



Old Truro Road Mobile Home Park Traffic Impact Study Update

April 2018

Prepared for
Cygnet Properties

JRL consulting

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1 Introduction

1.1 Background

Cygnit Properties has proposed to develop a portion of its lands of Melmik Holdings Ltd in the Elmsdale/Enfield area. The total area is approximately 1773 acres and it is located in the Halifax Regional Municipality (HRM) though access is gained through roads controlled by Nova Scotia Transportation and Infrastructure and Renewal (TIR) including Trunk 2 and Elmsdale Road. The property is split in HRM planning districts by Black Brook which runs east-west through the middle. The southwestern portion is covered by planning districts 14 and 17 and the northeastern portion is under the terms of the Musquodoboit/Dutch Settlement planning district.

The proposed residential development will consist of 525 mobile homes that will be marketed to seniors. It will be designed to meet Halifax County Municipality Mobile Home Park By-Law dated October 1986. It will be serviced with onsite centralized water supply and central sewage treatment plant.

The development will be located in the northeast portion of the lands with access from an extension of the existing Old Truro Road which connects to Elmsdale Road. The western portion of the property is accessed from the Old Post Road which has not been maintained in this area. Exhibit 1.1 shows the entire Lands of Melmik Holdings in the context of the surrounding area in Elmsdale and Enfield

Exhibit 1.1 – Lands of Melmik Holdings in Elmsdale, Nova Scotia



Source: Google Earth

JRL consulting inc. has completed a number of Traffic Impact Studies and Addendums for this proposed development since 2013. None of those studies included the impact of the proposed new Highway 102 interchange and connector road in Lantz

In a letter dated November 20, 2017 from Jason Rae, P.Eng., Development Engineer – Central District the following comments related to the Traffic Impact Study were provided to the client:

- *TIR has determined that the Province-owned infrastructure impacted by the proposed development could accept additional traffic volumes generated from the introduction of up to 100 units without requiring the additional traffic capacity increase expected from the construction of the proposed Lantz Interchange*
- *TIR does support HRM's Regional Plan recommendation of 228 additional units being built after the construction of the proposed Lantz Interchange. TIR would require the following phased approach to this development:*
 - Phase 1 - 100 units prior to the Lantz Interchange*
 - Phase 2 - An additional 228 units post-Lantz Interchange*
 - Phase 3 - TIR would require a Traffic Impact Study to increase the development from 328 to the requested 525 units. Phase 3 would require subsequent approval from TIR, which would be based on the results of the Traffic Impact Study*

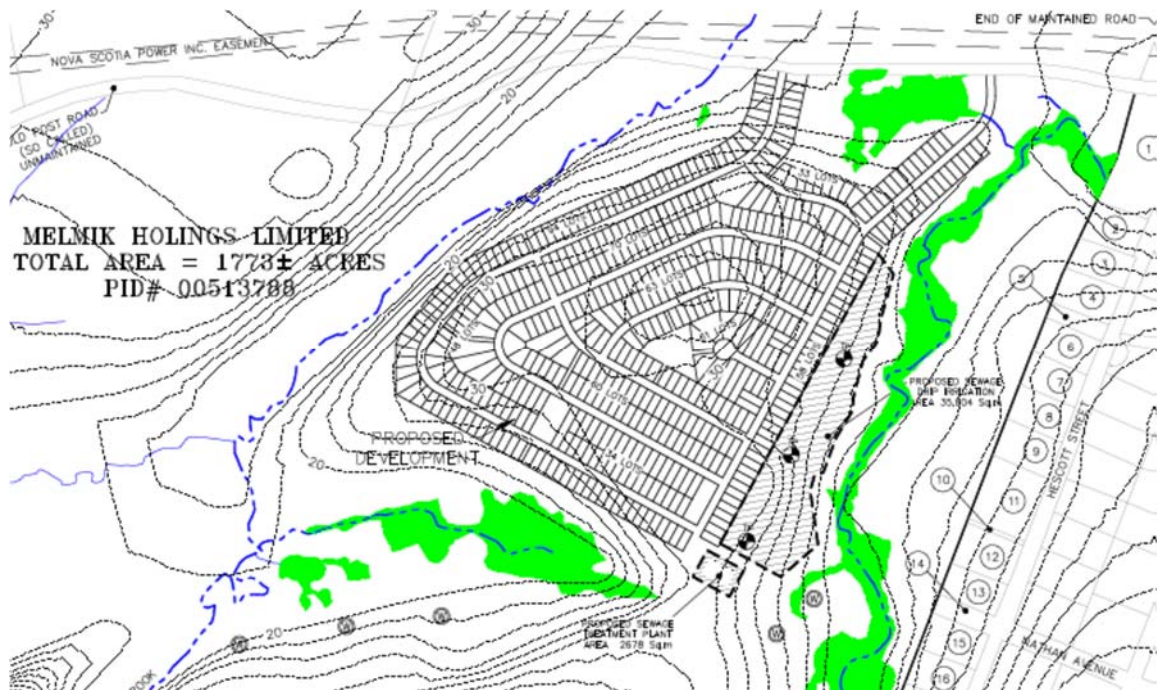
We met with representatives of TIR on December 15, 2017 and February 6, 2018 to review this letter, the proposed development and its traffic impacts. Based on feedback from these meetings, we submitted a Terms of Reference for this Update as summarized in Section 1.3.

GRIFFIN transportation group inc. completed a Long-Term Traffic Planning Study for NS Transportation & Infrastructure Renewal called the Elmsdale-Lantz Area Travel Demand Modeling Study. This study recommended the most effective and efficient location for a new interchange in Lantz South at the "S1" location which is located immediately south of, and parallel to, Towerview Court and the connector road would intersect with Trunk 2 opposite Shaw Drive. The proposed location was accepted by TIR and the new interchange is expected to be completed by 2021. The new interchange will change travel patterns in the area and will reduce traffic volumes at the Elmsdale Road/Trunk 2 intersection which was a key intersection for previous Traffic Impact Studies for this proposed development.

The proposed residential development is under the jurisdiction of the Halifax Regional Municipality. The surrounding road network is owned and maintained by Halifax Regional Municipality and Nova Scotia Department of Transportation and Infrastructure Renewal. As a result it will be subject to TIR's *Guide for the Preparation of Traffic Impact Studies* and Halifax Regional Municipality's *Guidelines for the Preparation of Transportation Impact Studies*. We are pleased to submit this revised report which summarizes our findings and recommendations.

The proposed Concept Plan with 525 mobile home lots with two access points from an extension of Old Truro Road with no secondary connection to Hescott Street A total of five internal roads are shown. Refer to Exhibit 1.2 for the revised proposed Concept Plan for the proposed Old Truro Road Mobile Home Park.

Exhibit 1.2 –Concept Plan for Proposed Mobile Home Park



Source: Strum Consulting

1.2 Study Area

The study area defined for this Traffic Impact Study Update consists of the transportation network in the immediate vicinity of the proposed development. It includes Old Truro Road and Elmsdale Road as well as the following key intersections:

- Old Truro Road at Elmsdale Road
- Elmsdale Road at Trunk 2

The proposed concept plan shows access and egress through an extension of Old Truro Road to the south so all traffic will be directed to, and come from, Elmsdale Road.

1.3 Objectives

Given the background set out above, the objective of this Traffic Impact Study Update is to assess the impacts of the proposed development on the surrounding transportation network. Recommendations and solutions will then be provided to allow the traffic generated by the proposed development to be introduced to the existing transportation network safely and efficiently.

We have reviewed the GRIFFIN report and will align our analysis to match their horizon years of 2021 and 2041 as recommended by TIR.

Detailed objectives are presented below:

- Update turning movement counts at the following intersections (AM and PM Peak Hour)
 - i. Old Truro Road at Elmsdale Road (from JRL report)
 - ii. Elmsdale Road (Route 214) at Trunk 2 (from GRIFFIN report)
- Estimate background traffic volumes in 2021 using a 0.5% annual growth rate
- Estimate the amount of traffic to be generated by the proposed development using local observed rates for a similar Mobile Home Park in HRM for 100 units (2021 horizon year) and full build out of 525 units
- Assign the estimated site generated traffic to the existing transportation network following observed distribution during turning movement counts
- Analyze the future performance of each key intersection in 2021 with and without the new Highway 102 Interchange in South Lantz using Synchro 8 software following the procedures outlined in the Highway Capacity Manual and by the Transportation Association of Canada (TAC)
- Analyze the future performance of each key intersection in 2041 with the new Highway 102 Interchange in South Lantz and full build out of 525 units
- Complete traffic signal warrants if required following Transportation Association of Canada's Canadian *Traffic Signal Warrant Procedure* (2005)
- Complete left turn auxiliary lane warrants where required following MTO procedures
- Complete right turn auxiliary lane warrants where required following Ohio State procedures
- Assess the required intersection configurations
- Develop and list existing, potential and future problems or concerns
- Develop solutions and recommendations to problems/issues
- Prepare a report summarizing the project activities and findings

2 Existing Traffic Conditions

2.1 Description

The routes impacted by this proposed development are Elmsdale Road and Old Truro Road.

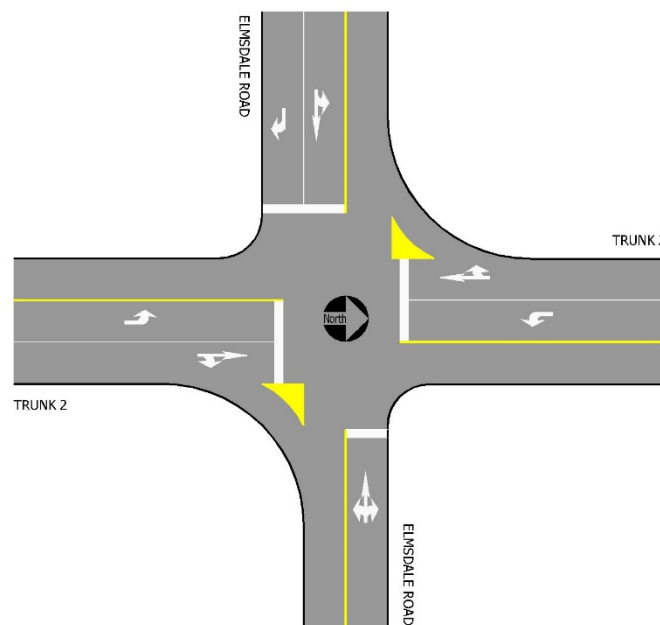
Old Truro Road is a two lane rural road with gravel shoulders that runs north-south from Elmsdale Road to Hescott Street where it terminates. The posted speed limit is 50 km/hr and it was recently resurfaced.

Elmsdale Road (Route 214) is a two-lane rural road with gravel shoulders from Old Truro Road to Trunk 2. It becomes a busy two lane road from Trunk 2 to Highway 102 at Exit 8 with a mixture of gravel shoulders, concrete curb and gutter and asphalt and concrete sidewalks. It provides access to a number of commercial developments including the Elmsdale Mall as well as single family homes and multi-unit apartments within the Study Area. It has a two-way left turn lane from the Brook Court to just south of the driveway to the Elmsdale Mall that serves a gas station and a number of fast food restaurants.

The **Old Truro Road at Elmsdale Road** intersection operates as a 3-leg intersection stop controlled at the minor approach (Old Truro Road). It connects on a curve at the eastern end of Elmsdale Road which becomes Old Trunk Road to the northeast. The wide connection effectively provides a right turn channelized lane for eastbound traffic from Elmsdale Road turning onto Old Truro Road.

The **Elmsdale Road at Trunk 2** intersection is a 4-leg signalized intersection. It has a dedicated northbound left turn lane and shared through/right lane with a channelized right turn including a pedestrian island. The eastbound approach has a shared through/left lane and a dedicated right turn lane. The southbound approach has a dedicated left turn lane and shared through/right lane with a channelized right turn including a pedestrian island. The westbound approach has a shared left/through/right lane with a railway crossing approximately 30 m east of the intersection. It's a fully actuated signalized intersection controlled by TIR. Refer to Exhibit 2.1 for a schematic drawing that shows the existing intersection configuration.

Exhibit 2.1 – Elmsdale Road at Trunk 2 Intersection Existing Configuration



2.2 Existing and Background Traffic Volumes

JRL consulting completed AM and PM peak hour turning movement counts at the Old Truro Road at Elmsdale Road intersection on Tuesday September 18, 2012.

GRIFFIN transportation group completed AM and PM peak hour turning movement counts at the Elmsdale Road at Trunk 2 intersection in November 2016.

These turning movement counts were used as a base point for analysis and volumes were adjusted with an annual background rate of 0.5% as outlined in the GRIFFIN report to estimate background traffic in 2021.

Exhibit 2.2 – Old Truro Road at Elmsdale Road Estimated Background Traffic 2021

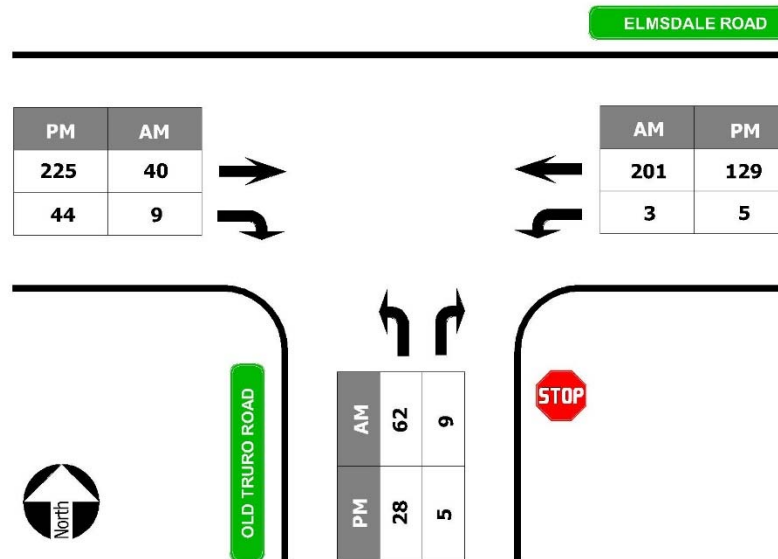
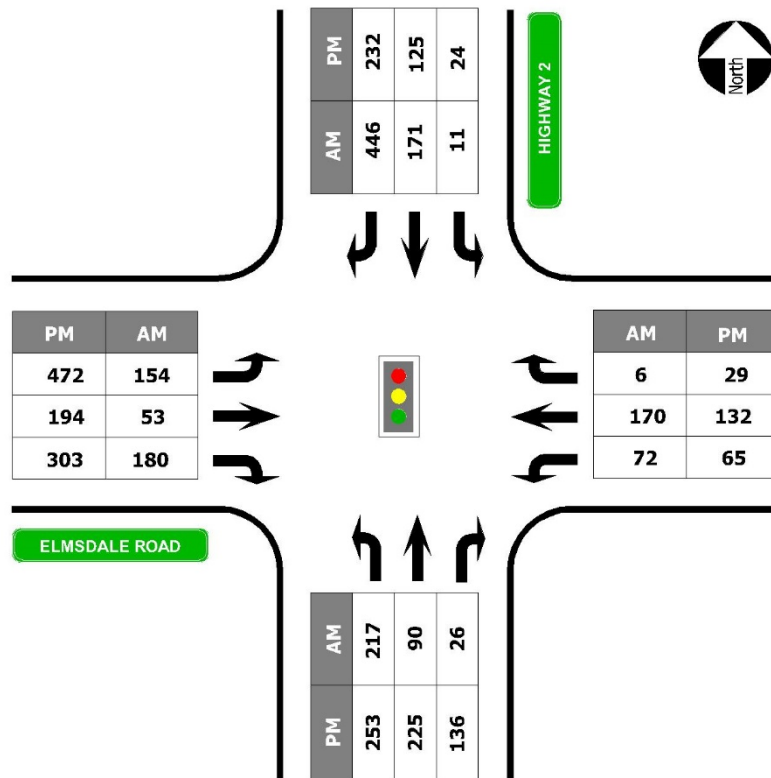


Exhibit 2.3 – Trunk 2 at Elmsdale Road Estimated Background Traffic 2021



3 Site Generated Traffic

3.1 Trip Generation

Institute of Transportation Engineers (ITE) Trip Generation Rates are often used to estimate site generated traffic; however, local traffic surveys or data similar to those for the proposed development, are a more accurate representation of local conditions.

We completed AM and PM peak hour counts at the Woodbine Mobile Home Park in Beaverbank, Nova Scotia on Monday October 21, 2013. This development has two access points from Beaverbank Road and a total of 610 mobile homes which makes it a good representation of the proposed development of 525 mobile home units in Elmsdale though this park was not marketed to seniors.

We also completed new trip generation estimates using equations provided in Institute for Transportation Engineer's Trip Generation Manual 9th Edition. We used the following ITE Land Use Code to assess site generated trips for this proposed development:

- ITE Land Use 240 Mobile Home Park

"Mobile Home Parks generally consist of manufactured homes that are sited and installed on permanent foundations and typically have community facilities such as recreation rooms, swimming pools and laundry facilities." The unit of measurement for average vehicle trip ends is dwelling units.

We compared our actual counts at the Woodbine Mobile Home Park and they were in line with ITE estimates though there were approximately 26% more vehicles in the AM peak hour and approximately 7% less vehicles in the PM peak hour. The breakdown of enter and exit distribution was also different that published by ITE for this Land Use Code. The average rates for peak hour traffic at Woodbine were 0.37 total trips per unit in the AM and 0.54 total trips per unit in the PM. Refer to Exhibit 3.1.

Exhibit 3.1 – Site Generated Traffic Volume Comparison Actual Observed versus ITE Rates

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Mobile Home Park Local Rate	525	195	32%	68%	284	63%	37%
			63	133		179	105
Mobile Home Park ITE Land Use 240	525	154	25%	75%	305	61%	39%
			39	116		186	119
DIFFERENCE		41	24	17	-21	-7	-14

As mentioned in Section 1.1 this proposed development will be marketed to seniors and studies show that the impact of traffic generated by seniors during the AM and PM peak hours are significantly less than that of single family homes as seniors tend to avoid these peak times and the associated traffic. For comparison purposes we also completed trip generation estimates using equations provided in Institute for Transportation Engineer's Trip Generation Manual Ninth Edition for Senior Adult Detached Housing using the following ITE Land Use Code

- ITE Land Use 251 Senior Adult Housing Attached

"These facilities are similar to those described in Land Use 251 except they contain apartment like residential units. Attached senior adult housing may include limited social or recreational services, but typically lacks centralized dining or medical facilities. Residents of these communities live independently, are typically active (requiring little to no medical supervision) and may or may not be retired." The unit of measurement for average vehicle trip ends is dwelling units on a weekday.

The analysis shows that estimated traffic generated by a development of Senior Adult Housing will be 40% less than that generated by Mobile Homes in the AM Peak Hour and 43% less in the PM Peak Hour. Refer to Exhibit 3.2.

Exhibit 3.2 – Site Generated Traffic Volume Comparison Mobile Home versus Senior Housing

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Mobile Home Park Local Rate	525	195	32%	68%	284	63%	37%
			63	133		179	105
Senior Adult Housing Detached	525	116	38%	62%	162	61%	39%
			44	72		99	63
DIFFERENCE		-79	-18	-61	-122	-80	-42
DIFFERENCE		-40%	-29%	-46%	-43%	-45%	-40%

For the purpose of this study we have used the trips estimated for a Mobile Home Park based on our local observed traffic counts at the Woodbine Mobile Home Park as a worst case scenario though actual traffic may be less if marketing to seniors is successful which will result in less impact to the surrounding transportation network.

The new Lantz South Interchange is expected to be completed in 2021. The proposed Mobile Home Park is expected to be developed over a 15-20 year period which works out to between 25 to 35 units per year. We have assumed that the development wouldn't start before 2019 so we expect between 75 and 105 units to be completed before the Lantz South Interchange is completed. TIR's letter indicated that 100 units would be permitted before the completion of the Lantz Interchange so we used that total to estimate traffic generated by the proposed development in 2021 per Exhibit 3.3.

Exhibit 3.3 – Site Generated Traffic for 100 Mobile Home Units in 2021

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL	ENTER	EXIT	TOTAL	ENTER	EXIT
Mobile Home Park Local Rate	100	37	32%	68%	54	63%	37%
			12	25		34	20
TOTAL		37	12	25	54	34	20

3.2 Trip Distribution and Assignment

We distributed and assigned the site-generated trips to the transportation network by analyzing the existing traffic distribution observed during the AM and PM peak hour manual traffic counts. Detailed spreadsheets showing how the site-generated traffic was distributed at all intersections have been included in Section 2 in the Appendix.

3.3 Total Traffic

The GRIFFIN report estimated future growth patterns in the community using a number of methods and they concluded that a housing increase of 80 units per year was reasonable which equates to 2,000 units being built between 2016 and 2041 (for an increase of about 4,800 people). It also assessed and estimated the future volumes related to Business Park Land Use Growth and Highway Commercial Land Use Growth.

An iterative traffic assignment process was completed to distribute and assign future traffic to the transportation network. A travel time assessment was also performed and the results of that review concluded that the "S1" location for the new interchange provides the most efficient location for drivers moving to/from Highway 102 south.

We note that the GRIFFIN report didn't include site generated traffic volumes from the proposed Old Truro Road Mobile Home Park in their analysis. Most traffic generated from this development will travel through the Trunk 2 at Elmsdale Road intersection as described in our previous traffic studies.

In Figure 2-3 they estimate New Growth Traffic peak hour volumes in 2021 for the area with only 2 vehicles approaching this intersection westbound in the AM and PM peak hours from Elmsdale Road and 3 vehicles travelling east on Elmsdale Road from this intersection in the AM and PM peak hours respectively.

In Figure 2-13 they estimate New Growth Traffic peak hour volumes in 2041 for the area with only 14 vehicles approaching this intersection westbound in the AM peak hour and 11 vehicles in the PM peak hour from Elmsdale Road. They estimated 14 vehicles travelling east on Elmsdale Road from this intersection in the AM peak hour and 15 vehicles in the PM peak hour.

For this assessment we used the estimated peak hour volumes from the GRIFFIN report which included new growth in the area with the benefits of the new interchange in South Lantz in 2021 and 2041 as a base point. We added the distributed site-generated traffic from the proposed Old Truro Road Mobile Home Park to these volumes to assess the impacts at the key intersections. Refer to the following exhibits. Detailed calculations have been included in the Appendix.

Exhibit 3.4 – Old Truro Rd at Elmsdale Rd with Estimated Total Traffic 2021 No Interchange

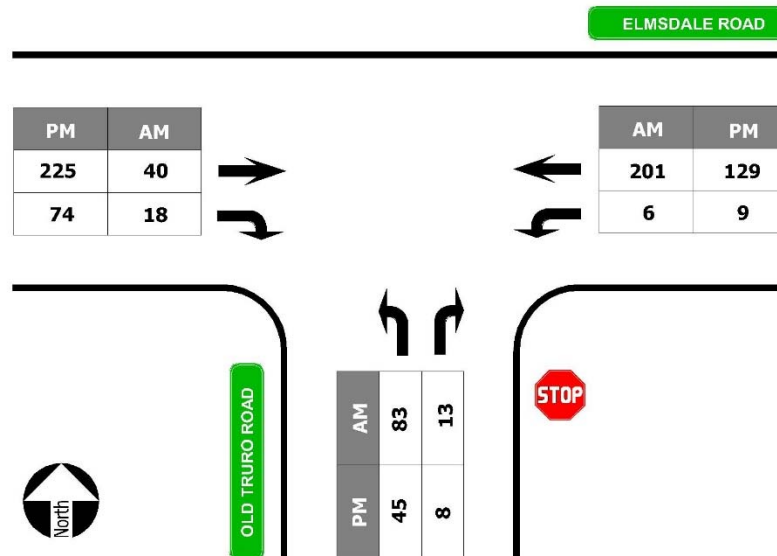


Exhibit 3.5 – Trunk 2 at Elmsdale Road with Estimated Total Traffic 2021 No Interchange

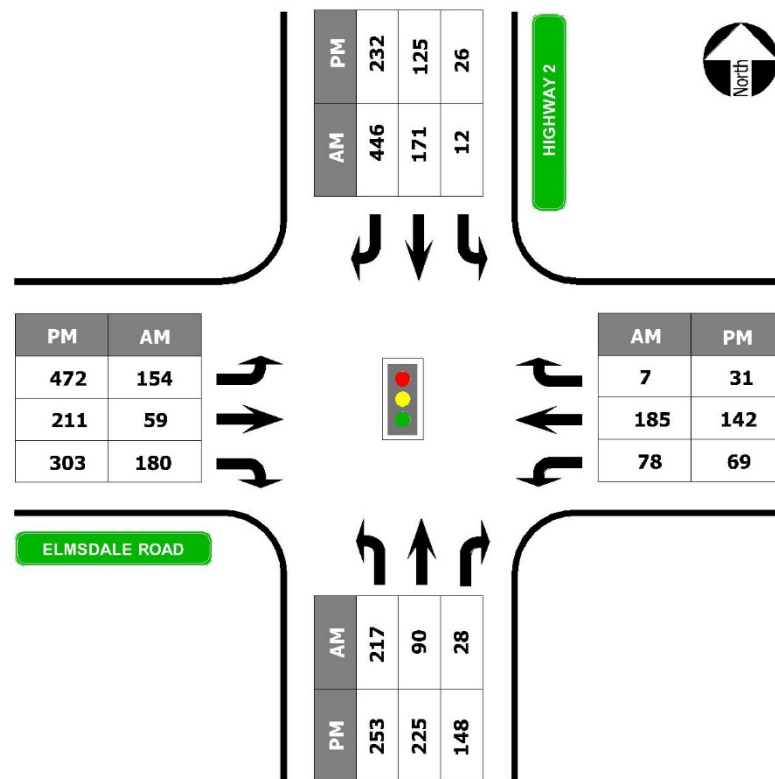


Exhibit 3.6 – Old Truro Rd at Elmsdale Rd with Estimated Total Traffic 2021 with Interchange

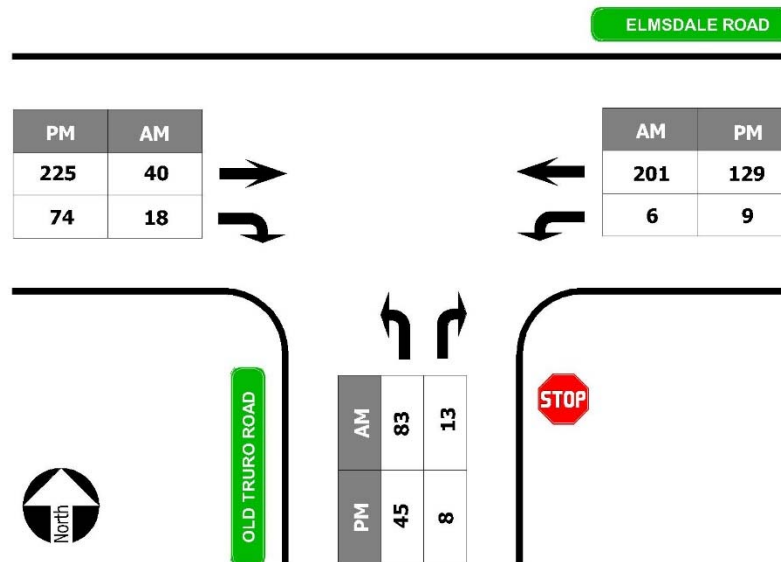


Exhibit 3.7 – Trunk 2 at Elmsdale Road with Estimated Total Traffic 2021 with Interchange

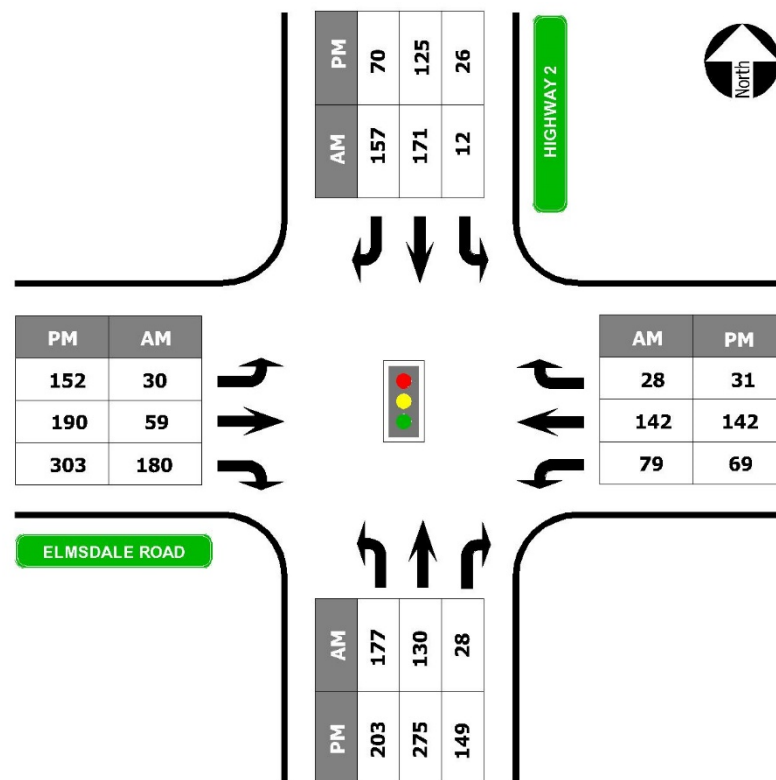


Exhibit 3.8 – Old Truro Rd at Elmsdale Rd with Estimated Total Traffic 2041 with Interchange

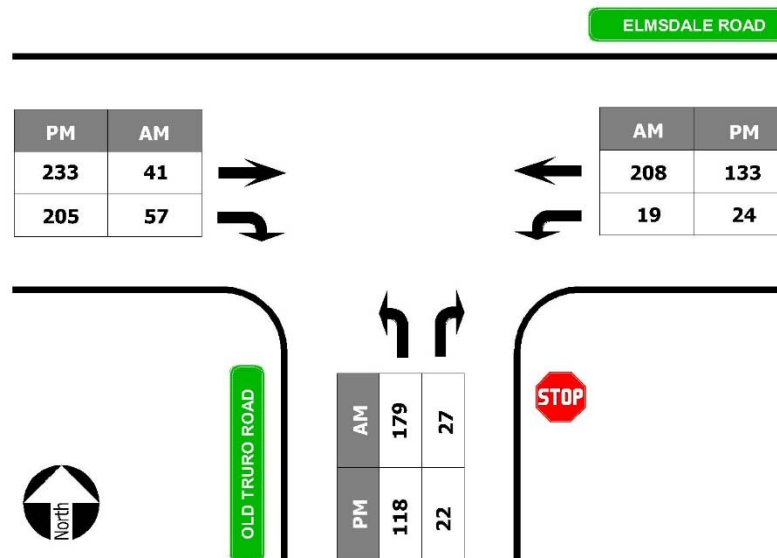
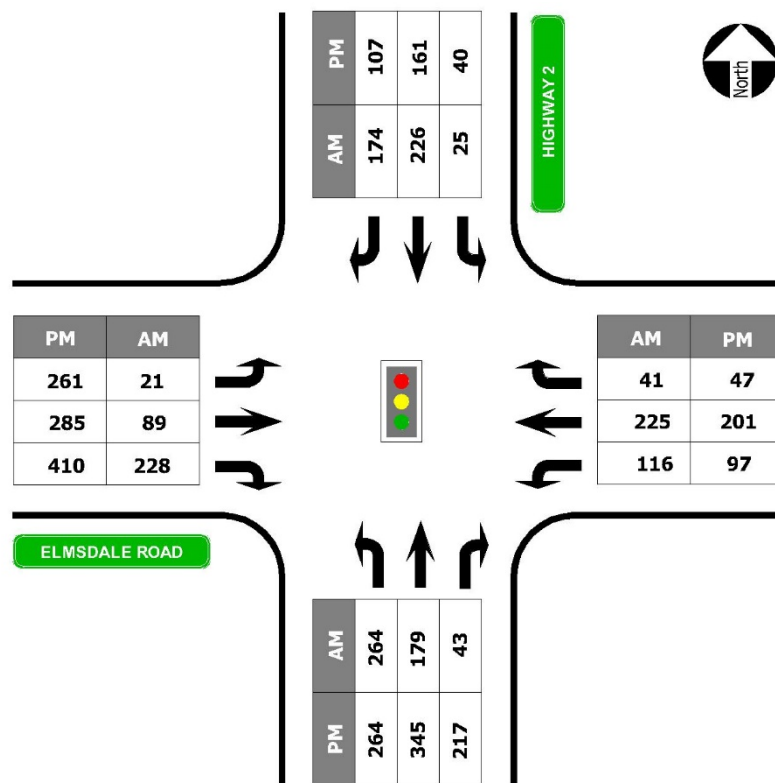


Exhibit 3.9 – Trunk 2 at Elmsdale Road with Estimated Total Traffic 2041 with Interchange



4 Evaluation of Impacts

4.1 Level of Service Analysis

As described in the Highway Capacity Manual "the concept of levels of service used qualitative measures that characterize operational conditions within a traffic stream and their perception by motorists and passengers. The descriptions of individual levels of service characterize these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility for which analysis procedures are available. They are given letter designations from A to F, with LOS A representing the best operating conditions and LOS F the worst."

As stated in the Highway Capacity Manual, "analysis of signalized intersections focuses on the capacity and level of service of intersection approaches and the intersection as a whole. Capacity is evaluated in terms of the ratio of demand flow rate (volume) to capacity (v/c ratio) while the level of service is evaluated on the basis of average control delay per vehicle (in seconds per vehicle)." Exhibit 4.1 defines Level of Service for signalized intersections.

The Highway Capacity Manual also states that "the level of service is determined by the computed or measured control delay and is defined for each minor movement. Level of Service is not defined for the intersection as a whole." LOS criteria for unsignalized intersections are summarized in Exhibit 4.2.

Exhibit 4.1 - Level of Service Criteria for Signalized Intersections

Level of Service	Description	Control, Delay Per Vehicle (Seconds)
A	Very low delay; most vehicles do not stop (Excellent)	≤ 10
B	Higher delay; more vehicles stop (Very Good)	≥ 10 and ≤ 20
C	Higher number of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping (Good)	≥ 20 and ≤ 35
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; Many vehicles stop (Satisfactory)	≥ 35 and ≤ 55
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of acceptable delay	≥ 55 and ≤ 80
F	This level is considered to be unacceptable for most drivers; occurs when arrival flow rates exceed the capacity of the intersection (Unacceptable)	≥ 80

Exhibit 4.2 - Level of Service Criteria for Unsignalized Intersections

Level of Service	Delay Range (Seconds)
A	≤ 10
B	≥ 10 and ≤ 15
C	≥ 15 and ≤ 25
D	≥ 25 and ≤ 35
E	≥ 35 and ≤ 50
F	≥ 50

Traffic volumes are at their highest during the AM and PM peak periods so the impact of the trips generated by the proposed development during these hours will provide a worst case assessment of their impacts on the existing transportation network.

TIR's Guide for the Preparation of Traffic Impact Studies states that:

"for signalized and unsignalized intersections and overall LOS rating of "A" to "D" (based on delay), and a volume/capacity (v/c) ratio less than 0.90 for any individual movement, are normally considered acceptable. Where existing or horizon year levels of service are "E" or "F", or v/c ratios exceed 0.90, without the proposed development, LOS and v/c ratios equal to or better than existing levels may be acceptable as long as the average stopped delay per vehicle per movement is not increased after the development."

We used Synchro 8 traffic analysis software to analyze the performance of all intersections and the results have been included in the Appendix. We optimized the splits and timing plans in Synchro to present the best potential overall performance at signalized intersections. Control Delay in seconds per vehicle (Delay), Level of Service (LOS), Volume-to-Capacity ratios (V/C) and 95% Queue Length in meters (95% Queue) have been summarized in this report. We have highlighted any LOS or V/C results that exceed TIR defined thresholds.

Exhibit 4.3 – Old Truro Road at Elmsdale Road Level of Service Results

	Elmsdale Road		Old Truro Road	Total
	EB-TR	WB-TL	NB-LR	
AM PEAK HOUR – 2021 BACKGROUND TRAFFIC				
Delay	A	7.3	10.4	2.3
LOS		A	B	
v/c		0.002	0.103	
95% Queue		0.0	0.3	
AM PEAK HOUR – 2021 TOTAL TRAFFIC NO INTERCHANGE				
Delay	A	7.3	10.6	2.9
LOS		A	B	
v/c		0.004	0.14	
95% Queue		0.0	0.5	
AM PEAK HOUR – 2021 TOTAL TRAFFIC WITH INTERCHANGE				
Delay	A	7.3	10.7	3
LOS		A	B	
v/c		0.004	0.15	
95% Queue		0.0	0.5	
AM PEAK HOUR – 2041 TOTAL TRAFFIC				
Delay	A	7.3	12.5	5.1
LOS		A	B	
v/c		0.013	0.32	
95% Queue		0.0	1.4	
PM PEAK HOUR – 2021 BACKGROUND TRAFFIC				
Delay	A	7.7	11.1	0.9
LOS		A	B	
v/c		0.004	0.057	
95% Queue		0.0	0.2	
PM PEAK HOUR – 2021 TOTAL TRAFFIC NO INTERCHANGE				
Delay	A	7.7	11.4	1.4
LOS		A	B	
v/c		0.007	0.093	
95% Queue		0.0	0.3	
PM PEAK HOUR – 2021 TOTAL TRAFFIC WITH INTERCHANGE				
Delay	A	7.7	11.4	1.4
LOS		A	B	
v/c		0.007	0.093	
95% Queue		0.0	0.3	
PM PEAK HOUR – 2041 TOTAL TRAFFIC				
Delay	A	7.8	13.4	2.8
LOS		A	B	
v/c		0.02	0.26	
95% Queue		0.1	1	

Exhibit 4.5 – Trunk 2 at Elmsdale Road Level of Service Results

	Elmsdale Road			Trunk 2				Total
	NB-LTR	SB-LT	SB-R	EB-L	EB-TR	WB-L	WB-TR	
AM PEAK HOUR – 2021 BACKGROUND TRAFFIC								
Delay	34.6	45.6	5.8	32.4	5.5	12.4	27.8	27.6
LOS	C	D	A	C	A	B	C	C
v/c	0.70	0.78	0.35	0.80	0.12	0.03	0.89	
95% Queue	64.9	61.7	13.8	43.9	10.9	3.7	105.5	
AM PEAK HOUR – 2021 TOTAL TRAFFIC NO INTERCHANGE								
Delay	38.6	45.4	5.5	41.0	5.8	13.1	29.9	30.0
LOS	D	D	A	D	A	B	C	C
v/c	0.74	0.78	0.34	0.85	0.13	0.03	0.90	
95% Queue	72.6	64.2	13.6	31.9	11.7	4.0	113.4	
AM PEAK HOUR – 2021 TOTAL TRAFFIC WITH INTERCHANGE								
Delay	19.6	16.4	4.4	13.7	8.0	16.2	24.3	15.9
LOS	B	B	A	B	A	B	C	B
v/c	0.49	0.18	0.29	0.50	0.21	0.04	0.71	
95% Queue	43.6	17.4	11.8	20.7	16.7	4.3	50.7	
AM PEAK HOUR – 2041 TOTAL TRAFFIC								
Delay	37.2	17.7	4.5	42.0	8.6	16.0	31.3	26.3
LOS	D	B	A	D	A	B	C	C
v/c	0.84	0.27	0.37	0.88	0.27	0.09	0.82	
95% Queue	87.3	22.5	13.1	47.7	23.3	6.9	76.0	
PM PEAK HOUR – 2021 BACKGROUND TRAFFIC								
Delay	15.5	82.7	2.4	99.7	29.6	35.6	117.1	62.9
LOS	B	F	A	F	C	D	F	E
v/c	0.46	1.08	0.32	1.05	0.65	0.16	1.13	
95% Queue	43.9	212.8	12.4	84.2	82.7	11.1	116.5	
PM PEAK HOUR – 2021 TOTAL TRAFFIC NO INTERCHANGE								
Delay	16.7	85.3	2.9	110.7	34.0	39.7	127.2	67.2
LOS	B	F	A	F	C	D	F	E
v/c	0.49	1.09	0.32	1.08	0.69	0.18	1.15	
95% Queue	49.5	230.9	14.9	93.9	95.8	12.8	131.4	
PM PEAK HOUR – 2021 TOTAL TRAFFIC WITH INTERCHANGE								
Delay	20.3	29.8	4.1	13.7	13.0	19.7	20.9	16.9
LOS	C	C	A	B	B	B	C	B
v/c	0.56	0.76	0.43	0.48	0.57	0.15	0.55	
95% Queue	44.2	78.5	14.5	24.6	49.1	7.6	30.6	
PM PEAK HOUR – 2041 TOTAL TRAFFIC								
Delay	29.3	49.5	2.7	63.7	46.1	56.6	60.5	21.2
LOS	C	D	A	E	D	E	E	C
v/c	0.75	0.95	0.43	0.94	0.92	0.51	0.88	
95% Queue	97.8	164.5	14.0	80.3	157.1	20.5	86.7	

All movements at the Old Truro Road/Elmsdale intersection will operate with acceptable level of service in 2021 and 2041 with the existing configuration and full build out of 525 mobile home units.

The existing Trunk 2/Elmsdale Road intersection is busy today with many conflicting movements including large volumes of NB and EB left turn traffic.

The addition of the Lantz South Interchange in 2021 will divert a significant amount of existing and future traffic from this intersection as described in the GRIFFIN report and shown in Section 3.3 exhibits. All movements will operate with acceptable level of service in 2021 once the interchange is completed including site generated traffic from 100 Mobile Home units.

The 2041 traffic volumes include site generated traffic from full build out of the Old Truro Road Mobile Home Park as well as background growth and new traffic created by other new residential, commercial and business park growth as estimated in the GRIFFIN report. We note that some movements will exceed TIR thresholds of 0.90 in the PM Peak hour in 2041 but these values are still less than those that will be observed with 2021 traffic without the interchange.

5 Conclusions and Recommendations

This report is an update to a number of past Traffic Impact Studies and Addendums that were completed since 2013. It includes new horizon years, new traffic counts, new annual background growth rate and an assessment of the impacts of a new Highway 102 Interchange in South Lantz to align with the GRIFFIN report that was accepted by TIR in 2017.

The proposed new Highway 102 Interchange in Lantz South is expected to be completed in 2021 and it will provide significant relief to traffic in the area including Elmsdale Road and its intersection with Trunk 2. The capacity created by the new Interchange at the Elmsdale Road/Trunk 2 intersection will allow it to absorb new site generated traffic from the proposed Old Truro Road Mobile Home Park without infrastructure changes at this intersection.

The proposed development of 525 mobile home units can be accommodated with the following mitigation measures:

- We estimate that the proposed development of 525 mobile home units will create a total of 154 new vehicle trips in the AM peak hour and 305 new vehicle trips in the PM peak hour.
- The extension of Old Truro Road to the proposed site access point should be constructed to match the existing road that was recently repaved to Hescott Street.
- A curbed traffic island in accordance with TIR standards at the existing Old Truro Road at Elmsdale Road intersection would help define the eastbound channelized right turn that was observed during manual traffic counts.
- Design of the proposed access point to the proposed development should be completed to ensure that minimum Stopping Site Distance of 65 meters is provided. The internal road network for the proposed development should be designed to HRM and Transportation of Canada (TAC) specifications and minimum stopping site distance must be provided for all intersections within the development
- We concur with TIR's recommendation to limit development to 100 Mobile Home Units until the new Lantz South Interchange is constructed as the performance at the Elmsdale Road/Trunk 2 intersection will further deteriorate without the capacity generated by the Interchange.
- The overall performance of the Elmsdale Road/Trunk2 intersection will improve significantly with the construction of the proposed Lantz South Interchange. It can accommodate traffic from the full build out of the development without new infrastructure improvements at this intersection.
- We estimated trips generated by the proposed development using local rates for a Mobile Home Park, however, the developer will be marketing to a seniors and senior adult housing generates 40% less traffic in the AM peak hour and 43% less traffic in the PM peak hour as seniors tend to avoid these peak times. Less traffic results in fewer impacts on the transportation network and associated key intersections.
- We recommend that this Traffic Study be updated once full build out of 525 units is completed to properly assess actual background traffic growth, other new development growth and site generated traffic against the assumptions made in this report including actual trips generated by the proposed development.

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OLD TRURO ROAD MOBILE HOME PARK TRAFFIC IMPACT STUDY

TRIP GENERATION ESTIMATES

Source - ITE Trip Generation Manual 9th Edition

Land Use 240 Mobile Home Park (ITE Rates)

AM PEAK $LN(T) = 0.64 LN(x) + 1.03$
PM PEAK $T = 0.57(X) + 5.31$

Land Use 240 Mobile Home Park (Observed Local Rates)

AM PEAK 0.37 Average Rate Observed During Woodbine Mobile Home Park Counts
PM PEAK 0.54 Average Rate Observed During Woodbine Mobile Home Park Counts

Land Use 251 Senior Adult Housing - Detached

AM PEAK $Ln(T) = 0.86Ln(X) - 0.63$
PM PEAK $Ln(T) = 0.72Ln(X) + 0.58$

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL TRIPS	ENTER	EXIT	TOTAL	ENTER	EXIT
Mobile Home Park Observed	525	195	32% 63	68% 133	284	63% 179	37% 105
Mobile Home Park ITE	525	154	25% 39	75% 116	305	61% 186	39% 119
DIFFERENCE		41	24	17	-21	-7	-14

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL TRIPS	ENTER	EXIT	TOTAL	ENTER	EXIT
Mobile Home Park Observed	100	37	32% 12	68% 25	54	63% 34	37% 20
TOTAL							

LAND USE	QUANTITY	AM PEAK			PM PEAK		
		TOTAL TRIPS	ENTER	EXIT	TOTAL	ENTER	EXIT
Mobile Home Park	525	195	32% 63	68% 133	284	63% 179	37% 105
Senior Adult Housing - Detached	525	116	38% 44	62% 72	162	61% 99	39% 63
DIFFERENCE		79	18	61	122	80	42
		40%	29%	46%	43%	45%	40%

OLD TRURO ROAD MOBILE HOME PARK TRAFFIC IMPACT STUDY

TOTAL TRAFFIC ANALYSIS WITH 100 MOBILE HOME UNITS

ANNUAL BACKGROUND GROWTH RATE 0.5%

AM PEAK		OLD TRURO ROAD						ELMSDALE ROAD					
ENTER	12	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
EXIT	25	L	T	R	L	T	R	L	T	R	L	T	R
2012													
07:15:00 AM	07:30:00 AM	11		2				0	45			14	2
07:30:00 AM	07:45:00 AM	18		1				1	61			9	1
07:45:00 AM	08:00:00 AM	14		4				0	41			11	6
08:00:00 AM	08:15:00 AM	16		2				2	45			4	0
2012													
07:15:00 AM	08:15:00 AM	59		9				3	192			38	9
2021													
07:15:00 AM	08:15:00 AM	62		9				3	201			40	9
DISTRIBUTION													
07:15:00 AM	08:15:00 AM	87%		13%				25%					75%
SITE GENERATED TRAFFIC													
07:15:00 AM	08:15:00 AM	22		3				3					9
TOTAL TRAFFIC 2021													
07:15:00 AM	08:15:00 AM	83		13				6	201			40	18

PM PEAK		OLD TRURO ROAD						ELMSDALE ROAD					
ENTER	34	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
EXIT	20	L	T	R	L	T	R	L	T	R	L	T	R
2012													
04:30:00 PM	04:45:00 PM	14		2				0	34			55	8
04:45:00 PM	05:00:00 PM	4		1				2	35			57	12
05:00:00 PM	05:15:00 PM	4		1				3	24			44	16
05:15:00 PM	05:30:00 PM	5		1				0	30			59	6
2012													
04:30:00 PM	05:30:00 PM	27		5				5	123			215	42
2021													
04:30:00 PM	05:30:00 PM	28		5				5	129			225	44
DISTRIBUTION													
04:30:00 PM	05:30:00 PM	84%		16%				11%					89%
SITE GENERATED TRAFFIC													
04:30:00 PM	05:30:00 PM	17		3				4					30
TOTAL TRAFFIC 2021													
04:30:00 PM	05:30:00 PM	45		8				9	129			225	74

OLD TRURO ROAD MOBILE HOME PARK TRAFFIC IMPACT STUDY

TOTAL TRAFFIC ANALYSIS WITH 100 MOBILE HOME UNITS WITH INTERCHANGE

ANNUAL BACKGROUND GROWTH RATE 0.5%

AM PEAK		OLD TRURO ROAD						ELMSDALE ROAD					
ENTER	12	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
EXIT	25	L	T	R	L	T	R	L	T	R	L	T	R
2012													
07:15:00 AM	07:30:00 AM	11		2				0	45			14	2
07:30:00 AM	07:45:00 AM	18		1				1	61			9	1
07:45:00 AM	08:00:00 AM	14		4				0	41			11	6
08:00:00 AM	08:15:00 AM	16		2				2	45			4	0
2012													
07:15:00 AM	08:15:00 AM	59		9				3	192			38	9
2021													
07:15:00 AM	08:15:00 AM	62		9				3	201			40	9
DISTRIBUTION													
07:15:00 AM	08:15:00 AM	87%		13%				25%					75%
SITE GENERATED TRAFFIC													
07:15:00 AM	08:15:00 AM	22		3				3					9
TOTAL TRAFFIC 2021													
07:15:00 AM	08:15:00 AM	83		13				6	201			40	18

PM PEAK		OLD TRURO ROAD						ELMSDALE ROAD					
ENTER	34	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
EXIT	20	L	T	R	L	T	R	L	T	R	L	T	R
2012													
04:30:00 PM	04:45:00 PM	14		2				0	34			55	8
04:45:00 PM	05:00:00 PM	4		1				2	35			57	12
05:00:00 PM	05:15:00 PM	4		1				3	24			44	16
05:15:00 PM	05:30:00 PM	5		1				0	30			59	6
2012													
04:30:00 PM	05:30:00 PM	27		5				5	123			215	42
2021													
04:30:00 PM	05:30:00 PM	28		5				5	129			225	44
DISTRIBUTION													
04:30:00 PM	05:30:00 PM	84%		16%				11%					89%
SITE GENERATED TRAFFIC													
04:30:00 PM	05:30:00 PM	17		3				4					30
TOTAL TRAFFIC 2021													
04:30:00 PM	05:30:00 PM	45		8				9	129			225	74

OLD TRURO ROAD MOBILE HOME PARK TRAFFIC IMPACT STUDY

TOTAL TRAFFIC ANALYSIS WITH 525 MOBILE HOME UNITS AND INTERCHANGE

ANNUAL BACKGROUND GROWTH RATE 0.5%

AM PEAK		OLD TRURO ROAD						ELMSDALE ROAD					
ENTER	63	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
EXIT	133	L	T	R	L	T	R	L	T	R	L	T	R
2012													
07:15:00 AM	07:30:00 AM	11		2				0	45			14	2
07:30:00 AM	07:45:00 AM	18		1				1	61			9	1
07:45:00 AM	08:00:00 AM	14		4				0	41			11	6
08:00:00 AM	08:15:00 AM	16		2				2	45			4	0
2012													
07:15:00 AM	08:15:00 AM	59		9				3	192			38	9
2021													
07:15:00 AM	08:15:00 AM	62		9				3	201			40	9
2041													
07:15:00 AM	08:15:00 AM	68		10				3	222			44	10
DISTRIBUTION													
07:15:00 AM	08:15:00 AM	87%		13%				25%					75%
SITE GENERATED TRAFFIC													
07:15:00 AM	08:15:00 AM	115		18				16					47
TOTAL TRAFFIC 2041													
07:15:00 AM	08:15:00 AM	179		27				19	208			41	57

PM PEAK		OLD TRURO ROAD						ELMSDALE ROAD					
ENTER	179	NORTHBOUND			SOUTHBOUND			WESTBOUND			EASTBOUND		
EXIT	105	L	T	R	L	T	R	L	T	R	L	T	R
2012													
04:30:00 PM	04:45:00 PM	14		2				0	34			55	8
04:45:00 PM	05:00:00 PM	4		1				2	35			57	12
05:00:00 PM	05:15:00 PM	4		1				3	24			44	16
05:15:00 PM	05:30:00 PM	5		1				0	30			59	6
2012													
04:30:00 PM	05:30:00 PM	27		5				5	123			215	42
2021													
04:30:00 PM	05:30:00 PM	28		5				5	129			225	44
2041													
04:30:00 PM	05:30:00 PM	31		6				6	142			248	49
DISTRIBUTION													
04:30:00 PM	05:30:00 PM	84%		16%				11%					89%
SITE GENERATED TRAFFIC													
04:30:00 PM	05:30:00 PM	89		16				19					160
TOTAL TRAFFIC 2028													
04:30:00 PM	05:30:00 PM	118		22				24	133			233	205

OLD TRURO ROAD MOBILE HOME PARK TRAFFIC IMPACT STUDY

TOTAL TRAFFIC ANALYSIS WITH 100 MOBILE HOME UNITS

ANNUAL BACKGROUND GROWTH RATE 0.5%

AM PEAK		ELMSDALE ROAD						HIGHWAY 2					
ENTER	22	WESTBOUND			EASTBOUND			NORTHBOUND			SOUTHBOUND		
EXIT	9	L	T	R	L	T	R	L	T	R	L	T	R
2016													
07:15:00 AM	08:15:00 AM	70	165	5	95	52	168	188	84	25	8	157	261
2021													
07:15:00 AM	08:15:00 AM	72	170	6	154	53	180	217	90	26	11	171	446
DISTRIBUTION													
07:15:00 AM	08:15:00 AM	29%	69%	2%		59%				28%	12%		
SITE GENERATED TRAFFIC													
07:15:00 AM	08:15:00 AM	6	15	1		5				3	1		
TOTAL TRAFFIC 2021													
07:15:00 AM	08:15:00 AM	78	185	7	154	59	180	217	90	28	12	171	446

PM PEAK		ELMSDALE ROAD						HIGHWAY 2					
ENTER	17	WESTBOUND			EASTBOUND			NORTHBOUND			SOUTHBOUND		
EXIT	30	L	T	R	L	T	R	L	T	R	L	T	R
2016													
04:30:00 PM	05:30:00 PM	63	129	26	278	188	271	233	209	133	21	114	121
2021													
04:30:00 PM	05:30:00 PM	65	132	29	472	194	303	253	225	136	24	125	232
DISTRIBUTION													
04:30:00 PM	05:30:00 PM	29%	59%	13%		55%				38%	7%		
SITE GENERATED TRAFFIC													
04:30:00 PM	05:30:00 PM	5	10	2		17				12	2		
TOTAL TRAFFIC 2021													
04:30:00 PM	05:30:00 PM	69	142	31	472	211	303	253	225	148	26	125	232

OLD TRURO ROAD MOBILE HOME PARK TRAFFIC IMPACT STUDY

TOTAL TRAFFIC ANALYSIS WITH 100 MOBILE HOME UNITS WITH INTERCHANGE

ANNUAL BACKGROUND GROWTH RATE 0.5%

AM PEAK		ELMSDALE ROAD						HIGHWAY 2					
ENTER	22	WESTBOUND			EASTBOUND			NORTHBOUND			SOUTHBOUND		
EXIT	9	L	T	R	L	T	R	L	T	R	L	T	R
2016													
07:15:00 AM	08:15:00 AM	70	165	5	95	52	168	188	84	25	8	157	261
2021													
07:15:00 AM	08:15:00 AM	72	130	26	30	53	180	177	130	26	11	171	157
DISTRIBUTION													
07:15:00 AM	08:15:00 AM	32%	57%	11%		59%				28%	12%		
SITE GENERATED TRAFFIC													
07:15:00 AM	08:15:00 AM	7	12	2		5				3	1		
TOTAL TRAFFIC 2021													
07:15:00 AM	08:15:00 AM	79	142	28	30	59	180	177	130	28	12	171	157

PM PEAK		ELMSDALE ROAD						HIGHWAY 2					
ENTER	17	WESTBOUND			EASTBOUND			NORTHBOUND			SOUTHBOUND		
EXIT	30	L	T	R	L	T	R	L	T	R	L	T	R
2016													
04:30:00 PM	05:30:00 PM	63	129	26	278	188	271	233	209	133	21	114	121
2021													
04:30:00 PM	05:30:00 PM	65	132	29	152	174	303	203	275	136	24	125	70
DISTRIBUTION													
04:30:00 PM	05:30:00 PM	29%	59%	13%		52%				41%	7%		
SITE GENERATED TRAFFIC													
04:30:00 PM	05:30:00 PM	5	10	2		16				12	2		
TOTAL TRAFFIC 2021													
04:30:00 PM	05:30:00 PM	69	142	31	152	190	303	203	275	149	26	125	70

OLD TRURO ROAD MOBILE HOME PARK TRAFFIC IMPACT STUDY

TOTAL TRAFFIC ANALYSIS WITH 525 MOBILE HOME UNITS AND INTERCHANGE

ANNUAL BACKGROUND GROWTH RATE 0.5%

AM PEAK		ELMSDALE ROAD						HIGHWAY 2					
ENTER	115	WESTBOUND			EASTBOUND			NORTHBOUND			SOUTHBOUND		
EXIT	47	L	T	R	L	T	R	L	T	R	L	T	R
2016													
07:15:00 AM	08:15:00 AM	70	165	5	95	52	168	188	84	25	8	157	261
2041													
07:15:00 AM	08:15:00 AM	79	159	28	21	61	228	264	179	30	19	226	174
DISTRIBUTION													
07:15:00 AM	08:15:00 AM	32%	57%	11%		59%				28%	12%		
SITE GENERATED TRAFFIC													
07:15:00 AM	08:15:00 AM	36	66	13		28				13	6		
TOTAL TRAFFIC 2041													
07:15:00 AM	08:15:00 AM	116	225	41	21	89	228	264	179	43	25	226	174

PM PEAK		ELMSDALE ROAD						HIGHWAY 2					
ENTER	89	WESTBOUND			EASTBOUND			NORTHBOUND			SOUTHBOUND		
EXIT	160	L	T	R	L	T	R	L	T	R	L	T	R
2016													
04:30:00 PM	05:30:00 PM	63	129	26	278	188	271	233	209	133	21	114	121
2041													
04:30:00 PM	05:30:00 PM	72	149	36	261	202	410	265	345	152	29	161	107
DISTRIBUTION													
04:30:00 PM	05:30:00 PM	29%	59%	13%		52%				41%	7%		
SITE GENERATED TRAFFIC													
04:30:00 PM	05:30:00 PM	25	52	11		83				65	11		
TOTAL TRAFFIC 2041													
04:30:00 PM	05:30:00 PM	97	201	47	261	285	410	265	345	217	40	161	107

AM PEAK 2021 BACKGROUND TRAFFIC EXISTING CONFIGURATION

6: Old Truro Road & Elmsdale Road

2018-04-08

Intersection						
Int Delay, s/veh	2.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	40	9	3	201	62	9
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	10	3	218	67	10
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	43	0	268	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	225	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1566	-	721	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	812	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1566	-	720	1027
Mov Cap-2 Maneuver	-	-	-	-	720	-
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	810	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.1		10.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	748	-	-	1566	-	
HCM Lane V/C Ratio	0.103	-	-	0.002	-	
HCM Control Delay (s)	10.4	-	-	7.3	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.3	-	-	0	-	

AM PEAK 2021 TOTAL TRAFFIC EXISTING CONFIGURATION

6: Old Truro Road & Elmsdale Road

2018-02-19

Intersection						
Int Delay, s/veh	2.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	40	18	6	201	83	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	20	7	218	90	14
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	43	0	275	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	232	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1566	-	715	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	807	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1566	-	711	1027
Mov Cap-2 Maneuver	-	-	-	-	711	-
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	803	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		10.6	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	742	-	-	1566	-	
HCM Lane V/C Ratio	0.141	-	-	0.004	-	
HCM Control Delay (s)	10.6	-	-	7.3	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.5	-	-	0	-	

AM PEAK 2021 TOTAL TRAFFIC WITH INTERCHANGE
6: Old Truro Road & Elmsdale Road

2018-02-22

Intersection						
Int Delay, s/veh	3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	40	18	6	201	86	13
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	43	20	7	218	93	14
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	43	0	275	43
Stage 1	-	-	-	-	43	-
Stage 2	-	-	-	-	232	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1566	-	715	1027
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	807	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1566	-	711	1027
Mov Cap-2 Maneuver	-	-	-	-	711	-
Stage 1	-	-	-	-	979	-
Stage 2	-	-	-	-	803	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.2		10.7	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	741	-	-	1566	-	
HCM Lane V/C Ratio	0.145	-	-	0.004	-	
HCM Control Delay (s)	10.7	-	-	7.3	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.5	-	-	0	-	

AM PEAK 2041 TOTAL TRAFFIC WITH INTERCHANGE
6: Old Truro Road & Elmsdale Road

2018-02-19

Intersection						
Int Delay, s/veh	5.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	41	57	19	208	179	27
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	45	62	21	226	195	29
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	45	0	312	45
Stage 1	-	-	-	-	45	-
Stage 2	-	-	-	-	267	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1563	-	681	1025
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1563	-	671	1025
Mov Cap-2 Maneuver	-	-	-	-	671	-
Stage 1	-	-	-	-	977	-
Stage 2	-	-	-	-	766	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.6		12.5	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	703	-	-	1563	-	
HCM Lane V/C Ratio	0.319	-	-	0.013	-	
HCM Control Delay (s)	12.5	-	-	7.3	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	1.4	-	-	0	-	

PM PEAK 2021 BACKGROUND TRAFFIC EXISTING CONFIGURATION
6: Old Truro Road & Elmsdale Road

2018-04-08

Intersection						
Int Delay, s/veh	0.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	225	44	5	129	28	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	245	48	5	140	30	5
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	245	0	396	245
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	151	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1321	-	609	794
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	877	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1321	-	607	794
Mov Cap-2 Maneuver	-	-	-	-	607	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	873	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.3		11.1	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	629	-	-	1321	-	
HCM Lane V/C Ratio	0.057	-	-	0.004	-	
HCM Control Delay (s)	11.1	-	-	7.7	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.2	-	-	0	-	

PM PEAK 2021 TOTAL TRAFFIC EXISTING CONFIGURATION
6: Old Truro Road & Elmsdale Road

2018-02-19

Intersection						
Int Delay, s/veh	1.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	225	74	9	129	45	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	245	80	10	140	49	9
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	245	0	405	245
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	160	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1321	-	602	794
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	869	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1321	-	597	794
Mov Cap-2 Maneuver	-	-	-	-	597	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	862	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		11.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	620	-	-	1321	-	
HCM Lane V/C Ratio	0.093	-	-	0.007	-	
HCM Control Delay (s)	11.4	-	-	7.7	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.3	-	-	0	-	

PM PEAK 2021 TOTAL TRAFFIC WITH INTERCHANGE
6: Old Truro Road & Elmsdale Road

2018-02-18

Intersection						
Int Delay, s/veh	1.4					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	225	74	9	129	45	8
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	245	80	10	140	49	9
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	245	0	405	245
Stage 1	-	-	-	-	245	-
Stage 2	-	-	-	-	160	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1321	-	602	794
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	869	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1321	-	597	794
Mov Cap-2 Maneuver	-	-	-	-	597	-
Stage 1	-	-	-	-	796	-
Stage 2	-	-	-	-	862	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.5		11.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	620	-	-	1321	-	
HCM Lane V/C Ratio	0.093	-	-	0.007	-	
HCM Control Delay (s)	11.4	-	-	7.7	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	0.3	-	-	0	-	

PM PEAK 2041 TOTAL TRAFFIC WITH INTERCHANGE
6: Old Truro Road & Elmsdale Road




















2018-02-18

Intersection						
Int Delay, s/veh	2.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Vol, veh/h	233	205	24	133	118	22
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	Yield	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	253	223	26	145	128	24
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	253	0	450	253
Stage 1	-	-	-	-	253	-
Stage 2	-	-	-	-	197	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1312	-	567	786
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	836	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1312	-	555	786
Mov Cap-2 Maneuver	-	-	-	-	555	-
Stage 1	-	-	-	-	789	-
Stage 2	-	-	-	-	818	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		1.2		13.4	
HCM LOS					B	
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	582	-	-	1312	-	
HCM Lane V/C Ratio	0.261	-	-	0.02	-	
HCM Control Delay (s)	13.4	-	-	7.8	0	
HCM Lane LOS	B	-	-	A	A	
HCM 95th %tile Q(veh)	1	-	-	0.1	-	

AM PEAK 2021 BACKGROUND TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road













2018-04-08

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	72	170	6	154	53	180	217	90	26	11	171	446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.996				0.850		0.967			0.892	
Flt Protected		0.986			0.964		0.950			0.950		
Satd. Flow (prot)	0	1850	0	0	1816	1601	1789	1821	0	1789	1680	0
Flt Permitted		0.793			0.593		0.143			0.676		
Satd. Flow (perm)	0	1488	0	0	1117	1601	269	1821	0	1273	1680	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				196		28			247	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	78	185	7	167	58	196	236	98	28	12	186	485
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	270	0	0	225	196	236	126	0	12	671	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	20.0	20.0		20.0	20.0	20.0	12.0	45.0		33.0	33.0	
Total Split (%)	30.8%	30.8%		30.8%	30.8%	30.8%	18.5%	69.2%		50.8%	50.8%	
Maximum Green (s)	14.0	14.0		14.0	14.0	14.0	6.0	39.0		27.0	27.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
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	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	

AM PEAK 2021 BACKGROUND TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road

2018-04-08

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5		5	5	5		5		5	5	
Act Effect Green (s)		16.2			16.2	16.2	34.1	34.1		22.0	22.0	
Actuated g/C Ratio		0.26			0.26	0.26	0.55	0.55		0.35	0.35	
v/c Ratio		0.70			0.78	0.35	0.80	0.12		0.03	0.89	
Control Delay		34.6			45.6	5.8	32.4	5.5		12.4	27.8	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		34.6			45.6	5.8	32.4	5.5		12.4	27.8	
LOS		C			D	A	C	A		B	C	
Approach Delay		34.6			27.1			23.0			27.5	
Approach LOS		C			C			C			C	
Queue Length 50th (m)		30.0			25.9	0.0	12.6	4.8		0.9	45.5	
Queue Length 95th (m)		#64.9			#61.7	13.8	#43.9	10.9		3.7	#105.5	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		386			289	559	294	1159		556	872	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.70			0.78	0.35	0.80	0.11		0.02	0.77	

Intersection Summary

Area Type: Other

Cycle Length: 65

Actuated Cycle Length: 62.4

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 27.6

Intersection LOS: C

Intersection Capacity Utilization 88.8%

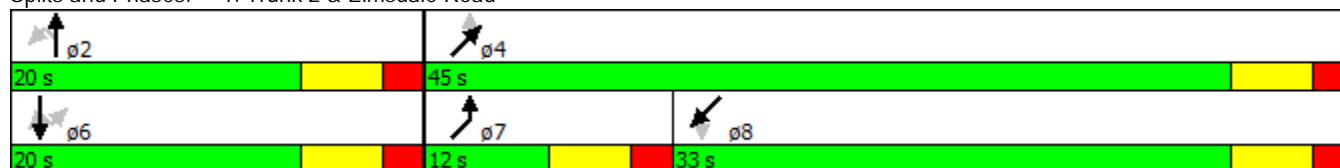
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.




















Splits and Phases: 1: Trunk 2 & Elmsdale Road



AM PEAK 2021 TOTAL TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road













2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	78	185	7	154	59	180	217	90	28	12	171	446
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.996				0.850		0.965			0.892	
Flt Protected		0.986			0.965		0.950			0.950		
Satd. Flow (prot)	0	1850	0	0	1818	1601	1789	1818	0	1789	1680	0
Flt Permitted		0.773			0.574		0.134			0.675		
Satd. Flow (perm)	0	1450	0	0	1081	1601	252	1818	0	1271	1680	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		2				196		30			224	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	85	201	8	167	64	196	236	98	30	13	186	485
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	294	0	0	231	196	236	128	0	13	671	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	24.0	24.0		24.0	24.0	24.0	12.0	46.0		34.0	34.0	
Total Split (%)	34.3%	34.3%		34.3%	34.3%	34.3%	17.1%	65.7%		48.6%	48.6%	
Maximum Green (s)	18.0	18.0		18.0	18.0	18.0	6.0	40.0		28.0	28.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
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	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	

AM PEAK 2021 TOTAL TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road

2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5		5	5	5		5		5	5	
Act Effect Green (s)		18.1			18.1	18.1	35.9	35.9		23.8	23.8	
Actuated g/C Ratio		0.27			0.27	0.27	0.54	0.54		0.36	0.36	
v/c Ratio		0.74			0.78	0.34	0.85	0.13		0.03	0.90	
Control Delay		36.8			45.4	5.5	41.0	5.8		13.1	29.9	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		36.8			45.4	5.5	41.0	5.8		13.1	29.9	
LOS		D			D	A	D	A		B	C	
Approach Delay		36.8			27.1			28.6			29.5	
Approach LOS		D			C			C			C	
Queue Length 50th (m)		35.6			28.6	0.0	13.8	5.3		1.0	51.9	
Queue Length 95th (m)		#72.6			#64.2	13.6	#48.9	11.7		4.0	#113.4	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		399			296	581	277	1119		542	845	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.74			0.78	0.34	0.85	0.11		0.02	0.79	

Intersection Summary

Area Type: Other

Cycle Length: 70

Actuated Cycle Length: 66.1

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 30.0

Intersection LOS: C

Intersection Capacity Utilization 89.0%

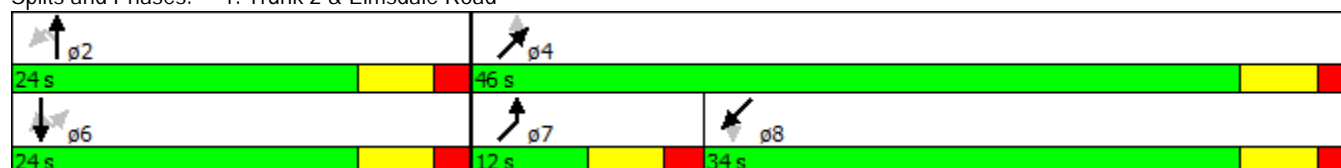
ICU Level of Service E

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.




















Splits and Phases: 1: Trunk 2 & Elmsdale Road



AM PEAK 2021 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road













2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	79	142	28	30	59	180	177	130	28	12	171	157
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.985				0.850		0.974			0.928	
Flt Protected		0.984			0.983		0.950			0.950		
Satd. Flow (prot)	0	1826	0	0	1851	1601	1789	1834	0	1789	1748	0
Flt Permitted		0.862			0.835		0.258			0.649		
Satd. Flow (perm)	0	1599	0	0	1573	1601	486	1834	0	1222	1748	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		11				196		26			77	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	86	154	30	33	64	196	192	141	30	13	186	171
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	270	0	0	97	196	192	171	0	13	357	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	24.0	24.0		24.0	24.0	24.0	13.0	36.0		23.0	23.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%	40.0%	21.7%	60.0%		38.3%	38.3%	
Maximum Green (s)	18.0	18.0		18.0	18.0	18.0	7.0	30.0		17.0	17.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
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	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	

AM PEAK 2021 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road

2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5		5	5	5		5		5	5	
Act Effect Green (s)		18.5			18.5	18.5	23.2	23.2		13.5	13.5	
Actuated g/C Ratio		0.34			0.34	0.34	0.43	0.43		0.25	0.25	
v/c Ratio		0.49			0.18	0.29	0.50	0.21		0.04	0.72	
Control Delay		19.6			16.4	4.4	13.7	8.0		16.2	24.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		19.6			16.4	4.4	13.7	8.0		16.2	24.3	
LOS		B			B	A	B	A		B	C	
Approach Delay		19.6			8.4			11.0			24.1	
Approach LOS		B			A			B			C	
Queue Length 50th (m)		22.0			7.4	0.0	10.9	8.0		1.0	26.3	
Queue Length 95th (m)		43.6			17.4	11.8	20.7	16.7		4.3	50.7	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		555			539	677	382	1059		395	618	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.49			0.18	0.29	0.50	0.16		0.03	0.58	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 54.1

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 15.9






Intersection LOS: B

Intersection Capacity Utilization 63.6%

ICU Level of Service B

Analysis Period (min) 15




















Splits and Phases: 1: Trunk 2 & Elmsdale Road

	
24 s	36 s
	
24 s	13 s
	
	23 s

AM PEAK 2041 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road













2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	116	225	41	31	89	228	264	179	43	25	226	174
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.985				0.850		0.971			0.935	
Flt Protected		0.985			0.987		0.950			0.950		
Satd. Flow (prot)	0	1827	0	0	1859	1601	1789	1829	0	1789	1761	0
Flt Permitted		0.850			0.840		0.198			0.608		
Satd. Flow (perm)	0	1577	0	0	1582	1601	373	1829	0	1145	1761	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				248		29			66	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	126	245	45	34	97	248	287	195	47	27	246	189
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	416	0	0	131	248	287	242	0	27	435	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	24.0	24.0		24.0	24.0	24.0	12.0	36.0		24.0	24.0	
Total Split (%)	40.0%	40.0%		40.0%	40.0%	40.0%	20.0%	60.0%		40.0%	40.0%	
Maximum Green (s)	18.0	18.0		18.0	18.0	18.0	6.0	30.0		18.0	18.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
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	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	

AM PEAK 2041 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road

2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5		5	5	5		5		5	5	
Act Effect Green (s)		18.1			18.1	18.1	27.9	27.9		15.9	15.9	
Actuated g/C Ratio		0.31			0.31	0.31	0.48	0.48		0.27	0.27	
v/c Ratio		0.84			0.27	0.37	0.88	0.27		0.09	0.82	
Control Delay		37.2			17.7	4.5	42.0	8.6		16.0	31.3	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		37.2			17.7	4.5	42.0	8.6		16.0	31.3	
LOS		D			B	A	D	A		B	C	
Approach Delay		37.2			9.0			26.7			30.4	
Approach LOS		D			A			C			C	
Queue Length 50th (m)		41.8			10.9	0.0	17.4	12.3		2.1	36.2	
Queue Length 95th (m)		#87.3			22.5	13.1	#47.7	23.3		6.9	#76.0	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		497			492	668	326	962		356	593	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.84			0.27	0.37	0.88	0.25		0.08	0.73	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 58

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.88

Intersection Signal Delay: 26.3

Intersection LOS: C

Intersection Capacity Utilization 79.6%

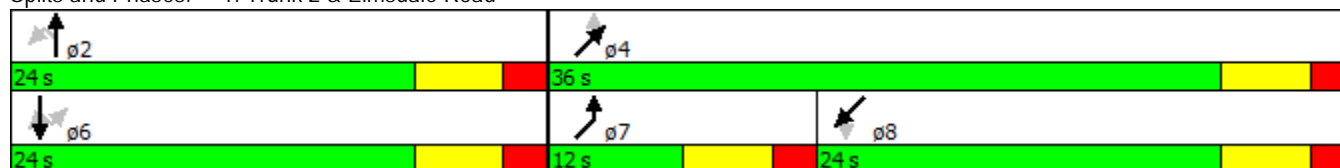
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.




















Splits and Phases: 1: Trunk 2 & Elmsdale Road



PM PEAK 2021 BACKGROUND TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road













2018-04-08

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	65	132	29	472	194	303	253	225	136	24	125	232
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.982				0.850		0.944			0.903	
Flt Protected		0.986			0.966		0.950			0.950		
Satd. Flow (prot)	0	1824	0	0	1819	1601	1789	1778	0	1789	1701	0
Flt Permitted		0.528			0.655		0.196			0.530		
Satd. Flow (perm)	0	977	0	0	1234	1601	369	1778	0	998	1701	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				320		36			88	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	71	143	32	513	211	329	275	245	148	26	136	252
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	246	0	0	724	329	275	393	0	26	388	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	55.0	55.0		55.0	55.0	55.0	15.0	35.0		20.0	20.0	
Total Split (%)	61.1%	61.1%		61.1%	61.1%	61.1%	16.7%	38.9%		22.2%	22.2%	
Maximum Green (s)	49.0	49.0		49.0	49.0	49.0	9.0	29.0		14.0	14.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
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	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	

PM PEAK 2021 BACKGROUND TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road

2018-04-08

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5		5	5	5		5		5	5	
Act Effect Green (s)		49.0			49.0	49.0	29.4	29.4		14.4	14.4	
Actuated g/C Ratio		0.54			0.54	0.54	0.33	0.33		0.16	0.16	
v/c Ratio		0.46			1.08	0.32	1.05	0.65		0.16	1.13	
Control Delay		15.5			82.7	2.4	99.7	29.6		35.6	117.1	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		15.5			82.7	2.4	99.7	29.6		35.6	117.1	
LOS		B			F	A	F	C		D	F	
Approach Delay		15.5			57.6			58.5			111.9	
Approach LOS		B			E			E			F	
Queue Length 50th (m)		22.8			~141.0	0.7	~40.6	52.7		4.0	~65.7	
Queue Length 95th (m)		43.9			#212.8	12.4	#84.2	82.7		11.1	#116.5	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		535			668	1014	261	602		159	344	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.46			1.08	0.32	1.05	0.65		0.16	1.13	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 90.4

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 62.9

Intersection LOS: E

Intersection Capacity Utilization 103.5%

ICU Level of Service G

Analysis Period (min) 15

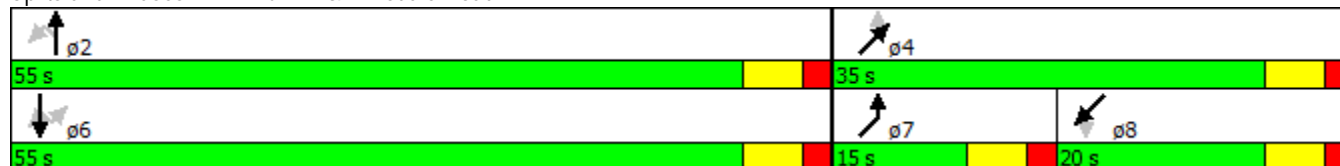
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.




















Splits and Phases: 1: Trunk 2 & Elmsdale Road



PM PEAK 2021 TOTAL TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road













2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	69	142	31	472	211	303	253	225	148	26	125	232
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.983				0.850		0.941			0.903	
Flt Protected		0.986			0.967		0.950			0.950		
Satd. Flow (prot)	0	1826	0	0	1821	1601	1789	1772	0	1789	1701	0
Flt Permitted		0.508			0.646		0.182			0.524		
Satd. Flow (perm)	0	941	0	0	1217	1601	343	1772	0	987	1701	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		12				291		35			79	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	154	34	513	229	329	275	245	161	28	136	252
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	263	0	0	742	329	275	406	0	28	388	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	62.0	62.0		62.0	62.0	62.0	16.0	38.0		22.0	22.0	
Total Split (%)	62.0%	62.0%		62.0%	62.0%	62.0%	16.0%	38.0%		22.0%	22.0%	
Maximum Green (s)	56.0	56.0		56.0	56.0	56.0	10.0	32.0		16.0	16.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
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	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	

PM PEAK 2021 TOTAL TRAFFIC EXISTING CONFIGURATION

1: Trunk 2 & Elmsdale Road

2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5		5	5	5		5		5	5	
Act Effect Green (s)		56.0			56.0	56.0	32.0	32.0		16.0	16.0	
Actuated g/C Ratio		0.56			0.56	0.56	0.32	0.32		0.16	0.16	
v/c Ratio		0.49			1.09	0.32	1.08	0.69		0.18	1.15	
Control Delay		16.7			85.3	2.9	110.7	34.0		39.7	127.2	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		16.7			85.3	2.9	110.7	34.0		39.7	127.2	
LOS		B			F	A	F	C		D	F	
Approach Delay		16.7			60.0			65.0			121.3	
Approach LOS		B			E			E			F	
Queue Length 50th (m)		27.7			~162.7	3.1	~44.1	62.4		4.7	~75.1	
Queue Length 95th (m)		49.5			#230.9	14.9	#93.9	95.8		12.8	#131.4	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		532			681	1024	254	590		157	338	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.49			1.09	0.32	1.08	0.69		0.18	1.15	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.15

Intersection Signal Delay: 67.2

Intersection LOS: E

Intersection Capacity Utilization 105.2%

ICU Level of Service G

Analysis Period (min) 15

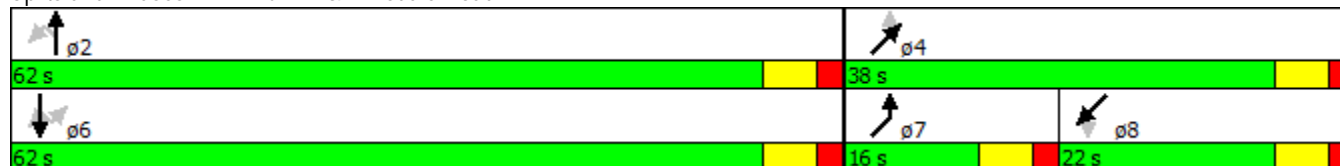
~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.




















Splits and Phases: 1: Trunk 2 & Elmsdale Road



PM PEAK 2021 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road













2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	69	142	31	152	190	303	203	275	149	26	125	70
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.983				0.850		0.947			0.946	
Flt Protected		0.986			0.978		0.950			0.950		
Satd. Flow (prot)	0	1826	0	0	1842	1601	1789	1784	0	1789	1782	0
Flt Permitted		0.717			0.753		0.402			0.498		
Satd. Flow (perm)	0	1327	0	0	1418	1601	757	1784	0	938	1782	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		13				329		63			46	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	75	154	34	165	207	329	221	299	162	28	136	76
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	263	0	0	372	329	221	461	0	28	212	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		Perm	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2			6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		6	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		22.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	25.0	25.0		25.0	25.0	25.0	13.0	35.0		22.0	22.0	
Total Split (%)	41.7%	41.7%		41.7%	41.7%	41.7%	21.7%	58.3%		36.7%	36.7%	
Maximum Green (s)	19.0	19.0		19.0	19.0	19.0	7.0	29.0		16.0	16.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
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	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0		5.0	5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0		11.0	11.0	11.0		11.0		11.0	11.0	

PM PEAK 2021 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road

2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5		5	5	5		5		5	5	
Act Effect Green (s)		19.1			19.1	19.1	23.8	23.8		10.7	10.7	
Actuated g/C Ratio		0.35			0.35	0.35	0.43	0.43		0.19	0.19	
v/c Ratio		0.56			0.76	0.43	0.48	0.57		0.15	0.55	
Control Delay		20.3			29.8	4.1	13.7	13.0		19.7	20.9	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		20.3			29.8	4.1	13.7	13.0		19.7	20.9	
LOS		C			C	A	B	B		B	C	
Approach Delay		20.3			17.8			13.2			20.8	
Approach LOS		C			B			B			C	
Queue Length 50th (m)		19.2			31.3	0.0	13.3	27.3		2.3	14.7	
Queue Length 95th (m)		44.2			#78.5	14.5	24.6	49.1		7.6	30.6	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		469			492	770	460	975		274	553	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.56			0.76	0.43	0.48	0.47		0.10	0.38	

Intersection Summary

Area Type: Other

Cycle Length: 60

Actuated Cycle Length: 54.9

Natural Cycle: 60

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 16.9

Intersection LOS: B

Intersection Capacity Utilization 81.0%

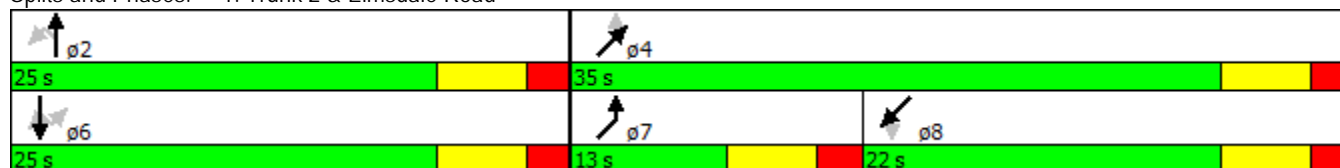
ICU Level of Service D

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.




















Splits and Phases: 1: Trunk 2 & Elmsdale Road



PM PEAK 2041 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road













2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (vph)	97	201	47	261	285	410	265	345	217	40	161	107
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (m)	0.0		0.0	0.0		53.3	68.6		0.0	30.5		0.0
Storage Lanes	0		0	0		1	1		0	1		0
Taper Length (m)	7.6			7.6			7.6			7.6		
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		0.982				0.850		0.942			0.940	
Flt Protected		0.986			0.977		0.950			0.950		
Satd. Flow (prot)	0	1824	0	0	1840	1601	1789	1774	0	1789	1770	0
Flt Permitted		0.528			0.659		0.194			0.260		
Satd. Flow (perm)	0	977	0	0	1241	1601	365	1774	0	490	1770	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		10				446		40			32	
Link Speed (k/h)		60			60			60			60	
Link Distance (m)		187.2			986.5			384.7			500.4	
Travel Time (s)		11.2			59.2			23.1			30.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	218	51	284	310	446	288	375	236	43	175	116
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	374	0	0	594	446	288	611	0	43	291	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			3.7			3.7	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		4.9			4.9			4.9			4.9	
Two way Left Turn Lane												
Headway Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Turn Type	Perm	NA		pm+pt	NA	Perm	pm+pt	NA		Perm	NA	
Protected Phases		2		1	6		7	4			8	
Permitted Phases	2			6		6	4			8		
Detector Phase	2	2		1	6	6	7	4		8	8	
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	22.0	22.0		13.0	22.0	22.0	13.0	22.0		22.0	22.0	
Total Split (s)	38.0	38.0		13.0	51.0	51.0	17.0	39.0		22.0	22.0	
Total Split (%)	42.2%	42.2%		14.4%	56.7%	56.7%	18.9%	43.3%		24.4%	24.4%	
Maximum Green (s)	32.0	32.0		7.0	45.0	45.0	11.0	33.0		16.0	16.0	
Yellow Time (s)	4.0	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	2.0	
Lost Time Adjust (s)		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Lost Time (s)		6.0			6.0	6.0	6.0	6.0		6.0	6.0	
Lead/Lag	Lag	Lag		Lead			Lead			Lag	Lag	
Lead-Lag Optimize?	Yes	Yes		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	
Recall Mode	Max	Max		None	Max	Max	None	None		None	None	
Walk Time (s)	5.0	5.0			5.0	5.0		5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0			11.0	11.0		11.0		11.0	11.0	

PM PEAK 2041 TOTAL TRAFFIC WITH INTERCHANGE

1: Trunk 2 & Elmsdale Road

2018-02-19

												
Lane Group	NBL	NBT	NBR	SBL	SBT	SBR	NEL	NET	NER	SWL	SWT	SWR
Pedestrian Calls (#/hr)	5	5			5	5		5		5	5	
Act Effect Green (s)		45.0			45.0	45.0	32.4	32.4		15.4	15.4	
Actuated g/C Ratio		0.50			0.50	0.50	0.36	0.36		0.17	0.17	
v/c Ratio		0.75			0.95	0.43	0.94	0.92		0.51	0.88	
Control Delay		29.3			49.5	2.7	63.7	46.1		56.6	60.5	
Queue Delay		0.0			0.0	0.0	0.0	0.0		0.0	0.0	
Total Delay		29.3			49.5	2.7	63.7	46.1		56.6	60.5	
LOS		C			D	A	E	D		E	E	
Approach Delay		29.3			29.4			51.8			60.0	
Approach LOS		C			C			D			E	
Queue Length 50th (m)		48.4			93.9	0.0	37.0	93.0		6.8	44.0	
Queue Length 95th (m)		#97.8			#164.5	14.0	#80.3	#157.1		#20.5	#86.7	
Internal Link Dist (m)		163.2			962.5			360.7			476.4	
Turn Bay Length (m)						53.3	68.6			30.5		
Base Capacity (vph)		496			624	1027	307	679		88	342	
Starvation Cap Reductn		0			0	0	0	0		0	0	
Spillback Cap Reductn		0			0	0	0	0		0	0	
Storage Cap Reductn		0			0	0	0	0		0	0	
Reduced v/c Ratio		0.75			0.95	0.43	0.94	0.90		0.49	0.85	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 89.4

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 40.9

Intersection LOS: D

Intersection Capacity Utilization 105.5%

ICU Level of Service G

Analysis Period (min) 15

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

Queue shown is maximum after two cycles.

Splits and Phases: 1: Trunk 2 & Elmsdale Road

		
13 s	38 s	39 s
		
51 s	17 s	22 s