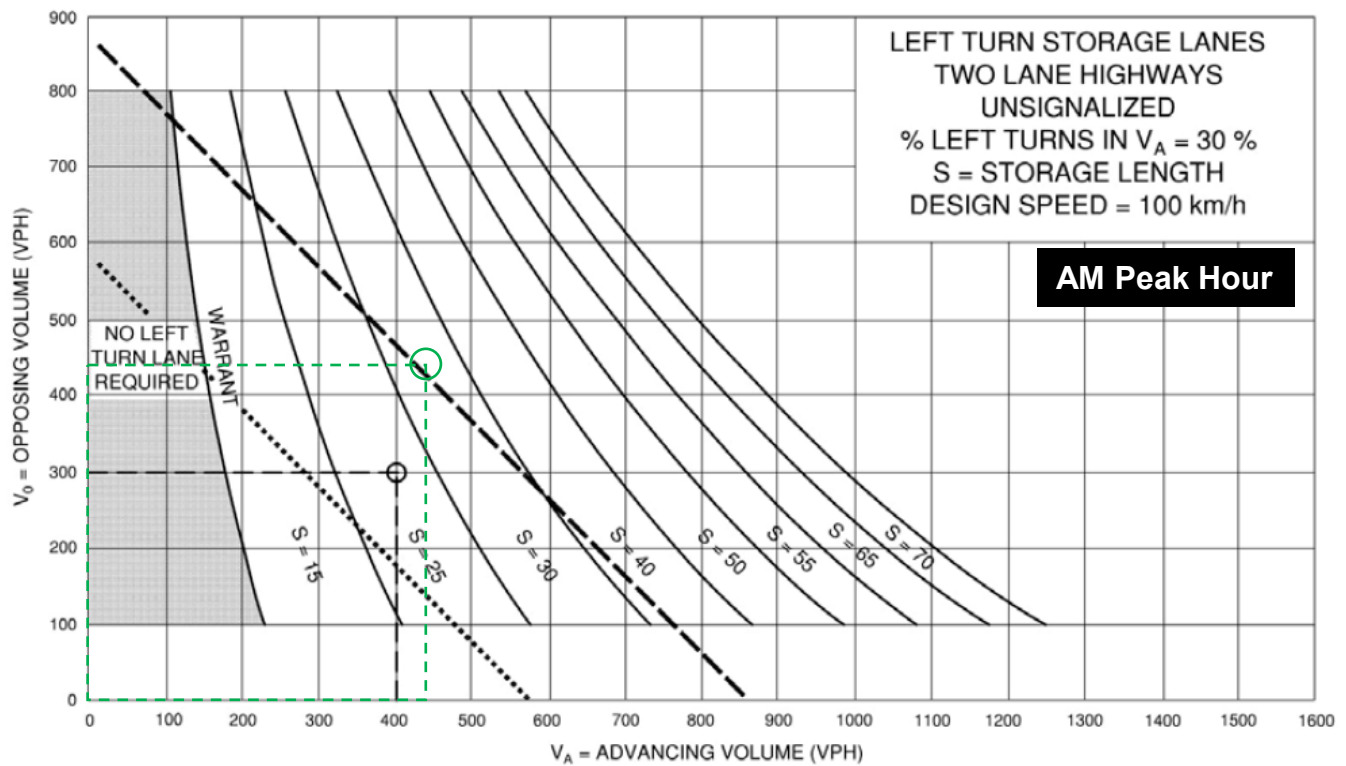


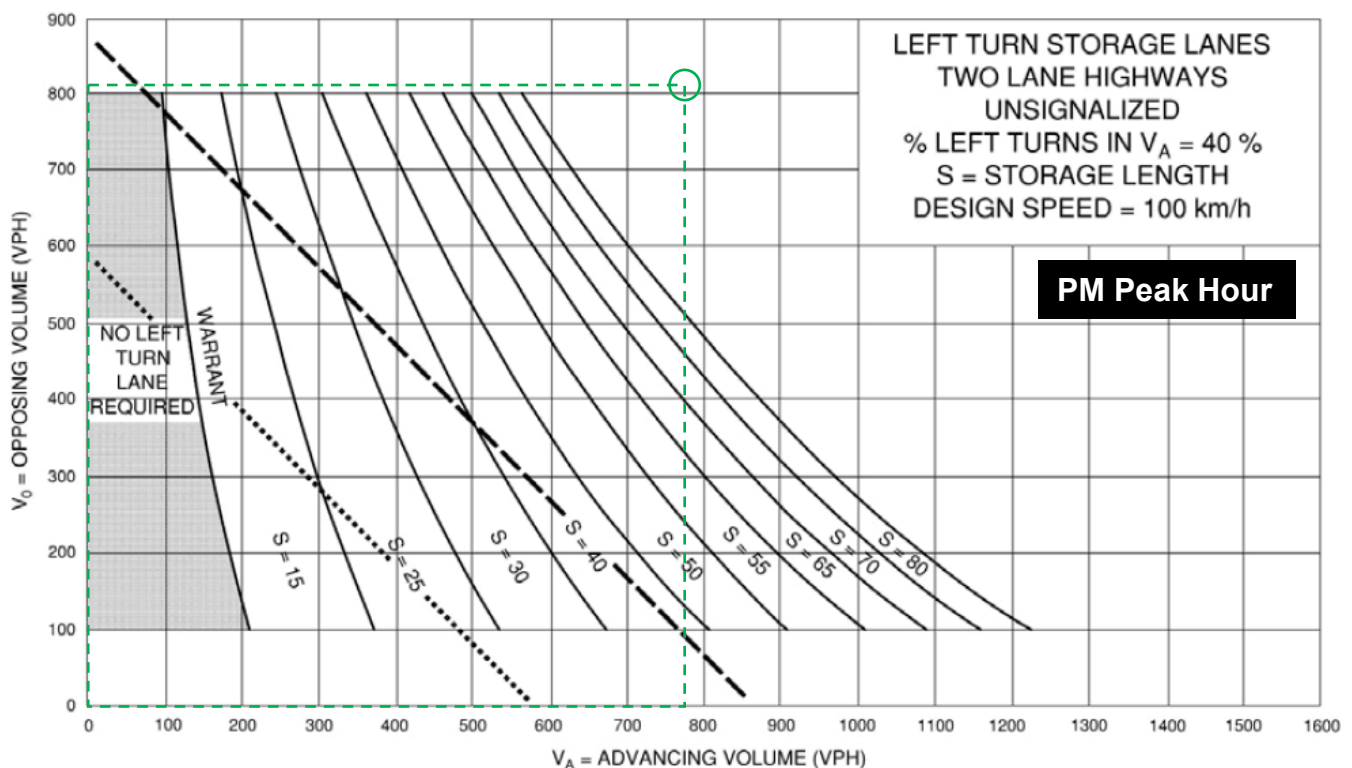
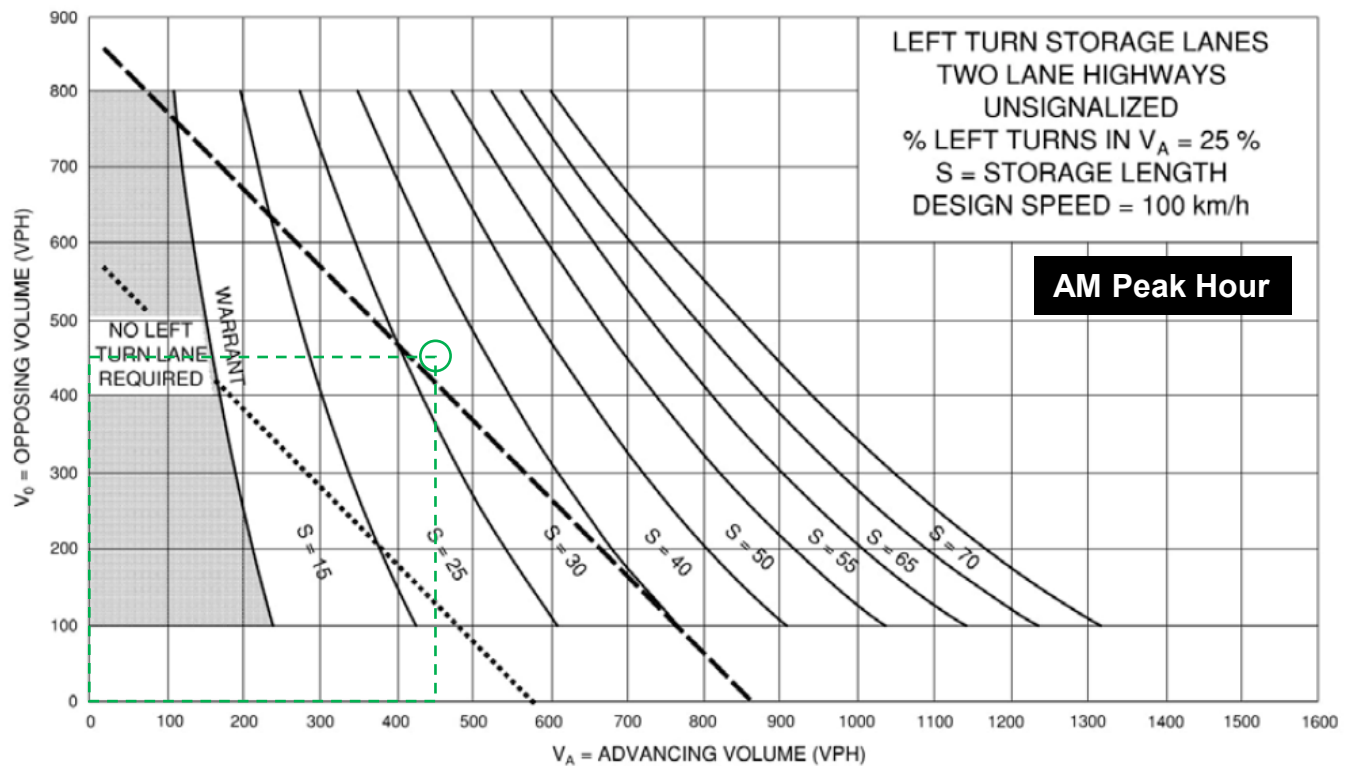


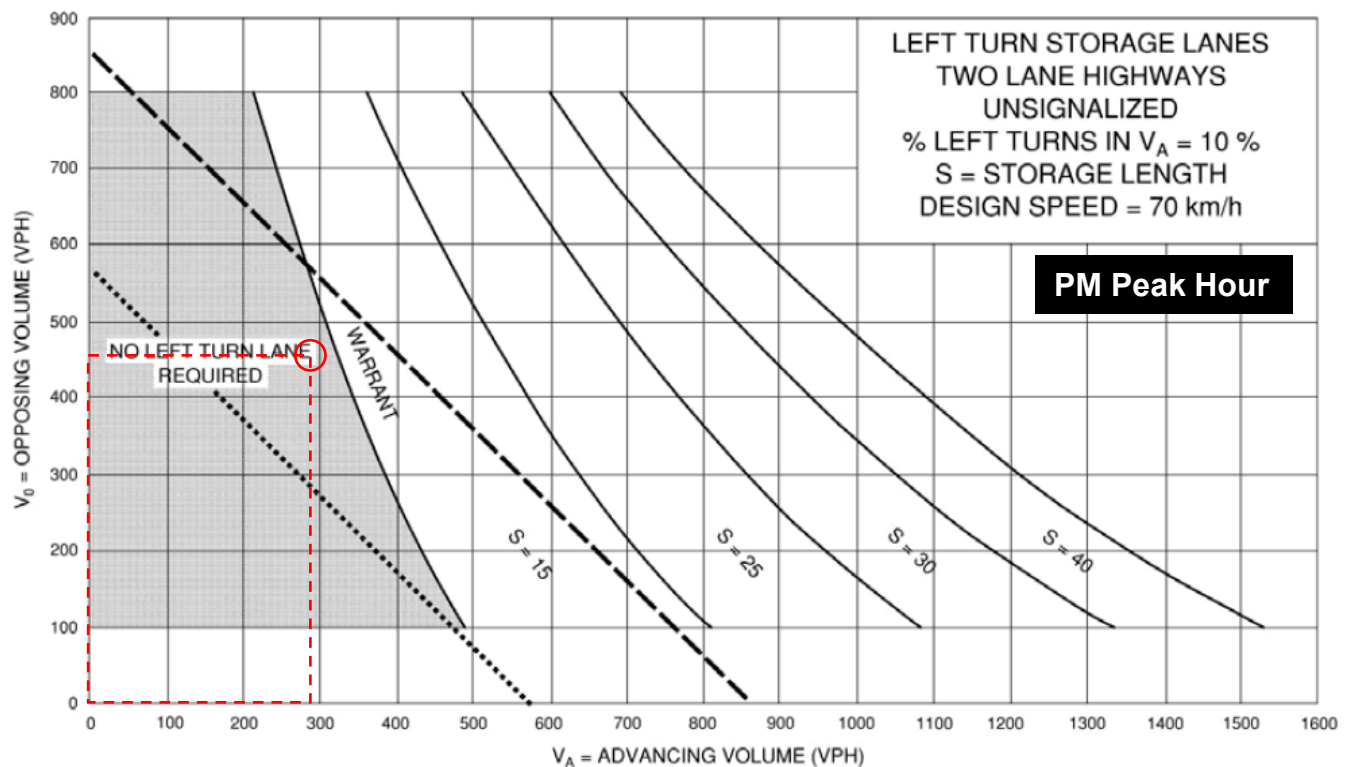
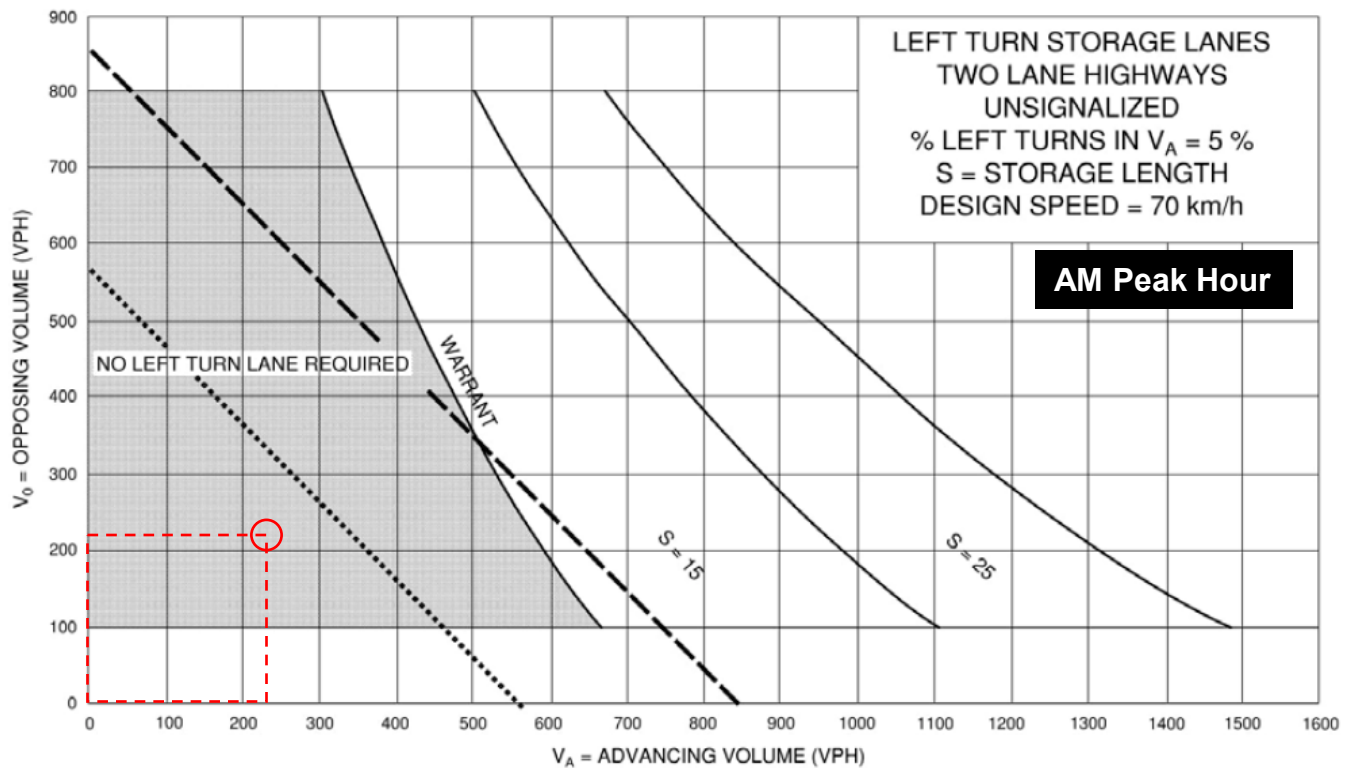


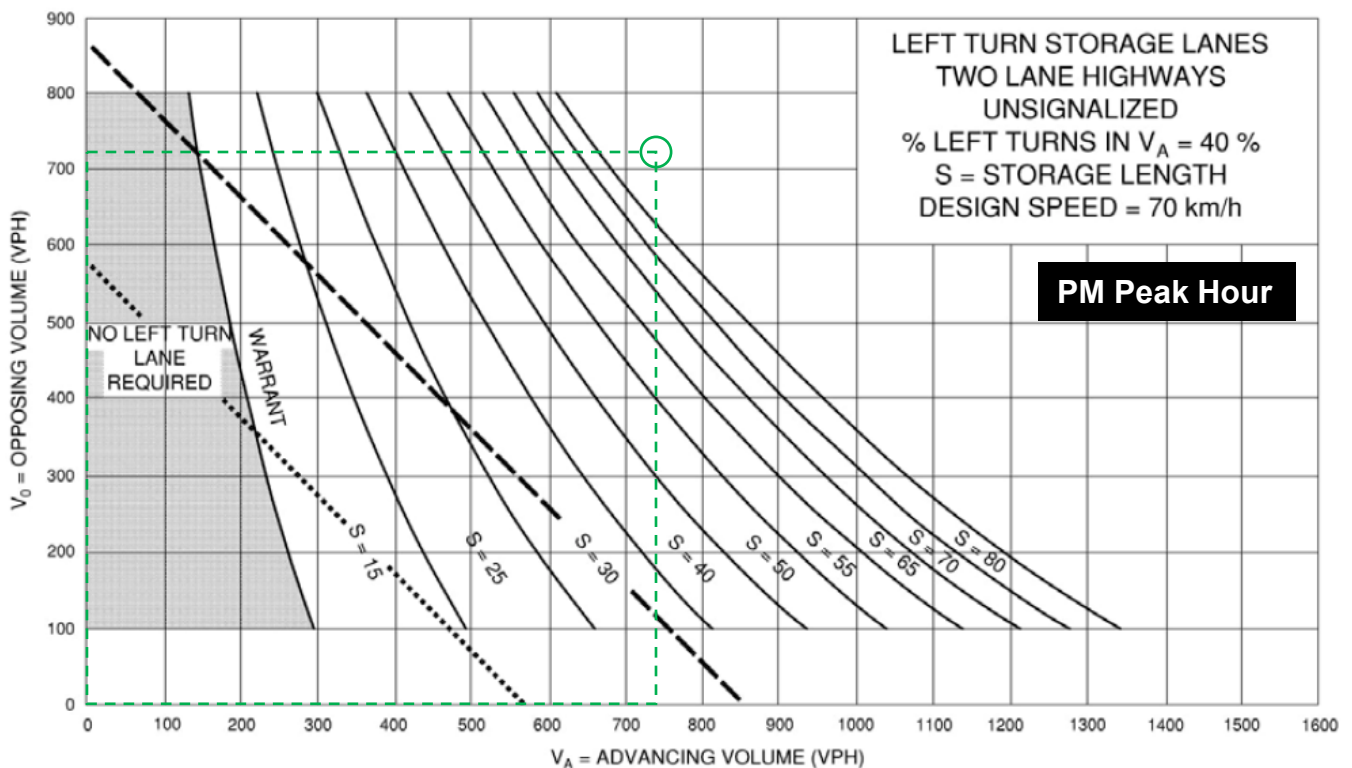
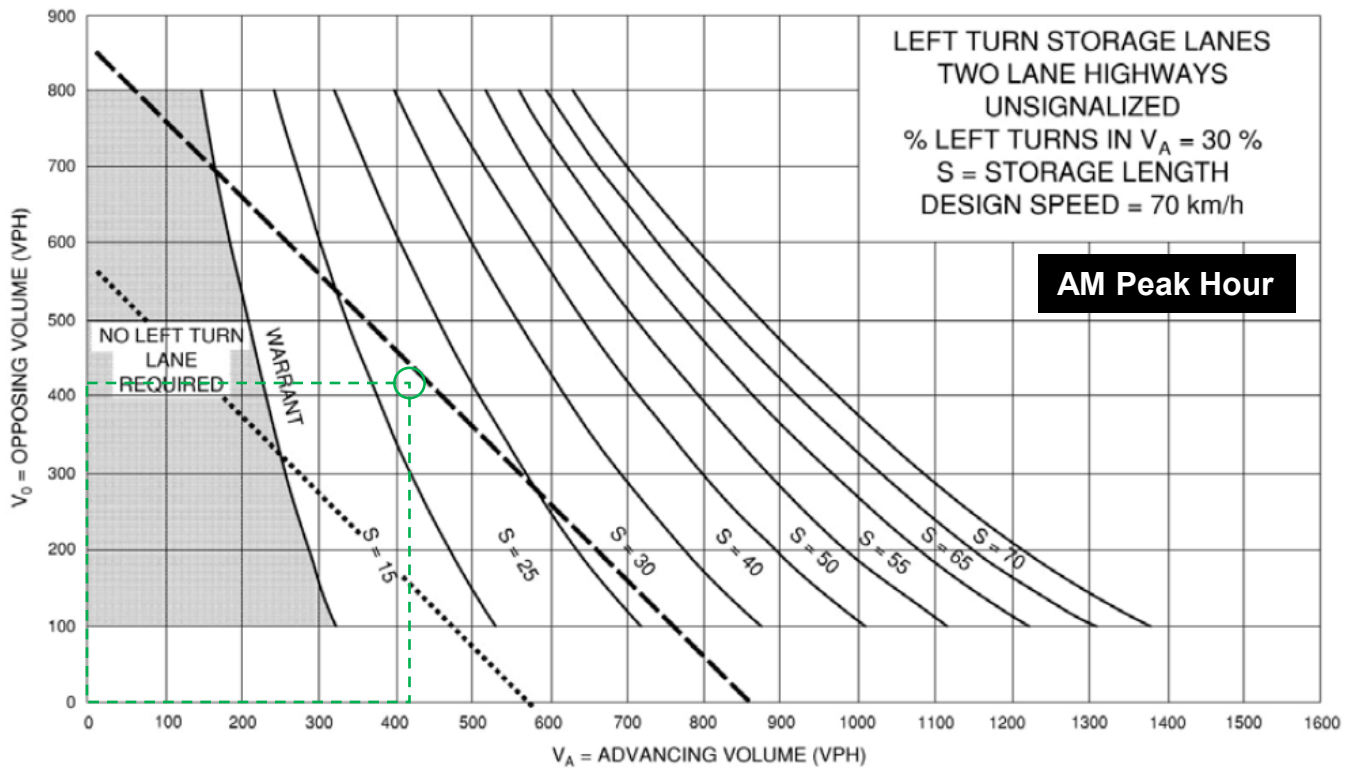


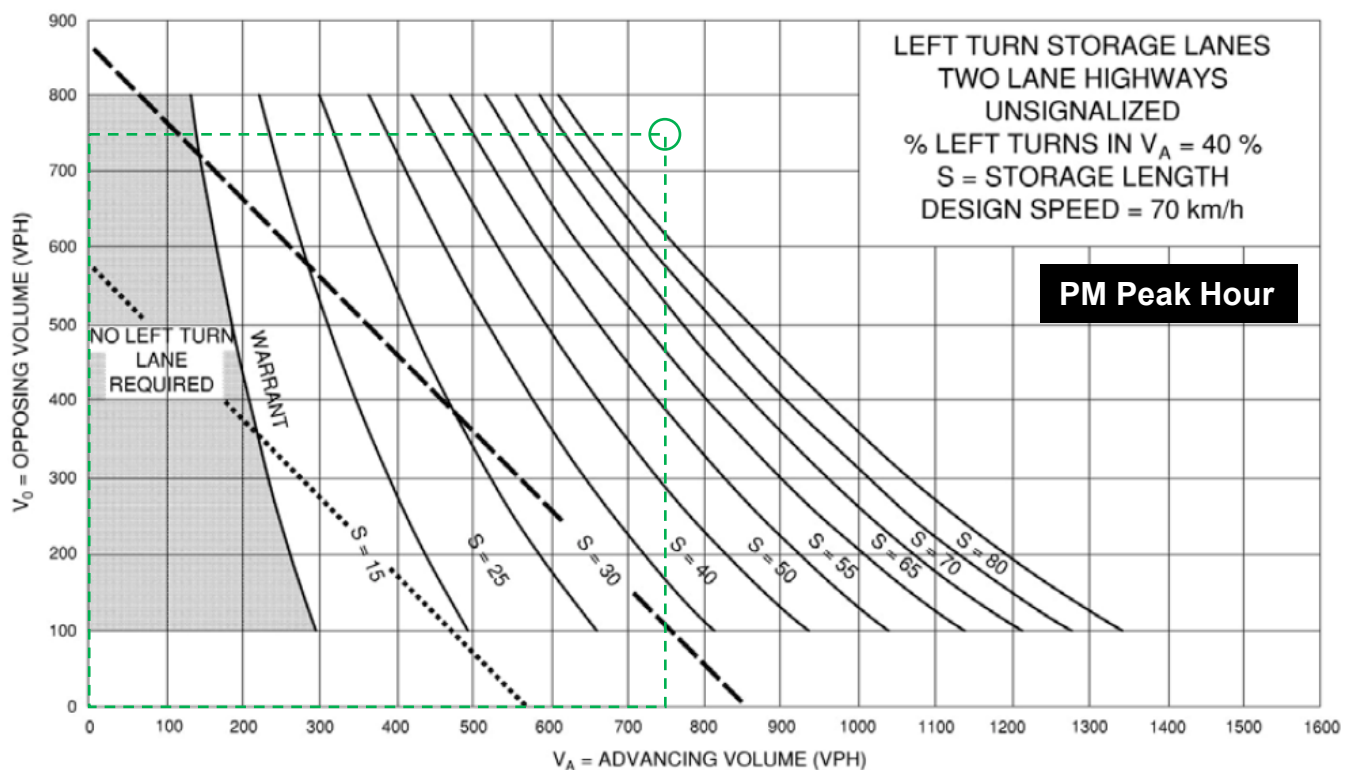
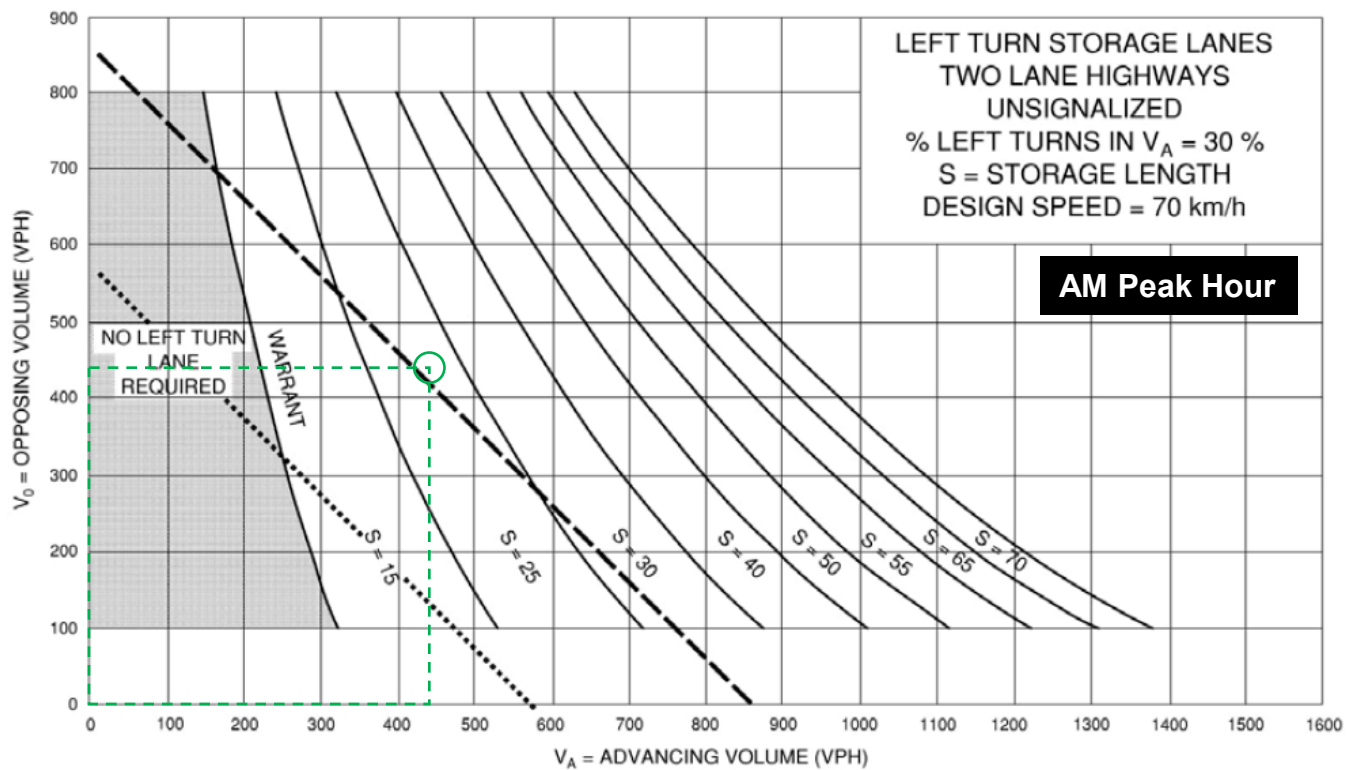


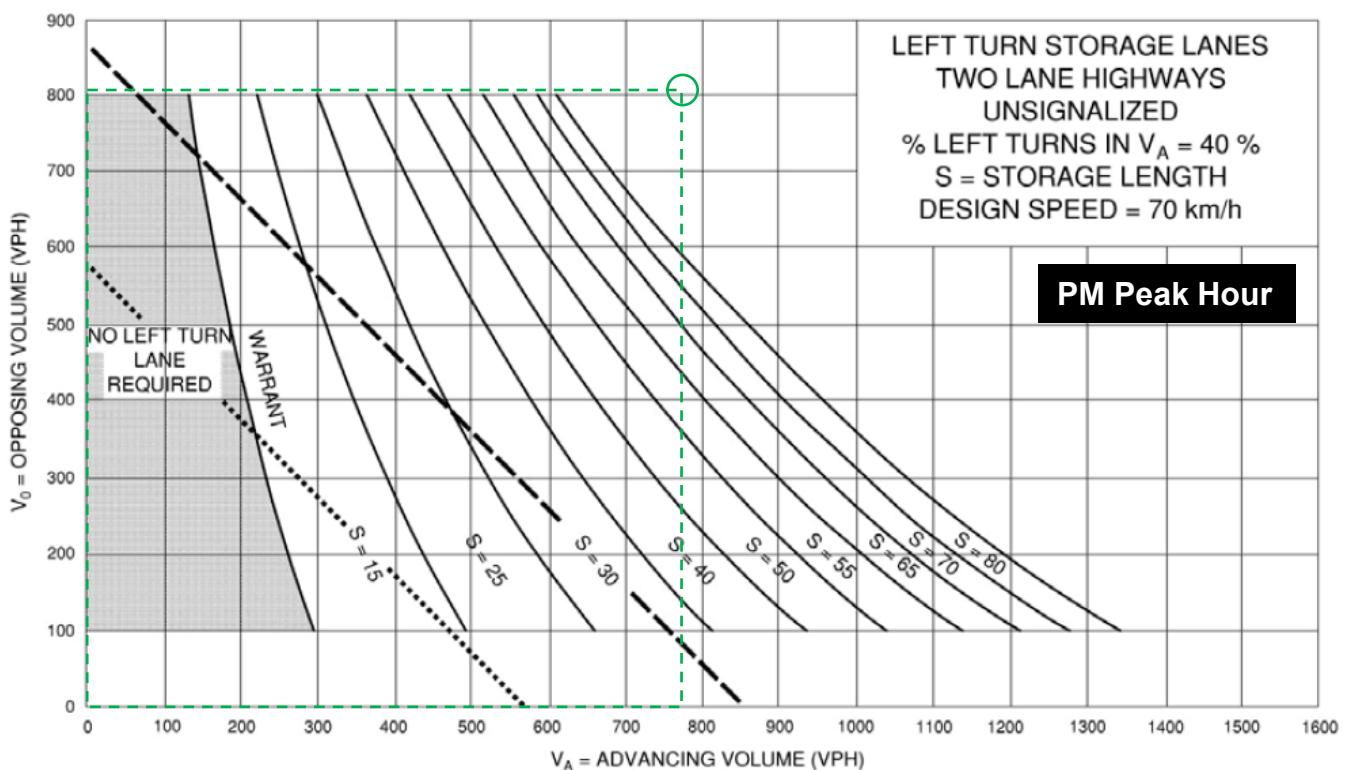
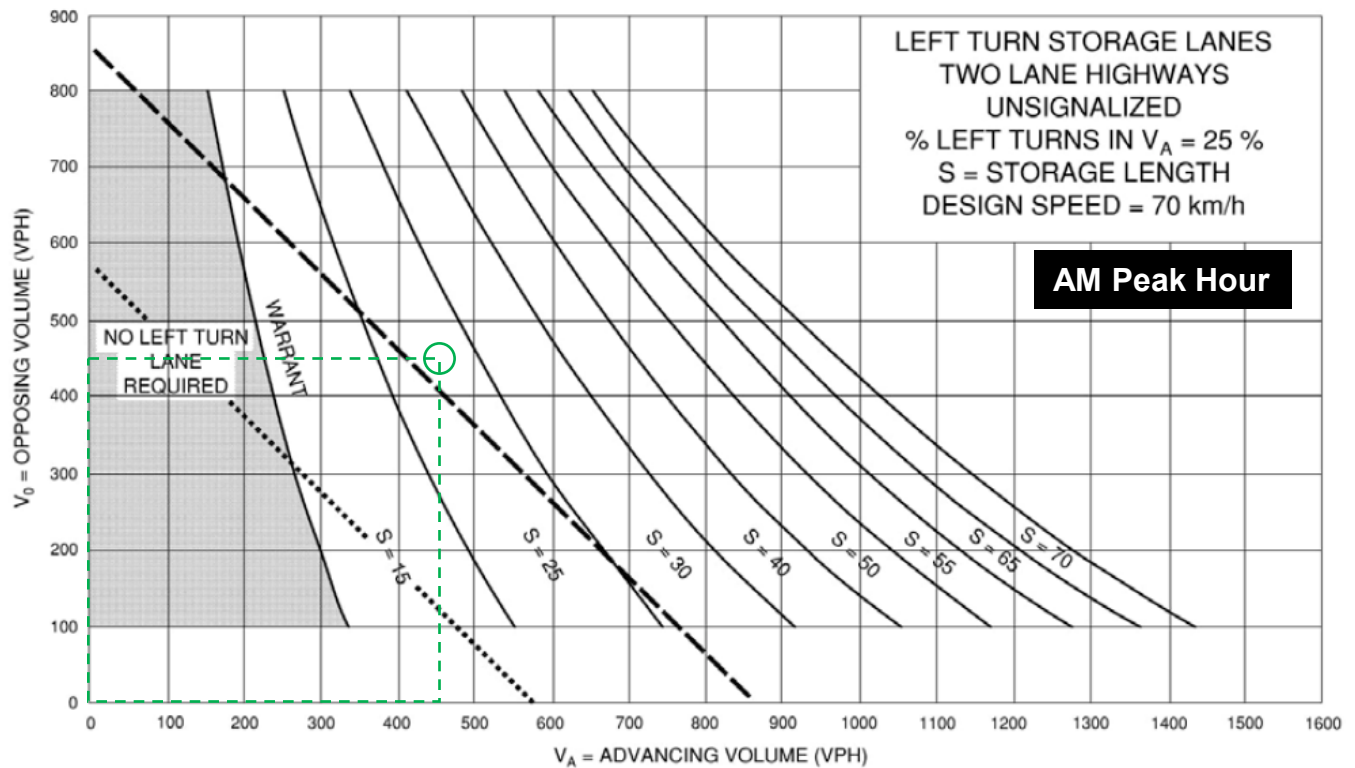












Northbound Left-Turn Lane Thorold Townline Road & Street H 2045 Total Traffic (70 km/h DS)

Appendix J1

2028 Total Operations with Improvements Synchro Reports



Lanes, Volumes, Timings

Total - 2028 - Phase 1 w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Future Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1629	1351
Storage Length (m)	90.0		60.0	55.0		0.0	80.0		0.0	50.0		50.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850		0.990			0.972				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	3005	1063	1429	2483	0	1311	1203	0	1191	1417	1073
Flt Permitted	0.449			0.376			0.676			0.657		
Satd. Flow (perm)	592	3005	1063	566	2483	0	933	1203	0	823	1417	1073
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			150		12			17				114
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			238.0	
Travel Time (s)		67.4			41.9			56.4			17.1	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	83	663	150	33	500	36	120	129	29	45	126	114
Shared Lane Traffic (%)												
Lane Group Flow (vph)	83	663	150	33	536	0	120	158	0	45	126	114
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings

Total - 2028 - Phase 1 w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		2	2		6	6	6
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		39.0	39.0		39.0	39.0	39.0
Total Split (s)	44.0	44.0	44.0	44.0	44.0		41.0	41.0		41.0	41.0	41.0
Total Split (%)	51.8%	51.8%	51.8%	51.8%	51.8%		48.2%	48.2%		48.2%	48.2%	48.2%
Maximum Green (s)	37.0	37.0	37.0	37.0	37.0		35.0	35.0		35.0	35.0	35.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	None
Walk Time (s)	15.0	15.0	15.0	15.0	15.0		15.0	15.0		15.0	15.0	15.0
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0		14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	0
Act Effect Green (s)	23.9	23.9	23.9	23.9	23.9		14.4	14.4		14.4	14.4	14.4
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.31	0.31		0.31	0.31	0.31
v/c Ratio	0.27	0.43	0.24	0.11	0.42		0.41	0.41		0.18	0.29	0.28
Control Delay (s/veh)	10.4	8.6	2.9	8.2	8.6		17.6	14.9		13.5	14.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	10.4	8.6	2.9	8.2	8.6		17.6	14.9		13.5	14.0	5.0
LOS	B	A	A	A	A		B	B		B	B	A
Approach Delay (s/veh)		7.8			8.6			16.1			10.3	
Approach LOS		A			A			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 85

Actuated Cycle Length: 46.4

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.43

Intersection Signal Delay (s/veh): 9.5

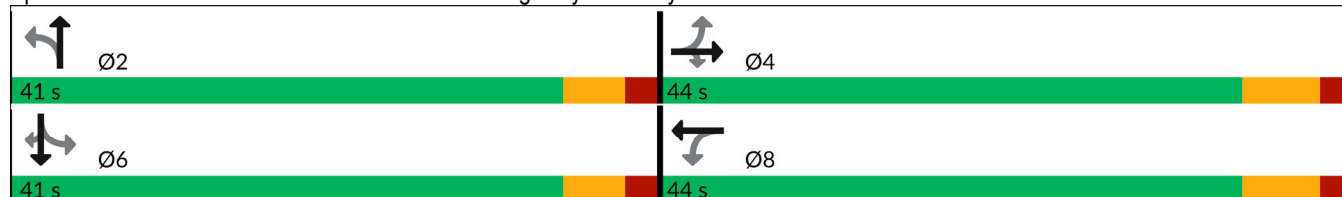
Intersection LOS: A

Intersection Capacity Utilization 68.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Total - 2028 - Phase 1 w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	83	663	150	33	536	120	158	45	126	114
v/c Ratio	0.27	0.43	0.24	0.11	0.42	0.41	0.41	0.18	0.29	0.28
Control Delay (s/veh)	10.4	8.6	2.9	8.2	8.6	17.6	14.9	13.5	14.0	5.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	10.4	8.6	2.9	8.2	8.6	17.6	14.9	13.5	14.0	5.0
Queue Length 50th (m)	3.2	14.6	0.0	1.2	11.4	7.6	8.9	2.6	7.7	0.0
Queue Length 95th (m)	13.5	34.4	7.6	6.0	28.4	20.7	23.1	9.1	19.3	8.4
Internal Link Dist (m)	912.7			557.5			759.0			214.0
Turn Bay Length (m)	90.0		60.0	55.0		80.0		50.0		50.0
Base Capacity (vph)	515	2616	944	492	2163	751	972	662	1141	886
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.16	0.25	0.16	0.07	0.25	0.16	0.16	0.07	0.11	0.13
Intersection Summary										

HCM Signalized Intersection Capacity Analysis 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Future Volume (vph)	76	610	138	30	460	33	110	119	27	41	116	105
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1629	1351
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1253	3005	1063	1429	2483		1311	1203		1191	1417	1073
Flt Permitted	0.45	1.00	1.00	0.38	1.00		0.68	1.00		0.66	1.00	1.00
Satd. Flow (perm)	593	3005	1063	566	2483		933	1203		823	1417	1073
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	83	663	150	33	500	36	120	129	29	45	126	114
RTOR Reduction (vph)	0	0	73	0	6	0	0	12	0	0	0	78
Lane Group Flow (vph)	83	663	77	33	530	0	120	146	0	45	126	36
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA		Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	20.8	20.8	20.8	20.8	20.8		12.4	12.4		12.4	12.4	12.4
Effective Green, g (s)	23.8	23.8	23.8	23.8	23.8		14.4	14.4		14.4	14.4	14.4
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.31	0.31		0.31	0.31	0.31
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		6.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	305	1548	547	291	1279		290	374		256	441	334
v/s Ratio Prot		c0.22			0.21			0.12			0.09	
v/s Ratio Perm	0.14		0.07	0.06			c0.13			0.05		0.03
v/c Ratio	0.27	0.43	0.14	0.11	0.41		0.41	0.39		0.18	0.29	0.11
Uniform Delay, d1	6.3	7.0	5.9	5.8	6.9		12.6	12.5		11.6	12.0	11.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.5	0.2	0.1	0.2	0.2		1.0	0.7		0.3	0.4	0.1
Delay (s)	6.8	7.2	6.0	5.9	7.1		13.5	13.1		11.9	12.4	11.5
Level of Service	A		A	A	A		B	B		B	B	B
Approach Delay (s/veh)		6.9			7.1			13.3			11.9	
Approach LOS		A			A			B			B	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			8.5			HCM 2000 Level of Service				A		
HCM 2000 Volume to Capacity ratio			0.42									
Actuated Cycle Length (s)			46.2			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			68.8%			ICU Level of Service				C		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
Future Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	100.0			100.0			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.962			0.981			0.957			0.954	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1361	1302	0	1429	1338	0	1242	1208	0	1335	1175	0
Flt Permitted	0.557			0.660			0.581			0.530		
Satd. Flow (perm)	798	1302	0	993	1338	0	760	1208	0	745	1175	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			14			49			53	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2177.2			714.3	
Travel Time (s)		30.1			38.7			156.8			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	95	114	39	60	222	33	50	247	100	17	203	89
Shared Lane Traffic (%)												
Lane Group Flow (vph)	95	153	0	60	255	0	50	347	0	17	292	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	26.0	26.0		26.0	26.0		34.0	34.0		34.0	34.0	
Total Split (%)	43.3%	43.3%		43.3%	43.3%		56.7%	56.7%		56.7%	56.7%	
Maximum Green (s)	20.0	20.0		20.0	20.0		28.0	28.0		28.0	28.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)	16.1	16.1		16.1	16.1		23.4	23.4		23.4	23.4	
Actuated g/C Ratio	0.39	0.39		0.39	0.39		0.56	0.56		0.56	0.56	
v/c Ratio	0.31	0.29		0.16	0.48		0.12	0.50		0.04	0.43	
Control Delay (s/veh)	15.1	11.2		12.4	15.1		8.6	10.9		7.8	9.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	15.1	11.2		12.4	15.1		8.6	10.9		7.8	9.7	
LOS	B	B		B	B		A	B		A	A	
Approach Delay (s/veh)		12.7			14.6			10.6			9.5	
Approach LOS		B			B			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 41.6

Natural Cycle: 50

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.50

Intersection Signal Delay (s/veh): 11.7

Intersection LOS: B

Intersection Capacity Utilization 71.2%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 102: Thorold Townline Rd & Beaverdams Rd



Queues

Total - 2028 - Phase 1 w/ Improvements

102: Thorold Townline Rd & Beaverdams Rd

AM Peak Hour

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	95	153	60	255	50	347	17	292
v/c Ratio	0.31	0.29	0.16	0.48	0.12	0.50	0.04	0.43
Control Delay (s/veh)	15.1	11.2	12.4	15.1	8.6	10.9	7.8	9.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	15.1	11.2	12.4	15.1	8.6	10.9	7.8	9.7
Queue Length 50th (m)	4.7	5.8	2.8	12.8	2.0	14.5	0.6	11.0
Queue Length 95th (m)	18.6	22.0	11.9	40.7	8.1	44.0	3.7	34.5
Internal Link Dist (m)		394.6		513.1		2153.2		690.3
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	461	766	574	780	569	917	558	893
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.21	0.20	0.10	0.33	0.09	0.38	0.03	0.33
Intersection Summary								

HCM Signalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
Future Volume (vph)	87	105	36	55	204	30	46	227	92	16	187	82
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.96		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1361	1302		1429	1338		1242	1208		1335	1175	
Flt Permitted	0.56	1.00		0.66	1.00		0.58	1.00		0.53	1.00	
Satd. Flow (perm)	797	1302		992	1338		760	1208		744	1175	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	95	114	39	60	222	33	50	247	100	17	203	89
RTOR Reduction (vph)	0	23	0	0	10	0	0	24	0	0	26	0
Lane Group Flow (vph)	95	130	0	60	245	0	50	323	0	17	266	0
Heavy Vehicles (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	10.6	10.6		10.6	10.6		19.9	19.9		19.9	19.9	
Effective Green, g (s)	12.6	12.6		12.6	12.6		21.9	21.9		21.9	21.9	
Actuated g/C Ratio	0.30	0.30		0.30	0.30		0.52	0.52		0.52	0.52	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	236	386		294	396		391	622		383	605	
v/s Ratio Prot		0.10			c0.18			c0.27			0.23	
v/s Ratio Perm	0.12			0.06			0.07			0.02		
v/c Ratio	0.40	0.34		0.20	0.62		0.13	0.52		0.04	0.44	
Uniform Delay, d1	11.9	11.7		11.2	12.9		5.3	6.8		5.1	6.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.5		0.3	2.9		0.1	0.7		0.0	0.5	
Delay (s)	13.1	12.2		11.5	15.8		5.5	7.6		5.2	7.0	
Level of Service	B	B		B	B		A	A		A	A	
Approach Delay (s/veh)		12.5			15.0			7.3			6.9	
Approach LOS		B			B			A			A	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			10.1									B
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			42.5									8.0
Intersection Capacity Utilization			71.2%									C
ICU Level of Service												
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	88	513	537	138	310	203
Future Volume (vph)	88	513	537	138	310	203
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.969		0.947	
Flt Protected		0.993			0.971	
Satd. Flow (prot)	0	2149	2397	0	1282	0
Flt Permitted		0.993			0.971	
Satd. Flow (perm)	0	2149	2397	0	1282	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	96	558	584	150	337	221
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	654	734	0	558	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	100.2%			ICU Level of Service G		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	88	513	537	138	310	203
Future Volume (veh/h)	88	513	537	138	310	203
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	96	558	584	150	337	221
Approach Volume (veh/h)		654	734		558	
Crossing Volume (veh/h)		337	96		584	
High Capacity (veh/h)		1063	1285		873	
High v/c (veh/h)		0.62	0.57		0.64	
Low Capacity (veh/h)		870	1070		701	
Low v/c (veh/h)		0.75	0.69		0.80	
Intersection Summary						
Maximum v/c High			0.64			
Maximum v/c Low			0.80			
Intersection Capacity Utilization			100.2%		ICU Level of Service	G

Intersection					
Intersection Delay, s/veh	10.1				
Intersection LOS	B				
Approach	EB		WB		SB
Entry Lanes	2		2		1
Conflicting Circle Lanes	2		2		2
Adj Approach Flow, veh/h	654		734		558
Demand Flow Rate, veh/h	705		783		593
Vehicles Circulating, veh/h	350		119		619
Vehicles Exiting, veh/h	862		936		283
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	7.6		6.1		18.3
Approach LOS	A		A		C
Lane	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LR
Assumed Moves	LT	TR	LT	TR	LR
RT Channelized					
Lane Util	0.470	0.530	0.470	0.530	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	331	374	368	415	593
Cap Entry Lane, veh/h	978	1055	1210	1283	839
Entry HV Adj Factor	0.929	0.927	0.937	0.937	0.941
Flow Entry, veh/h	307	347	345	389	558
Cap Entry, veh/h	909	978	1134	1203	790
V/C Ratio	0.338	0.355	0.304	0.323	0.707
Control Delay, s/veh	7.7	7.5	6.1	6.0	18.3
LOS	A	A	A	A	C
95th %tile Queue, veh	2	2	1	1	6

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	16	31	11	222	207	5
Future Volume (vph)	16	31	11	222	207	5
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		45.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.910				0.997	
Flt Protected	0.984		0.950			
Satd. Flow (prot)	1302	0	1144	1204	1357	0
Flt Permitted	0.984		0.950			
Satd. Flow (perm)	1302	0	1144	1204	1357	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	182.8			213.0	2177.2	
Travel Time (s)	13.2			15.3	156.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	34	12	241	225	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	51	0	12	241	230	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	28.3%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	31	11	222	207	5
Future Volume (Veh/h)	16	31	11	222	207	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	34	12	241	225	5
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	493	228	230			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	493	228	230			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	99			
cM capacity (veh/h)	531	812	1338			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	51	12	241	230		
Volume Left	17	12	0	0		
Volume Right	34	0	0	5		
cSH	690	1338	1700	1700		
Volume to Capacity	0.07	0.01	0.14	0.14		
Queue Length 95th (m)	1.9	0.2	0.0	0.0		
Control Delay (s/veh)	10.6	7.7	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s/veh)	10.6	0.4		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay				1.2		
Intersection Capacity Utilization				28.3%	ICU Level of Service	A
Analysis Period (min)				15		

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	16	30	10	217	233	5
Future Volume (vph)	16	30	10	217	233	5
Ideal Flow (vphpl)	1483	1483	1504	1629	1388	1388
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		45.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911				0.997	
Flt Protected	0.983		0.950			
Satd. Flow (prot)	1328	0	1429	1597	1357	0
Flt Permitted	0.983		0.950			
Satd. Flow (perm)	1328	0	1429	1597	1357	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	219.5			238.0	213.0	
Travel Time (s)	15.8			17.1	15.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	17	33	11	236	253	5
Shared Lane Traffic (%)						
Lane Group Flow (vph)	50	0	11	236	258	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.34	1.22	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	27.4%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2028 - Phase 1 w/ Improvements
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	16	30	10	217	233	5
Future Volume (Veh/h)	16	30	10	217	233	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	33	11	236	253	5
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				238		
pX, platoon unblocked						
vC, conflicting volume	514	256	258			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	514	256	258			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	97	96	99			
cM capacity (veh/h)	520	788	1318			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	50	11	236	258		
Volume Left	17	11	0	0		
Volume Right	33	0	0	5		
cSH	671	1318	1700	1700		
Volume to Capacity	0.07	0.01	0.14	0.15		
Queue Length 95th (m)	1.9	0.2	0.0	0.0		
Control Delay (s/veh)	10.8	7.8	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s/veh)	10.8	0.3		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay			1.1			
Intersection Capacity Utilization			27.4%		ICU Level of Service	A
Analysis Period (min)			15			

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	37.0	37.0	39.4	22.7	13.7	35.6	36.3	42.3	44.2	24.2	42.3	24.2
Average Queue (m)	13.8	17.7	21.0	8.0	4.5	17.8	18.7	17.2	16.6	8.3	16.1	9.9
95th Queue (m)	27.3	30.9	34.9	17.1	11.7	29.9	31.2	33.5	34.9	19.3	33.1	19.8
Link Distance (m)		889.6	889.6			568.1	568.1		765.2		214.9	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	90.0			60.0	55.0			80.0		50.0		50.0
Storage Blk Time (%)												0
Queuing Penalty (veh)												0

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	28.9	34.2	16.1	37.6	23.9	59.9	10.8	53.1
Average Queue (m)	12.7	13.9	6.1	16.8	8.7	27.2	2.9	23.3
95th Queue (m)	23.9	27.2	13.7	30.4	20.3	50.0	9.7	42.2
Link Distance (m)		408.4		522.6		2152.8		704.1
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	50.0		50.0		50.0		50.0	
Storage Blk Time (%)		0				1		0
Queuing Penalty (veh)		0				0		0

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	WB	WB	SB
Directions Served	LT	T	TR	LR
Maximum Queue (m)	30.8	22.9	19.2	89.7
Average Queue (m)	12.2	5.8	2.1	32.9
95th Queue (m)	24.0	16.7	11.1	68.9
Link Distance (m)	983.9	889.6	889.6	435.6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	19.7	7.3
Average Queue (m)	7.4	0.5
95th Queue (m)	14.9	3.8
Link Distance (m)	172.6	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB
Directions Served	LR	L
Maximum Queue (m)	14.6	9.2
Average Queue (m)	7.1	0.8
95th Queue (m)	14.0	5.0
Link Distance (m)	209.1	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		15.0
Storage Blk Time (%)		0
Queuing Penalty (veh)		0

Network Summary

Network wide Queuing Penalty: 1

Junctions 8						
ARCADY 8 - Roundabout Module						
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025						
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:38:56 PM

Summary of intersection performance

AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Dual Lane - TT 2028							
Leg North	0.41	~1	2.65	0.28	A	2.74	A
Leg West	0.47	~1	2.55	0.30	A		
Leg East	0.61	1.07	2.99	0.37	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:38:56 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Dual Lane - TT 2028, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Name	Roundabout Capacity Model	Description	Include In Report	Use Specific Demand Set(s)	Specific Demand Set(s)	Locked	Network Flow Scaling Factor (%)	Network Capacity Scaling Factor (%)	Reason For Scaling Factors
Dual Lane	ARCADY		✓				100.000	100.000	

Demand Set Details

Name	Scenario Name	Time Period Name	Description	Traffic Profile Type	Model Start Time (HH:mm)	Model Finish Time (HH:mm)	Model Time Period Length (min)	Time Segment Length (min)	Results For Central Hour Only	Single Time Segment Only	Locked	Run Automatically	Use Relationship	Relationship
TT 2028, AM	TT 2028	AM		ONE HOUR	08:00	09:30	90	15				✓		

Intersection Network

Intersections

Intersection	Name	Intersection Type	Leg Order	Grade Separated	Large Roundabout	Do Geometric Delay	Intersection Delay (s)	Intersection LOS
1	Barker Pkwy / S-Leg & Hwy 20	Roundabout	North,West,East				2.74	A

Intersection Network Options

Driving Side	Lighting
Right	Normal/unknown

Legs

Legs

Leg	Leg	Name	Description
North	North	Barker Pkwy	
West	West	Hwy 20	
East	East	Hwy 20	

Capacity Options

Leg	Minimum Capacity (PCE/hr)	Maximum Capacity (PCE/hr)	Assume Flat Start Profile	Initial Queue (PCE)
North	0.00	99999.00		0.00
West	0.00	99999.00		0.00
East	0.00	99999.00		0.00

Roundabout Geometry

Leg	V - Approach road half-width (m)	E - Entry width (m)	I' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit Only
North	7.00	8.00	30.00	20.00	55.00	25.00	
West	7.00	8.00	30.00	20.00	55.00	25.00	
East	7.00	8.00	30.00	20.00	55.00	25.00	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Leg	Enter slope and intercept directly	Entered slope	Entered intercept (PCE/hr)	Final Slope	Final Intercept (PCE/hr)
North		(calculated)	(calculated)	0.723	2436.345
West		(calculated)	(calculated)	0.723	2436.345
East		(calculated)	(calculated)	0.723	2436.345

The slope and intercept shown above include any corrections and adjustments.

Traffic Flows

Demand Set Data Options

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	513.00	100.000
West	ONE HOUR	✓	601.00	100.000
East	ONE HOUR	✓	675.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	203.000	310.000
	West	513.000	0.000	88.000
	East	138.000	537.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.85	0.00	0.15
	East	0.20	0.80	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.28	2.65	0.41	~1	A	470.74	706.11	28.39	2.41	0.32	28.39	2.41
West	0.30	2.55	0.47	~1	A	551.49	827.23	32.36	2.35	0.36	32.37	2.35
East	0.37	2.99	0.61	1.07	A	619.39	929.09	41.09	2.65	0.46	41.09	2.65

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	386.21	96.55	385.28	488.92	403.24	0.00	2144.82	1644.81	0.180	0.00	0.23	2.173	A
West	452.46	113.12	451.39	555.70	232.82	0.00	2268.03	1717.78	0.200	0.00	0.27	2.144	A
East	508.18	127.04	506.87	298.92	385.30	0.00	2157.80	1376.32	0.236	0.00	0.33	2.322	A

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	461.18	115.29	460.91	584.90	482.42	0.00	2087.58	1644.81	0.221	0.23	0.30	2.352	A
West	540.29	135.07	539.99	664.81	278.52	0.00	2234.99	1717.78	0.242	0.27	0.34	2.298	A
East	606.81	151.70	606.40	357.59	460.92	0.00	2103.12	1376.32	0.289	0.33	0.43	2.564	A

Main results: (08:30-08:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	564.82	141.21	564.37	716.20	590.67	0.00	2009.32	1644.80	0.281	0.30	0.41	2.648	A
West	661.71	165.43	661.22	813.99	341.04	0.00	2189.79	1717.78	0.302	0.34	0.47	2.549	A
East	743.19	185.80	742.46	437.86	564.40	0.00	2028.31	1376.31	0.366	0.43	0.61	2.983	A

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	564.82	141.21	564.82	716.76	591.24	0.00	2008.91	1644.80	0.281	0.41	0.41	2.649	A
West	661.71	165.43	661.71	814.75	341.31	0.00	2189.59	1717.78	0.302	0.47	0.47	2.549	A
East	743.19	185.80	743.18	438.20	564.82	0.00	2028.01	1376.31	0.366	0.61	0.61	2.986	A

Main results: (09:00-09:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	461.18	115.29	461.63	585.80	483.33	0.00	2086.92	1644.81	0.221	0.41	0.30	2.356	A
West	540.29	135.07	540.77	666.00	278.96	0.00	2234.67	1717.78	0.242	0.47	0.35	2.302	A
East	606.81	151.70	607.53	358.14	461.59	0.00	2102.64	1376.32	0.289	0.61	0.43	2.567	A

Main results: (09:15-09:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	386.21	96.55	386.49	490.45	404.61	0.00	2143.83	1644.81	0.180	0.30	0.23	2.177	A
West	452.46	113.12	452.77	557.55	233.55	0.00	2267.50	1717.78	0.200	0.35	0.27	2.148	A
East	508.18	127.04	508.59	299.84	386.47	0.00	2156.95	1376.32	0.236	0.43	0.33	2.330	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.44	0.23	2.173	A	A
West	3.98	0.27	2.144	A	A
East	4.83	0.32	2.322	A	A

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.46	0.30	2.352	A	A
West	5.10	0.34	2.298	A	A

East	6.38	0.43	2.564	A	A

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.13	0.41	2.648	A	A
West	6.91	0.46	2.549	A	A
East	9.05	0.60	2.983	A	A

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.22	0.41	2.649	A	A
West	7.01	0.47	2.549	A	A
East	9.21	0.61	2.986	A	A

Queueing Delay results: (09:00-09:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.59	0.31	2.356	A	A
West	5.26	0.35	2.302	A	A
East	6.61	0.44	2.567	A	A

Queueing Delay results: (09:15-09:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.55	0.24	2.177	A	A
West	4.10	0.27	2.148	A	A
East	5.00	0.33	2.330	A	A

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.43	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.61	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.47	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.61	0.00	0.00	0.00	1.07			N/A	N/A

Queue Variation results: (09:00-09:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.43	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.23	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.33	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Lanes, Volumes, Timings

Total - 2028 - Phase 1 w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Future Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1629	1351
Storage Length (m)	90.0		60.0	55.0		0.0	80.0		0.0	50.0		50.0
Storage Lanes	1		1	1		0	1		0	1		1
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00	1.00							
Frt			0.850		0.991			0.962				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	3064	1137	1429	2585	0	1415	1297	0	1429	1582	1104
Flt Permitted	0.212			0.246			0.394			0.625		
Satd. Flow (perm)	298	3064	1110	370	2585	0	587	1297	0	940	1582	1104
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			215		9			27				96
Link Speed (k/h)		50			50			50				50
Link Distance (m)		936.7			581.5			783.0				204.0
Travel Time (s)		67.4			41.9			56.4				14.7
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	121	897	215	45	925	61	238	158	54	48	211	227
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	897	215	45	986	0	238	212	0	48	211	227
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0		2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6		2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

Total - 2028 - Phase 1 w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Detector Phase	4	4	4	8	8		5	2		6	6	6
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0		5.0	10.0		10.0	10.0	10.0
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0		9.5	39.0		39.0	39.0	39.0
Total Split (s)	42.0	42.0	42.0	42.0	42.0		9.5	48.5		39.0	39.0	39.0
Total Split (%)	46.4%	46.4%	46.4%	46.4%	46.4%		10.5%	53.6%		43.1%	43.1%	43.1%
Maximum Green (s)	35.0	35.0	35.0	35.0	35.0		5.5	42.5		33.0	33.0	33.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0		3.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0		1.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0		0.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lead/Lag							Lead			Lag	Lag	Lag
Lead-Lag Optimize?							Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	Min	Min	Min	Min		None	None		None	None	None
Walk Time (s)	15.0	15.0	15.0	15.0	15.0			15.0		15.0	15.0	15.0
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0			14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0			0		0	0	0
Act Effect Green (s)	38.2	38.2	38.2	38.2	38.2		27.5	27.5		18.0	18.0	18.0
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.37	0.37		0.24	0.24	0.24
v/c Ratio	0.79	0.57	0.32	0.24	0.73		0.85	0.42		0.21	0.55	0.67
Control Delay (s/veh)	55.7	14.9	3.4	16.1	19.3		47.1	17.3		23.7	29.6	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	55.7	14.9	3.4	16.1	19.3		47.1	17.3		23.7	29.6	24.1
LOS	E	B	A	B	B		D	B		C	C	C
Approach Delay (s/veh)		16.9			19.2			33.1			26.4	
Approach LOS		B			B			C			C	

Intersection Summary

Area Type: Other

Cycle Length: 90.5

Actuated Cycle Length: 73.8

Natural Cycle: 95

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay (s/veh): 21.4

Intersection LOS: C

Intersection Capacity Utilization 91.9%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Thorold Townline & Highway 20, Thorold
PTSL (210565)

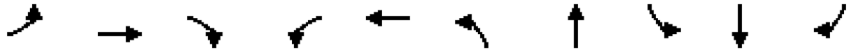
Synchro 12 Report
Page 2

Queues

Total - 2028 - Phase 1 w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

										
Lane Group	EBL	EBT	EBR	WBL	WBT	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	121	897	215	45	986	238	212	48	211	227
v/c Ratio	0.79	0.57	0.32	0.24	0.73	0.85	0.42	0.21	0.55	0.67
Control Delay (s/veh)	55.7	14.9	3.4	16.1	19.3	47.1	17.3	23.7	29.6	24.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	55.7	14.9	3.4	16.1	19.3	47.1	17.3	23.7	29.6	24.1
Queue Length 50th (m)	12.8	41.9	0.0	3.2	52.0	25.5	19.2	5.6	26.8	16.5
Queue Length 95th (m)	#52.6	79.5	12.0	13.0	#104.8	#53.5	36.0	13.9	46.0	39.2
Internal Link Dist (m)	912.7				557.5		759.0		180.0	
Turn Bay Length (m)	90.0			60.0	55.0	80.0		50.0	50.0	
Base Capacity (vph)	154	1586	678	191	1342	281	797	448	754	576
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.79	0.57	0.32	0.24	0.73	0.85	0.27	0.11	0.28	0.39

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis

101: Thorold Townline Rd & Highway 20/Lundy's Lane

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Future Volume (vph)	111	825	198	41	851	56	219	145	50	44	194	209
Ideal Flow (vphpl)	1504	1629	1351	1504	1388	1388	1504	1388	1388	1504	1629	1351
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.96		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1334	3064	1111	1428	2585		1415	1296		1429	1582	1104
Flt Permitted	0.21	1.00	1.00	0.25	1.00		0.39	1.00		0.63	1.00	1.00
Satd. Flow (perm)	297	3064	1111	369	2585		587	1296		940	1582	1104
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	897	215	45	925	61	238	158	54	48	211	227
RTOR Reduction (vph)	0	0	104	0	4	0	0	17	0	0	0	73
Lane Group Flow (vph)	121	897	111	45	982	0	238	195	0	48	211	154
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	Perm	NA	Perm	Perm	NA		pm+pt	NA		Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		4	8			2			6		6
Actuated Green, G (s)	35.2	35.2	35.2	35.2	35.2		25.5	25.5		16.0	16.0	16.0
Effective Green, g (s)	38.2	38.2	38.2	38.2	38.2		25.5	27.5		18.0	18.0	18.0
Actuated g/C Ratio	0.52	0.52	0.52	0.52	0.52		0.35	0.37		0.24	0.24	0.24
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0		4.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	153	1588	575	191	1339		264	483		229	386	269
v/s Ratio Prot		0.29			0.38		c0.07	0.15			0.13	
v/s Ratio Perm	c0.41		0.10	0.12			c0.24			0.05		0.14
v/c Ratio	0.79	0.56	0.19	0.24	0.73		0.90	0.40		0.21	0.55	0.57
Uniform Delay, d1	14.5	12.1	9.5	9.7	13.8		22.7	17.1		22.2	24.3	24.5
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	23.7	0.5	0.2	0.6	2.1		30.9	0.6		0.5	1.6	2.9
Delay (s)	38.2	12.6	9.7	10.4	15.9		53.6	17.6		22.6	25.9	27.4
Level of Service	D	B	A	B	B		D	B		C	C	C
Approach Delay (s/veh)		14.6			15.7			36.6			26.3	
Approach LOS		B			B			D			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			19.8			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.85									
Actuated Cycle Length (s)			73.7			Sum of lost time (s)				12.0		
Intersection Capacity Utilization			91.9%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
Future Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	100.0			100.0			100.0			100.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960			0.982			0.951			0.949	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1323	1303	0	1429	1351	0	1429	1236	0	1429	1255	0
Flt Permitted	0.487			0.406			0.310			0.522		
Satd. Flow (perm)	678	1303	0	611	1351	0	466	1236	0	785	1255	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			12			62			67	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2181.2			714.3	
Travel Time (s)		30.1			38.7			157.0			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	105	259	93	140	257	34	51	225	108	34	384	199
Shared Lane Traffic (%)												
Lane Group Flow (vph)	105	352	0	140	291	0	51	333	0	34	583	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	24.0	24.0		24.0	24.0		36.0	36.0		36.0	36.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%		60.0%	60.0%		60.0%	60.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0		30.0	30.0		30.0	30.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)	18.1	18.1		18.1	18.1		28.0	28.0		28.0	28.0	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.52	0.52		0.52	0.52	
v/c Ratio	0.47	0.78		0.69	0.64		0.21	0.50		0.08	0.86	
Control Delay (s/veh)	23.9	30.3		39.2	23.3		10.1	10.1		7.5	25.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	23.9	30.3		39.2	23.3		10.1	10.1		7.5	25.9	
LOS	C	C		D	C		B	B		A	C	
Approach Delay (s/veh)		28.9			28.4			10.1			24.9	
Approach LOS		C			C			B			C	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 54.3

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.86

Intersection Signal Delay (s/veh): 23.7

Intersection LOS: C

Intersection Capacity Utilization 91.5%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 102: Thorold Townline Rd & Beaverdams Rd



Queues

Total - 2028 - Phase 1 w/ Improvements

102: Thorold Townline Rd & Beaverdams Rd

PM Peak Hour

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	105	352	140	291	51	333	34	583
v/c Ratio	0.47	0.78	0.69	0.64	0.21	0.50	0.08	0.86
Control Delay (s/veh)	23.9	30.3	39.2	23.3	10.1	10.1	7.5	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.9	30.3	39.2	23.3	10.1	10.1	7.5	25.9
Queue Length 50th (m)	9.4	32.6	13.7	26.7	2.8	17.1	1.7	45.6
Queue Length 95th (m)	23.3	#73.6	#39.9	50.7	8.6	35.8	5.4	#109.3
Internal Link Dist (m)		394.6		513.1		2157.2		690.3
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	257	514	231	520	283	775	477	789
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.41	0.68	0.61	0.56	0.18	0.43	0.07	0.74

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
Future Volume (vph)	97	238	86	129	236	31	47	207	99	31	353	183
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.96		1.00	0.98		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1323	1303		1429	1352		1429	1237		1429	1255	
Flt Permitted	0.49	1.00		0.41	1.00		0.31	1.00		0.52	1.00	
Satd. Flow (perm)	679	1303		610	1352		466	1237		785	1255	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	259	93	140	257	34	51	225	108	34	384	199
RTOR Reduction (vph)	0	21	0	0	8	0	0	30	0	0	32	0
Lane Group Flow (vph)	105	331	0	140	283	0	51	303	0	34	551	0
Heavy Vehicles (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	16.0	16.0		16.0	16.0		25.9	25.9		25.9	25.9	
Effective Green, g (s)	18.0	18.0		18.0	18.0		27.9	27.9		27.9	27.9	
Actuated g/C Ratio	0.33	0.33		0.33	0.33		0.52	0.52		0.52	0.52	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	226	435		203	451		241	640		406	649	
v/s Ratio Prot		c0.25			0.21			0.25			c0.44	
v/s Ratio Perm	0.15			0.23			0.11			0.04		
v/c Ratio	0.46	0.76		0.69	0.63		0.21	0.47		0.08	0.85	
Uniform Delay, d1	14.2	16.0		15.5	15.1		7.0	8.3		6.6	11.2	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	7.6		9.4	2.7		0.4	0.6		0.1	10.1	
Delay (s)	15.7	23.7		24.9	17.9		7.5	8.9		6.6	21.3	
Level of Service	B	C		C	B		A	A		A	C	
Approach Delay (s/veh)		21.8			20.1			8.7			20.4	
Approach LOS		C			C			A			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			18.3			HCM 2000 Level of Service				B		
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			53.9			Sum of lost time (s)				8.0		
Intersection Capacity Utilization			91.5%			ICU Level of Service				F		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	184	895	944	335	239	158
Future Volume (vph)	184	895	944	335	239	158
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.961		0.946	
Flt Protected		0.992			0.971	
Satd. Flow (prot)	0	2277	2497	0	1336	0
Flt Permitted		0.992			0.971	
Satd. Flow (perm)	0	2277	2497	0	1336	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	200	973	1026	364	260	172
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1173	1390	0	432	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	136.3%			ICU Level of Service H		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis
103: Highway 20 & Barker Parkway

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	184	895	944	335	239	158
Future Volume (veh/h)	184	895	944	335	239	158
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	200	973	1026	364	260	172
Approach Volume (veh/h)		1173	1390		432	
Crossing Volume (veh/h)		260	200		1026	
High Capacity (veh/h)		1129	1184		609	
High v/c (veh/h)		1.04	1.17		0.71	
Low Capacity (veh/h)		930	979		471	
Low v/c (veh/h)		1.26	1.42		0.92	
Intersection Summary						
Maximum v/c High			1.17			
Maximum v/c Low			1.42			
Intersection Capacity Utilization			136.3%		ICU Level of Service	H

Intersection					
Intersection Delay, s/veh	12.9				
Intersection LOS	B				
Approach	EB		WB		SB
Entry Lanes	2		2		1
Conflicting Circle Lanes	2		2		2
Adj Approach Flow, veh/h	1173		1390		432
Demand Flow Rate, veh/h	1192		1411		441
Vehicles Circulating, veh/h	260		200		1047
Vehicles Exiting, veh/h	1228		1252		564
Ped Vol Crossing Leg, #/h	0		0		0
Ped Cap Adj	1.000		1.000		1.000
Approach Delay, s/veh	9.9		10.9		27.0
Approach LOS	A		B		D
Lane	Left	Right	Left	Right	Left
Designated Moves	LT	TR	LT	TR	LR
Assumed Moves	LT	TR	LT	TR	LR
RT Channelized					
Lane Util	0.470	0.530	0.470	0.530	1.000
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.328
Entry Flow, veh/h	560	632	663	748	441
Cap Entry Lane, veh/h	1063	1138	1123	1198	583
Entry HV Adj Factor	0.984	0.983	0.986	0.985	0.980
Flow Entry, veh/h	551	621	654	737	432
Cap Entry, veh/h	1046	1119	1107	1180	571
V/C Ratio	0.527	0.555	0.590	0.624	0.756
Control Delay, s/veh	9.8	9.9	10.8	11.1	27.0
LOS	A	A	B	B	D
95th %tile Queue, veh	3	4	4	5	7

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	12	19	31	260	427	19
Future Volume (vph)	12	19	31	260	427	19
Ideal Flow (vphpl)	1483	1483	1228	1228	1388	1388
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		45.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.917				0.994	
Flt Protected	0.981		0.950			
Satd. Flow (prot)	1334	0	1167	1204	1354	0
Flt Permitted	0.981		0.950			
Satd. Flow (perm)	1334	0	1167	1204	1354	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	252.7			243.0	2181.2	
Travel Time (s)	18.2			17.5	157.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	13	21	34	283	464	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	34	0	34	283	485	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.71	1.71	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	49.0%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 201: Thorold Townline Rd & Street A

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	12	19	31	260	427	19
Future Volume (Veh/h)	12	19	31	260	427	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	21	34	283	464	21
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	826	475	485			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	826	475	485			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	96	97			
cM capacity (veh/h)	334	594	1088			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	34	34	283	485		
Volume Left	13	34	0	0		
Volume Right	21	0	0	21		
cSH	458	1088	1700	1700		
Volume to Capacity	0.07	0.03	0.17	0.29		
Queue Length 95th (m)	1.9	0.8	0.0	0.0		
Control Delay (s/veh)	13.5	8.4	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s/veh)	13.5	0.9		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay				0.9		
Intersection Capacity Utilization				49.0%	ICU Level of Service	A
Analysis Period (min)				15		

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	11	19	31	280	427	19
Future Volume (vph)	11	19	31	280	427	19
Ideal Flow (vphpl)	1483	1483	1504	1629	1388	1388
Storage Length (m)	0.0	0.0	15.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	7.5		45.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.914				0.994	
Flt Protected	0.982		0.950			
Satd. Flow (prot)	1331	0	1429	1597	1354	0
Flt Permitted	0.982		0.950			
Satd. Flow (perm)	1331	0	1429	1597	1354	0
Link Speed (k/h)	50			50	50	
Link Distance (m)	258.3			204.0	243.0	
Travel Time (s)	18.6			14.7	17.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	12	21	34	304	464	21
Shared Lane Traffic (%)						
Lane Group Flow (vph)	33	0	34	304	485	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.34	1.22	1.48	1.48
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	42.5%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2028 - Phase 1 w/ Improvements
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	11	19	31	280	427	19
Future Volume (Veh/h)	11	19	31	280	427	19
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	12	21	34	304	464	21
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				204		
pX, platoon unblocked						
vC, conflicting volume	847	475	485			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	847	475	485			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	96	96	97			
cM capacity (veh/h)	325	594	1088			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1		
Volume Total	33	34	304	485		
Volume Left	12	34	0	0		
Volume Right	21	0	0	21		
cSH	456	1088	1700	1700		
Volume to Capacity	0.07	0.03	0.18	0.29		
Queue Length 95th (m)	1.9	0.8	0.0	0.0		
Control Delay (s/veh)	13.5	8.4	0.0	0.0		
Lane LOS	B	A				
Approach Delay (s/veh)	13.5	0.8		0.0		
Approach LOS	B					
Intersection Summary						
Average Delay				0.9		
Intersection Capacity Utilization				42.5%	ICU Level of Service	A
Analysis Period (min)				15		

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	T	T	R	L	T	TR	L	TR	L	T	R
Maximum Queue (m)	61.5	63.1	65.1	30.5	22.4	75.7	75.6	52.7	42.8	22.5	56.0	56.8
Average Queue (m)	32.1	33.2	37.3	11.1	7.3	41.1	43.6	25.9	19.4	7.9	27.1	21.4
95th Queue (m)	62.2	54.9	58.5	21.7	17.4	64.9	68.4	46.5	35.9	19.0	46.7	41.8
Link Distance (m)		889.6	889.6			568.2	568.2		765.2		181.1	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	90.0			60.0	55.0			80.0		50.0		50.0
Storage Blk Time (%)	0		1			2					1	1
Queuing Penalty (veh)	2		1			1					2	2

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	40.0	67.4	54.9	46.3	25.9	53.5	15.0	114.6
Average Queue (m)	17.2	34.2	21.9	22.8	9.4	26.7	5.3	52.9
95th Queue (m)	31.0	58.2	45.5	42.5	20.3	46.7	13.2	95.2
Link Distance (m)		408.4		522.6		2156.8		704.1
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	50.0		50.0		50.0		50.0	
Storage Blk Time (%)	0	2	2	0		0		10
Queuing Penalty (veh)	0	2	4	0		0		3

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	EB	WB	WB	SB
Directions Served	LT	T	T	TR	LR
Maximum Queue (m)	31.4	15.0	27.4	29.9	80.0
Average Queue (m)	15.2	0.5	13.9	5.7	34.6
95th Queue (m)	25.7	8.1	25.2	18.7	69.2
Link Distance (m)	983.9	983.9	889.6	889.6	435.6
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (m)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (m)	13.1	13.2	1.2
Average Queue (m)	5.7	3.5	0.0
95th Queue (m)	13.3	11.2	0.8
Link Distance (m)	242.5		2156.8
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		15.0	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	NB	SB
Directions Served	LR	L	TR
Maximum Queue (m)	15.6	13.1	1.3
Average Queue (m)	5.1	3.2	0.0
95th Queue (m)	13.3	10.7	0.9
Link Distance (m)	248.1		226.2
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		15.0	
Storage Blk Time (%)		0	
Queuing Penalty (veh)		0	

Network Summary

Network wide Queuing Penalty: 18

Junctions 8						
ARCADY 8 - Roundabout Module						
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Filename: Barker and Hwy 20.arc8
 Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
 Report generation date: 2025-08-26 5:38:27 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Dual Lane - TT 2028							
Leg North	0.36	~1	2.94	0.26	A	7.11	A
Leg West	1.14	1.02	3.46	0.53	A		
Leg East	4.37	12.18	11.50	0.82	B		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
 "D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
 "D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
 "D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
 "D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
 "D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
 "D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
 "D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:38:27 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Dual Lane - TT 2028, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	397.00	100.000
West	ONE HOUR	✓	1079.00	100.000
East	ONE HOUR	✓	1279.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	158.000	239.000
	West	895.000	0.000	184.000
	East	335.000	944.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.83	0.00	0.17
	East	0.26	0.74	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.26	2.94	0.36	~1	A	364.29	546.44	23.65	2.60	0.26	23.65	2.60
West	0.53	3.46	1.14	1.02	A	990.11	1485.16	72.77	2.94	0.81	72.77	2.94
East	0.82	11.50	4.37	12.18	B	1173.63	1760.45	202.16	6.89	2.25	202.17	6.89

Main Results for each time segment

Main results: (16:00-16:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	298.88	74.72	298.14	923.15	707.80	0.00	1924.64	1681.77	0.155	0.00	0.19	2.254	A
West	812.33	203.08	810.13	826.45	179.48	0.00	2306.59	1704.39	0.352	0.00	0.55	2.442	A
East	962.90	240.72	958.97	317.63	671.98	0.00	1950.54	1414.28	0.494	0.00	0.98	3.668	A

Main results: (16:15-16:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	356.89	89.22	356.65	1104.41	846.72	0.00	1824.21	1681.77	0.196	0.19	0.25	2.500	A
West	970.00	242.50	969.21	988.66	214.71	0.00	2281.12	1704.40	0.425	0.55	0.75	2.788	A
East	1149.79	287.45	1147.20	379.99	803.93	0.00	1855.14	1414.28	0.620	0.98	1.63	5.141	A

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	437.11	109.28	436.68	1350.25	1031.67	0.00	1690.50	1681.76	0.259	0.25	0.35	2.927	A
West	1188.00	297.00	1186.47	1205.46	262.89	0.00	2246.29	1704.40	0.529	0.75	1.13	3.449	A
East	1408.21	352.05	1397.78	465.21	984.14	0.00	1724.86	1414.27	0.816	1.63	4.24	10.838	B

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	437.11	109.28	437.10	1354.10	1038.96	0.00	1685.23	1681.76	0.259	0.35	0.36	2.939	A
West	1188.00	297.00	1187.98	1212.91	263.14	0.00	2246.11	1704.40	0.529	1.13	1.14	3.457	A
East	1408.21	352.05	1407.65	465.72	985.40	0.00	1723.95	1414.27	0.817	4.24	4.37	11.496	B

Main results: (17:00-17:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	356.89	89.22	357.32	1109.83	856.58	0.00	1817.08	1681.77	0.196	0.36	0.25	2.516	A
West	970.00	242.50	971.52	998.79	215.11	0.00	2280.83	1704.40	0.425	1.14	0.76	2.797	A
East	1149.79	287.45	1160.56	380.78	805.85	0.00	1853.76	1414.28	0.620	4.37	1.68	5.348	A

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	298.88	74.72	299.13	927.39	712.71	0.00	1921.09	1681.77	0.156	0.25	0.19	2.262	A
West	812.33	203.08	813.13	831.76	180.08	0.00	2306.16	1704.39	0.352	0.76	0.56	2.451	A
East	962.90	240.72	965.63	318.74	674.47	0.00	1948.74	1414.28	0.494	1.68	1.00	3.727	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	2.76	0.18	2.254	A	A
West	8.10	0.54	2.442	A	A
East	14.29	0.95	3.668	A	A

Queueing Delay results: (16:15-16:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.66	0.24	2.500	A	A
West	11.04	0.74	2.788	A	A

East	23.58	1.57	5.141	A	A

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.23	0.35	2.927	A	A
West	16.60	1.11	3.449	A	A
East	57.38	3.83	10.838	B	B

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.33	0.36	2.939	A	A
West	17.02	1.13	3.457	A	A
East	64.80	4.32	11.496	B	B

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.80	0.25	2.516	A	A
West	11.56	0.77	2.797	A	A
East	26.72	1.78	5.348	A	A

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	2.86	0.19	2.262	A	A
West	8.45	0.56	2.451	A	A
East	15.39	1.03	3.727	A	A

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.55	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.98	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (16:15-16:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.75	0.00	0.00	0.00	1.02			N/A	N/A
East	1.63	0.00	0.00	3.04	5.07			N/A	N/A

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.13	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	4.24	0.00	0.00	3.04	12.18			N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
						Percentiles could not be calculated. This may			

North	0.36	~1	~1	~1	~1	be because the mean queue is very small or very big.		N/A	N/A
West	1.14	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	4.37	0.00	0.00	0.00	6.09			N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.25	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.76	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	1.68	0.00	0.00	3.04	5.07			N/A	N/A

Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.19	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.56	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	1.00	0.00	0.00	1.01	3.04			N/A	N/A

Appendix J2

2035 Total Operations with Improvements Synchro Reports



Lanes, Volumes, Timings

Total - 2035 Full Build-Out w/Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Future Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Ideal Flow (vphpl)	1504	1629	1351	1504	1629	1351	1504	1388	1388	1504	1629	1351
Storage Length (m)	100.0		60.0	100.0		100.0	50.0		0.0	100.0		100.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.978				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1253	3005	1063	1429	2976	949	1311	1207	0	1191	1417	1073
Flt Permitted	0.418			0.327			0.580			0.578		
Satd. Flow (perm)	551	3005	1063	492	2976	949	800	1207	0	724	1417	1073
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			168			100		12				248
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		936.7			581.5			783.0			238.0	
Travel Time (s)		67.4			41.9			56.4			17.1	
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 (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Adj. Flow (vph)	157	725	168	37	555	100	135	188	33	161	220	248
Shared Lane Traffic (%)												
Lane Group Flow (vph)	157	725	168	37	555	100	135	221	0	161	220	248
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings

Total - 2035 Full Build-Out w/Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	4	4	4	8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	20.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	42.0	42.0	42.0	42.0	42.0	42.0	39.0	39.0		39.0	39.0	39.0
Total Split (s)	49.0	49.0	49.0	49.0	49.0	49.0	41.0	41.0		41.0	41.0	41.0
Total Split (%)	54.4%	54.4%	54.4%	54.4%	54.4%	54.4%	45.6%	45.6%		45.6%	45.6%	45.6%
Maximum Green (s)	42.0	42.0	42.0	42.0	42.0	42.0	35.0	35.0		35.0	35.0	35.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	-3.0	-3.0	-3.0	-3.0	-3.0	0.0	-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	7.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Recall Mode	Min	Min	Min	Min	Min	Min	None	None		None	None	None
Walk Time (s)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0		15.0	15.0	15.0
Flash Don't Walk (s)	7.0	7.0	7.0	7.0	7.0	7.0	14.0	14.0		14.0	14.0	14.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0		0	0	0
Act Effct Green (s)	31.4	31.4	31.4	31.4	31.4	28.2	22.2	22.2		22.2	22.2	22.2
Actuated g/C Ratio	0.50	0.50	0.50	0.50	0.50	0.45	0.36	0.36		0.36	0.36	0.36
v/c Ratio	0.57	0.48	0.27	0.15	0.37	0.21	0.48	0.51		0.63	0.44	0.46
Control Delay (s/veh)	23.1	12.5	3.4	12.6	11.4	4.3	23.2	20.2		30.0	19.2	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	23.1	12.5	3.4	12.6	11.4	4.3	23.2	20.2		30.0	19.2	5.5
LOS	C	B	A	B	B	A	C	C		C	B	A
Approach Delay (s/veh)		12.6			10.4			21.4			16.6	
Approach LOS		B			B			C			B	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 62.3

Natural Cycle: 85

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay (s/veh): 14.1

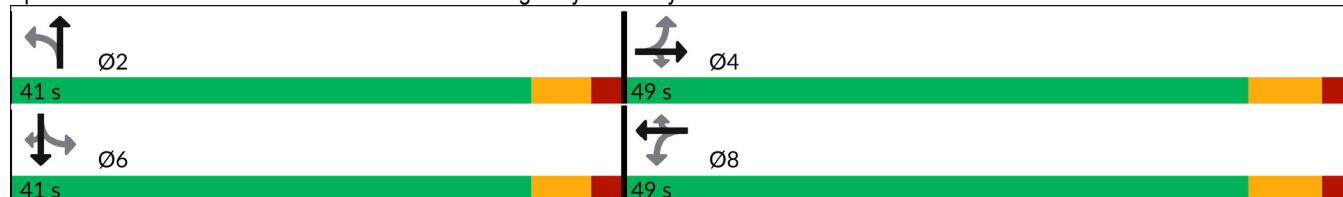
Intersection LOS: B

Intersection Capacity Utilization 76.8%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Total - 2035 Full Build-Out w/Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

AM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	157	725	168	37	555	100	135	221	161	220	248
v/c Ratio	0.57	0.48	0.27	0.15	0.37	0.21	0.48	0.51	0.63	0.44	0.46
Control Delay (s/veh)	23.1	12.5	3.4	12.6	11.4	4.3	23.2	20.2	30.0	19.2	5.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	23.1	12.5	3.4	12.6	11.4	4.3	23.2	20.2	30.0	19.2	5.5
Queue Length 50th (m)	11.1	25.2	0.0	2.0	18.0	0.0	10.3	16.1	13.1	16.6	0.0
Queue Length 95th (m)	42.1	59.1	10.1	9.6	43.3	8.6	33.7	47.1	43.5	46.2	14.6
Internal Link Dist (m)	912.7			557.5			759.0			214.0	
Turn Bay Length (m)	100.0		60.0	100.0		100.0	50.0		100.0		100.0
Base Capacity (vph)	427	2330	862	381	2308	721	516	783	467	914	780
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.31	0.19	0.10	0.24	0.14	0.26	0.28	0.34	0.24	0.32
Intersection Summary											

HCM Signalized Intersection Capacity Analysis Total - 2035 Full Build-Out w/Improvements
 101: Thorold Townline Rd & Highway 20/Lundy's Lane AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Future Volume (vph)	144	667	155	34	511	92	124	173	30	148	202	228
Ideal Flow (vphpl)	1504	1629	1351	1504	1629	1351	1504	1388	1388	1504	1629	1351
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	7.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1253	3005	1063	1429	2976	949	1311	1206		1191	1417	1073
Flt Permitted	0.42	1.00	1.00	0.33	1.00	1.00	0.58	1.00		0.58	1.00	1.00
Satd. Flow (perm)	552	3005	1063	492	2976	949	800	1206		725	1417	1073
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	157	725	168	37	555	100	135	188	33	161	220	248
RTOR Reduction (vph)	0	0	82	0	0	54	0	8	0	0	0	159
Lane Group Flow (vph)	157	725	86	37	555	46	135	213	0	161	220	89
Heavy Vehicles (%)	14%	3%	8%	0%	4%	21%	9%	14%	4%	20%	15%	7%
Turn Type	Perm	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases		4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)	28.2	28.2	28.2	28.2	28.2	28.2	20.0	20.0		20.0	20.0	20.0
Effective Green, g (s)	31.2	31.2	31.2	31.2	31.2	28.2	22.0	22.0		22.0	22.0	22.0
Actuated g/C Ratio	0.51	0.51	0.51	0.51	0.51	0.46	0.36	0.36		0.36	0.36	0.36
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	281	1531	541	250	1517	437	287	433		260	509	385
v/s Ratio Prot		0.24			0.19			0.18			0.16	
v/s Ratio Perm	c0.28		0.08	0.08		0.05	0.17			c0.22		0.08
v/c Ratio	0.56	0.47	0.16	0.15	0.37	0.11	0.47	0.49		0.62	0.43	0.23
Uniform Delay, d1	10.3	9.7	8.0	8.0	9.0	9.4	15.1	15.3		16.1	14.9	13.7
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	2.4	0.2	0.1	0.3	0.2	0.1	1.2	0.9		4.3	0.6	0.3
Delay (s)	12.7	9.9	8.1	8.2	9.2	9.5	16.3	16.1		20.5	15.5	14.0
Level of Service	B	A	A	A	A	A	B	B		C	B	B
Approach Delay (s/veh)		10.1			9.2			16.2			16.2	
Approach LOS		B			A			B			B	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			12.0									B
HCM 2000 Volume to Capacity ratio			0.58									
Actuated Cycle Length (s)			61.2									8.0
Intersection Capacity Utilization			76.8%									D
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2035 Full Build-Out w/Improvements
AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
Future Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.943			0.981			0.953			0.957	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1361	1261	0	1429	1338	0	1242	1207	0	1335	1178	0
Flt Permitted	0.513			0.625			0.501			0.390		
Satd. Flow (perm)	735	1261	0	940	1338	0	655	1207	0	548	1178	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		56			13			57			50	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		803.0			537.1			2177.2			714.3	
Travel Time (s)		57.8			38.7			156.8			51.4	
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 (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Adj. Flow (vph)	108	129	78	93	253	37	117	322	149	9	251	101
Shared Lane Traffic (%)												
Lane Group Flow (vph)	108	207	0	93	290	0	117	471	0	9	352	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings

Total - 2035 Full Build-Out w/Improvements

102: Thorold Townline Rd & Beaverdams Rd

AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	25.0	25.0		25.0	25.0		35.0	35.0		35.0	35.0	
Total Split (%)	41.7%	41.7%		41.7%	41.7%		58.3%	58.3%		58.3%	58.3%	
Maximum Green (s)	19.0	19.0		19.0	19.0		29.0	29.0		29.0	29.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		Min	Min		Min	Min	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Don't Walk (s)	11.0	11.0		11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0		0	0		0	0		0	0	
Act Effect Green (s)	17.2	17.2		17.2	17.2		23.6	23.6		23.6	23.6	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.48	0.48		0.48	0.48	
v/c Ratio	0.42	0.43		0.28	0.61		0.37	0.77		0.03	0.60	
Control Delay (s/veh)	20.4	13.8		16.3	20.7		12.6	20.1		7.6	13.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	20.4	13.8		16.3	20.7		12.6	20.1		7.6	13.0	
LOS	C	B		B	C		B	C		A	B	
Approach Delay (s/veh)		16.1			19.6			18.6			12.9	
Approach LOS		B			B			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 49.2

Natural Cycle: 55

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.77

Intersection Signal Delay (s/veh): 17.1

Intersection LOS: B

Intersection Capacity Utilization 82.4%

ICU Level of Service E

Analysis Period (min) 15

Splits and Phases: 102: Thorold Townline Rd & Beaverdams Rd



Queues

Total - 2035 Full Build-Out w/Improvements

102: Thorold Townline Rd & Beaverdams Rd

AM Peak Hour

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	108	207	93	290	117	471	9	352
v/c Ratio	0.42	0.43	0.28	0.61	0.37	0.77	0.03	0.60
Control Delay (s/veh)	20.4	13.8	16.3	20.7	12.6	20.1	7.6	13.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	20.4	13.8	16.3	20.7	12.6	20.1	7.6	13.0
Queue Length 50th (m)	7.8	10.6	6.4	21.7	6.3	28.8	0.4	18.1
Queue Length 95th (m)	22.5	29.0	18.0	49.0	18.1	#76.2	2.3	43.8
Internal Link Dist (m)		779.0		513.1		2153.2		690.3
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	331	598	423	609	435	822	364	800
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.35	0.22	0.48	0.27	0.57	0.02	0.44

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2035 Full Build-Out w/Improvements
AM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
Future Volume (vph)	99	119	72	86	233	34	108	296	137	8	231	93
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.95		1.00	0.96	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1361	1262		1429	1338		1242	1207		1335	1178	
Flt Permitted	0.51	1.00		0.62	1.00		0.50	1.00		0.39	1.00	
Satd. Flow (perm)	734	1262		940	1338		655	1207		549	1178	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	108	129	78	93	253	37	117	322	149	9	251	101
RTOR Reduction (vph)	0	36	0	0	8	0	0	29	0	0	26	0
Lane Group Flow (vph)	108	171	0	93	282	0	117	442	0	9	326	0
Heavy Vehicles (%)	5%	0%	10%	0%	2%	0%	15%	14%	0%	7%	13%	12%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	15.1	15.1		15.1	15.1		21.5	21.5		21.5	21.5	
Effective Green, g (s)	17.1	17.1		17.1	17.1		23.5	23.5		23.5	23.5	
Actuated g/C Ratio	0.35	0.35		0.35	0.35		0.48	0.48		0.48	0.48	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	258	444		330	470		316	583		265	569	
v/s Ratio Prot		0.14			c0.21			c0.37			0.28	
v/s Ratio Perm	0.15			0.10			0.18			0.02		
v/c Ratio	0.42	0.38		0.28	0.60		0.37	0.76		0.03	0.57	
Uniform Delay, d1	12.0	11.8		11.3	12.9		7.9	10.2		6.6	9.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.1	0.6		0.5	2.1		0.7	5.6		0.1	1.4	
Delay (s)	13.1	12.4		11.8	15.0		8.6	15.8		6.6	10.4	
Level of Service	B	B		B	B		A	B		A	B	
Approach Delay (s/veh)		12.6			14.2			14.4			10.3	
Approach LOS		B			B			B			B	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			13.1									
HCM 2000 Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			48.6									
Intersection Capacity Utilization			82.4%									
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2035 Full Build-Out w/Improvements
AM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	94	638	715	148	328	215
Future Volume (vph)	94	638	715	148	328	215
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Storage Length (m)	0.0			0.0	50.0	0.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.974			0.850
Flt Protected		0.994			0.950	
Satd. Flow (prot)	0	2159	2412	0	1355	1146
Flt Permitted		0.994			0.950	
Satd. Flow (perm)	0	2159	2412	0	1355	1146
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	24%	5%	6%	9%	4%	10%
Adj. Flow (vph)	102	693	777	161	357	234
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	795	938	0	357	234
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type:	Roundabout					
Intersection Capacity Utilization	98.3%			ICU Level of Service F		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis Total - 2035 Full Build-Out w/Improvements
 103: Highway 20 & Barker Parkway AM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	94	638	715	148	328	215
Future Volume (veh/h)	94	638	715	148	328	215
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	102	693	777	161	357	234
Approach Volume (veh/h)		795	938		591	
Crossing Volume (veh/h)		357	102		777	
High Capacity (veh/h)		1046	1279		747	
High v/c (veh/h)		0.76	0.73		0.79	
Low Capacity (veh/h)		855	1065		590	
Low v/c (veh/h)		0.93	0.88		1.00	
Intersection Summary						
Maximum v/c High			0.79			
Maximum v/c Low			1.00			
Intersection Capacity Utilization			98.3%		ICU Level of Service	F

Intersection						
Intersection Delay, s/veh	9.6					
Intersection LOS	A					
Approach	EB		WB		SB	
Entry Lanes	2		2		2	
Conflicting Circle Lanes	2		2		2	
Adj Approach Flow, veh/h	795		938		591	
Demand Flow Rate, veh/h	854		999		628	
Vehicles Circulating, veh/h	371		126		824	
Vehicles Exiting, veh/h	1081		1099		301	
Ped Vol Crossing Leg, #/h	0		0		0	
Ped Cap Adj	1.000		1.000		1.000	
Approach Delay, s/veh	8.9		7.2		14.4	
Approach LOS	A		A		B	
Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	L	TR
Assumed Moves	LT	TR	LT	TR	L	TR
RT Channelized						
Lane Util	0.470	0.530	0.470	0.530	0.591	0.409
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
Entry Flow, veh/h	401	453	470	529	371	257
Cap Entry Lane, veh/h	960	1036	1202	1276	633	705
Entry HV Adj Factor	0.932	0.931	0.938	0.940	0.962	0.911
Flow Entry, veh/h	374	422	441	497	357	234
Cap Entry, veh/h	894	964	1128	1199	609	642
V/C Ratio	0.418	0.437	0.391	0.415	0.587	0.365
Control Delay, s/veh	9.0	8.8	7.2	7.2	16.9	10.6
LOS	A	A	A	A	C	B
95th %tile Queue, veh	2	2	2	2	4	2

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2035 Full Build-Out w/Improvements
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	64	123	62	350	286	31
Future Volume (vph)	64	123	62	350	286	31
Ideal Flow (vphpl)	1483	1483	1504	1629	1629	1351
Storage Length (m)	0.0	0.0	40.0			5.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.911					0.850
Flt Protected	0.983		0.950			
Satd. Flow (prot)	1302	0	1401	1597	1597	1126
Flt Permitted	0.983		0.950			
Satd. Flow (perm)	1302	0	1401	1597	1597	1126
Link Speed (k/h)	50			50	50	
Link Distance (m)	182.8			213.0	2177.2	
Travel Time (s)	13.2			15.3	156.8	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	70	134	67	380	311	34
Shared Lane Traffic (%)						
Lane Group Flow (vph)	204	0	67	380	311	34
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.34	1.22	1.22	1.53
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	46.1%			ICU Level of Service A		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis Total - 2035 Full Build-Out w/Improvements 201: Thorold Townline Rd & Street A AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	64	123	62	350	286	31
Future Volume (Veh/h)	64	123	62	350	286	31
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	134	67	380	311	34
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				213		
pX, platoon unblocked						
vC, conflicting volume	825	311	345			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	825	311	345			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	78	82	94			
cM capacity (veh/h)	323	729	1214			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	204	67	380	311	34	
Volume Left	70	67	0	0	0	
Volume Right	134	0	0	0	34	
cSH	510	1214	1700	1700	1700	
Volume to Capacity	0.40	0.06	0.22	0.18	0.02	
Queue Length 95th (m)	15.3	1.4	0.0	0.0	0.0	
Control Delay (s/veh)	16.7	8.1	0.0	0.0	0.0	
Lane LOS	C	A				
Approach Delay (s/veh)	16.7	1.2		0.0		
Approach LOS	C					
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			46.1%		ICU Level of Service	
					A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2035 Full Build-Out w/Improvements
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	118	229	116	294	349	60
Future Volume (vph)	118	229	116	294	349	60
Ideal Flow (vphpl)	1504	1388	1504	1629	1629	1351
Storage Length (m)	50.0	0.0	80.0			5.0
Storage Lanes	1	1	1			1
Taper Length (m)	45.0		45.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1429	1180	1429	1597	1597	1148
Flt Permitted	0.950		0.507			
Satd. Flow (perm)	1429	1180	763	1597	1597	1148
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		249				36
Link Speed (k/h)	50			50	50	
Link Distance (m)	219.5			238.0	213.0	
Travel Time (s)	15.8			17.1	15.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	128	249	126	320	379	65
Shared Lane Traffic (%)						
Lane Group Flow (vph)	128	249	126	320	379	65
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.34	1.48	1.34	1.22	1.22	1.53
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2035 Full Build-Out w/Improvements
AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases	4	4	2			6
Detector Phase	4	4	2	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	20.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	26.0	26.0	26.0	26.0
Total Split (s)	24.0	24.0	26.0	26.0	26.0	26.0
Total Split (%)	48.0%	48.0%	52.0%	52.0%	52.0%	52.0%
Maximum Green (s)	18.0	18.0	20.0	20.0	20.0	20.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	0.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	6.0	4.0	4.0	4.0	4.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	7.0	7.0	7.0	7.0	7.0	7.0
Flash Don't Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0
Act Effect Green (s)	11.7	9.7	22.8	22.8	22.8	22.8
Actuated g/C Ratio	0.28	0.23	0.54	0.54	0.54	0.54
v/c Ratio	0.33	0.54	0.31	0.37	0.44	0.10
Control Delay (s/veh)	14.3	7.4	8.9	7.9	8.6	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.3	7.4	8.9	7.9	8.6	4.0
LOS	B	A	A	A	A	A
Approach Delay (s/veh)	9.7			8.2	8.0	
Approach LOS	A			A	A	

Intersection Summary

Area Type: Other

Cycle Length: 50

Actuated Cycle Length: 42.5

Natural Cycle: 50

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.54

Intersection Signal Delay (s/veh): 8.6

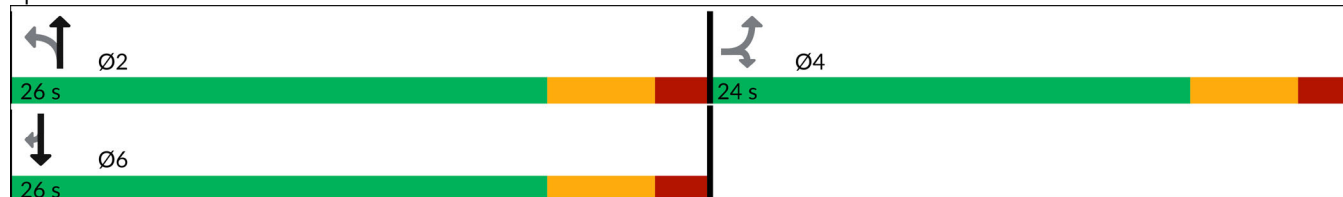
Intersection LOS: A

Intersection Capacity Utilization 56.3%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 202: Thorold Townline Rd & Street H



Queues

Total - 2035 Full Build-Out w/Improvements

202: Thorold Townline Rd & Street H

AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	128	249	126	320	379	65
v/c Ratio	0.33	0.54	0.31	0.37	0.44	0.10
Control Delay (s/veh)	14.3	7.4	8.9	7.9	8.6	4.0
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	14.3	7.4	8.9	7.9	8.6	4.0
Queue Length 50th (m)	7.5	0.0	4.3	11.4	14.2	0.9
Queue Length 95th (m)	17.4	12.6	15.3	30.0	36.7	5.6
Internal Link Dist (m)	195.5			214.0	189.0	
Turn Bay Length (m)	50.0		80.0			5.0
Base Capacity (vph)	673	643	409	857	857	633
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.19	0.39	0.31	0.37	0.44	0.10
Intersection Summary						

HCM Signalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2035 Full Build-Out w/Improvements
AM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	118	229	116	294	349	60
Future Volume (vph)	118	229	116	294	349	60
Ideal Flow (vphpl)	1504	1388	1504	1629	1629	1351
Total Lost time (s)	4.0	6.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1429	1180	1429	1597	1597	1148
Flt Permitted	0.95	1.00	0.51	1.00	1.00	1.00
Satd. Flow (perm)	1429	1180	763	1597	1597	1148
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	128	249	126	320	379	65
RTOR Reduction (vph)	0	192	0	0	0	17
Lane Group Flow (vph)	128	57	126	320	379	48
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Turn Type	Perm	Perm	Perm	NA	NA	Perm
Protected Phases				2	6	
Permitted Phases	4	4	2			6
Actuated Green, G (s)	9.7	9.7	20.8	20.8	20.8	20.8
Effective Green, g (s)	11.7	9.7	22.8	22.8	22.8	22.8
Actuated g/C Ratio	0.28	0.23	0.54	0.54	0.54	0.54
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	393	269	409	856	856	615
v/s Ratio Prot				0.20	c0.24	
v/s Ratio Perm	c0.09	0.05	0.17			0.04
v/c Ratio	0.33	0.21	0.31	0.37	0.44	0.08
Uniform Delay, d1	12.3	13.3	5.5	5.7	6.0	4.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4	0.4	0.3	0.4	0.1
Delay (s)	12.7	13.7	5.9	6.0	6.4	4.8
Level of Service	B	B	A	A	A	A
Approach Delay (s/veh)	13.4			6.0	6.1	
Approach LOS	B			A	A	
Intersection Summary						
HCM 2000 Control Delay (s/veh)			8.2	HCM 2000 Level of Service		A
HCM 2000 Volume to Capacity ratio			0.43			
Actuated Cycle Length (s)			42.5	Sum of lost time (s)		10.0
Intersection Capacity Utilization			56.3%	ICU Level of Service		B
Analysis Period (min)			15			
c Critical Lane Group						

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	T
Maximum Queue (m)	56.2	54.1	57.2	30.1	18.6	49.5	48.2	25.9	49.6	48.8	73.3	63.2
Average Queue (m)	23.6	26.7	30.7	12.1	5.2	22.7	23.1	9.6	22.0	22.6	28.3	26.5
95th Queue (m)	46.4	45.8	49.7	24.2	13.6	39.8	41.0	21.0	39.7	42.8	56.2	49.8
Link Distance (m)		889.6	889.6			567.4	567.4			765.2		207.6
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	100.0			60.0	100.0			100.0	50.0		100.0	
Storage Blk Time (%)	0		0						0	0		
Queuing Penalty (veh)	0		1						1	0		

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	SB
Directions Served	R
Maximum Queue (m)	34.6
Average Queue (m)	14.5
95th Queue (m)	27.1
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	100.0
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	38.1	36.9	26.9	41.4	34.4	78.0	14.3	56.0
Average Queue (m)	17.4	19.2	11.2	20.2	16.6	37.4	2.1	27.3
95th Queue (m)	31.9	32.3	21.6	36.2	31.2	66.6	8.9	48.1
Link Distance (m)		792.8		522.6		2152.8		704.0
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (m)	50.0		50.0		50.0		50.0	
Storage Blk Time (%)	0	0		0		3		1
Queuing Penalty (veh)	0	0		0		3		0

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	EB	WB	WB	SB	SB
Directions Served	LT	T	T	TR	L	R
Maximum Queue (m)	34.9	6.6	24.4	19.4	56.1	77.5
Average Queue (m)	14.0	0.2	7.6	1.9	26.5	16.3
95th Queue (m)	27.3	4.6	19.9	10.0	48.4	44.8
Link Distance (m)	983.9	983.9	889.6	889.6		436.0
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)					50.0	
Storage Blk Time (%)					3	0
Queuing Penalty (veh)					6	0

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB	SB
Directions Served	LR	L	R
Maximum Queue (m)	25.8	15.6	1.3
Average Queue (m)	10.9	4.2	0.0
95th Queue (m)	19.9	12.3	0.9
Link Distance (m)	168.4		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		40.0	5.0
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (m)	27.9	37.2	32.3	39.6	49.3	25.0
Average Queue (m)	13.3	14.3	15.3	19.1	23.6	9.6
95th Queue (m)	22.3	25.0	27.3	33.5	43.0	23.7
Link Distance (m)		205.6		207.6	196.3	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	50.0		80.0			5.0
Storage Blk Time (%)		0			21	3
Queuing Penalty (veh)		0			12	10

Network Summary

Network wide Queuing Penalty: 34

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025							
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:38:04 PM

Summary of intersection performance

AM							
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Dual Lane - TT 2035							
Leg North	0.50	1.06	3.01	0.32	A	3.32	A
Leg West	0.63	1.08	2.83	0.37	A		
Leg East	1.03	?	3.92	0.49	A		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM " model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM" model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:38:04 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Dual Lane - TT 2035, AM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	543.00	100.000
West	ONE HOUR	✓	732.00	100.000
East	ONE HOUR	✓	863.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	215.000	328.000
	West	638.000	0.000	94.000
	East	148.000	715.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.87	0.00	0.13
	East	0.17	0.83	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.100	1.040
	West	1.050	1.000	1.320
	East	1.090	1.060	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	10.0	4.0
	West	5.0	0.0	32.0
	East	9.0	6.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.32	3.01	0.50	1.06	A	498.27	747.40	33.28	2.67	0.37	33.28	2.67
West	0.37	2.83	0.63	1.08	A	671.70	1007.54	42.85	2.55	0.48	42.85	2.55
East	0.49	3.92	1.03	?	A	791.90	1187.86	64.76	3.27	0.72	64.76	3.27

Main Results for each time segment

Main results: (08:00-08:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	408.80	102.20	407.74	590.20	536.70	0.00	2048.33	1628.25	0.200	0.00	0.26	2.331	A
West	551.09	137.77	549.70	698.15	246.30	0.00	2258.28	1725.29	0.244	0.00	0.35	2.269	A
East	649.71	162.43	647.80	316.89	479.11	0.00	2089.97	1349.22	0.311	0.00	0.48	2.655	A

Main results: (08:15-08:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	488.15	122.04	487.81	706.11	642.17	0.00	1972.09	1628.25	0.248	0.26	0.35	2.578	A
West	658.05	164.51	657.63	835.32	294.66	0.00	2223.32	1725.29	0.296	0.35	0.45	2.479	A
East	775.82	193.95	775.10	379.11	573.18	0.00	2021.96	1349.22	0.384	0.48	0.66	3.073	A

Main results: (08:30-08:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	597.85	149.46	597.26	864.52	786.02	0.00	1868.09	1628.24	0.320	0.35	0.50	3.009	A
West	805.95	201.49	805.23	1022.50	360.77	0.00	2175.52	1725.29	0.370	0.45	0.63	2.831	A
East	950.18	237.55	948.72	464.18	701.82	0.00	1928.96	1349.22	0.493	0.66	1.03	3.906	A

Main results: (08:45-09:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	597.85	149.46	597.85	865.39	787.21	0.00	1867.23	1628.24	0.320	0.50	0.50	3.013	A
West	805.95	201.49	805.94	1023.93	361.13	0.00	2175.27	1725.29	0.371	0.63	0.63	2.834	A
East	950.18	237.55	950.16	464.63	702.45	0.00	1928.51	1349.22	0.493	1.03	1.03	3.918	A

Main results: (09:00-09:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	488.15	122.04	488.74	707.47	643.97	0.00	1970.78	1628.25	0.248	0.50	0.35	2.582	A
West	658.05	164.51	658.76	837.49	295.22	0.00	2222.91	1725.29	0.296	0.63	0.46	2.482	A
East	775.82	193.95	777.27	379.82	574.17	0.00	2021.25	1349.22	0.384	1.03	0.67	3.087	A

Main results: (09:15-09:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	408.80	102.20	409.14	592.24	538.90	0.00	2046.75	1628.25	0.200	0.35	0.27	2.336	A
West	551.09	137.77	551.51	700.90	247.14	0.00	2257.67	1725.29	0.244	0.46	0.35	2.277	A
East	649.71	162.43	650.45	317.96	480.69	0.00	2088.83	1349.22	0.311	0.67	0.48	2.666	A

Queueing Delay Results for each time segment

Queueing Delay results: (08:00-08:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.90	0.26	2.331	A	A
West	5.12	0.34	2.269	A	A
East	7.04	0.47	2.655	A	A

Queueing Delay results: (08:15-08:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.16	0.34	2.578	A	A
West	6.69	0.45	2.479	A	A

East	9.73	0.65	3.073	A	A

Queueing Delay results: (08:30-08:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.35	0.49	3.009	A	A
West	9.33	0.62	2.831	A	A
East	15.01	1.00	3.906	A	A

Queueing Delay results: (08:45-09:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	7.48	0.50	3.013	A	A
West	9.49	0.63	2.834	A	A
East	15.42	1.03	3.918	A	A

Queueing Delay results: (09:00-09:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.34	0.36	2.582	A	A
West	6.92	0.46	2.482	A	A
East	10.20	0.68	3.087	A	A

Queueing Delay results: (09:15-09:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.04	0.27	2.336	A	A
West	5.30	0.35	2.277	A	A
East	7.35	0.49	2.666	A	A

Queue Variation Results for each time segment**Queue Variation results: (08:00-08:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.26	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:15-08:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.45	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.66	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:30-08:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.50	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.63	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	1.03	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (08:45-09:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.50	0.00	0.00	0.00	1.06			N/A	N/A
West	0.63	0.00	0.00	0.00	1.08			N/A	N/A
East	1.03	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:00-09:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.46	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.67	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Queue Variation results: (09:15-09:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.27	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.35	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	0.48	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Lanes, Volumes, Timings

Total - 2035 Full Build-Out w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Future Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Ideal Flow (vphpl)	1504	1629	1351	1504	1629	1351	1504	1388	1388	1504	1629	1351
Storage Length (m)	90.0		20.0	55.0		30.0	50.0		0.0	50.0		40.0
Storage Lanes	1		1	1		1	1		0	1		1
Taper Length (m)	100.0			80.0			50.0			50.0		
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00		0.98	1.00		0.98						
Frt			0.850			0.850		0.971				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1335	3064	1137	1429	3064	1148	1415	1306	0	1429	1582	1104
Flt Permitted	0.116			0.270			0.475			0.457		
Satd. Flow (perm)	163	3064	1112	406	3064	1123	707	1306	0	687	1582	1104
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			142			135		13				179
Link Speed (k/h)		50			50			50				50
Link Distance (m)		936.7			581.5			783.0			204.0	
Travel Time (s)		67.4			41.9			56.4			14.7	
Confl. Peds. (#/hr)	2		2	2		2						
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 (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Adj. Flow (vph)	327	957	245	52	987	215	271	255	62	178	300	401
Shared Lane Traffic (%)												
Lane Group Flow (vph)	327	957	245	52	987	215	271	317	0	178	300	401
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.22	1.53	1.34	1.22	1.53	1.34	1.48	1.48	1.34	1.22	1.53
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2	1	1	2	1	1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	Right
Leading Detector (m)	2.0	10.0	2.0	2.0	10.0	2.0	2.0	10.0		2.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Size(m)	2.0	0.6	2.0	2.0	0.6	2.0	2.0	0.6		2.0	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	

Lanes, Volumes, Timings

Total - 2035 Full Build-Out w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Detector Phase	7	4	4	8	8	8	2	2		6	6	6
Switch Phase												
Minimum Initial (s)	5.0	20.0	20.0	20.0	20.0	20.0	10.0	10.0		10.0	10.0	10.0
Minimum Split (s)	9.5	42.0	42.0	42.0	42.0	42.0	39.0	39.0		39.0	39.0	39.0
Total Split (s)	9.5	65.5	65.5	56.0	56.0	56.0	39.0	39.0		39.0	39.0	39.0
Total Split (%)	9.1%	62.7%	62.7%	53.6%	53.6%	53.6%	37.3%	37.3%		37.3%	37.3%	37.3%
Maximum Green (s)	5.5	58.5	58.5	49.0	49.0	49.0	33.0	33.0		33.0	33.0	33.0
Yellow Time (s)	3.0	5.0	5.0	5.0	5.0	5.0	4.0	4.0		4.0	4.0	4.0
All-Red Time (s)	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	2.0
Lost Time Adjust (s)	0.0	-3.0	-3.0	-3.0	-3.0	-3.0	-2.0	-2.0		-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lead/Lag	Lead			Lag	Lag	Lag						
Lead-Lag Optimize?	Yes			Yes	Yes	Yes						
Vehicle Extension (s)	3.0	0.2	0.2	0.2	0.2	0.2	3.0	3.0		3.0	3.0	3.0
Recall Mode	None	Min	Min	Min	Min	Min	None	None		None	None	None
Act Effect Green (s)	43.0	43.0	43.0	33.4	33.4	33.4	35.2	35.2		35.2	35.2	35.2
Actuated g/C Ratio	0.50	0.50	0.50	0.39	0.39	0.39	0.41	0.41		0.41	0.41	0.41
v/c Ratio	2.10	0.63	0.39	0.33	0.83	0.42	0.94	0.59		0.64	0.46	0.72
Control Delay (s/veh)	532.1	17.6	7.2	24.5	30.5	9.7	69.3	26.1		35.4	23.2	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0
Total Delay (s/veh)	532.1	17.6	7.2	24.5	30.5	9.7	69.3	26.1		35.4	23.2	21.7
LOS	F	B	A	C	C	A	E	C		D	C	C
Approach Delay (s/veh)		126.0			26.7			46.0			25.0	
Approach LOS		F			C			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 104.5

Actuated Cycle Length: 86.2

Natural Cycle: 105

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 2.10

Intersection Signal Delay (s/veh): 64.7

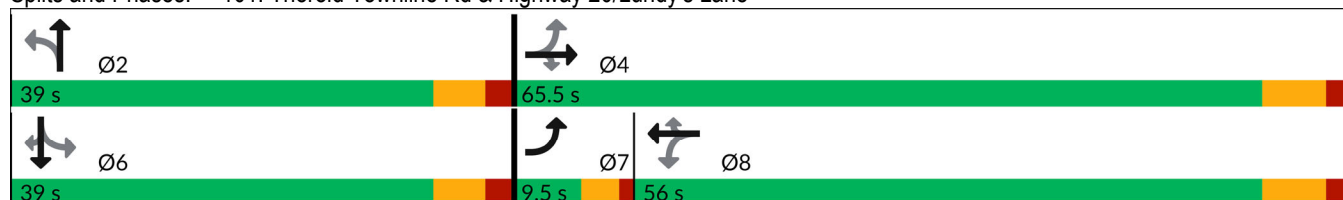
Intersection LOS: E

Intersection Capacity Utilization 98.0%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 101: Thorold Townline Rd & Highway 20/Lundy's Lane



Queues

Total - 2035 Full Build-Out w/ Improvements

101: Thorold Townline Rd & Highway 20/Lundy's Lane

PM Peak Hour

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	SBL	SBT	SBR
Lane Group Flow (vph)	327	957	245	52	987	215	271	317	178	300	401
v/c Ratio	2.10	0.63	0.39	0.33	0.83	0.42	0.94	0.59	0.64	0.46	0.72
Control Delay (s/veh)	532.1	17.6	7.2	24.5	30.5	9.7	69.3	26.1	35.4	23.2	21.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	532.1	17.6	7.2	24.5	30.5	9.7	69.3	26.1	35.4	23.2	21.7
Queue Length 50th (m)	~78.4	60.2	9.4	6.2	79.2	8.9	43.7	39.7	23.9	36.8	31.0
Queue Length 95th (m)	#144.8	78.5	24.0	16.0	103.3	25.3	#108.9	81.1	#64.6	72.5	#93.2
Internal Link Dist (m)	912.7			557.5			759.0			180.0	
Turn Bay Length (m)	90.0		20.0	55.0		30.0	50.0		50.0		40.0
Base Capacity (vph)	156	2198	837	246	1858	734	288	540	280	646	556
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	2.10	0.44	0.29	0.21	0.53	0.29	0.94	0.59	0.64	0.46	0.72

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis Total - 2035 Full Build-Out w/ Improvements 101: Thorold Townline Rd & Highway 20/Lundy's Lane PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 			 			 	
Traffic Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Future Volume (vph)	301	880	225	48	908	198	249	235	57	164	276	369
Ideal Flow (vphpl)	1504	1629	1351	1504	1629	1351	1504	1388	1388	1504	1629	1351
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	1.00	0.98	1.00	1.00		1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1335	3064	1112	1428	3064	1122	1415	1305		1429	1582	1104
Flt Permitted	0.12	1.00	1.00	0.27	1.00	1.00	0.48	1.00		0.46	1.00	1.00
Satd. Flow (perm)	163	3064	1112	405	3064	1122	708	1305		687	1582	1104
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	327	957	245	52	987	215	271	255	62	178	300	401
RTOR Reduction (vph)	0	0	71	0	0	83	0	8	0	0	0	106
Lane Group Flow (vph)	327	957	174	52	987	132	271	309	0	178	300	295
Confl. Peds. (#/hr)	2		2	2		2						
Heavy Vehicles (%)	7%	1%	1%	0%	1%	0%	1%	4%	0%	0%	3%	4%
Turn Type	pm+pt	NA	Perm	Perm	NA	Perm	Perm	NA		Perm	NA	Perm
Protected Phases	7	4			8			2			6	
Permitted Phases	4		4	8		8	2			6		6
Actuated Green, G (s)	40.0	40.0	40.0	30.5	30.5	30.5	33.2	33.2		33.2	33.2	33.2
Effective Green, g (s)	40.0	43.0	43.0	33.5	33.5	33.5	35.2	35.2		35.2	35.2	35.2
Actuated g/C Ratio	0.46	0.50	0.50	0.39	0.39	0.39	0.41	0.41		0.41	0.41	0.41
Clearance Time (s)	4.0	7.0	7.0	7.0	7.0	7.0	6.0	6.0		6.0	6.0	6.0
Vehicle Extension (s)	3.0	0.2	0.2	0.2	0.2	0.2	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	150	1528	554	157	1190	436	289	532		280	646	450
v/s Ratio Prot	c0.14	0.31			0.32			0.24			0.19	
v/s Ratio Perm	c0.87		0.16	0.13		0.12	c0.38			0.26		0.27
v/c Ratio	2.18	0.63	0.31	0.33	0.83	0.30	0.94	0.58		0.64	0.46	0.66
Uniform Delay, d1	19.1	15.7	12.8	18.5	23.8	18.3	24.4	19.8		20.4	18.6	20.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	552.3	0.6	0.1	0.5	4.7	0.1	36.3	1.6		4.7	0.5	3.4
Delay (s)	571.4	16.3	13.0	18.9	28.5	18.4	60.7	21.4		25.0	19.1	24.0
Level of Service	F	B	B	B	C	B	E	C		C	B	C
Approach Delay (s/veh)		134.5			26.3			39.5			22.6	
Approach LOS		F			C			D			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			66.3									
HCM 2000 Volume to Capacity ratio			1.58									
Actuated Cycle Length (s)			86.2									
Intersection Capacity Utilization			98.0%									
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
Future Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Storage Length (m)	50.0		0.0	50.0		0.0	50.0		0.0	50.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	50.0			50.0			50.0			50.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.941			0.983			0.951			0.953	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1323	1276	0	1429	1352	0	1429	1237	0	1429	1259	0
Flt Permitted	0.443			0.274			0.161			0.382		
Satd. Flow (perm)	617	1276	0	412	1352	0	242	1237	0	575	1259	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			10			44			41	
Link Speed (k/h)		50			50			50			50	
Link Distance (m)		418.6			537.1			2181.2			714.3	
Travel Time (s)		30.1			38.7			157.0			51.4	
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 (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Adj. Flow (vph)	121	297	192	195	292	38	123	305	149	38	504	228
Shared Lane Traffic (%)												
Lane Group Flow (vph)	121	489	0	195	330	0	123	454	0	38	732	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		3.6			3.6			3.6			3.6	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.8			4.8			4.8			4.8	
Two way Left Turn Lane												
Headway Factor	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48	1.34	1.48	1.48
Turning Speed (k/h)	25		15	25		15	25		15	25		15
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	

Lanes, Volumes, Timings
102: Thorold Townline Rd & Beaverdams Rd

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0	
Minimum Split (s)	24.0	24.0		24.0	24.0		24.0	24.0		24.0	24.0	
Total Split (s)	36.0	36.0		36.0	36.0		44.0	44.0		44.0	44.0	
Total Split (%)	45.0%	45.0%		45.0%	45.0%		55.0%	55.0%		55.0%	55.0%	
Maximum Green (s)	30.0	30.0		30.0	30.0		38.0	38.0		38.0	38.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0		-2.0	-2.0		-2.0	-2.0		-2.0	-2.0	
Total Lost Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None		None	None		None	None		None	None	
Act Effect Green (s)	32.0	32.0		32.0	32.0		40.0	40.0		40.0	40.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.50	0.50		0.50	0.50	
v/c Ratio	0.49	0.91		1.19	0.60		1.02	0.71		0.13	1.13	
Control Delay (s/veh)	26.4	44.2		157.8	24.1		113.9	21.4		12.3	97.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay (s/veh)	26.4	44.2		157.8	24.1		113.9	21.4		12.3	97.2	
LOS	C	D		F	C		F	C		B	F	
Approach Delay (s/veh)		40.7			73.8			41.1			93.0	
Approach LOS		D			E			D			F	

Intersection Summary

Area Type: Other

Cycle Length: 80

Actuated Cycle Length: 80

Natural Cycle: 80

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 1.19

Intersection Signal Delay (s/veh): 64.0

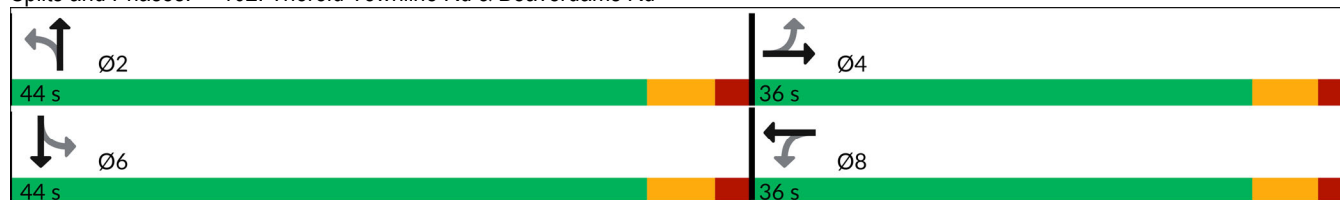
Intersection LOS: E

Intersection Capacity Utilization 119.6%

ICU Level of Service H

Analysis Period (min) 15

Splits and Phases: 102: Thorold Townline Rd & Beaverdams Rd



Queues

Total - 2035 Full Build-Out w/ Improvements

102: Thorold Townline Rd & Beaverdams Rd

PM Peak Hour

								
Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Group Flow (vph)	121	489	195	330	123	454	38	732
v/c Ratio	0.49	0.91	1.19	0.60	1.02	0.71	0.13	1.13
Control Delay (s/veh)	26.4	44.2	157.8	24.1	113.9	21.4	12.3	97.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	26.4	44.2	157.8	24.1	113.9	21.4	12.3	97.2
Queue Length 50th (m)	14.1	65.7	~38.1	39.4	~19.6	48.1	3.1	~134.6
Queue Length 95th (m)	31.5	#127.9	#78.3	67.1	#54.3	86.1	8.6	#202.6
Internal Link Dist (m)		394.6		513.1		2157.2		690.3
Turn Bay Length (m)	50.0		50.0		50.0		50.0	
Base Capacity (vph)	246	539	164	546	121	640	287	650
Starvation Cap Reductn	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.91	1.19	0.60	1.02	0.71	0.13	1.13

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 102: Thorold Townline Rd & Beaverdams Rd

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
Future Volume (vph)	111	273	177	179	269	35	113	281	137	35	464	210
Ideal Flow (vphpl)	1504	1388	1388	1504	1388	1388	1504	1388	1388	1504	1388	1388
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	0.95		1.00	0.95	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1323	1276		1429	1352		1429	1237		1429	1259	
Flt Permitted	0.44	1.00		0.27	1.00		0.16	1.00		0.38	1.00	
Satd. Flow (perm)	616	1276		413	1352		241	1237		575	1259	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	121	297	192	195	292	38	123	305	149	38	504	228
RTOR Reduction (vph)	0	29	0	0	6	0	0	22	0	0	21	0
Lane Group Flow (vph)	121	460	0	195	324	0	123	432	0	38	712	0
Heavy Vehicles (%)	8%	2%	3%	0%	1%	0%	0%	10%	0%	0%	6%	3%
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	30.0	30.0		30.0	30.0		38.0	38.0		38.0	38.0	
Effective Green, g (s)	32.0	32.0		32.0	32.0		40.0	40.0		40.0	40.0	
Actuated g/C Ratio	0.40	0.40		0.40	0.40		0.50	0.50		0.50	0.50	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0		6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	246	510		165	540		120	618		287	629	
v/s Ratio Prot		0.36			0.24			0.35			c0.56	
v/s Ratio Perm	0.20			c0.47			0.51			0.07		
v/c Ratio	0.49	0.90		1.18	0.60		1.02	0.70		0.13	1.13	
Uniform Delay, d1	17.9	22.5		24.0	18.9		20.0	15.4		10.7	20.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2	1.5	19.1		127.4	1.9		89.0	3.5		0.2	77.8	
Delay (s)	19.5	41.6		151.4	20.8		109.0	18.8		10.9	97.8	
Level of Service	B	D		F	C		F	B		B	F	
Approach Delay (s/veh)		37.2			69.3			38.1			93.5	
Approach LOS		D			E			D			F	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			61.7				HCM 2000 Level of Service			E		
HCM 2000 Volume to Capacity ratio			1.15									
Actuated Cycle Length (s)			80.0				Sum of lost time (s)			8.0		
Intersection Capacity Utilization			119.6%				ICU Level of Service			H		
Analysis Period (min)			15									
c Critical Lane Group												

Lanes, Volumes, Timings
103: Highway 20 & Barker Parkway

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

						
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	190	1153	1168	353	254	168
Future Volume (vph)	190	1153	1168	353	254	168
Ideal Flow (vphpl)	1228	1228	1388	1388	1483	1483
Storage Length (m)	0.0			0.0	0.0	50.0
Storage Lanes	0			0	1	1
Taper Length (m)	7.5				7.5	
Lane Util. Factor	0.95	0.95	0.95	0.95	1.00	1.00
Frt			0.965			0.850
Flt Protected		0.993			0.950	
Satd. Flow (prot)	0	2278	2506	0	1409	1201
Flt Permitted		0.993			0.950	
Satd. Flow (perm)	0	2278	2506	0	1409	1201
Link Speed (k/h)		50	50		50	
Link Distance (m)		1017.3	936.7		470.3	
Travel Time (s)		73.2	67.4		33.9	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	2%	0%	0%	5%
Adj. Flow (vph)	207	1253	1270	384	276	183
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	1460	1654	0	276	183
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		3.6	3.6		3.6	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		4.8	4.8		4.8	
Two way Left Turn Lane						
Headway Factor	1.71	1.71	1.48	1.48	1.37	1.37
Turning Speed (k/h)	25			15	25	15
Sign Control		Yield	Yield		Yield	
Intersection Summary						
Area Type:	Other					
Control Type: Roundabout						
Intersection Capacity Utilization 145.5%				ICU Level of Service H		
Analysis Period (min) 15						

HCM Unsignalized Intersection Capacity Analysis Total - 2035 Full Build-Out w/ Improvements
 103: Highway 20 & Barker Parkway PM Peak Hour

						
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Right Turn Channelized						
Traffic Volume (veh/h)	190	1153	1168	353	254	168
Future Volume (veh/h)	190	1153	1168	353	254	168
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	207	1253	1270	384	276	183
Approach Volume (veh/h)		1460	1654		459	
Crossing Volume (veh/h)		276	207		1270#	
High Capacity (veh/h)		1115	1178		498	
High v/c (veh/h)		1.31	1.40		0.92	
Low Capacity (veh/h)		917	973		377	
Low v/c (veh/h)		1.59	1.70		1.22	
Intersection Summary						
Maximum v/c High			1.40			
Maximum v/c Low			1.70			
Intersection Capacity Utilization			145.5%		ICU Level of Service	H
# Crossing flow exceeds 1200, method is not applicable						

Intersection						
Intersection Delay, s/veh	15.5					
Intersection LOS	C					
Approach	EB		WB		SB	
Entry Lanes	2		2		2	
Conflicting Circle Lanes	2		2		2	
Adj Approach Flow, veh/h	1460		1654		459	
Demand Flow Rate, veh/h	1485		1679		468	
Vehicles Circulating, veh/h	276		207		1295	
Vehicles Exiting, veh/h	1487		1554		591	
Ped Vol Crossing Leg, #/h	0		0		0	
Ped Cap Adj	1.000		1.000		1.000	
Approach Delay, s/veh	13.8		14.8		23.2	
Approach LOS	B		B		C	
Lane	Left	Right	Left	Right	Left	Right
Designated Moves	LT	TR	LT	TR	L	TR
Assumed Moves	LT	TR	LT	TR	L	TR
RT Channelized						
Lane Util	0.470	0.530	0.470	0.530	0.590	0.410
Follow-Up Headway, s	2.667	2.535	2.667	2.535	2.667	2.535
Critical Headway, s	4.645	4.328	4.645	4.328	4.645	4.328
A (Intercept)	1350	1420	1350	1420	1350	1420
B (Slope)	9.199e-4	8.501e-4	9.199e-4	8.501e-4	9.199e-4	8.501e-4
Entry Flow, veh/h	698	787	789	890	276	192
Cap Entry Lane, veh/h	1047	1123	1116	1191	410	472
Entry HV Adj Factor	0.983	0.983	0.985	0.985	1.000	0.953
Flow Entry, veh/h	686	774	777	876	276	183
Cap Entry, veh/h	1029	1104	1099	1173	410	450
V/C Ratio	0.667	0.701	0.707	0.747	0.673	0.407
Control Delay, s/veh	13.5	14.0	14.3	15.3	28.4	15.4
LOS	B	B	B	C	D	C
95th %tile Queue, veh	5	6	6	7	5	2

Lanes, Volumes, Timings
201: Thorold Townline Rd & Street A

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	61	102	140	389	614	84
Future Volume (vph)	61	102	140	389	614	84
Ideal Flow (vphpl)	1483	1483	1504	1629	1629	1351
Storage Length (m)	0.0	0.0	40.0			8.0
Storage Lanes	1	0	1			1
Taper Length (m)	7.5		40.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.915					0.850
Flt Protected	0.982		0.950			
Satd. Flow (prot)	1333	0	1429	1597	1597	1148
Flt Permitted	0.982		0.950			
Satd. Flow (perm)	1333	0	1429	1597	1597	1148
Link Speed (k/h)	50			50	50	
Link Distance (m)	252.7			243.0	2181.2	
Travel Time (s)	18.2			17.5	157.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	66	111	152	423	667	91
Shared Lane Traffic (%)						
Lane Group Flow (vph)	177	0	152	423	667	91
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.37	1.37	1.34	1.22	1.22	1.53
Turning Speed (k/h)	25	15	25			15
Sign Control	Stop			Free	Free	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	69.9%			ICU Level of Service C		
Analysis Period (min)	15					

HCM Unsignalized Intersection Capacity Analysis Total - 2035 Full Build-Out w/ Improvements

201: Thorold Townline Rd & Street A

PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	61	102	140	389	614	84
Future Volume (Veh/h)	61	102	140	389	614	84
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	66	111	152	423	667	91
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage veh						
Upstream signal (m)				243		
pX, platoon unblocked						
vC, conflicting volume	1394	667	758			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1394	667	758			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	49	76	82			
cM capacity (veh/h)	130	462	862			
Direction, Lane #	EB 1	NB 1	NB 2	SB 1	SB 2	
Volume Total	177	152	423	667	91	
Volume Left	66	152	0	0	0	
Volume Right	111	0	0	0	91	
cSH	236	862	1700	1700	1700	
Volume to Capacity	0.75	0.18	0.25	0.39	0.05	
Queue Length 95th (m)	41.9	5.1	0.0	0.0	0.0	
Control Delay (s/veh)	54.9	10.1	0.0	0.0	0.0	
Lane LOS	F	B				
Approach Delay (s/veh)	54.9	2.7		0.0		
Approach LOS	F					
Intersection Summary						
Average Delay	7.5					
Intersection Capacity Utilization	69.9%			ICU Level of Service	C	
Analysis Period (min)	15					

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	128	261	333	401	548	168
Future Volume (vph)	128	261	333	401	548	168
Ideal Flow (vphpl)	1504	1351	1504	1629	1629	1351
Storage Length (m)	50.0	0.0	80.0			8.0
Storage Lanes	1	1	1			1
Taper Length (m)	50.0		60.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected	0.950		0.950			
Satd. Flow (prot)	1429	1148	1429	1597	1597	1148
Flt Permitted	0.950		0.173			
Satd. Flow (perm)	1429	1148	260	1597	1597	1148
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		284				44
Link Speed (k/h)	50			50	50	
Link Distance (m)	258.3			204.0	243.0	
Travel Time (s)	18.6			14.7	17.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Adj. Flow (vph)	139	284	362	436	596	183
Shared Lane Traffic (%)						
Lane Group Flow (vph)	139	284	362	436	596	183
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	3.6			3.6	3.6	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	4.8			4.8	4.8	
Two way Left Turn Lane						
Headway Factor	1.34	1.53	1.34	1.22	1.22	1.53
Turning Speed (k/h)	25	15	25			15
Number of Detectors	1	1	1	2	2	1
Detector Template	Left	Right	Left	Thru	Thru	Right
Leading Detector (m)	2.0	2.0	2.0	10.0	10.0	2.0
Trailing Detector (m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Position(m)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Size(m)	2.0	2.0	2.0	0.6	0.6	2.0
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(m)				9.4	9.4	
Detector 2 Size(m)				0.6	0.6	
Detector 2 Type				Cl+Ex	Cl+Ex	
Detector 2 Channel						
Detector 2 Extend (s)				0.0	0.0	
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	

Lanes, Volumes, Timings
202: Thorold Townline Rd & Street H

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Permitted Phases	4	4	2			6
Detector Phase	4	4	5	2	6	6
Switch Phase						
Minimum Initial (s)	8.0	8.0	5.0	20.0	20.0	20.0
Minimum Split (s)	24.0	24.0	9.5	27.0	27.0	27.0
Total Split (s)	24.0	24.0	22.0	66.0	44.0	44.0
Total Split (%)	26.7%	26.7%	24.4%	73.3%	48.9%	48.9%
Maximum Green (s)	18.0	18.0	18.0	60.0	38.0	38.0
Yellow Time (s)	4.0	4.0	3.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	1.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	0.0	-2.0	-2.0	-2.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag			Lead		Lag	Lag
Lead-Lag Optimize?			Yes		Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Walk Time (s)	7.0	7.0		7.0	7.0	7.0
Flash Don't Walk (s)	11.0	11.0		11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0		0	0	0
Act Effect Green (s)	15.1	15.1	56.0	56.0	34.3	34.3
Actuated g/C Ratio	0.19	0.19	0.71	0.71	0.43	0.43
v/c Ratio	0.51	0.63	0.82	0.39	0.86	0.35
Control Delay (s/veh)	37.8	11.1	31.2	6.2	35.3	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.8	11.1	31.2	6.2	35.3	13.7
LOS	D	B	C	A	D	B
Approach Delay (s/veh)	19.9			17.5	30.2	
Approach LOS	B			B	C	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 79.3

Natural Cycle: 90

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.86

Intersection Signal Delay (s/veh): 23.0

Intersection LOS: C

Intersection Capacity Utilization 75.9%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 202: Thorold Townline Rd & Street H



Queues

Total - 2035 Full Build-Out w/ Improvements

202: Thorold Townline Rd & Street H

PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Group Flow (vph)	139	284	362	436	596	183
v/c Ratio	0.51	0.63	0.82	0.39	0.86	0.35
Control Delay (s/veh)	37.8	11.1	31.2	6.2	35.3	13.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay (s/veh)	37.8	11.1	31.2	6.2	35.3	13.7
Queue Length 50th (m)	21.9	0.0	32.2	23.4	83.5	13.9
Queue Length 95th (m)	40.2	22.8	#89.2	45.7	#156.9	31.7
Internal Link Dist (m)	234.3			180.0	219.0	
Turn Bay Length (m)	50.0		80.0			8.0
Base Capacity (vph)	369	507	455	1263	826	615
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.38	0.56	0.80	0.35	0.72	0.30

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

HCM Signalized Intersection Capacity Analysis 202: Thorold Townline Rd & Street H

Total - 2035 Full Build-Out w/ Improvements
PM Peak Hour

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	128	261	333	401	548	168
Future Volume (vph)	128	261	333	401	548	168
Ideal Flow (vphpl)	1504	1351	1504	1629	1629	1351
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.85	1.00	1.00	1.00	0.85
Flt Protected	0.95	1.00	0.95	1.00	1.00	1.00
Satd. Flow (prot)	1429	1148	1429	1597	1597	1148
Flt Permitted	0.95	1.00	0.17	1.00	1.00	1.00
Satd. Flow (perm)	1429	1148	260	1597	1597	1148
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	139	284	362	436	596	183
RTOR Reduction (vph)	0	230	0	0	0	25
Lane Group Flow (vph)	139	54	362	436	596	158
Heavy Vehicles (%)	0%	0%	0%	2%	2%	0%
Turn Type	Perm	Perm	pm+pt	NA	NA	Perm
Protected Phases			5	2	6	
Permitted Phases	4	4	2			6
Actuated Green, G (s)	13.0	13.0	54.0	54.0	32.4	32.4
Effective Green, g (s)	15.0	15.0	54.0	56.0	34.4	34.4
Actuated g/C Ratio	0.19	0.19	0.68	0.71	0.44	0.44
Clearance Time (s)	6.0	6.0	4.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	271	217	438	1132	695	499
v/s Ratio Prot			c0.18	0.27	c0.37	
v/s Ratio Perm	c0.10	0.05	0.38			0.14
v/c Ratio	0.51	0.25	0.83	0.39	0.86	0.32
Uniform Delay, d1	28.7	27.2	15.9	4.6	20.1	14.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	1.6	0.6	12.1	0.2	10.2	0.4
Delay (s)	30.4	27.8	28.0	4.8	30.3	15.0
Level of Service	C	C	C	A	C	B
Approach Delay (s/veh)	28.6			15.3	26.7	
Approach LOS	C			B	C	
Intersection Summary						
HCM 2000 Control Delay (s/veh)			22.6	HCM 2000 Level of Service		C
HCM 2000 Volume to Capacity ratio			0.80			
Actuated Cycle Length (s)			79.0	Sum of lost time (s)		14.0
Intersection Capacity Utilization			75.9%	ICU Level of Service		D
Analysis Period (min)			15			
c Critical Lane Group						

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	EB	EB	EB	EB	WB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	T	R	L	T	T	R	L	TR	L	T
Maximum Queue (m)	190.0	430.6	418.0	69.6	69.0	166.2	167.7	80.0	99.9	438.7	64.2	71.1
Average Queue (m)	162.8	230.5	209.2	22.4	15.6	88.5	90.4	41.0	81.9	215.1	27.7	34.6
95th Queue (m)	230.8	541.8	523.7	57.2	60.6	167.3	169.3	91.2	123.3	537.5	50.4	61.2
Link Distance (m)		889.6	889.6			567.4	567.4			765.2		173.8
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (m)	90.0			20.0	55.0			30.0	50.0		50.0	
Storage Blk Time (%)	90	6	35	3		31	51	2	70	12	3	7
Queuing Penalty (veh)	395	19	78	15		15	100	7	206	31	19	37

Intersection: 101: Thorold Townline Rd & Highway 20/Lundy's Lane

Movement	SB
Directions Served	R
Maximum Queue (m)	67.7
Average Queue (m)	36.1
95th Queue (m)	61.9
Link Distance (m)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (m)	40.0
Storage Blk Time (%)	7
Queuing Penalty (veh)	30

Intersection: 102: Thorold Townline Rd & Beaverdams Rd

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (m)	91.8	144.4	99.9	535.3	99.9	1484.8	99.9	490.4
Average Queue (m)	29.9	67.1	99.0	457.0	92.0	641.2	40.4	321.5
95th Queue (m)	68.0	117.3	103.8	677.2	118.8	1458.2	115.2	591.8
Link Distance (m)		408.4		522.6		2156.8		704.1
Upstream Blk Time (%)				69				5
Queuing Penalty (veh)				0				0
Storage Bay Dist (m)	50.0		50.0		50.0		50.0	
Storage Blk Time (%)	3	22	99	11	93	8		59
Queuing Penalty (veh)	13	24	301	20	388	9		21

Intersection: 103: Highway 20 & Barker Parkway

Movement	EB	EB	WB	WB	SB	SB
Directions Served	LT	T	T	TR	L	R
Maximum Queue (m)	54.1	30.6	36.7	42.1	64.1	30.2
Average Queue (m)	21.3	2.2	17.1	8.7	29.0	13.4
95th Queue (m)	40.3	20.4	29.8	29.4	52.2	24.1
Link Distance (m)	983.9	983.9	889.6	889.6	436.0	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)						50.0
Storage Blk Time (%)					3	
Queuing Penalty (veh)					4	

Intersection: 201: Thorold Townline Rd & Street A

Movement	EB	NB	SB
Directions Served	LR	L	R
Maximum Queue (m)	34.7	25.2	6.7
Average Queue (m)	15.1	10.2	1.1
95th Queue (m)	29.3	20.6	5.2
Link Distance (m)	238.4		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)		40.0	8.0
Storage Blk Time (%)			0
Queuing Penalty (veh)			1

Intersection: 202: Thorold Townline Rd & Street H

Movement	EB	EB	NB	NB	SB	SB
Directions Served	L	R	L	T	T	R
Maximum Queue (m)	39.4	58.4	68.6	66.3	136.5	28.0
Average Queue (m)	19.8	23.4	32.6	20.2	71.1	19.5
95th Queue (m)	33.0	44.4	54.6	44.6	117.5	36.3
Link Distance (m)		244.2		173.8	226.2	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)	50.0		80.0			8.0
Storage Blk Time (%)	0	1	0	0	47	11
Queuing Penalty (veh)	0	1	1	1	79	60

Network Summary

Network wide Queuing Penalty: 1875

Junctions 8							
ARCADY 8 - Roundabout Module							
Version: 8.0.6.541 [19821,26/11/2015] © Copyright TRL Limited, 2025							
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Filename: Barker and Hwy 20.arc8
Path: C:\Users\AdamMorrison\OneDrive - Paradigm\Desktop\Project\Project Files\2021\210565 - Arcady
Report generation date: 2025-08-26 5:37:29 PM

Summary of intersection performance

	PM						
	Queue (PCE)	95% Queue (PCE)	Delay (s)	V/C Ratio	LOS	Intersection Delay (s)	Intersection LOS
Dual Lane - TT 2035							
Leg North	0.42	~1	3.25	0.29	A	80.19	F
Leg West	1.97	3.05	4.83	0.66	A		
Leg East	88.59	158.39	167.80	1.10	F		

Values shown are the maximum values over all time segments. Delay is the maximum value of average delay per arriving vehicle. Intersection LOS and Intersection Delay are demand-weighted averages.

"D1 - TT 2028, AM" model duration: 8:00 AM - 9:30 AM
"D2 - TT 2028, PM" model duration: 4:00 PM - 5:30 PM
"D3 - TT 2035, AM" model duration: 8:00 AM - 9:30 AM
"D4 - TT 2035, PM " model duration: 4:00 PM - 5:30 PM
"D5 - TT 2040, AM" model duration: 8:00 AM - 9:30 AM
"D6 - TT 2040, PM" model duration: 4:00 PM - 5:30 PM
"D7 - TT 2045, AM" model duration: 8:00 AM - 9:30 AM
"D8 - TT 2045, PM" model duration: 4:00 PM - 5:30 PM

Run using Junctions 8.0.6.541 at 2025-08-26 5:37:29 PM

File summary

Title	(untitled)
Location	
Site Number	
Date	2023-11-22
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Analyst	AdamMorrison
Description	

Analysis Options

Vehicle Length (m)	Do Queue Variations	Calculate Residual Capacity	Residual Capacity Criteria Type	V/C Ratio Threshold	Average Delay Threshold (s)	Queue Threshold (PCE)
7.50	✓		N/A	0.85	36.00	20.00

Units

Distance Units	Speed Units	Traffic Units Input	Traffic Units Results	Flow Units	Average Delay Units	Total Delay Units	Rate Of Delay Units
m	kph	PCE	PCE	perHour	s	-Min	perMin

Dual Lane - TT 2035, PM

Data Errors and Warnings

No errors or warnings

Analysis Set Details

Default Vehicle Mix	Vehicle Mix Varies Over Time	Vehicle Mix Varies Over Turn	Vehicle Mix Varies Over Entry	Vehicle Mix Source	PCE Factor for a Truck (PCE)	Default Turning Proportions	Estimate from entry/exit counts	Turning Proportions Vary Over Time	Turning Proportions Vary Over Turn	Turning Proportions Vary Over Entry
		✓	✓	Truck Percentages	2.00				✓	✓

Entry Flows

General Flows Data

Leg	Profile Type	Use Turning Counts	Average Demand Flow (PCE/hr)	Flow Scaling Factor (%)
North	ONE HOUR	✓	422.00	100.000
West	ONE HOUR	✓	1341.00	100.000
East	ONE HOUR	✓	1524.00	100.000

Turning Proportions

Turning Counts / Proportions (PCE/hr) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.000	168.000	254.000
	West	1151.000	0.000	190.000
	East	353.000	1171.000	0.000

Turning Proportions (PCE) - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.00	0.40	0.60
	West	0.86	0.00	0.14
	East	0.23	0.77	0.00

Vehicle Mix

Average PCE Per Vehicle - Intersection 1 (for whole period)

	To			
		North	West	East
	North	1.000	1.050	1.000
	West	1.020	1.000	1.000
	East	1.000	1.020	1.000

Truck Percentages - Intersection 1 (for whole period)

	To			
		North	West	East
	North	0.0	5.0	0.0
	West	2.0	0.0	0.0
	East	0.0	2.0	0.0

Results

Results Summary for whole modelled period

Leg	Max V/C Ratio	Max Delay (s)	Max Queue (PCE)	Max 95th percentile Queue (PCE)	Max LOS	Average Demand (PCE/hr)	Total Intersection Arrivals (PCE)	Total Queueing Delay (PCE-min)	Average Queueing Delay (s)	Rate Of Queueing Delay (PCE-min/min)	Inclusive Total Queueing Delay (PCE-min)	Inclusive Average Queueing Delay (s)
North	0.29	3.25	0.42	~1	A	387.23	580.85	28.58	2.95	0.32	28.58	2.95
West	0.66	4.83	1.97	3.05	A	1230.53	1845.79	116.07	3.77	1.29	116.08	3.77
East	1.10	167.80	88.59	158.39	F	1398.45	2097.67	2331.20	66.68	25.90	2331.25	66.68

Main Results for each time segment

Main results: (16:00-16:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	317.70	79.43	316.83	1127.97	876.29	0.00	1802.83	1672.03	0.176	0.00	0.22	2.468	A
West	1009.58	252.39	1006.41	1002.42	190.70	0.00	2298.48	1708.78	0.439	0.00	0.79	2.826	A
East	1147.35	286.84	1140.45	333.29	863.81	0.00	1811.85	1376.02	0.633	0.00	1.72	5.390	A

Main results: (16:15-16:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	379.37	94.84	379.05	1348.66	1045.40	0.00	1680.57	1671.96	0.226	0.22	0.30	2.819	A
West	1205.53	301.38	1204.14	1196.30	228.15	0.00	2271.40	1708.81	0.531	0.79	1.14	3.426	A
East	1370.04	342.51	1360.54	398.76	1033.53	0.00	1689.16	1376.00	0.811	1.72	4.10	10.820	B

Main results: (16:30-16:45)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	464.63	116.16	464.16	1612.08	1153.04	0.00	1602.75	1671.97	0.290	0.30	0.41	3.220	A
West	1476.47	369.12	1473.23	1337.83	279.37	0.00	2234.37	1708.80	0.661	1.14	1.95	4.791	A
East	1677.96	419.49	1500.63	488.11	1264.49	0.00	1522.18	1376.00	1.102	4.10	48.43	72.973	F

Main results: (16:45-17:00)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	464.63	116.16	464.61	1618.68	1165.87	0.00	1593.48	1671.97	0.292	0.41	0.42	3.249	A
West	1476.47	369.12	1476.41	1350.83	279.65	0.00	2234.17	1708.80	0.661	1.95	1.97	4.832	A
East	1677.96	419.49	1517.32	488.84	1267.22	0.00	1520.21	1376.00	1.104	48.43	88.59	167.801	F

Main results: (17:00-17:15)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	379.37	94.84	379.67	1423.66	1281.02	0.00	1510.23	1671.96	0.251	0.42	0.34	3.245	A
West	1205.53	301.38	1208.76	1432.16	228.52	0.00	2271.14	1708.81	0.531	1.97	1.16	3.458	A
East	1370.04	342.51	1667.18	399.78	1037.49	0.00	1686.29	1376.00	0.812	88.59	14.31	115.296	F

Main results: (17:15-17:30)

Leg	Total Demand (PCE/hr)	Intersection Arrivals (PCE)	Entry Flow (PCE/hr)	Exit Flow (PCE/hr)	Circulating Flow (PCE/hr)	Pedestrian Demand (Ped/hr)	Capacity (PCE/hr)	Saturation Capacity (PCE/hr)	V/C Ratio	Start Queue (PCE)	End Queue (PCE)	Delay (s)	LOS
North	317.70	79.43	318.18	1145.12	920.06	0.00	1771.19	1672.03	0.179	0.34	0.22	2.525	A
West	1009.58	252.39	1011.01	1046.73	191.51	0.00	2297.89	1708.78	0.439	1.16	0.80	2.847	A
East	1147.35	286.84	1197.41	334.76	867.76	0.00	1809.00	1376.02	0.634	14.31	1.79	6.467	A

Queueing Delay Results for each time segment

Queueing Delay results: (16:00-16:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.21	0.21	2.468	A	A
West	11.62	0.77	2.826	A	A
East	24.63	1.64	5.390	A	A

Queueing Delay results: (16:15-16:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	4.38	0.29	2.819	A	A
West	16.74	1.12	3.426	A	A

East	55.78	3.72	10.820	B	B

Queueing Delay results: (16:30-16:45)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.11	0.41	3.220	A	A
West	28.18	1.88	4.791	A	A
East	413.83	27.59	72.973	F	E

Queueing Delay results: (16:45-17:00)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	6.25	0.42	3.249	A	A
West	29.41	1.96	4.832	A	A
East	1028.62	68.57	167.801	F	F

Queueing Delay results: (17:00-17:15)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	5.22	0.35	3.245	A	A
West	17.87	1.19	3.458	A	A
East	771.74	51.45	115.296	F	F

Queueing Delay results: (17:15-17:30)

Leg	Queueing Total Delay (PCE-min)	Queueing Rate Of Delay (PCE-min/min)	Average Delay Per Arriving Vehicle (s)	Unsignalised Level Of Service	Signalised Level Of Service
North	3.40	0.23	2.525	A	A
West	12.25	0.82	2.847	A	A
East	36.60	2.44	6.467	A	A

Queue Variation Results for each time segment**Queue Variation results: (16:00-16:15)**

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.22	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.79	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	1.72	0.00	0.00	3.05	4.06			N/A	N/A

Queue Variation results: (16:15-16:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.30	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.14	0.00	0.00	2.03	3.05			N/A	N/A
East	4.10	0.00	0.00	9.14	15.23			N/A	N/A

Queue Variation results: (16:30-16:45)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.41	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.95	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	48.43	15.23	43.66	81.22	94.42			N/A	N/A

Queue Variation results: (16:45-17:00)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.42	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

West	1.97	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	88.59	35.54	82.24	139.10	158.39			N/A	N/A

Queue Variation results: (17:00-17:15)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.34	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	1.16	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
East	14.31	0.00	9.14	32.49	42.64			N/A	N/A

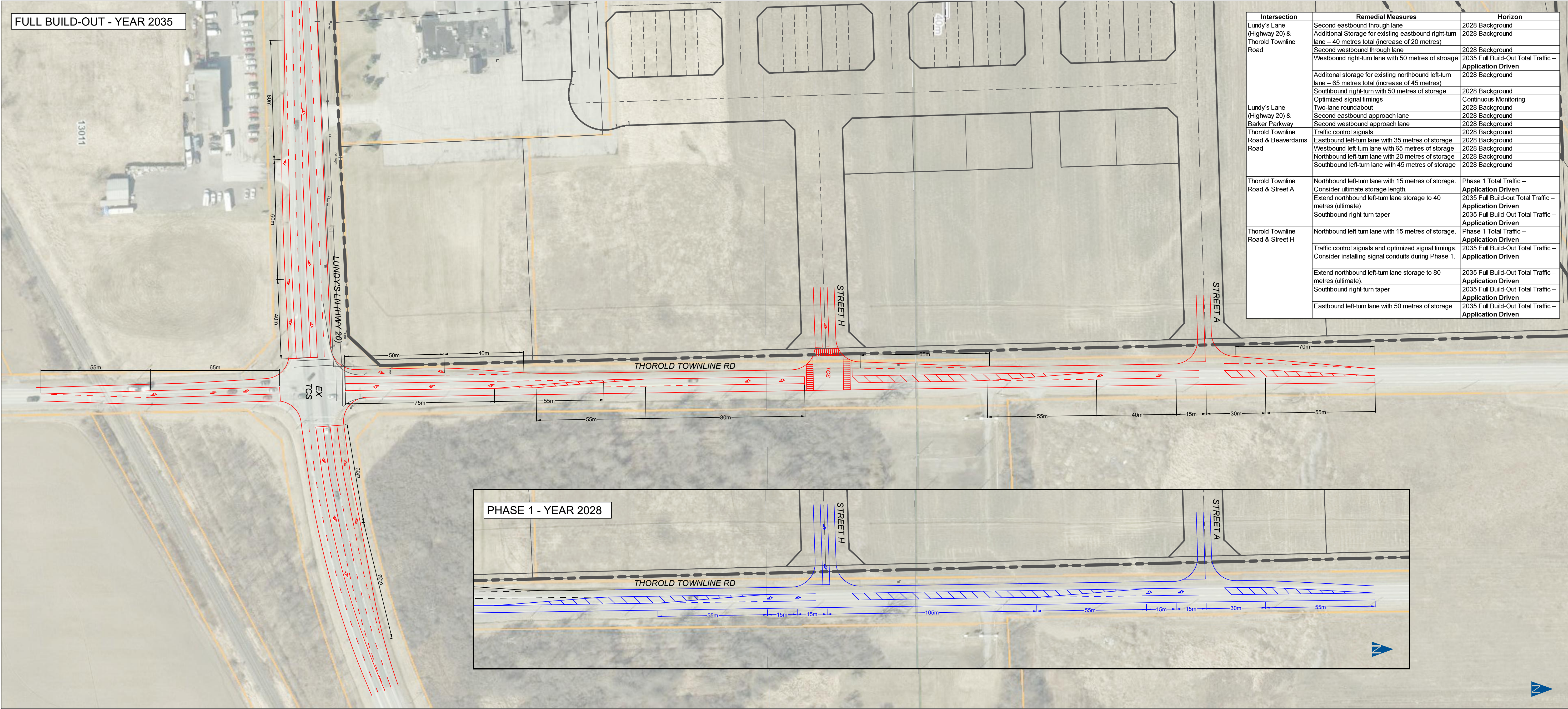
Queue Variation results: (17:15-17:30)

Leg	Mean (PCE)	Q05 (PCE)	Q50 (PCE)	Q90 (PCE)	Q95 (PCE)	Percentile Message	Marker Message	Probability Of Reaching Or Exceeding Marker	Probability Of Exactly Reaching Marker
North	0.22	~1	~1	~1	~1	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A
West	0.80	0.00	0.00	1.02	1.02			N/A	N/A
East	1.79	?	?	?	?	Percentiles could not be calculated. This may be because the mean queue is very small or very big.		N/A	N/A

Appendix K

Functional Design





Intersection	Remedial Measures	Horizon
Lundy's Lane (Highway 20) & Thorold Townline Road	Second eastbound through lane	2028 Background
	Additional Storage for existing eastbound right-turn lane – 40 metres total (increase of 20 metres)	2028 Background
	Second westbound through lane	2028 Background
	Westbound right-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven
	Additional storage for existing northbound left-turn lane – 85 metres total (increase of 45 metres)	2028 Background
	Southbound right-turn with 50 metres of storage	2028 Background
Lundy's Lane (Highway 20) & Barker Parkway	Optimized signal timings	Continuous Monitoring
	Two-lane roundabout	2028 Background
	Second eastbound approach lane	2028 Background
	Second westbound approach lane	2028 Background
Thorold Townline Road & Beaverdams Road	Traffic control signals	2028 Background
	Eastbound left-turn lane with 35 metres of storage	2028 Background
	Westbound left-turn lane with 65 metres of storage	2028 Background
	Northbound left-turn lane with 20 metres of storage	2028 Background
	Southbound left-turn lane with 45 metres of storage	2028 Background
Thorold Townline Road & Street A	Northbound left-turn lane with 15 metres of storage. Consider ultimate storage length.	Phase 1 Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 40 metres (ultimate)	2035 Full Build-out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven
Thorold Townline Road & Street H	Northbound left-turn lane with 15 metres of storage.	Phase 1 Total Traffic – Application Driven
	Traffic control signals and optimized signal timings. Consider installing signal conduits during Phase 1.	2035 Full Build-Out Total Traffic – Application Driven
	Extend northbound left-turn lane storage to 80 metres (ultimate).	2035 Full Build-Out Total Traffic – Application Driven
	Southbound right-turn taper	2035 Full Build-Out Total Traffic – Application Driven
	Eastbound left-turn lane with 50 metres of storage	2035 Full Build-Out Total Traffic – Application Driven

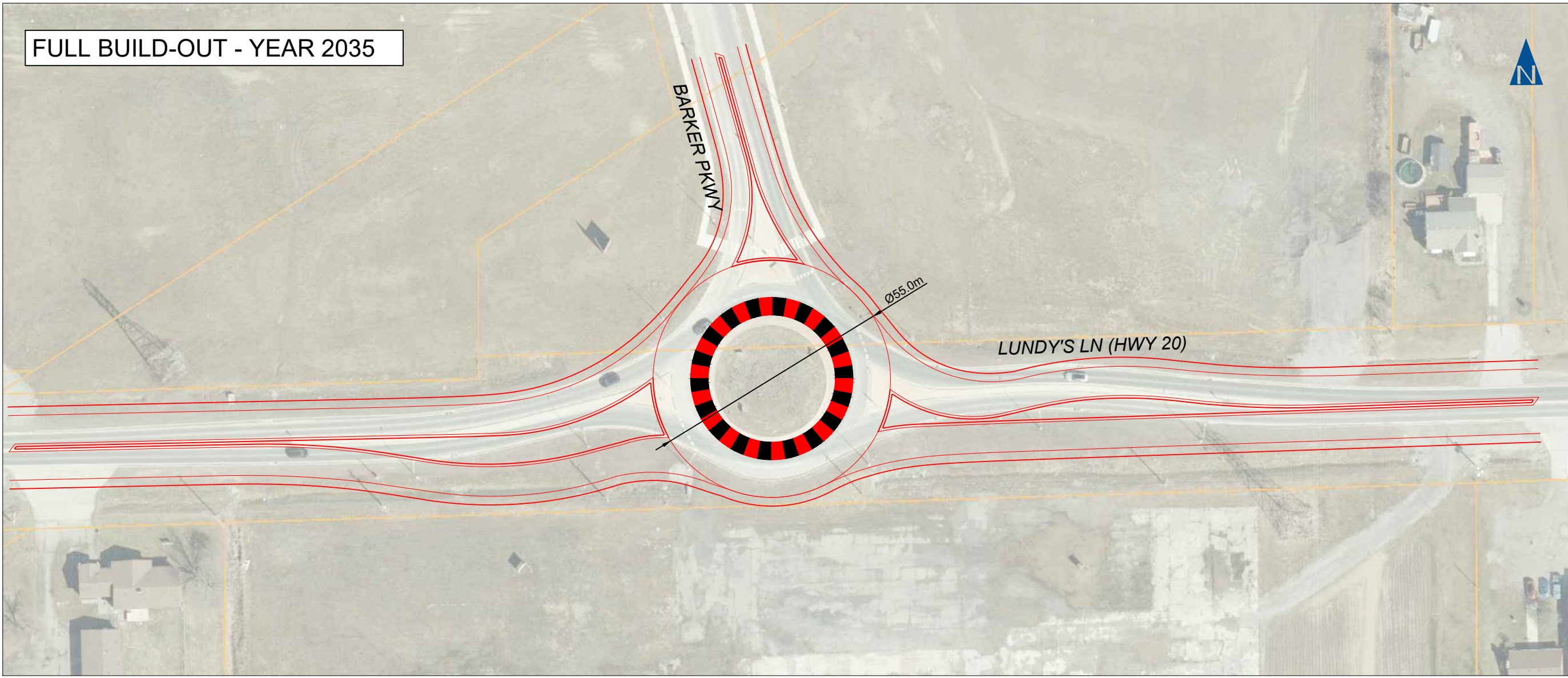
- NOTES
1. INTENDED FOR PLANNING PURPOSES ONLY
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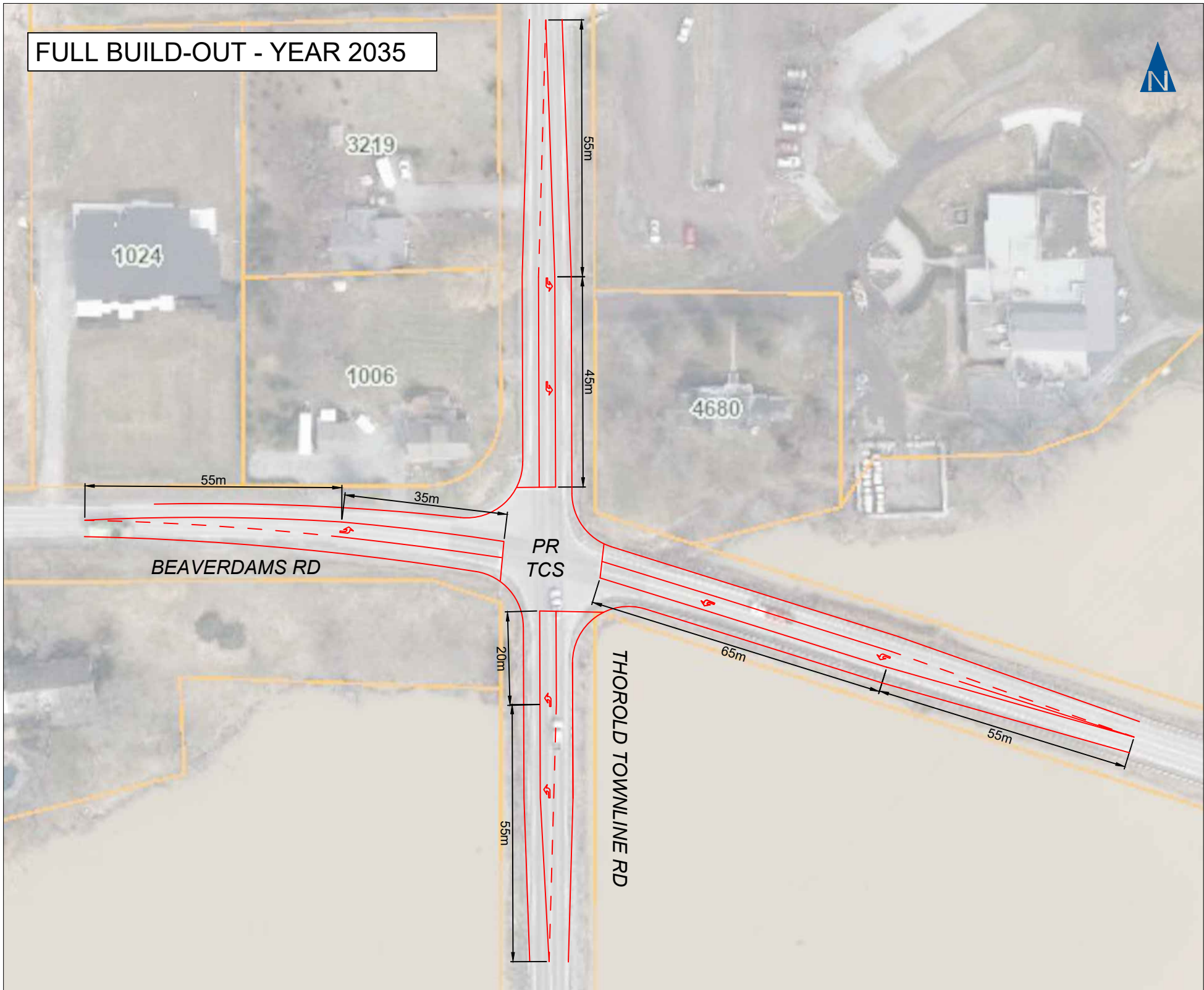
FUNCTIONAL LAYOUT
REMEDIAL MEASURES
13030 LUNDY'S LANE, THOROLD

PROJECT NO.: 210565	DATE: SEPT 2025	SCALE: 1:1000	DRAWING NO.: 01
DESIGN: SC	DRAWN: SC	CHECK: MB	

LUNDY'S LANE (HIGHWAY 20) AT BARKER PARKWAY



THOROLD TOWNLINE ROAD AT BEAVERDAMS ROAD



- NOTES
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FUNCTIONAL LAYOUT
REMEDIAL MEASURES
13030 LUNDY'S LANE, THOROLD

PROJECT NO.: 210565	DATE: SEPT 2025	SCALE: 1:1000	DRAWING NO.: 02
DESIGN: SC	DRAWN: SC	CHECK: MB	