Corseed Residential Subdivision

Town of Grand Valley
County of Dufferin

Traffic Impact Study for

Corseed Inc.

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Executive Summary

This report summarizes the traffic impact study prepared for the proposed 14.9 hectare Corseed Subdivision, located west of County Road 25, across from Industrial Drive. The report assesses the impact of traffic related to the development on the adjacent roadways and provides recommendations to accommodate this traffic in a safe and efficient manner.

The proposed Corseed Subdivision will include the following:

- Single Detached 85 units
- Townhouses 30 units
- Future Mixed-Use blocks
    - Townhomes TBD
    - Commercial Development TBD

A concept plan for the future mixed-use blocks in the Corseed Subdivision is not available at this time. Consequently, for the purpose of this analysis, it is assumed that the traffic generated by the future mixed-use blocks in the Corseed Subdivision will be proportionate to the traffic generated by the future mixed-use blocks in the Moco Subdivision, as calculated in the previous version of this report. This traffic generation estimate was completed using the previous breakdown for the mixed-use blocks presented for the Moco Subdivision, which was based on a concept plan prepared by IPS Consulting Inc., intended for future planning purposes.

Access to the Corseed Subdivision is provided via a connection to County Road 25 [Corseed Access] directly across from Industrial Drive.

The scope of this analysis includes a review of the existing intersections of County Road 25 / Melody Lane, County Road 25 / County Road 109 and proposed intersection of Corseed Access / County Road 25 / Industrial Drive.

Conclusions

1. The proposed residential development [Phase 1] in the Corseed Subdivision is expected to generate a total of 85 AM and 111 PM peak hour trips.
2. The proposed ultimate development of the Corseed Subdivision, including the future mixed-use development, is expected to generate a total of 148 AM and 246 PM primary peak hour trips.
3. Background traffic and pedestrian counts were completed for the existing intersections of County Road 25 / Melody Lane and County Road 25 / County Road 109 on Tuesday August 19th, 2014.
4. Level-of-service [LOS] analysis was completed at the study area intersections, using the existing (2016) and background (2021 & 2026) traffic volumes without the proposed development. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. Based on the background 2021 traffic volume, a northbound left turn lane is warranted at the intersection of Melody Lane / County Road 25; however, based on our discussions with the Town, widening the road at this intersection is not feasible.
5. The following improvements are recommended as a result of the background 2026 traffic volume:

Future Collector & Industrial Drive / Country Road 25

- A northbound left turn lane is recommended at the intersection of Future Collector & Industrial Drive / County Road 25 with 25 metre storage, 40 metre parallel and 115 metre taper length.
- A southbound left turn lane is recommended at the intersection of Future Collector & Industrial Drive / County Road 25 with 15 metre storage, 40 metre parallel and 115 metre taper length.

6. No other geometric or traffic signage improvements were recommended at the intersections in the study area as a result of the existing (2016) or background (2021 & 2026) traffic volumes without the proposed development.
7. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area streets and intersections.
8. LOS analysis was completed under total (2021, 2026 & 2031) traffic volumes with the proposed development operational at the study area intersections.
9. No geometric or traffic signage improvements are recommended at the existing Melody Lane / County Road 25 or County Road 25 / County Road 109 intersections as a result of the total (2021, 2026 & 2031) traffic volumes with the proposed development. As noted above, a northbound left turn lane is warranted at the intersection of Melody Lane / County Road 25; however, based on our discussions with the Town, widening the road at this intersection is not feasible.
10. The following improvements are recommended as a result of the Phase 1 Corseed Development:

    - The proposed **Corseed Access** & Industrial Drive / County Road 25 intersection will operate efficiently using unsignalized control with two-way stop control for westbound and eastbound traffic at County Road 25. One lane for egress traffic and one lane for ingress traffic for the west leg of the intersection will provide the necessary capacity for the proposed development.

11. The following improvements are recommended as a result of the ultimate Corseed Development (2031). These recommendations should be confirmed once the specifics for the future mixed-use blocks are known:

    Corseed Access & Industrial Drive / Country Road 25

    Total (2031) Traffic Volume

    - Installation of traffic signals to improve the eastbound control delay

12. The road structure for the internal streets within the proposed development will meet Town standards for local and collector roadways.
13. In order to address the County sight distance requirements at the Corseed Access & Industrial Drive / County Road 25 intersection, it is recommended that the existing 60km/h speed limit zone is converted to a 50km/h speed limit zone.

In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

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1 Introduction

1.1 Background

Corseed Inc. [The Developer] is proposing to develop a 14.9 hectare site [Corseed Subdivision] located west of Dufferin County Road 25 [County Road 25], south of the Upper Grand Trailway, in the Town of Grand Valley [Town], County of Dufferin [County].

The proposed Corseed Subdivision will include 85 single detached residential units, 30 townhouse units and two future mixed-use blocks (combined area of 1.35 hectares).

Corseed Inc. has retained **JD Northcote Engineering Inc.** [JD Engineering] to prepare this traffic impact study in support of the Draft Plan Application.

1.2 Study Area

Figure 1 shows the location of the subject site and study area intersections in relation to the surrounding area. The Draft Plan of Subdivision (by IPS Consulting Inc.) for the proposed development is shown in **Appendix A**.

The Corseed Subdivision is bound by existing residential lands to the north, County Road 25 to the east, and existing agricultural lands to the west and south. The subject site includes a single access [Corseed Access] connection with County Road 25, across from Industrial Drive.

Through consultation with the Town and County, the following intersections are included in the Study:

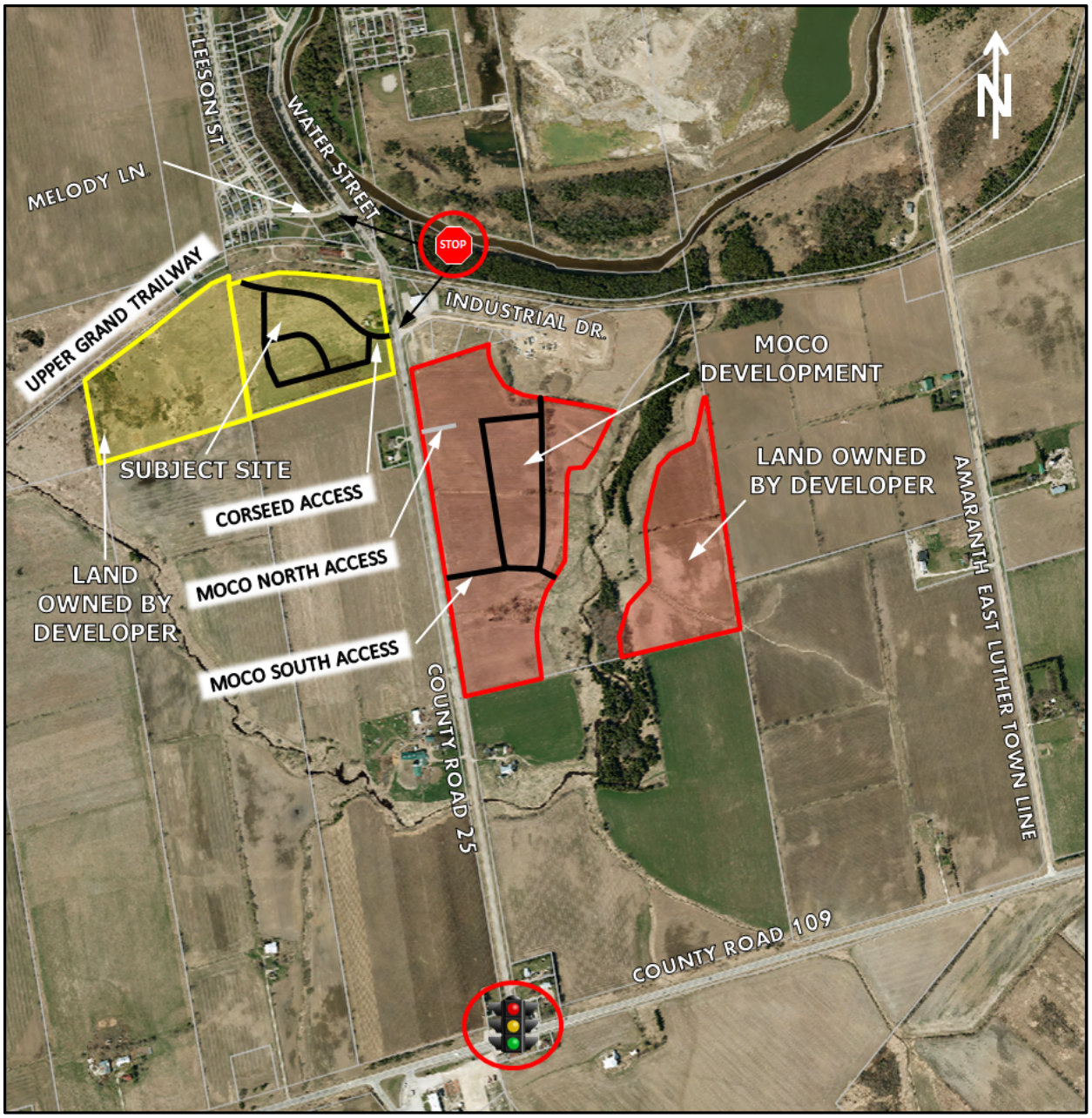
- Corseed Access / County Road 25 / Industrial Drive;
- County Road 25 / Melody Lane; and
- County Road 25 / County Road 109.

1.3 Study Scope and Objectives

The purpose of this study is to identify the potential impacts to traffic flow at the site access and on the surrounding roadway network. The study analysis includes the following tasks:

- Consult with the Town and County to address any transportation-related issues or concerns they have with the proposed development;
- Determine existing traffic volumes and circulation patterns;
- Estimate future traffic volumes if the proposed development was not constructed, including the impact of additional proposed developments in the area;
- Complete level-of-service [LOS] analysis of horizon year traffic conditions and identify operational deficiencies;
- Estimate the amount of traffic that would be generated by the proposed development and assign to the roadway network;
- Complete LOS analysis of horizon year traffic conditions and identify additional operational deficiencies;
- Identify improvement options to address operational deficiencies; and
- Document findings and recommendations in a final report.

Figure 1 – Proposed Site Location and Study Area



1.4 Horizon Year and Analysis Periods

It has been assumed that, should all approvals be granted, the residential units [Phase 1] within the proposed development will be built-out by 2021. The existing year traffic (2016), Phase 1 build-out year (2021), as well as 5-year post Phase 1 build-out year (2026) scenarios were selected for analysis of traffic operations in the study area. The weekday morning [AM] and afternoon [PM] peak hour have been selected as the analysis periods for this study.

Development plans for the Phase 2 (mixed-use blocks) for the proposed development have not been finalized at this time. It is anticipated that development of the mixed-use blocks will not commence within 10 years of the current proposed development. Based on our correspondence with the Town and County, although the development of the mixed-use blocks are not anticipated to develop in the short term, a longer-term preliminary review of the anticipated mixed-use development for the year 2031 is required.

2 Information Gathering

2.1 Street and Intersection Characteristics

County Road 109 is a two-lane county road with a posted speed limit of 80km/h in the study area. County Road 109 has a rural cross-section with shoulders and ditch on both sides of the road. County Road 109 includes a westbound right turn lane and an eastbound left turn lane at County Road 25. County Road 109 and is under the jurisdiction of the County.

County Road 25 (Water Street): South of the Upper Grand Trailway, County Road 25 is a two-lane road with a posted speed limit of 60km/h for 300 metres, then transitions to posted speed limit of 80km/h over the entire study area to the south. County Road 25 has a rural cross-section with shoulders and ditch on both sides of the road and is under the jurisdiction of the County. North of the Upper Grand Trailway, County Road 25 becomes Water Street, which is a two-lane primary road with a posted speed limit of 40km/h in the study area. Water Street has a rural cross-section with a sidewalk on the west side of the street, starting just south of Melody Lane. Water Street is under jurisdiction of the Town.

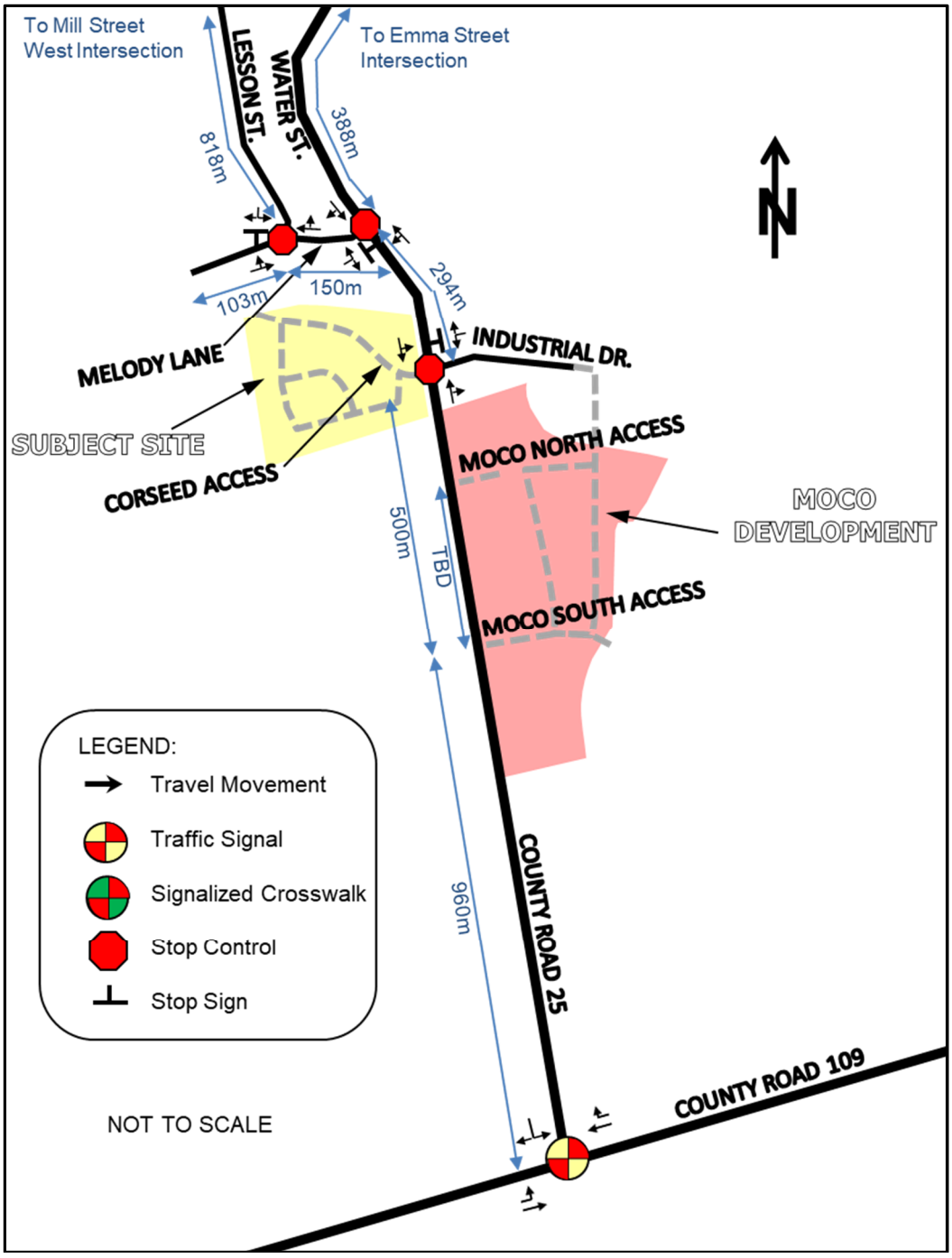
Melody Lane is a two-lane primary road with unsigned (assumed) speed limit of 40km/h in the study area. Melody Lane has an urban cross-section with a sidewalk on the north side of the street. Melody Lane is under jurisdiction of the Town.

Leeson Street is a two-lane primary road with unsigned (assumed) speed limit of 40km/h in the study area. Leeson Street has an urban cross-section with a sidewalk on the west side of the street. Leeson Street is under jurisdiction of the Town.

Industrial Drive is a two-lane road primary road with a rural cross-section with an unsigned (assumed) speed limit of 40km/h in the study area. Industrial Drive is under the jurisdiction of the Town.

The existing lane configuration for all study area intersections can be seen in **Figure 2**.

Figure 2 – Existing Lane Configuration for Study Area Intersections



2.2 Transit Access

There is currently no public transit available, or planned for in the study area.

2.3 Local Road Improvements

Based on the Town's Transportation Master Plan (dated March 2017) [Town TMP], the recommended alternative includes a future collector road [Future Collector] southwest of the Corseed Subdivision with a connection to County Road 25, south of the Corseed Access (excerpt provided in **Appendix I**). However, based on our correspondence with the Town, in conjunction with the proposed Corseed Subdivision, the location of the Future Collector has been revised to extend through the northwest side of the Corseed Subdivision, via Street A and will connect to County Road 25 at Industrial Drive. The Future Collector will bypass the Town and reconnect to County Road 25 north of Fife Road and continue around the existing built boundary of the Village east of County Road 25 and connect with Scott Street at Bielby Street. For the purpose of our analysis, we have assumed that the Future Collector will be constructed by the 2026 horizon year scenario.

The above noted improvement will have a notable impact on the distribution of the local traffic volumes, when it is completed in 2026. For the purpose of this report, it is assumed that the majority of the existing traffic that would pass through the Village and continue northbound or southbound on County Road 25 will be redistributed to the Future Collector. Based on our review of the local traffic volumes, it is assumed that 20% of the existing traffic currently travelling along Water Street through the Village will use the Future Collector.

The recommended alternative in the Town TMP also includes upgrading Amaranth Townline to a collector road with a collector road connection to County Road 25, through the Moco Subdivision mentioned in Section 2.4. Upgrading Amaranth Townline is anticipated to redirect some existing and future background traffic on County Road 25; however, in order to be conservative, we have not specifically accounted for this redistribution in our analysis.

No other geometric or road capacity improvements are currently planned within the study area.

2.4 Other Developments within the Study Area

The Moco Subdivision and the Thomasfield Subdivision are the only planned developments that will have a significant impact on local traffic volumes in the study area.

The Developer is moving ahead with plans to develop a 34.4 hectare site [Moco Subdivision] located southeast of the proposed development, bound by County Road 25 to the west, existing employment land to the north, and existing agricultural lands to the south and east. The proposed Moco Subdivision will include 54 single-family detached residential units, future mixed-use blocks (combined area of 9.17 hectares) and 6.9 hectares of future development lands. It is anticipated the Phase 1 of the Moco Subdivision will be built-out by 2021. The build-out date for Phase 2 of this development is not anticipated within 10 years of the proposed development; however, as noted in Section 1.4, a longer-term preliminary review of the anticipated mixed-use development for the 2031 horizon is included in the scope of this study. The previous submission of this report, prepared by JD Engineering (dated December 2016) [2016 TIS], included the analysis with an estimate of the traffic generation by the conceptual development plan for the future mixed-use block in the Moco Subdivision.

The Moco Subdivision includes a proposed t-intersection with County Road 25 on the south half of the property [Moco South Access]. A second right-in right-out access onto County Road 25 [Moco North Access] with an internal connection via Street A is anticipated to service the mixed-use block at

the northwest corner of the property. Although the exact location of the Moco North Access is not known at this time, we have provided a conceptual access as part of our review to allow for a preliminary review of the mixed-use block. An internal connection to Industrial Drive is anticipated to be constructed as well. The Moco South Access and the internal connection to Industrial Drive is expected to be constructed along with Phase 1 and the Moco North Access is expected to be constructed along with Phase 2 for the Moco Subdivision.

Thomasfield Homes Ltd. Is moving ahead with the proposed Thomasfield Subdivision. The location of this development is illustrated in **Figure 3**[1]. Phase 1 of this development is currently under construction. Phase 1 includes a connection with Amaranth Street West at the north end and Melody Lane at the south end. The developer of the Thomasfield Subdivision also owns lands located west of the Phase 1 lands; however, there are currently no plans for the development of these lands. Paradigm Transportation Solutions Ltd. prepared a traffic impact study (dated April 2011) for the Thomasfield Subdivision [Thomasfield TIS].

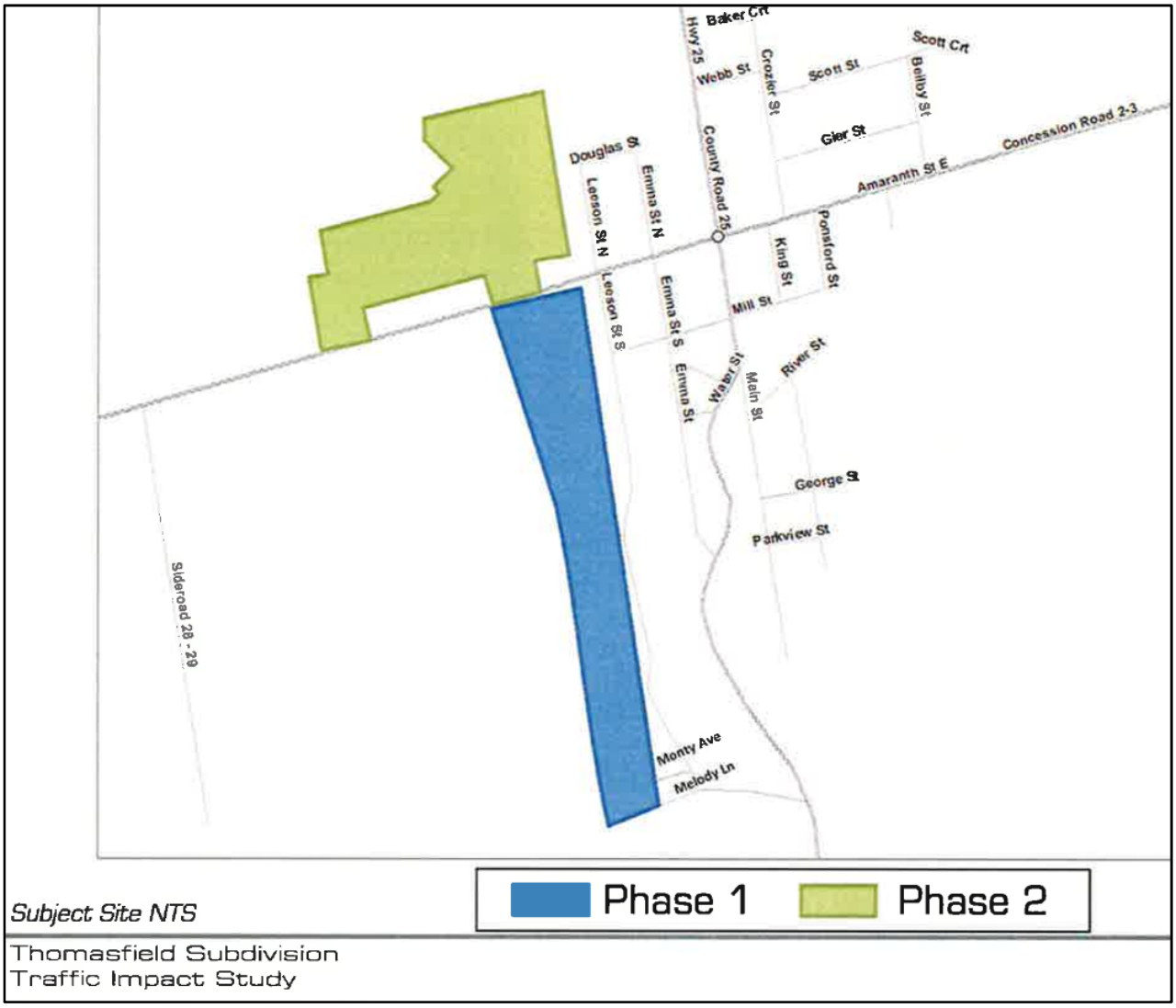
Industrial lands along Industrial Drive [Industrial Drive Development] are anticipated to be developed within the proposed developments horizon years. The development density on Industrial Drive has been estimated based on the 2021 and 2031 employment projections provided in the Draft Transportation Master Plan for Grand Valley (excerpts included in **Appendix I**). Based on a comparison between the employment population projections and the developable areas east of County Road 25 and south of the Grand River, we have estimated that the employment population for the Industrial Drive Development will be 185 employees by 2031.

There are a number of other developments in the village of Grand Valley at various stages of the planning process. The majority of these developments are located north of the existing built boundary of the village.

Section 2.4.2 to 2.4.7 outline the methodology applied to account for the additional traffic in the study area, as a result of the Moco Subdivision, Thomasfield Subdivision and the Industrial Drive Development.

[1] Excerpt from the Thomasfield TIS (Fig. 1.1).

Figure 3 – Thomasfield Subdivision Location



2.4.1 Background Traffic Growth

Through our discussions with the Town and County, a background traffic growth rate of 2.2% has been applied to the traffic volumes on County Road 25 and 109. This background traffic growth will account for increased traffic volumes as a result of small infill developments close to the study area, or larger developments beyond the study area

2.4.2 Traffic Generation for the Moco Subdivision

An updated conceptual site plan (dated October 2017) for the Moco Subdivision was prepared by IPS Consulting Inc. (attached in **Appendix J**).

The traffic generation for Phase 1 of the Moco Subdivision has been based on the Institute of Transportation Engineers [ITE] *Trip Generation* data. The following ITE land uses have been applied to estimate the traffic from the proposed development:

- ITE land use 210 (Single-Family Detached Housing); and
- ITE land use 230 (Residential Condominium / Townhouse).

As noted in Section 1.4, it is anticipated that development of the mixed-use blocks will not commence within the next 10 years. Based on our correspondence with the Town and County, although the development of the mixed-use blocks are not anticipated to develop in the short term, a longer-term preliminary review of the anticipated mixed-use development for the year 2031 is required.

The traffic generated by the future mixed-use block in the Moco Subdivision has been calculated based on the traffic projections completed in the 2016 TIS for the future mixed-use block in the Moco Subdivision. The traffic generated by the Moco Subdivision in the 2016 TIS was based off the conceptual development plan (dated November 2016) by IPS Consulting Inc. Excerpts from this study have been included in **Appendix K.**

The estimated trip generation of the Moco Subdivision is illustrated below in **Table 1**. The AM and PM peak traffic generation for the subject site generally aligns with the AM and PM peak hour in the traffic counts.

Table 1 – Estimated Traffic Generation from Proposed Moco Subdivision

Phase	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
1	Single-Family Detached Housing ITE Land Use: 210	54 units	12	36	48	38	22	60
	Residential Condominium/Townhouse ITE Land Use: 230	7 units	1	5	6	5	2	7
PHASE 1 TOTAL TRIPS			**13**	**41**	**54**	**43**	**24**	**67**
2	Residential Condominium/Townhouse ITE Land Use: 230	141% of Moco Traffic Volumes in 2016 TIS*	10	50	60	47	23	70
	Shopping Center ITE Land Use: 820		126	77	203	371	402	773
	Internal Capture (10%)[2]		-13	-7	-20	-37	-40	-77
	Pass-by Trips (Shopping Center)		0	0	0	-119	-119	-238
PHASE 2 TOTAL PRIMARY TRIPS			**126**	**111**	**237**	**258**	**267**	**525**

*Excerpts for the traffic generation of the residential townhouse and mixed-use land in the Moco Subdivision are outlined in **Table 9** of the 2016 TIS (excerpts provided in **Appendix K**).

In order to be conservative, no transportation modal split has been applied to the above-noted traffic generation calculation.

2.4.3 Traffic Distribution for the Moco Subdivision

The distribution of traffic for the Moco Subdivision has been taken directly from the 2016 TIS (excerpts provided in **Appendix K**). The internal distribution of traffic in the Moco Subdivision has been adjusted to reflect the updated conceptual site plan and the relocation of the Future Collector on the west side of County Road 25, as noted in Section 2.3.

Figures A and **B** in **Appendix L** illustrate the traffic distribution pattern for the residential component of the Moco in the 2021 horizon year and the 2026/2031 horizon years respectively.

[2] The internal capture rate (10%) was estimated based on a conservative application of the values provided in Table 7.1 and 7.2 of the ITE *Trip Generation Handbook*.

Figures C in **Appendix L** illustrates the traffic distribution pattern for the commercial component of the Moco Subdivision.

Figure 4, 5 and **6** illustrates the traffic assignment by the Moco Subdivision for the Phase 1 build-out (2021), 5-year post Phase 1 build-out (2026) and Phase 2 build-out (2031) scenarios respectively, in the AM and PM peak hour.

2.4.4 Traffic Generation for the Thomasfield Subdivision

The traffic generation for the Thomasfield Subdivision has been included in addition to the background traffic growth outlined above. **Table 2**[3] summarizes the estimated trip generation for each phase of the development. Phase 1 was approximately 75% built-out in 2014 at the time the traffic counts were completed for this report. In order to avoid double counting this traffic, we have reduced the overall traffic generation by 37.5%[4]. It is anticipated that the remaining units will be built-out prior to the 2021 horizon year.

Table 2 – Estimated Traffic Generation from Adjacent Thomasfield Subdivision

Development Phase	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Phase 1	Single-Family Detached	98 units	18	55	73	62	37	99
	Low-Rise Condominium / Townhouse	52 units	9	26	35	24	17	41
	PHASE 1 TOTAL TRIPS		27	81	108	86	54	140
Phase 2	Single-Family Detached	142 units	27	80	107	90	53	143
	Low-Rise Condominium / Townhouse	29 units	5	15	20	13	10	23
	PHASE 2 TOTAL TRIPS		32	95	127	103	63	166

2.4.5 Traffic Distribution for the Thomasfield Subdivision

The distribution of traffic for the Thomasfield Subdivisions has been taken directly from the Thomasfield TIS.

The construction of the Future Collector is anticipated to impact the distribution of traffic generated by the Thomasfield Subdivision. Based on our review of future road network, in conjunction with our estimate of the origin / destination of the trips from the Thomasfield Subdivision, we have estimated that 40% of the traffic south of the Thomasfield Subdivision will use the Future Collector in the 2026 and 2031 scenarios. This assumption is fundamentally based on our estimates of the travel time through the future road network and the assumption that people will select the route with the shortest travel time.

Figures 7 and **8** illustrate the additional 2021 and 2026/2031 traffic volumes in the study area generated by the Thomasfield Subdivision during the AM and PM peak hour.

[3] Excerpt from the Thomasfield TIS (Table 4.3)
[4] Since the traffic generated by Phase 1 and 2 is relatively equal, we have taken 75% of Phase 1 to be equal to 37.5% of the total traffic generation.

2.4.6 Traffic Generation for the Industrial Drive Development

The lands along Industrial Drive were partially built-out on the date the traffic counts used in this report were completed (October 2014). Development included the Grand Valley and District Fire Department, the Water Pollution Control Plant and a mini-storage facility (16 units[5]). The traffic generation for the three above-noted existing land-uses is relatively low during the AM and PM peak hour analyzed in this report. Consequently we have ignored the traffic on this approach for the existing (2016) and future 2021 scenarios. For the future 2026 and 2031 scenarios we have estimated the traffic generation for the Industrial Drive Development based on the Institute of Transportation Engineers [ITE] *Trip Generation* data. The Industrial Park (ITE #130) land use has been applied to represent the development in the area.

The estimated trip generation from the future development on Industrial Drive is illustrated below in **Table 3**. The AM and PM peak traffic generation for industrial properties generally aligns with the AM and PM peak hour in the traffic counts.

Table 3 – Estimated Traffic Generation from the Industrial Drive Development

Location	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
Industrial Drive	Industrial Park ITE Land Use: 130	185 Employees	70	10	80	17	66	83

In order to be conservative, no transportation modal split has been applied to the above-noted traffic generation calculation.

2.4.7 Traffic Distribution for the Industrial Drive Development

For the purposes of this study, it has been assumed that all traffic generated by Industrial Drive Development will be new traffic and would not be in the study area if the development was not constructed.

The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. Beyond the local area the distribution of traffic from the developments on Industrial Drive have been estimated based on the 2011 Transportation Tomorrow Survey [TTS] data for the area (excerpt attached as **Appendix M**). TTS data provides historical data for work trip origins with a destination in the Grand Valley zone (2006 GTA Zone – 8416).

The above-noted methodology provides an estimate of the distribution of ingress trips. We have assumed that the distribution of egress trips will follow the inverse of the ingress traffic distribution. For each of the individual areas identified in the TTS data, we have selected the probable route of travel, assuming that people will select their route primarily based on travel time.

Table 4 summarizes the trip distribution for the Industrial Drive Development.

[5] A second mini-storage building with 24 storage units was constructed in 2016.

Table 4 – Traffic Distribution Summary

Travel Direction (to/from)	Percent of Total Traffic Generation
North	70%
Southwest	6%
Southeast	24%
Total	**100%**

Figure 9 illustrates the additional (2026 and 2031) traffic volumes in the study area generated by the Industrial Drive Development during the AM and PM peak hour.

Figure 4 – Moco Subdivision Phase 1 Build-out (2021) Peak Hour Traffic Volumes

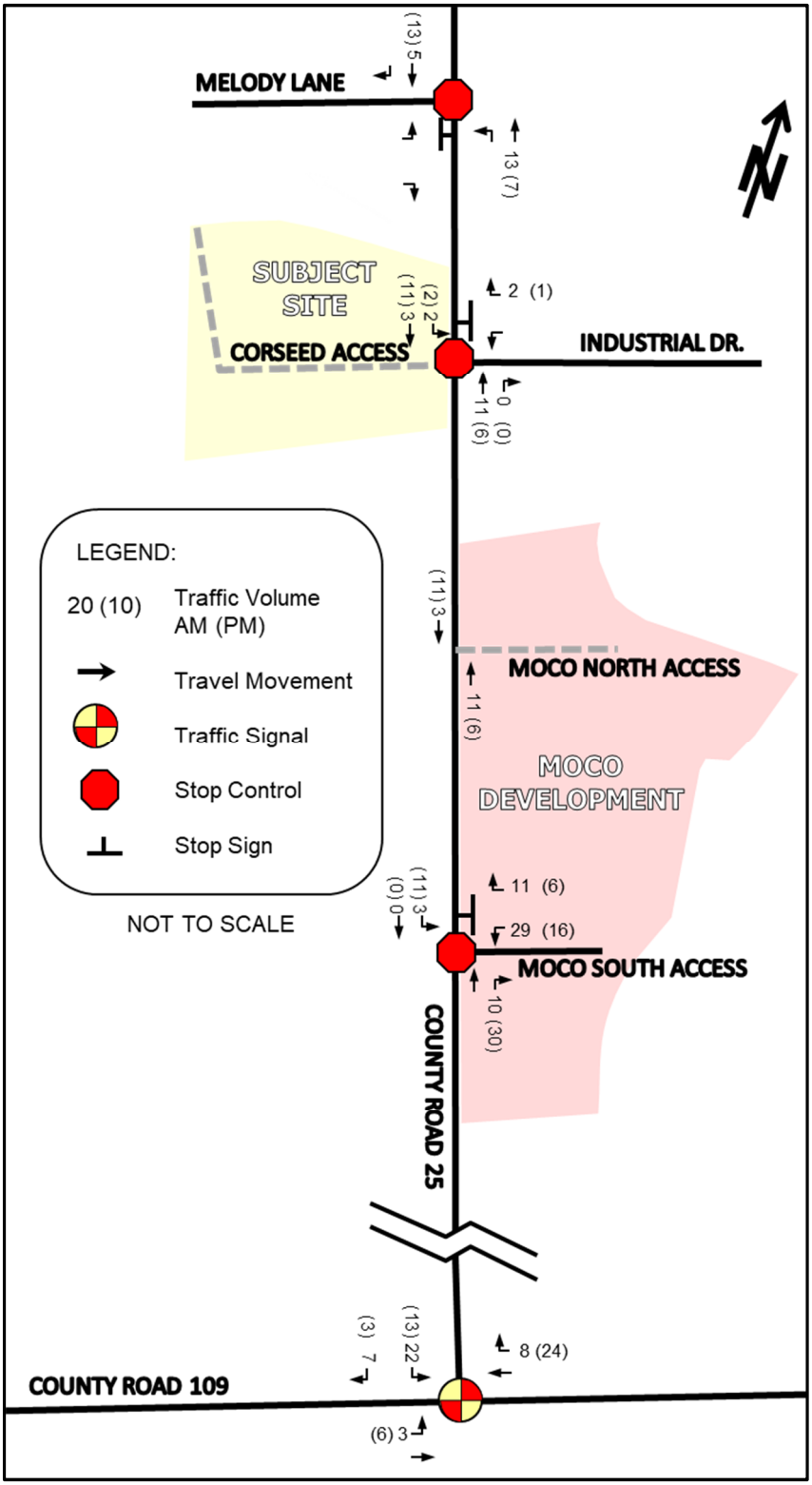


Figure 5 – Moco Subdivision 5-year Post Phase 1 Build-out (2026) Peak Hour Traffic Volumes

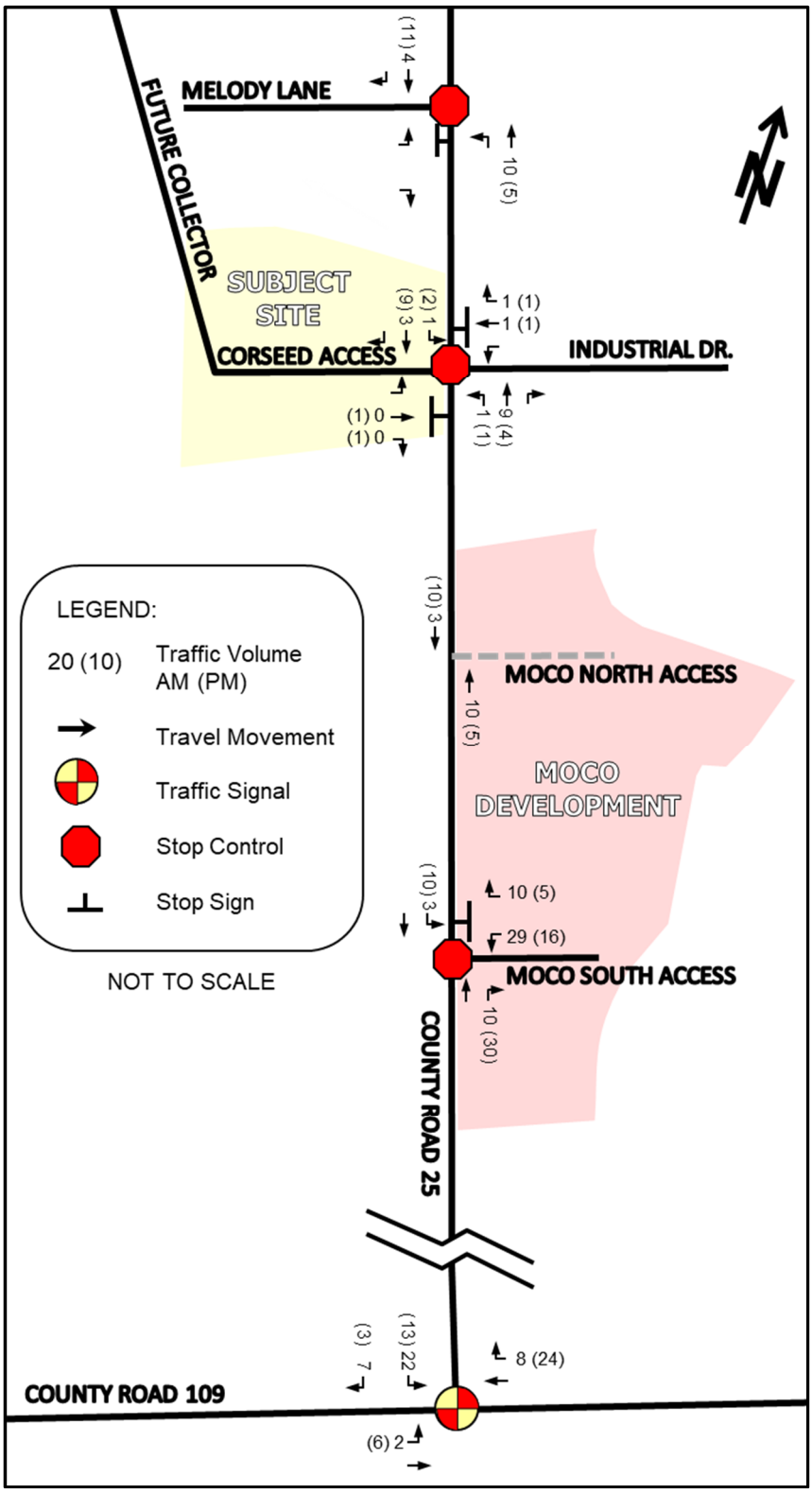


Figure 6 – Moco Subdivision Phase 2 Build-out (2031) Peak Hour Traffic Volumes

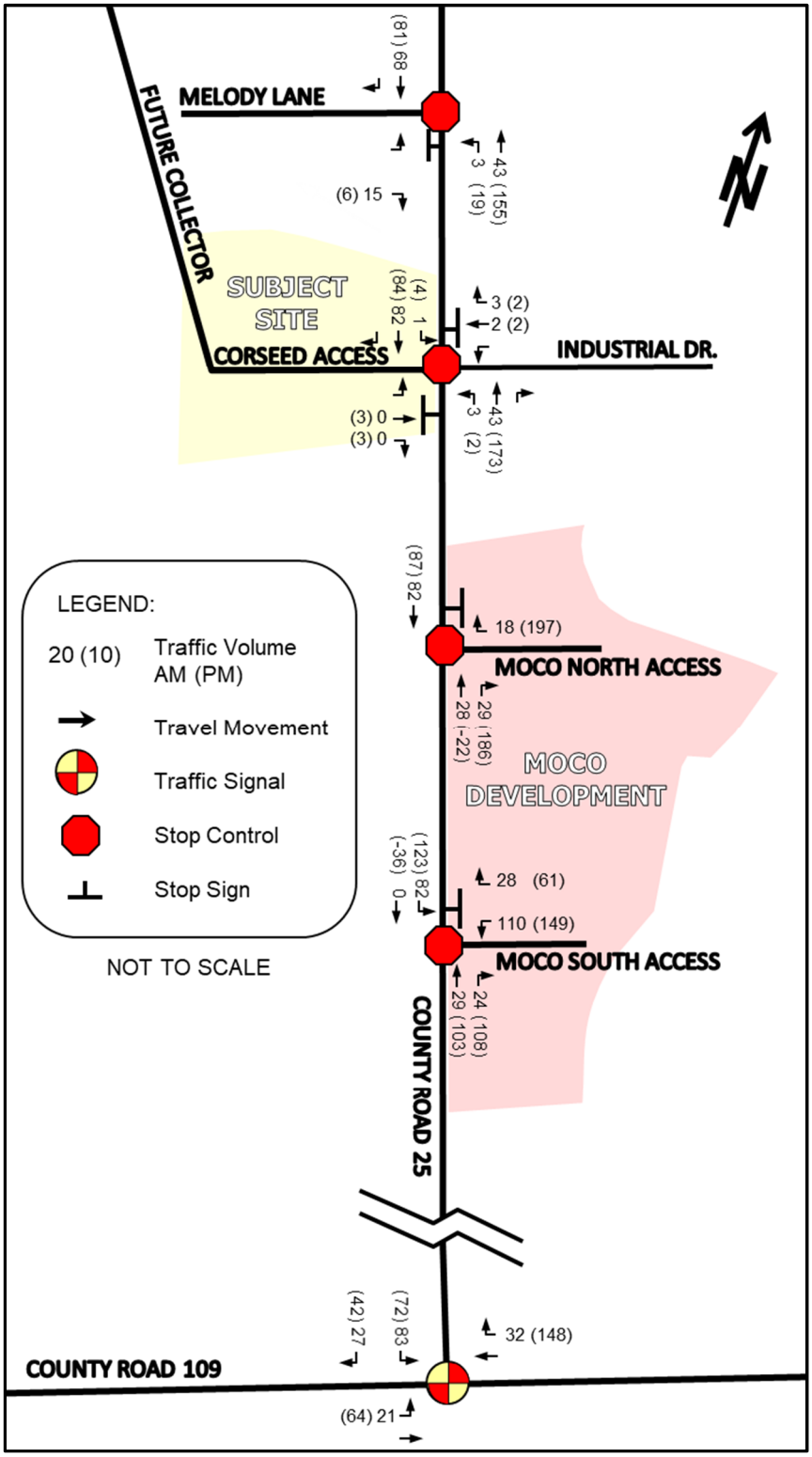


Figure 7 – Additional Thomasfield Subdivision (2021) Peak Hour Traffic Volumes

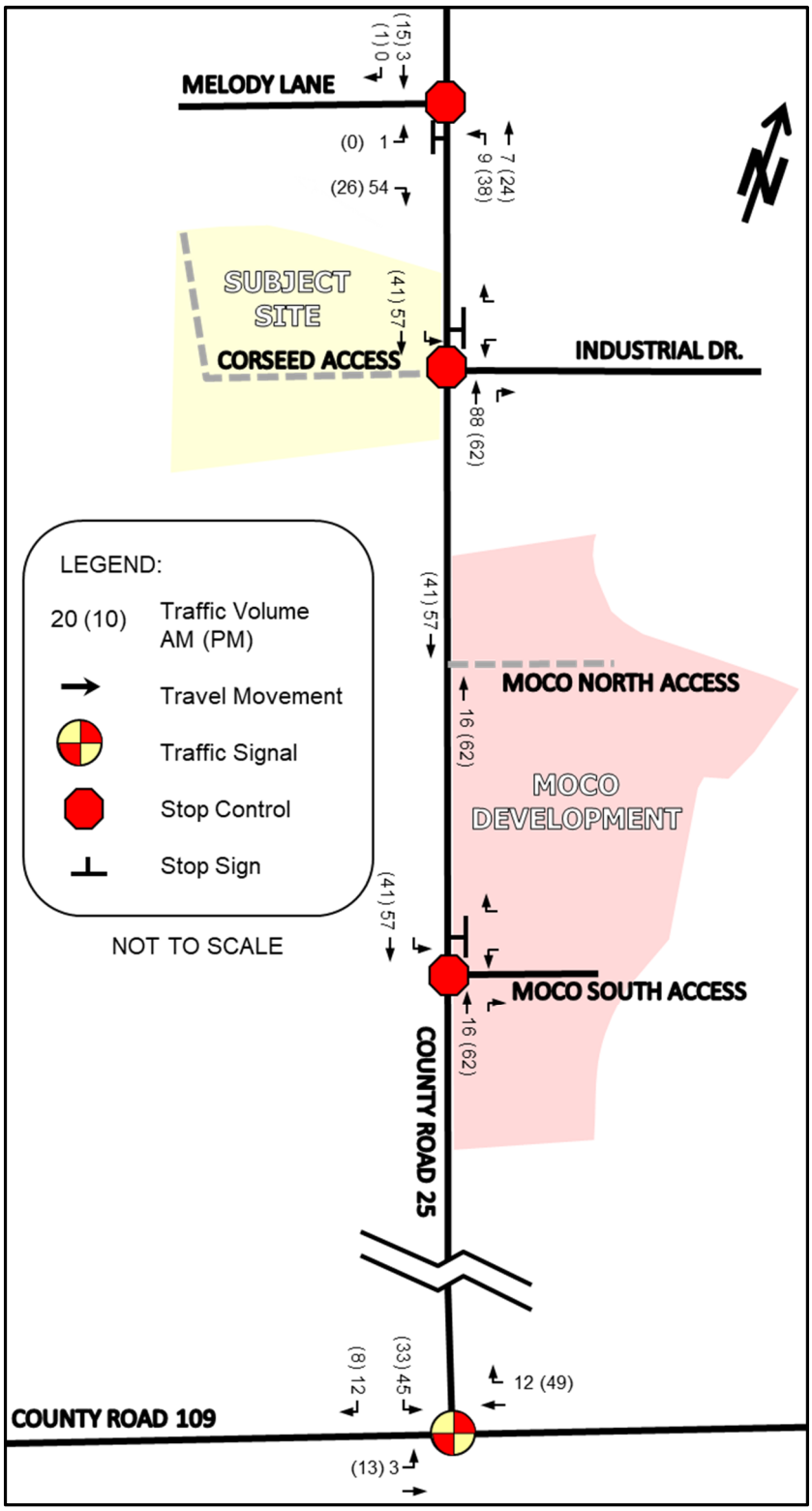


Figure 8 – Additional Thomasfield Subdivision (2026 and 2031) Peak Hour Traffic Volumes

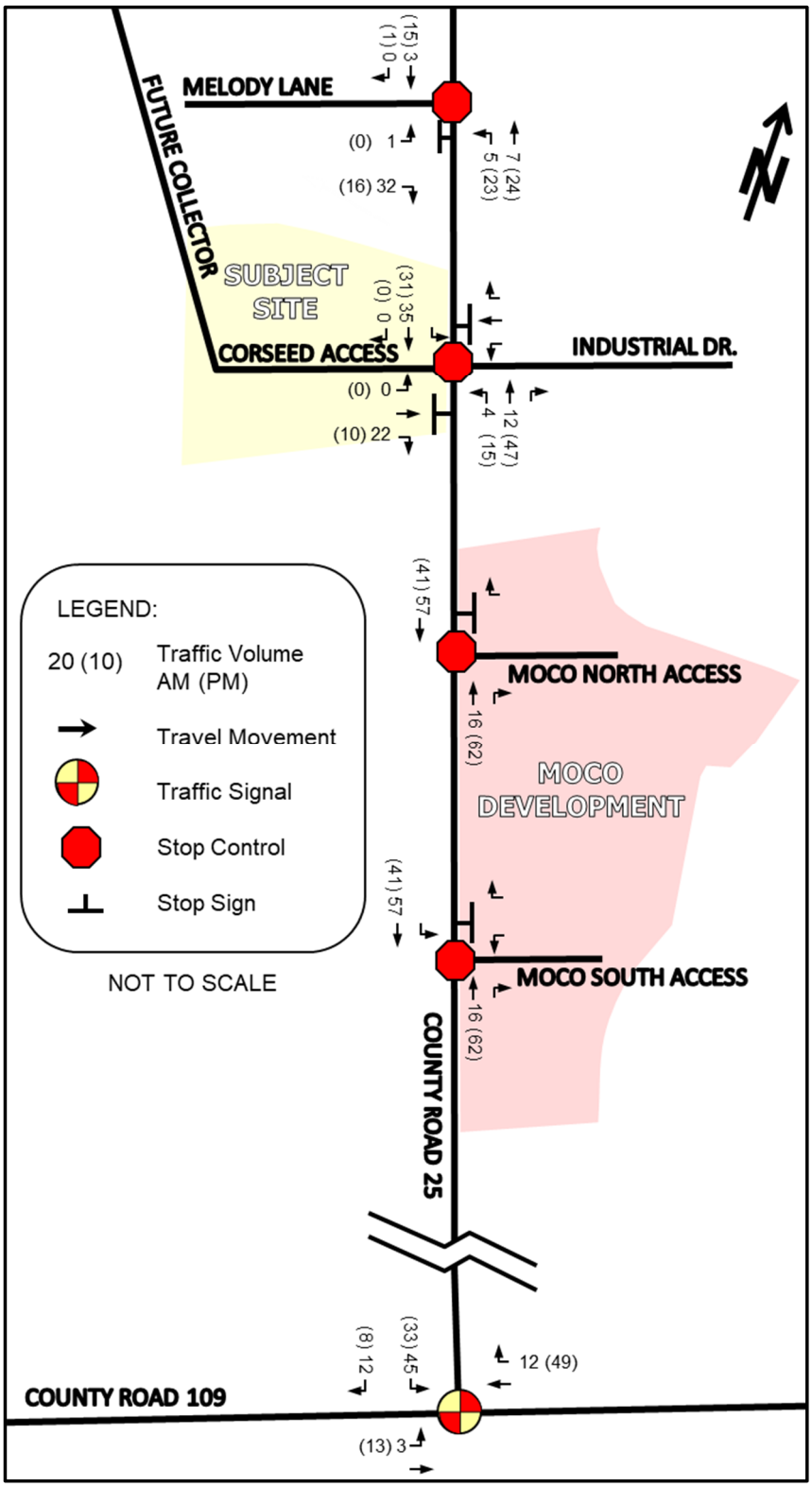
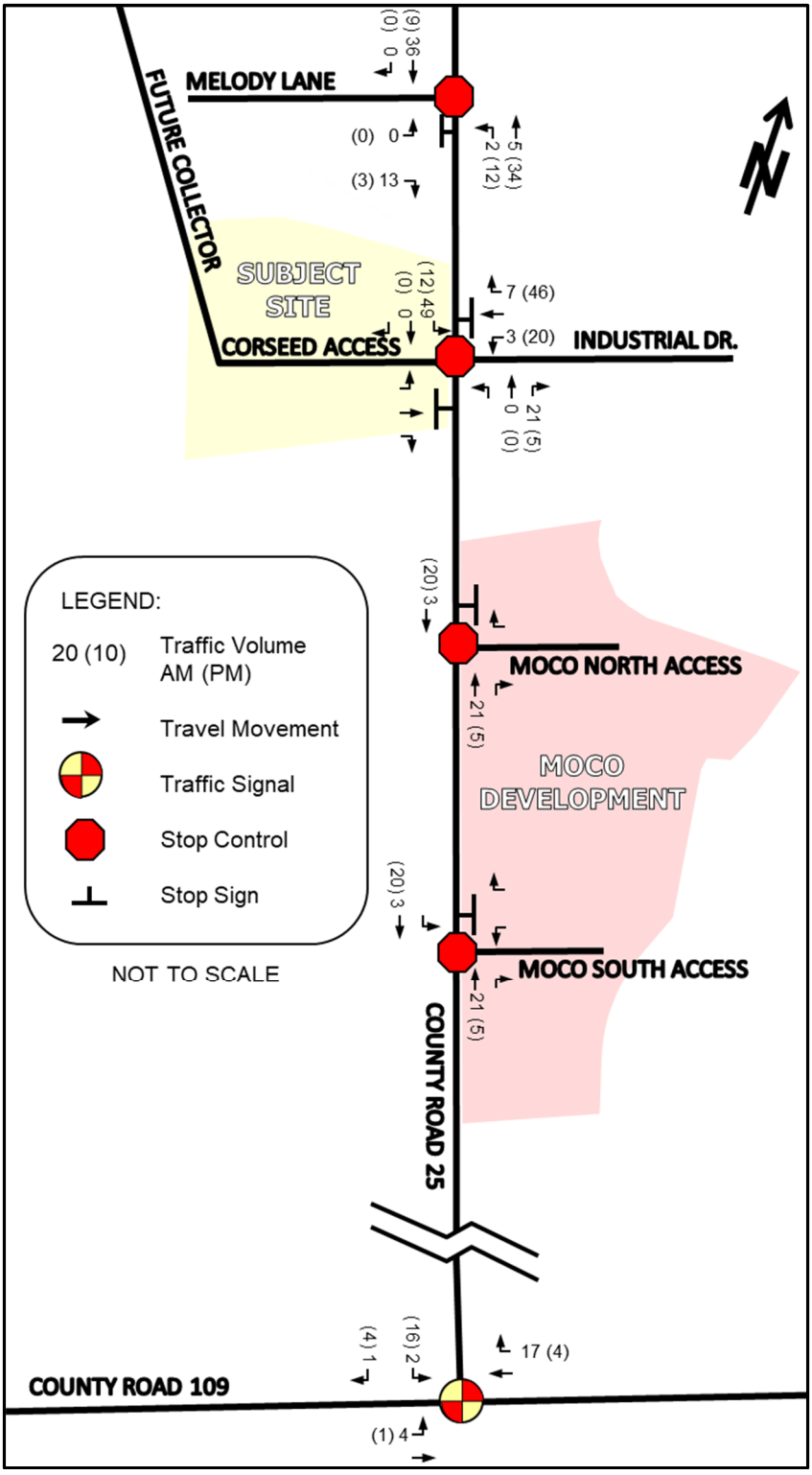


Figure 9 – Industrial Drive Development (2026 and 2031) Peak Hour Traffic Volumes



2.5 Traffic Counts

Detailed turning movement traffic and pedestrian counts were completed at the two existing intersections within the study area. **Table 5** summarizes the traffic count data collection information.

Table 5 – Traffic Count Data Collection Information

Intersection	Count Date	AM Peak Hour	PM Peak Hour	Source
County Road 25 / Melody Lane	Thursday October 9th, 2014	07:45 – 08:45	17:15 – 18:15	JD Eng.
County Road 25 / County Road 109	Wednesday October 9th, 2014	07:30 – 08:30	16:45 – 17:45	JD Eng.

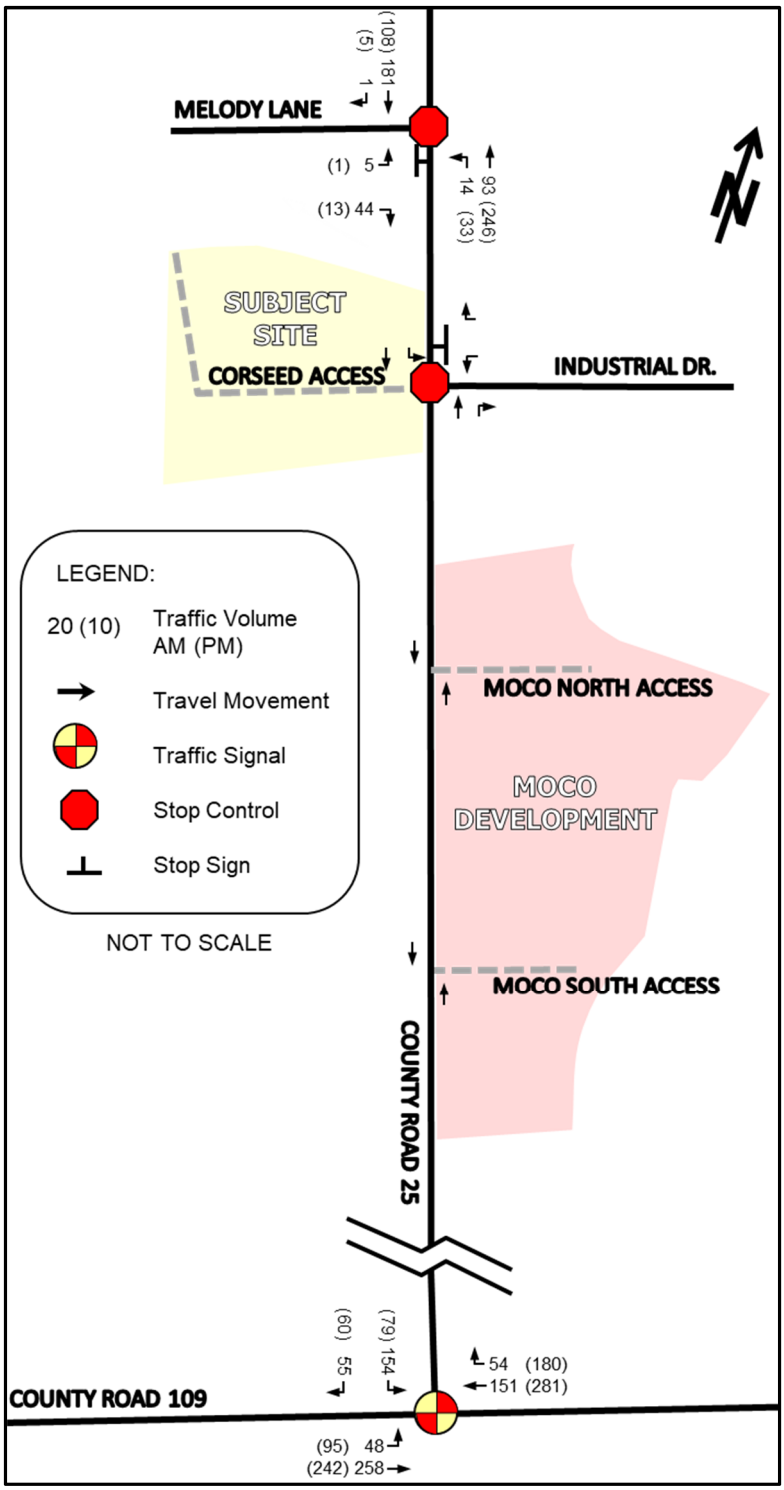
Detailed traffic count data can be found in **Appendix B**. These peaks hours generally aligned with the anticipated peak hour of traffic generation by the proposed development. Although the AM and PM peak periods at the two intersections did not exactly align, for the purpose of this report, we have assumed that the AM and PM peak hours are concurrent.

Heavy vehicle percentages and pedestrian crossings from the traffic count data have also been included in the Synchro analysis.

The traffic counts have been factored by the annual background traffic growth rate (2.2% - as calculated in Section 2.4.1) to estimate the existing (2016) traffic volumes.

Figure 10 illustrates the existing (2016) AM and PM peak hour traffic volumes at the site access and study area intersections.

Figure 10 – Existing (2016) Peak Hour Traffic Volumes



2.6 Horizon Year Traffic Volumes

Future horizon year traffic volumes without the proposed development were estimated to provide base case scenarios to compare to horizon year traffic scenarios with the proposed development operational.

The background traffic growth rate, the Thomasfield Subdivision and Industrial Drive development traffic volumes calculated in Section 2.4.1 have been applied to the existing traffic counts to estimate the total background traffic volume within the study area.

Figure 11, 12 and **13** illustrate the 2021, 2026 and 2031 total background AM and PM peak hour traffic volumes in the study area, respectively.

Figure 11 – Total Background (2021) Peak Hour Traffic Volumes

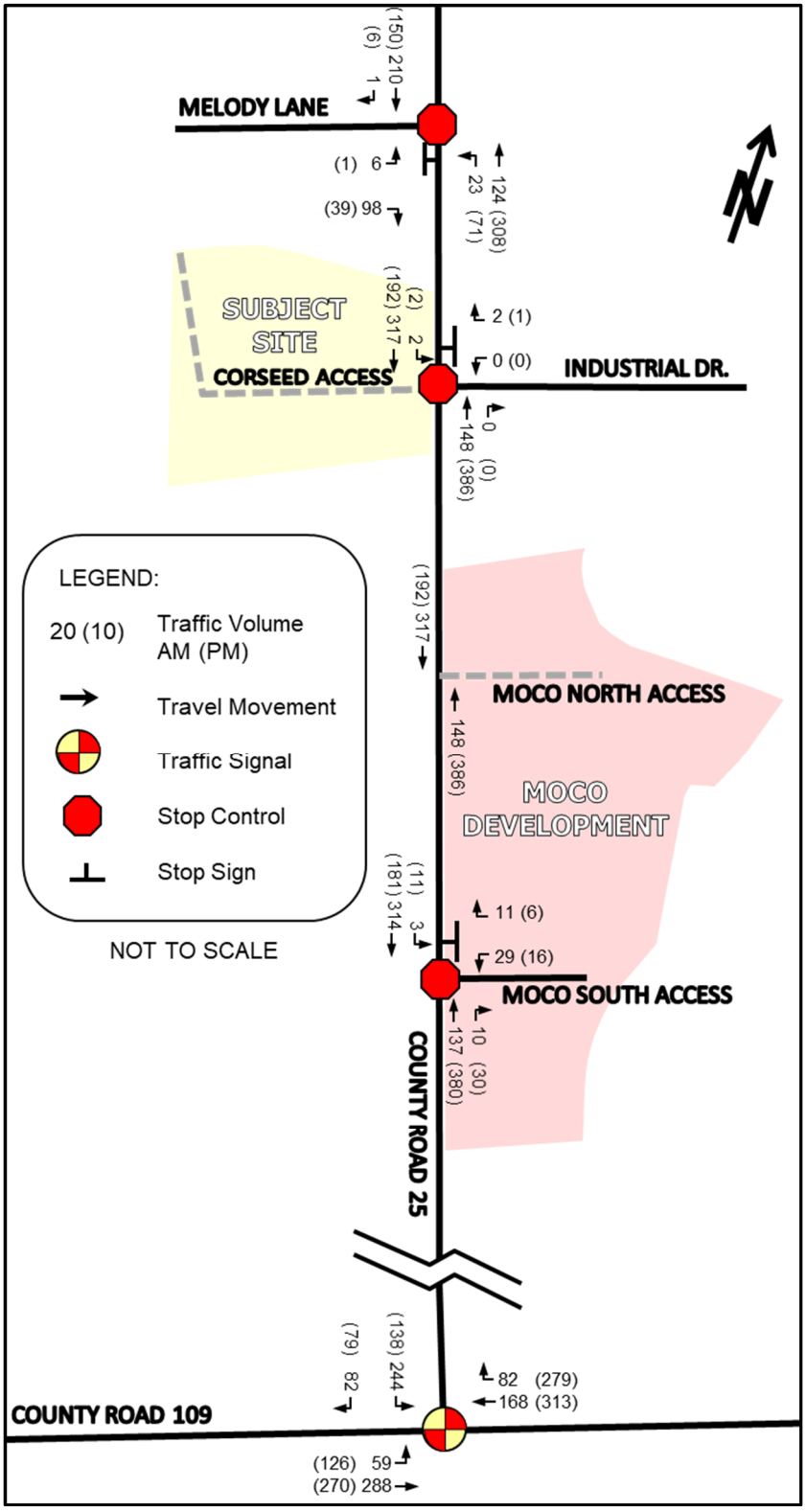


Figure 12 – Total Background (2026) Peak Hour Traffic Volumes

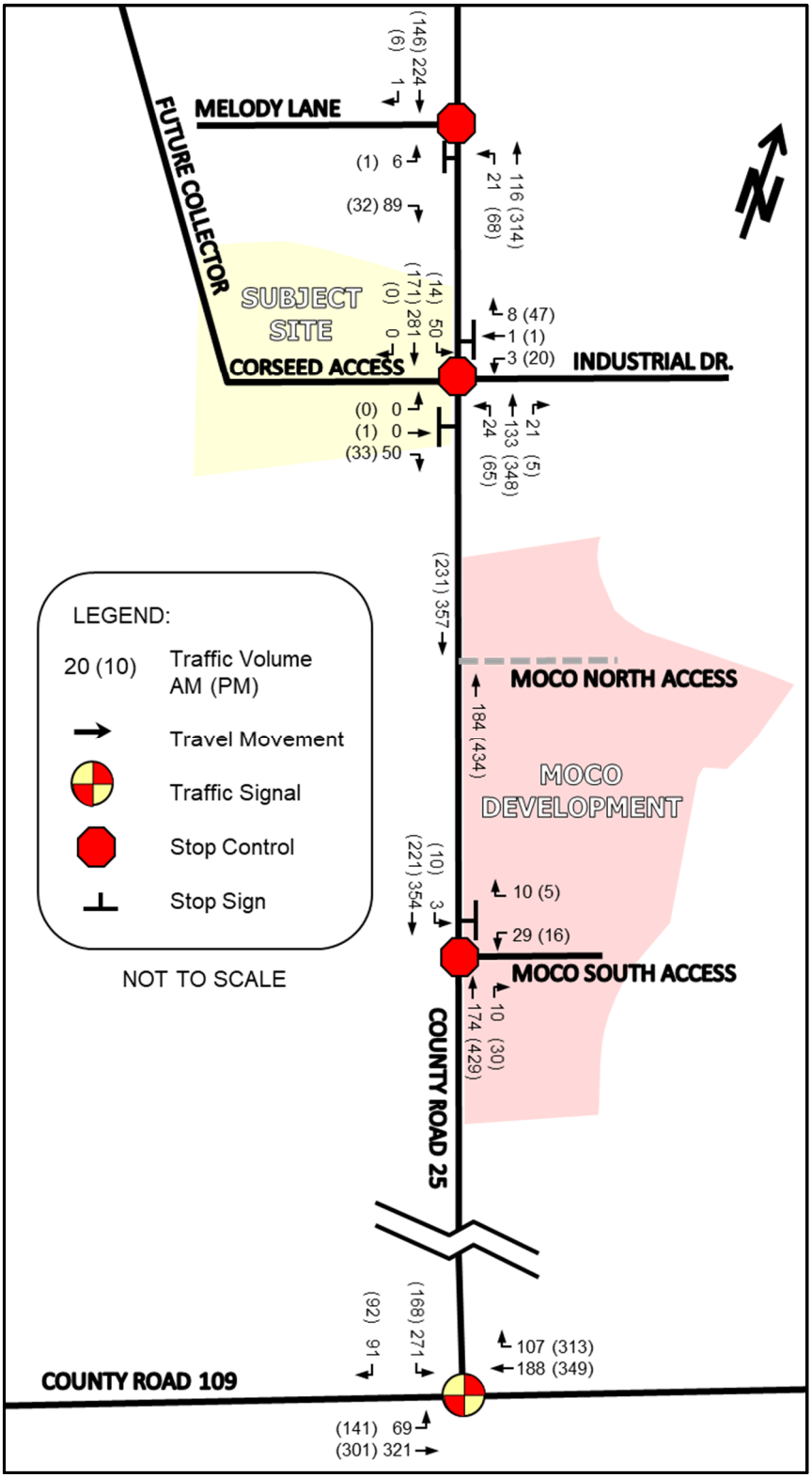
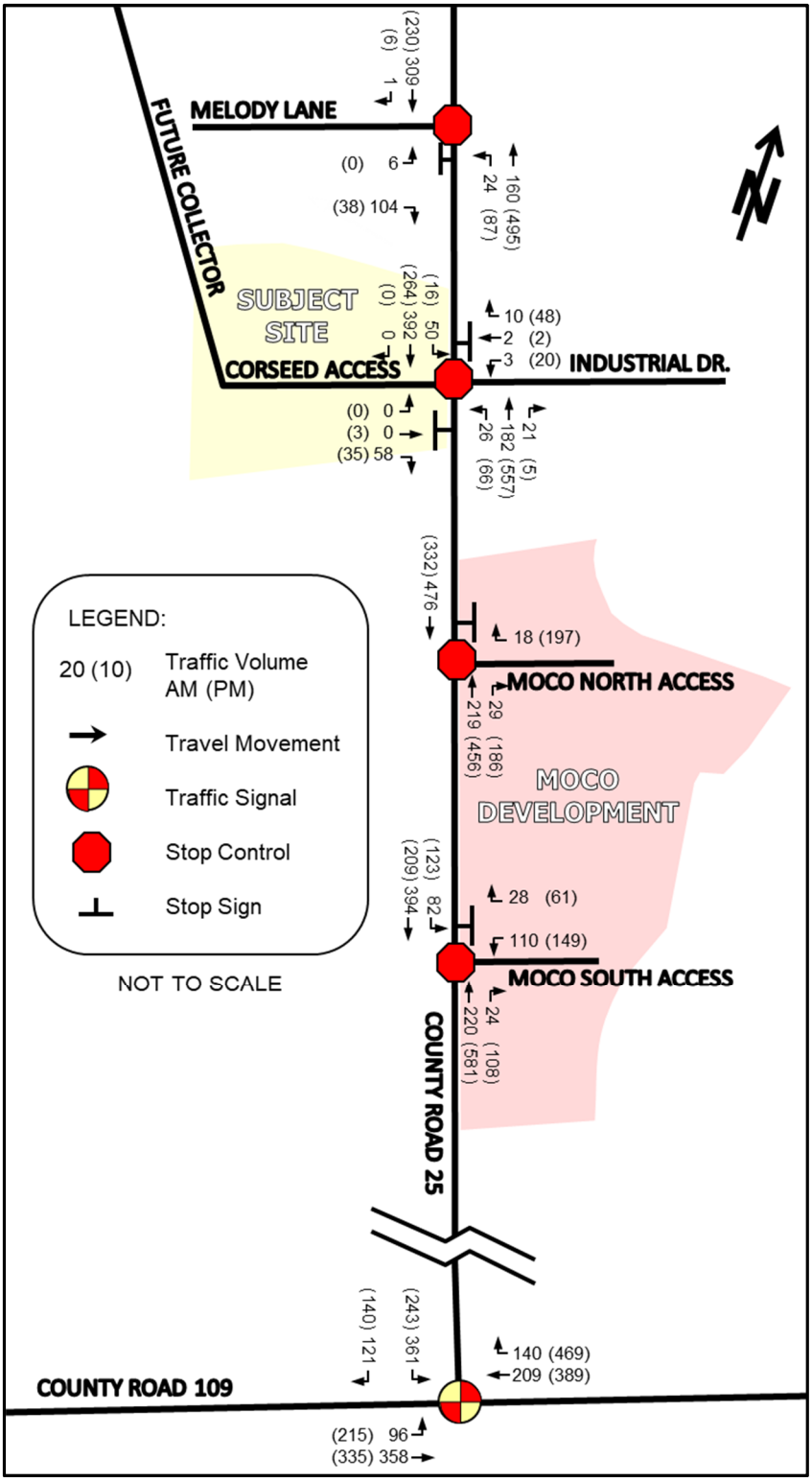


Figure 13 – Total Background (2031) Peak Hour Traffic Volumes



3 Existing Year LOS without Proposed Development

3.1 Introduction

Existing year operational conditions were established to determine how the street network within the study area is currently functioning without the proposed development. This provides a base case scenario to compare with future development scenarios. Traffic operations within the study area were evaluated using the 2015 traffic volumes with the existing road configuration and traffic control. The intersection performance was measured using the traffic analysis software, Synchro 9, a deterministic model that employs Highway Capacity Manual and Intersection Capacity Utilization methodologies for analyzing intersection operations. These procedures are accepted by provincial and municipal agencies throughout North America.

Synchro 9 enables the study area to be graphically defined in terms of streets and intersections, along with their geometric and traffic control characteristics. The user is able to evaluate both signalized and unsignalized intersections in relation to each other, thus not only providing level of service for the individual intersections, but also enabling an assessment of the impact the various intersections in a network have on each other in terms of spacing, traffic congestion, delay, and queuing.

Individual turning movements with a volume-to-capacity [V/C] ratio of 0.85 or greater are considered to be critical movements. Turning movements with a V/C ratio approaching this threshold and have been highlighted in the LOS tables.

The intersection operations were also evaluated in terms of the LOS. LOS is a common measure of the quality of performance at an intersection and is defined in terms of vehicular delay. This delay includes deceleration delay, queue move-up time, stopped delay, and acceleration delay. LOS is expressed on a scale of A through F, where LOS A represents very little delay (i.e. less than 10 seconds per vehicle) and LOS F represents very high delay (i.e. greater than 50 seconds per vehicle for a stop sign controlled intersection and greater than 80 seconds per vehicle for a signalized intersection).

The LOS criteria for signalized and stop sign controlled intersections are shown in **Table 6**. A description of traffic performance characteristics is included for each LOS.

Table 6 – Level of Service Criteria for Intersections

LOS	LOS Description	Control Delay (seconds per vehicle)	
		Signalized Intersections	**Stop Controlled Intersections**
A	Very low delay; most vehicles do not stop (**Excellent**)	less than 10.0	less than 10.0
B	Higher delay; more vehicles stop (**Very Good**)	between 10.0 and 20.0	between 10.0 and 15.0
C	Higher level of congestion; number of vehicles stopping is significant, although many still pass through intersection without stopping **(Good**)	between 20.0 and 35.0	between 15.0 and 25.0
D	Congestion becomes noticeable; vehicles must sometimes wait through more than one red light; many vehicles stop (**Satisfactory**)	between 35.0 and 55.0	between 25.0 and 35.0
E	Vehicles must often wait through more than one red light; considered by many agencies to be the limit of **acceptable** delay	between 55.0 and 80.0	between 35.0 and 50.0
F	This level is considered to be unacceptable to most drivers; occurs when arrival flow rates exceed the capacity of the intersection (**Unacceptable**)	greater than 80.0	greater than 50.0

3.2 Existing (2016) LOS

The results of the LOS analysis under existing (2016) traffic volumes during the AM and PM peak hour can be found below in **Table 7**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix C**.

Table 7 – Existing (2016) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Melody Lane / County Road 25	-	1.8	A	-	1.0	A
EB	0.07	10.0	A	0.02	9.1	A
County Road 109 / County Road 25	0.37	13.9	B	0.31	11.1	B
EBL	0.09	8.0	A	0.20	8.8	A
EBT	0.31	9.4	A	0.30	9.3	A
WBT	0.20	8.7	A	0.33	9.6	A
WBR	0.04	7.7	A	0.12	8.2	A
SB	0.49	26.4	C	0.27	22.7	C

The results of the LOS analysis indicate that the study area intersections are operating at a good LOS for all turning movements.

For right turn movements at unsignalized intersections, the criteria outlined in Appendix 9A of the Ontario Ministry of Transportation Design Supplement [MTO DS] were applied. Based on the above-noted criteria, a right turn lane is not warranted at the Melody Lane / County Road 25 intersection.

An analysis was completed for left turn movement on County Road 25 at Melody Lane. Based on the criteria outlined in Section E.B.1 of the MTO Geometric Design Standards for Ontario Highways [GDSOH] left turn lanes are not warranted[6]. MTO GDSOH left turn warrant graphs are provided in **Appendix G**.

[6] At Melody Lane, a design speed of 60km/h is assumed for County Road 25.
At Industrial Drive, a design speed of 80km/h is assumed for County Road 25.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the intersection of Melody Lane / County Road 25 (results are provided in **Appendix H**).

No additional improvements are required at the existing intersections.

3.3 Background (2021) LOS without Proposed Development

The results of the LOS analysis for the background (2021) traffic volumes during the AM and PM peak hour can be found below in **Table 8**. Existing intersection geometry and traffic control have been utilized for this scenario. Detailed output of the Synchro analysis can be found in **Appendix D**.

Table 8 – Background (2021) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Melody Lane / County Road 25	-	2.8	A	-	1.9	A
EB	0.16	10.6	B	0.05	9.4	A
Industrial Drive / County Road 25	-	0.1	A	-	0.0	A
WB	0.00	9.1	A	0.00	10.7	B
County Road 109 / County Road 25	0.48	19.3	B	0.41	12.5	B
EBL	0.11	8.2	A	0.27	9.4	A
EBT	0.35	9.7	A	0.33	9.6	A
WBT	0.22	8.8	A	0.37	9.9	A
WBR	0.06	7.8	A	0.19	8.6	A
SB	0.78	38.1	D	0.50	26.7	C

The results of the LOS analysis indicate that the study area intersections are operating at a good LOS for all turning movements.

For right turn movements, the criteria outlined in Section E.7 of the MTO GDSOH was applied. Based on the above-noted criteria, right turn lanes are not warranted at the unsignalized intersections in the study area.

An analysis was completed for the left turn movements at all unsignalized intersections within the study area based on the criteria outlined in Appendix 9A of the MTO DS[7], a northbound left turn lane is warranted at the Melody Lane / County Road with a 15 metre storage length; however, based on our discussions with the Town, widening the road at this intersection is not feasible. Consequently, we have proceeded with our analysis without the warranted northbound left turn lane. No additional left turn lanes are warranted. MTO GDSOH left turn warrant graphs are provided in **Appendix G**.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the intersection of Melody Lane / County Road 25 (results are provided in **Appendix H**).

No additional improvements are required at the existing intersections.

3.4 Background (2026) LOS without Proposed Development

The results of the LOS analysis for the background (2026) traffic volumes during the AM and PM peak hour can be found below in **Table 9**. Existing intersection geometry and signal timing

South of Industrial Drive, a design speed of 100km/h is assumed for County Road 25.
[7] The 70km/h design speed used at the intersection of Future Collector & Industrial Drive / County Road 25 is based on the extension of the 50km/h speed limit zone as recommended in Section 5.6.

adjustments for the AM peak hour at the County Road 25 / County Road 109 intersection have been made to optimize the operation at this intersection. Detailed output of the Synchro analysis can be found in **Appendix D**.

Table 9 – Background (2026) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Melody Lane / County Road 25	-	2.6	A	-	1.7	A
EB	0.15	10.6	B	0.04	9.3	A
Future Collector & Industrial Drive / County Road 25	-	2.3	A	-	3.0	A
WB	0.02	11.2	B	0.16	13.9	B
County Road 109 / County Road 25	0.51	20.1	C	0.48	13.6	B
EBL	0.17	16.8	B	0.32	9.9	A
EBT	0.50	20.4	C	0.37	9.9	A
WBT	0.32	18.2	B	0.42	10.3	B
WBR	0.08	15.9	B	0.22	8.8	A
SB	0.53	22.5	C	0.61	29.9	C

The results of the LOS analysis indicate that the study area intersections are operating at a good LOS for all turning movements.

For right turn movements, the criteria outlined in Section E.7 of the MTO GDSOH was applied. Based on the above-noted criteria, right turn lanes are not warranted at the unsignalized intersections in the study area.

An analysis was completed for left turn movements at all unsignalized intersections within the study area based on the criteria outlined in Appendix 9A of the MTO DS.

Based on the above-noted warrants, a northbound left turn lane on County Road 25 at Melody Lane is warranted with a 15 metre storage length; however, widening the road at this intersection is not feasible. Consequently, for the purpose of this analysis, it is assumed that a northbound left turn lane will not be constructed on County Road 25 at Melody Lane.

Based on the above noted warrants, a northbound left turn lane is recommended on County Road 25 at the Future Collector with a 25 metre storage length[8], 40 metre parallel length and a 115 metre taper length.

Based on the above noted warrants a southbound left turn lane is not warranted on County Road 25 at Industrial Drive; however, a southbound left turn lane is recommended to avoid piecemeal reconstruction of County Road 25 in the study area. The traffic volumes in this scenario are approaching the warrant for a southbound left turn lane and are anticipated to pass the warrant prior to the construction of the mixed-use blocks in the 2031 horizon year. Consequently, a southbound left turn lane is recommended on County Road 25 at Industrial Drive with a 15 metre storage length, 40 metre parallel length and a 115 metre taper length.

No other left turn lanes are warranted in the study area. MTO DS left turn warrant graphs are provided in **Appendix G**.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the intersection of Melody Lane / County Road 25 or Future Collector / County Road 25 (results are provided in **Appendix H**).

[8] Storage length requirement based on the anticipated queue in the Total (2031) scenario.

No additional improvements are required at the existing intersections.

4 Proposed Development Traffic Generation and Assignment

4.1 Traffic Generation

The proposed site plan for the Corseed Subdivision is shown in **Appendix A**.

The traffic generation for Phase 1 of the proposed development has been based on the ITE *Trip Generation* data. The following ITE land uses have been applied to estimate the traffic from the proposed development:

- ITE land use 210 (Single-Family Detached Housing).

As noted in Section 1.4, development plans for the future mixed-use blocks (Phase 2) in the proposed development have not been finalized at this time. It is anticipated that development of the mixed-use blocks will not commence within 10 years of the current proposed development. Based on our correspondence with the Town and County, although the development of the mixed-use blocks are not anticipated to develop in the short term, a longer-term preliminary review of the anticipated mixed-use development for the year 2031 is required.

The traffic generated by the future mixed-use block in the Corseed Subdivision has been calculated based on the traffic projections completed in the 2016 TIS for the future mixed-use block in the Moco Subdivision. The traffic generated by the Moco Subdivision in the 2016 TIS was based off the conceptual development plan (dated November 2016) by IPS Consulting Inc. Excerpts from this study have been included in **Appendix K.**

The estimated trip generation of the proposed development is illustrated below in **Table 10**. The AM and PM peak traffic generation for the subject site generally aligns with the AM and PM peak hour in the traffic counts.

Table 10 – Estimated Traffic Generation from Proposed Development

Phase	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
1	Single-Family Detached Housing ITE Land Use: 210	85 units	18	52	70	57	34	91
	Multifamily Housing (Low-Rise) ITE Land Use: 220	30 units	3	12	15	13	7	20
PHASE 1 TOTAL TRIPS			21	64	85	70	41	111
2	Residential Condominium/Townhouse	26% of Moco*	3	13	16	12	6	18
	Shopping Centre		32	20	53	96	103	199
	Internal Capture		-3	-2	-6	-10	-10	-20
	Pass-by		0	0	0	-31	-31	-62
PHASE 2 TOTAL PRIMARY TRIPS			**53**	**95**	**148**	**137**	**109**	**246**

*Traffic generated by the residential townhouse and commercial area for the proposed Moco Subdivision is provided in **Table 1.**

In order to be conservative, no transportation modal split has been applied to the above-noted traffic generation calculation.

4.2 Traffic Assignment

For the purposes of this study, it has been assumed that all traffic generated by the proposed development will be new traffic and would not be in the study area if the development was not constructed. The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. Beyond the local area the distribution of traffic from the proposed development has been estimated based on the 2011 TTS data (excerpt attached as **Appendix M**). TTS data provides historical origin and destination work trip percentages for specific areas within the County and the Greater Toronto and Hamilton Area [GTHA].

The egress distribution of the residential trips generated by the proposed development was based on TTS data for trips originating in Zone 8614 between 07:00 and 09:00. Logically, the distribution of ingress traffic will follow the inverse of the exiting traffic distribution. For each of the individual areas identified in the TTS data, we have selected the probable route of travel, assuming that people will select their route primarily based on travel time.

Trips generated by the mixed-use developable areas in the proposed development has been distributed proportionately with the existing traffic volumes on the roads in the study area.

It is anticipated that some traffic generated by the proposed development would ultimately take the Future Collector (once constructed) to bypass main intersections within the Town during peak hours; however, for the purposes of analysis we have conservatively assumed all traffic generated by the proposed development to be assigned to the existing local network.

Table 11 summarizes the residential trip distribution for the Moco Subdivision and Corseed Subdivision.

Table 11 – Traffic Distribution Summary

Travel Direction (to/from)	Percent of Total Traffic Generation
North (via County Road 25)	32%
Southwest	14%
Southeast	54%
Total	**100%**

Figure A and **B** in **Appendix L** illustrates the traffic distribution pattern for the residential and commercial component of the proposed development respectively.

It is assumed that the residential component will be constructed and completely occupied by 2021 and the mixed-use residential and commercial component to be operational by 2031.

Using the traffic distribution patterns and timing assumptions noted above, the 2021/2026 and 2031 development traffic assignment during the AM and PM peak hour for the Corseed Subdivision is illustrated in **Figure 14** and **15** respectively.

Figure 14 – Traffic Assignment for the Proposed Development (2021 & 2026)

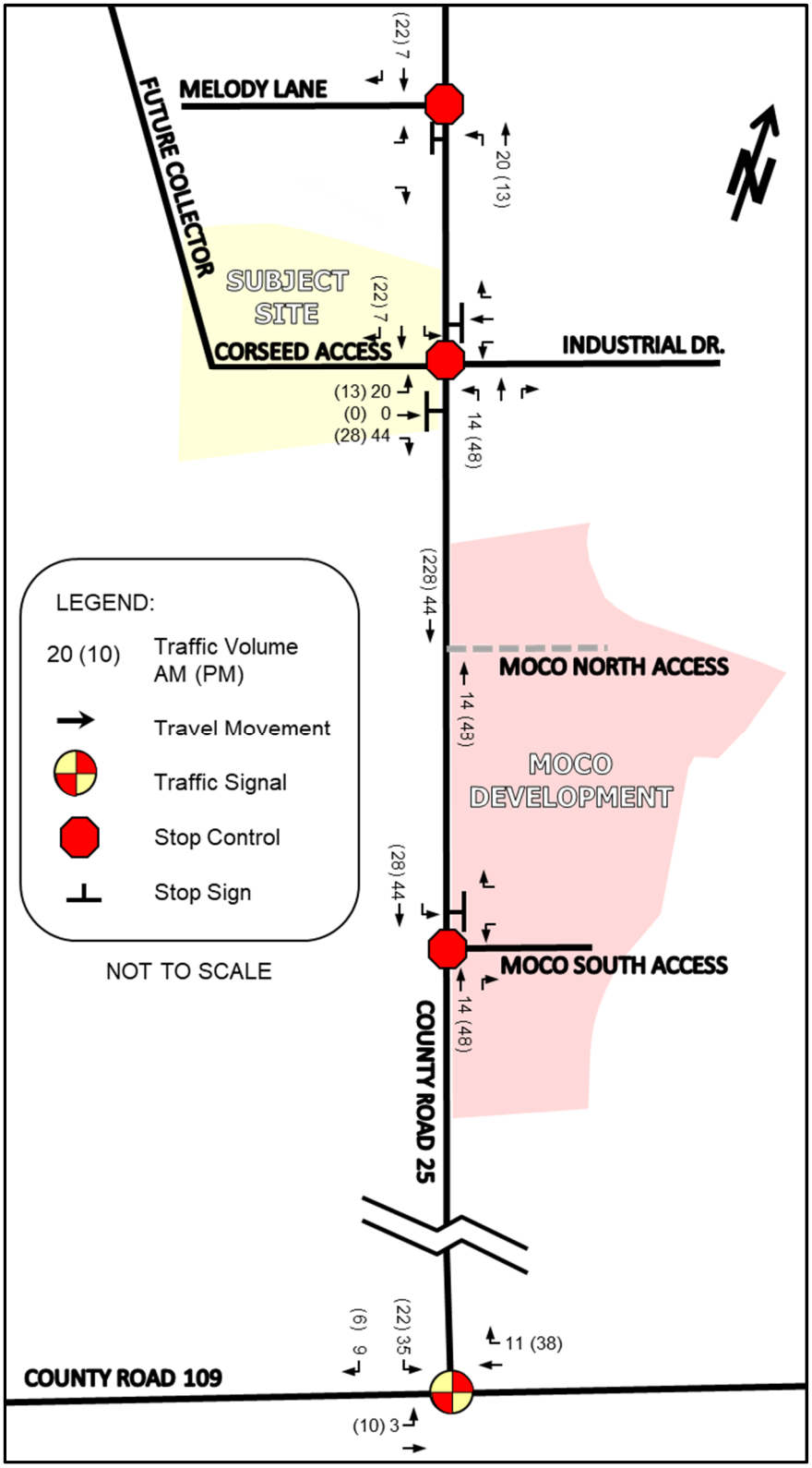
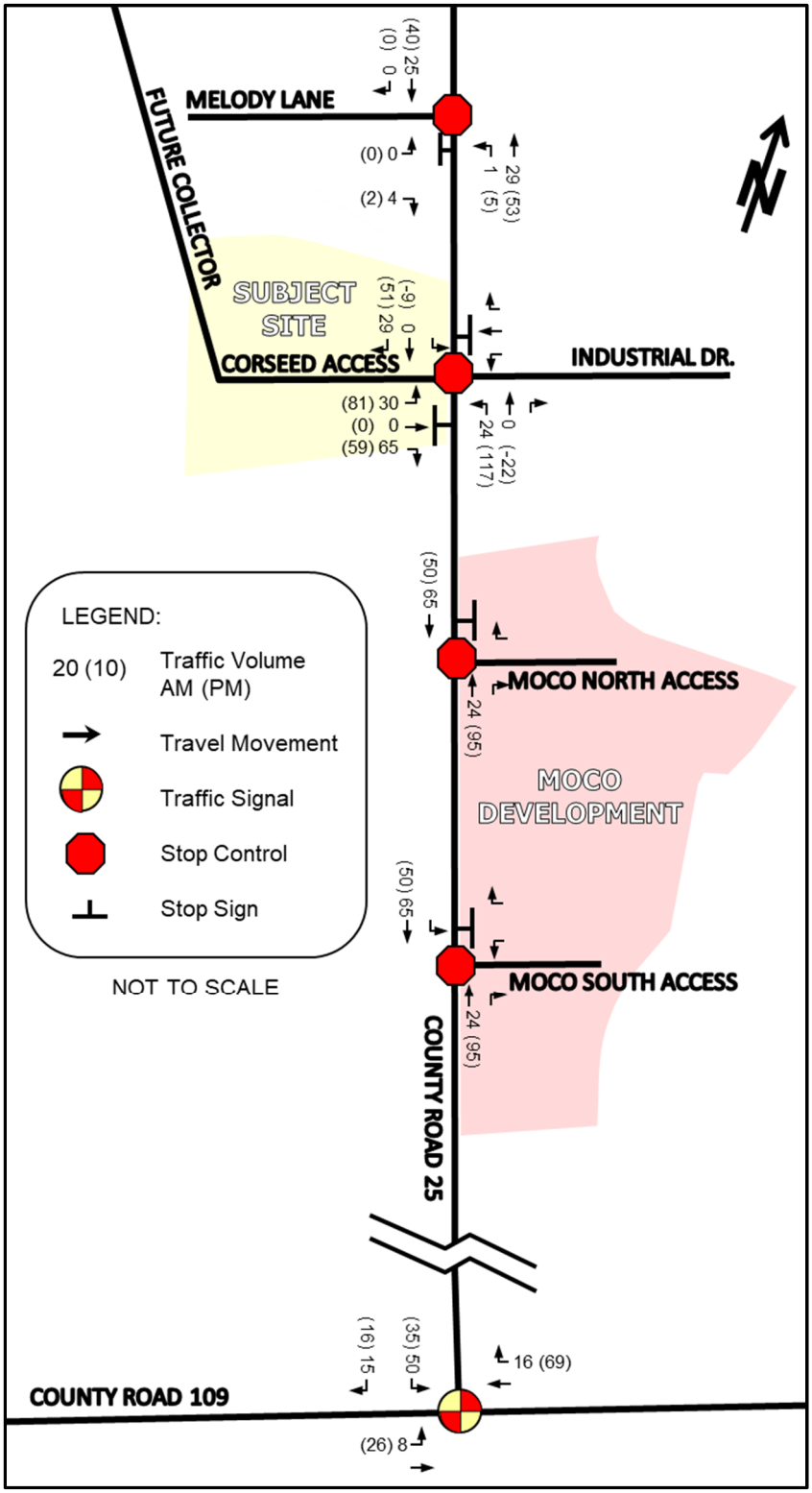


Figure 15 – Traffic Assignment for the Proposed Development (2031)



4.3 Total Horizon Year Traffic Volumes with the Proposed Development

For the total (2021, 2026 and 2031) horizon year traffic volumes, the proposed development traffic was added to the background (2021, 2026 and 2031) traffic volumes. The resulting total (2021, 2026 and 2031) horizon year total traffic volume for the AM and PM peak hour can be found in **Figure 16, 17** and **18**.

Figure 16 – Total (2021) Peak Hour Traffic Volumes with Proposed Development

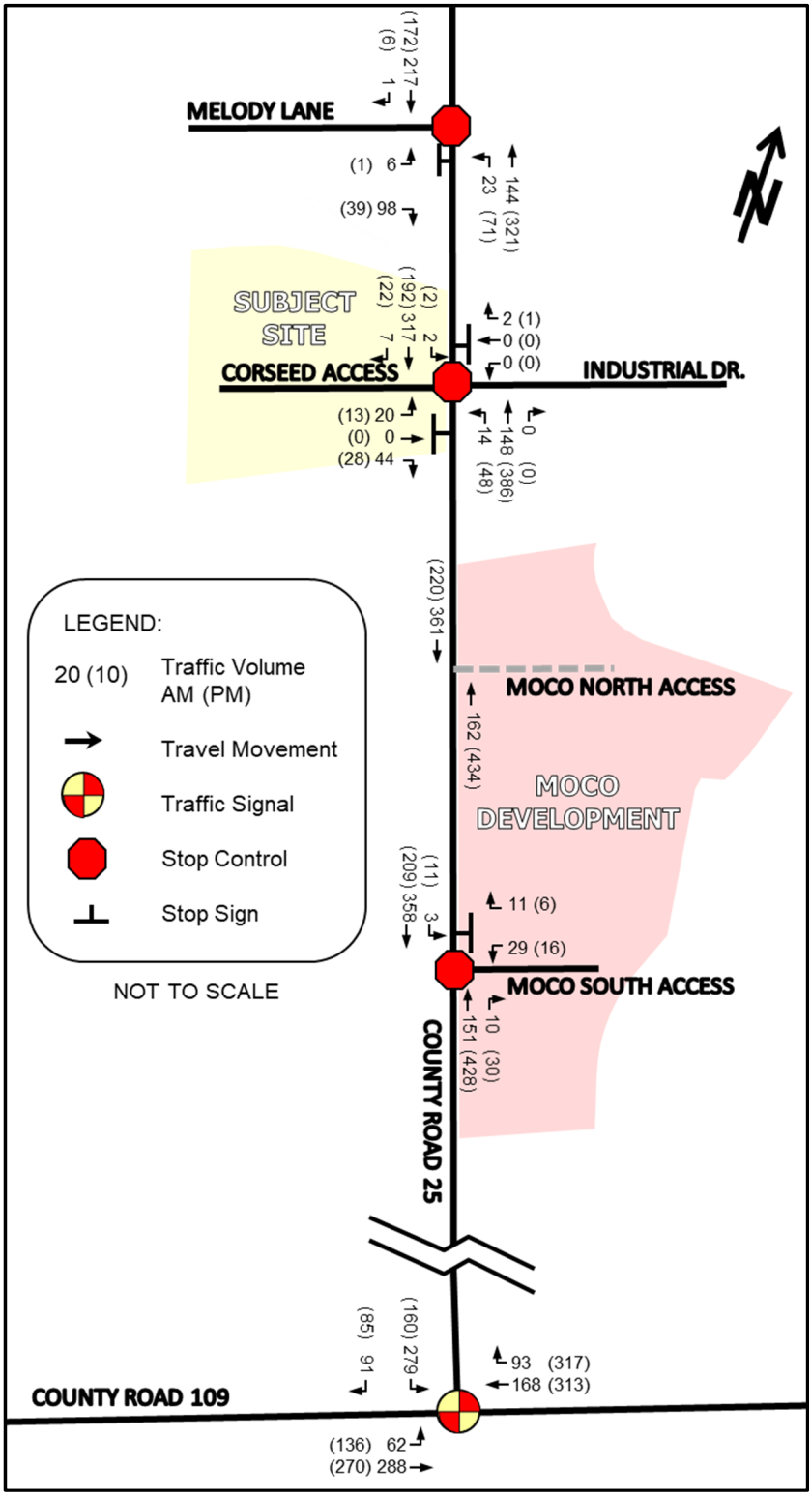


Figure 17 – Total (2026) Peak Hour Traffic Volumes with Proposed Development

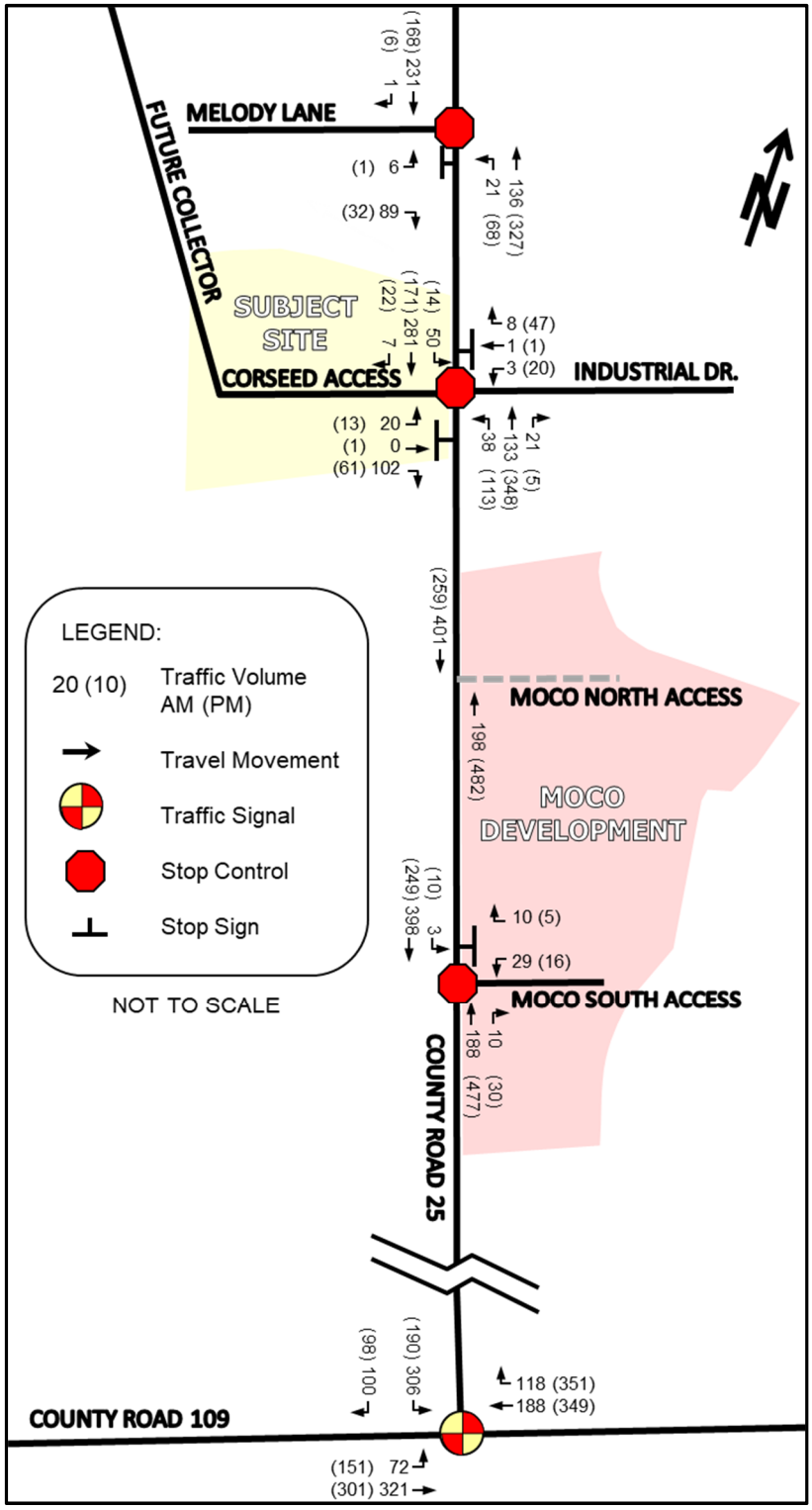
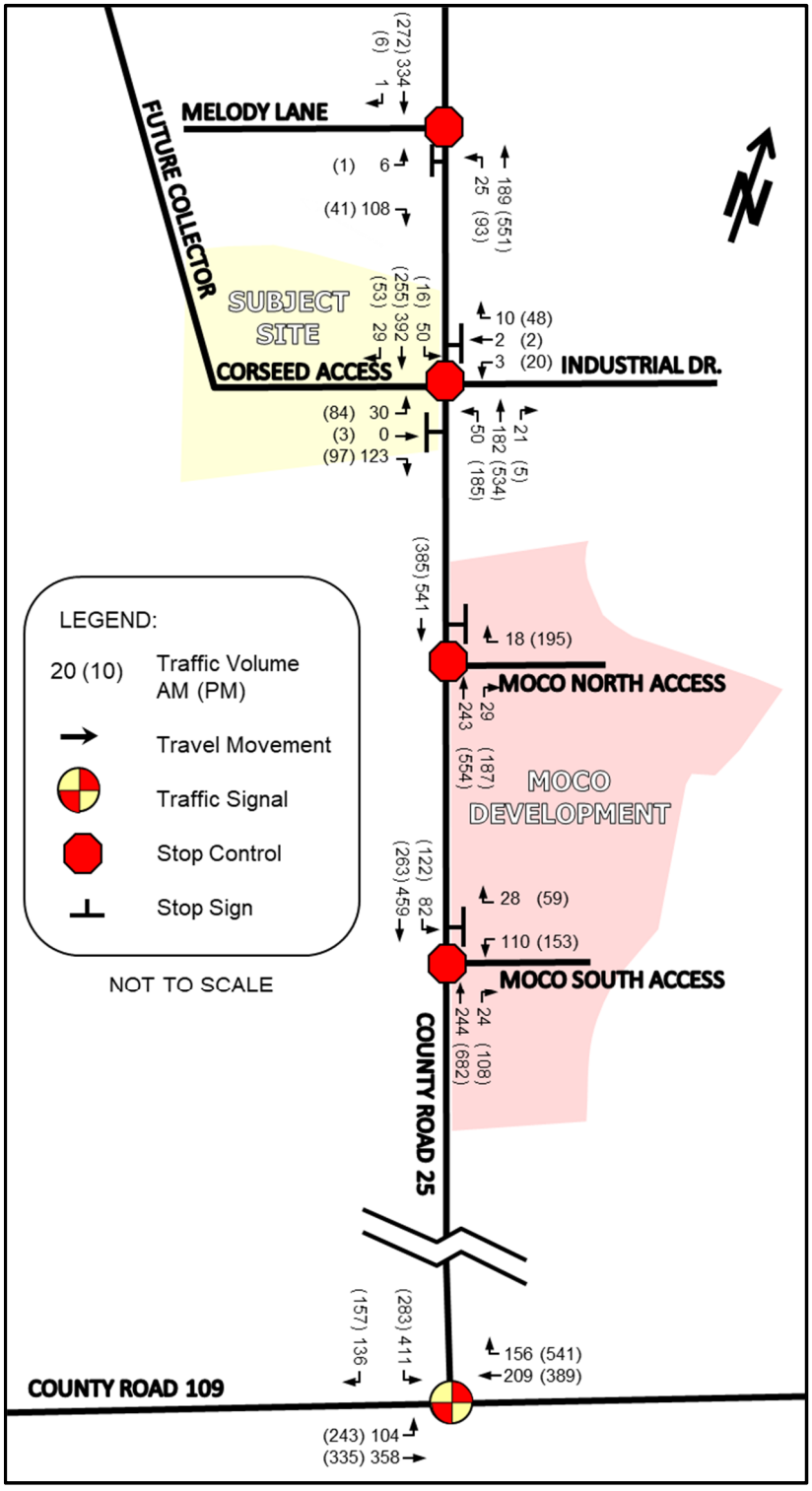


Figure 18 – Total (2031) Peak Hour Traffic Volumes with Proposed Development



5 Intersection Operation with Proposed Development

5.1 2021 Horizon Year LOS with Full Development

The 2021 horizon year was evaluated to determine how the study area would function at build-out of Phase 1 of the Corseed Subdivision. In this scenario, existing intersection geometry and signal timing improvements outlined in Section 3.4 have been utilized in this scenario. The proposed intersection of Corseed Access & Industrial Drive / Country Road 25 is assumed to be unsignalized with two-way stop control for eastbound and westbound movements.

The results of the LOS analysis under total (2021) traffic volumes during the AM and PM peak hour can be found below in **Table 12**. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 12 – Total (2021) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Melody Lane / County Road 25	-	2.7	A	-	1.8	A
EB	0.16	10.7	B	0.05	9.5	A
Corseed Access & Industrial Drive / County Road 25	-	1.6	A	-	1.5	A
EB	0.12	12.2	B	0.08	12.1	B
NB	0.01	0.8	A	0.04	1.2	A
WB	0.00	9.1	A	0.00	10.7	B
County Road 109 / County Road 25	0.49	20.0	B	0.44	13.1	B
EBL	0.15	16.6	B	0.29	9.6	A
EBT	0.44	19.7	B	0.33	9.6	A
WBT	0.29	17.9	B	0.37	9.9	A
WBR	0.07	15.8	B	0.22	8.8	A
SB	0.54	22.8	C	0.57	28.7	C

The results of the LOS analysis indicate that all intersections in the study area will operate at a good LOS for all turning movements.

For right turn movements, the criteria outlined in Section E.7 of the MTO GDSOH was applied. Based on the above-noted criteria, right turn lanes are not warranted at the unsignalized intersections in the study area.

An analysis was completed for left turn movements at all unsignalized intersections within the study area based on the criteria outlined in Appendix 9A of the MTO DS.

A northbound left turn lane on County Road 25 at Melody Lane is warranted with a 15 metre storage length; however, widening the road at this intersection is not feasible. Consequently, for the purpose of this analysis, it is assumed that a northbound left turn lane will not be constructed on County Road 25 at Melody Lane.

A northbound left turn lane is marginally over the warrant based on the above-noted criteria for the Corseed Access & Industrial Drive / County Road 25 intersection; however, since the control delay and V/C ratio for this movement are very low, a northbound left turn lane is not recommended for this horizon year.

No additional left turn lanes are warranted in the study area. MTO DS left turn warrant graphs are provided in **Appendix G**.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at any of the unsignalized intersections (results are provided in **Appendix H**).

No other improvements are recommended within the study area.

5.2 2026 Horizon Year LOS with Full Development

The 2026 horizon year was evaluated to determine how the study area would function five years following Phase 1 build-out of the Corseed Development. In this scenario, the intersection and signal timing improvements outlined in Section 3.4 have been utilized in this scenario.

The results of the LOS analysis under Total (2026) traffic volumes during the AM and PM peak hour can be found below in **Table 13**. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 13 – Total (2026) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Melody Lane / County Road 25	-	2.5	A	-	1.7	A
EB	0.15	10.7	B	0.04	9.5	A
Corseed Access & Industrial Drive / County Road 25	-	3.4	A	-	3.7	A
EB	0.22	12.6	B	0.14	12.5	B
WB	0.03	12.2	B	0.18	15.7	C
County Road 109 / County Road 25	0.55	20.7	C	0.50	14.3	B
EBL	0.18	16.9	B	0.34	10.1	B
EBT	0.50	20.4	C	0.37	9.9	A
WBT	0.32	18.2	B	0.42	10.3	B
WBR	0.09	16.0	B	0.24	8.9	A
SB	0.60	24.1	C	0.69	32.8	C

The results of the LOS analysis indicate that all intersection in the study area will operate at a good LOS for all turning movements.

For right turn movements, the criteria outlined in Section E.7 of the MTO GDSOH was applied. Based on the above-noted criteria, right turn lanes are not warranted at the unsignalized intersections in the study area.

An analysis was completed for left turn movements at all unsignalized intersections within the study area based on the criteria outlined in Appendix 9A of the MTO DS.

Based on the above-noted warrants, a northbound left turn lane on County Road 25 at Melody Lane is warranted with a 15 metre storage length; however, as noted in Section 3.4, widening the road at this intersection is not feasible. Consequently, for the purpose of this analysis, it is assumed that a northbound left turn lane will not be constructed on County Road 25 at Melody Lane.

No additional left turn lanes are warranted. MTO DS left turn warrant graphs are provided in **Appendix G**.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at any of the unsignalized intersections (results are provided in **Appendix H**).

No other improvements are recommended within the study area.

5.3 2031 Horizon Year LOS with Full Development

The 2031 horizon year was evaluated for long-term right-of-way planning purposes. In this scenario, the intersection improvements outlined in Section 5.2 have been utilized and signal timing adjustments for the PM peak hour at the County Road 25 / County Road 109 intersection have been made to optimize the operation at this intersection.

The results of the LOS analysis under total (2031) traffic volumes during the AM and PM peak hour can be found below in **Table 14**. Detailed output of the Synchro analysis can be found in **Appendix E**.

Table 14 – Total (2031) LOS

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Melody Lane / County Road 25	-	2.5	A	-	1.7	B
EB	0.21	12.2	B	0.06	10.3	B
Corseed Access & Industrial Drive / County Road 25	-	4.0	A	-	22.8	B
EB	0.37	17.3	C	1.08	143.6	F
WB	0.04	14.6	B	0.37	32.2	D
County Road 109 / County Road 25	0.68	24.8	C	0.75	20.8	C
EBL	0.26	17.8	B	0.73	26.5	C
EBT	0.55	21.5	C	0.47	15.4	B
WBT	0.36	18.7	B	0.53	16.2	B
WBR	0.12	16.2	B	0.37	14.3	B
SB	0.81	33.1	C	0.78	34.1	C

The results of the LOS analysis indicate that all intersection in the study area will operate at a acceptable LOS for all turning movements. However, the eastbound movement at the Corseed Access & Industrial Drive / County Road 25 intersection is operating outside the typical design limits noted in Section 3.1 during the PM peak hour. Based on the Ontario Traffic Manual Book 12 *Signal Justification,* traffic signals are not warranted at this intersection (results are provided in **Appendix H**); however, due to the anticipated control delay for the eastbound movement at this intersection, it is recommended that the Town plan to install traffic signals at this intersection before 2031.

The results of the Synchro analysis with the above-noted improvements can be found below in **Table 15.** Detailed output of the Synchro analysis can be found in **Appendix F**. It is recommended that the Town review the traffic volumes at this intersection closer to the anticipated construction date to assess the recommendation for signalization at this intersection.

Table 15 – Total (2031) LOS with Improvements

Location (E-W Street / N-S Street)	Weekday AM Peak Hour			Weekday PM Peak Hour		
	V/C	Delay (s)	LOS	V/C	Delay (s)	LOS
Corseed Access & Industrial Drive / County Road 25	0.36	8.0	A	0.50	10.2	B
EB	0.28	25.6	C	0.54	26.2	C
WB	0.04	24.1	C	0.13	22.3	C
NBL	0.09	3.3	A	0.30	6.2	A
NBTR	0.18	3.6	A	0.49	7.4	A
SBL	0.07	3.1	A	0.04	4.3	A
SBTR	0.38	4.7	A	0.28	5.6	A

For right turn movements, the criteria outlined in Section E.7 of the MTO GDSOH was applied. Based on the above-noted criteria, right turn lanes are not warranted at the unsignalized intersections in the study area.

An analysis was completed for left turn movements at all unsignalized intersections within the study area based on the criteria outlined in Appendix 9A of the MTO DS.

A northbound left turn lane on County Road 25 at Melody Lane is warranted with a 25 metre storage length; however, as noted in Section 3.4, widening the road at this intersection is not feasible. Consequently, for the purpose of this analysis, it is assumed that a northbound left turn lane will not be constructed on County Road 25 at Melody Lane.

No additional left turn lanes are warranted in the study area. MTO DS left turn warrant graphs are provided in **Appendix G**.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at any of the unsignalized intersections (results are provided in **Appendix H**).

The proposed Corseed Access & Industrial Drive / County Road 25 intersection will operate efficiently using unsignalized control with two-way stop control for westbound and eastbound traffic at County Road 25. One lane for egress traffic and one lane for ingress traffic for the west leg of the intersection will provide the necessary capacity for the proposed development.

No other improvements are recommended within the study area.

5.4 Site Access and Intersection Spacing Review

Prior to the development of the future mixed-use block, the proposed Corseed Access & Industrial Drive / County Road 25 intersection will operate efficiently using unsignalized control with two-way stop control for westbound and eastbound traffic at County Road 25. One lane for egress traffic and one lane for ingress traffic for the west leg of the intersection will provide the necessary capacity for Phase 1 of the proposed development.

As noted in Section 5.3, it is anticipated that this intersection may require traffic signalization by 2031 to reduce the anticipated eastbound delay at this intersection.

A review of the proposed site access configuration for the proposed development was completed as part of our analysis. The existing and proposed intersection spacing dimensions are illustrated in Figure 2. The proposed spacing between the Corseed Access and the Moco South Access exceeds the County's Entrance Policy minimum intersection spacing (365 metres).

The Corseed Access is located 294 metres south of the existing Melody Lane / County Road 25 intersection, which is less than the minimum intersection spacing noted above; however, the access is aligned with the existing Industrial Drive intersection. Traffic movements and queuing at the adjacent intersections are not anticipated to result in any operational issues, consequently, no change to the proposed intersection spacing is recommended.

The specific location of the Moco North Access is not known at this time. A review of the proposed intersection spacing for this access will be completed at a later date, when more information is known about the proposed access configuration.

5.5 Pedestrian Movements Review

In order to facilitate pedestrian movements, the following pedestrian infrastructure is proposed:

1) Sidewalks will be constructed on both sides along of Street A and along one side of all other internal roads in the proposed development;
2) A connection can be provided from the parkland block in the proposed development to the Upper Grand Trailway; and
3) A sidewalk will be constructed within the 3.0 metre block proposed across the frontage of the subject site, west of the County Road 25 right-of-way [ROW]. The sidewalk will transition into the Town's existing ROW for Water Street (County Road 25), starting at the south edge of the Upper Grand Trailway. A sidewalk will be constructed on the west side of Water Street (County Road 25) from the Upper Grand Trailway to Melody, within the Town's existing ROW.

5.6 Sight Distance Review

A review of the available sight distance for the proposed Corseed Access was completed as part of this analysis.

The available sight distance south of the proposed Corseed Access for egress movements is significantly greater than the County's minimum sight distance requirements for a posted speed limit of 60km/h. The available sight distance north of the proposed Corseed Access was determined based on field measurements obtained during a site visit. The egress sight distance north of the proposed Corseed Access (139 metres) meets the sight distance requirements for a posted speed limit of 50km/h, but does not meet the sight distance requirements for the existing posted speed limit of 60km/h.

A relocation of the proposed Corseed Access north or south would result in a skewed intersection alignment with the existing location of Industrial Drive, which is not preferred. Consequently, in order to address the sight distance constraints, it is recommended that the existing 60km/h speed limit zone is converted to a 50km/h zone, to ensure that the intersection of County Road 25 / Industrial Drive / Corseed Access meets the applicable County sight distance requirements.

5.7 Road Design

The road structure for the roads within the proposed development will meet the Town standards for local and collector roadways. Street A will have a 26 metre ROW and be classified as a collector road to match the Future Collector road connection. Street B & Street C will have a 20 metre ROW and be classified as local roads.

6 Summary

Corseed Inc. has retained **JD Engineering** to prepare this traffic impact study in support of the Draft Plan Application for the Corseed Subdivision in the Town of Grand Valley, County of Dufferin. The proposed site plan is shown in **Appendix A**.

The proposed Corseed Subdivision will include the following:

- Single Detached 85 units
- Townhouses 30 units

- Future Mixed-Use blocks (assumed from the ratio of developable area between Moco and Corseed)
    - o Townhomes TBD
    - o Commercial Development TBD

Development plans for the mixed-use blocks for the proposed development have not been finalized at this time. A concept plan for the future mixed-use blocks in the proposed development is not available at this time, consequently, for the purpose of this analysis, it is assumed that the traffic generated by the future mixed-use blocks in the proposed development will be proportionate to the traffic generated by the future mixed-use blocks in the proposed Moco Subdivision based on the relative developable areas.

This chapter summarizes the conclusions and recommendations from the study.

1. The proposed residential development [Phase 1] in the Corseed Subdivision is expected to generate a total of 85 AM and 111 PM peak hour trips.
2. The proposed ultimate development of the Corseed Subdivision, including the future mixed-use development, is expected to generate a total of 148 AM and 246 PM primary peak hour trips.
3. Background traffic and pedestrian counts were completed for the existing intersections of County Road 25 / Melody Lane and County Road 25 / County Road 109 on Tuesday August 19th, 2014.
4. Level-of-service [LOS] analysis was completed at the study area intersections, using the existing (2016) and background (2021 & 2026) traffic volumes without the proposed development. This enabled a review of existing and future traffic deficiencies that would be present without the influence of the proposed development. Based on the background 2021 traffic volume, a northbound left turn lane is warranted at the intersection of Melody Lane / County Road 25; however, based on our discussions with the Town, widening the road at this intersection is not feasible.
5. The following improvements are recommended as a result of the background 2026 traffic volume:

    Future Collector & Industrial Drive / Country Road 25

    - A northbound left turn lane is recommended at the intersection of Future Collector & Industrial Drive / County Road 25 with 25 metre storage, 40 metre parallel and 115 metre taper length.
    - A southbound left turn lane is recommended at the intersection of Future Collector & Industrial Drive / County Road 25 with 15 metre storage, 40 metre parallel and 115 metre taper length.

6. No other geometric or traffic signage improvements were recommended at the intersections in the study area as a result of the existing (2016) or background (2021 & 2026) traffic volumes without the proposed development.
7. An estimate of the amount of traffic that would be generated by the Subject Site was prepared and assigned to the study area streets and intersections.
8. LOS analysis was completed under total (2021, 2026 & 2031) traffic volumes with the proposed development operational at the study area intersections.
9. No geometric or traffic signage improvements are recommended at the existing Melody Lane / County Road 25 or County Road 25 / County Road 109 intersections as a result of the total

(2021, 2026 & 2031) traffic volumes with the proposed development. As noted above, a northbound left turn lane is warranted at the intersection of Melody Lane / County Road 25; however, based on our discussions with the Town, widening the road at this intersection is not feasible.

10. The following improvements are recommended as a result of the Phase 1 Corseed Development:

    - The proposed **Corseed Access** & Industrial Drive / County Road 25 intersection will operate efficiently using unsignalized control with two-way stop control for westbound and eastbound traffic at County Road 25. One lane for egress traffic and one lane for ingress traffic for the west leg of the intersection will provide the necessary capacity for the proposed development.

11. The following improvements are recommended as a result of the ultimate Corseed Development (2031). These recommendations should be confirmed once the specifics for the future mixed-use blocks are known:

    Corseed Access & Industrial Drive / Country Road 25

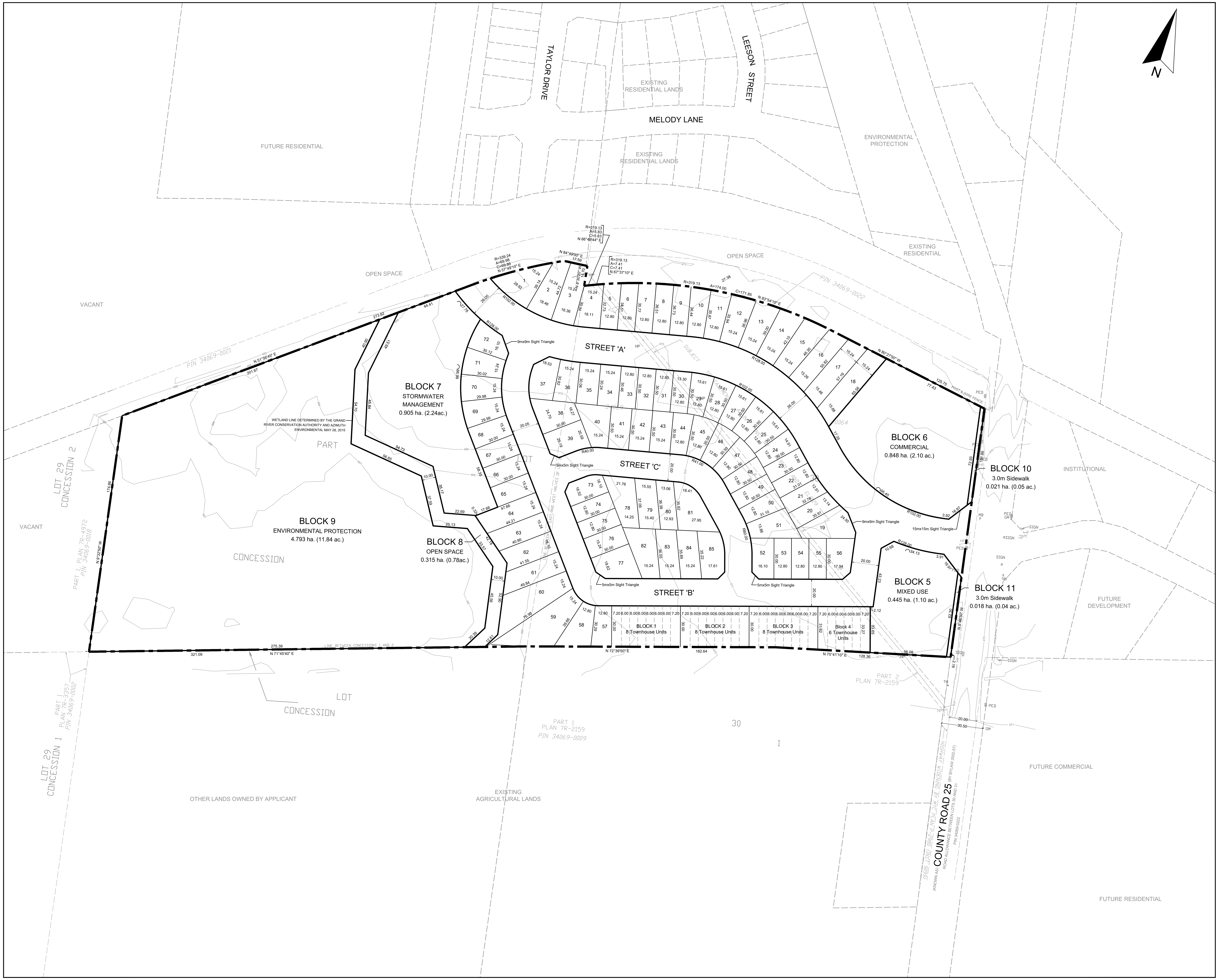
    Total (2031) Traffic Volume

    - Installation of traffic signals to improve the eastbound control delay

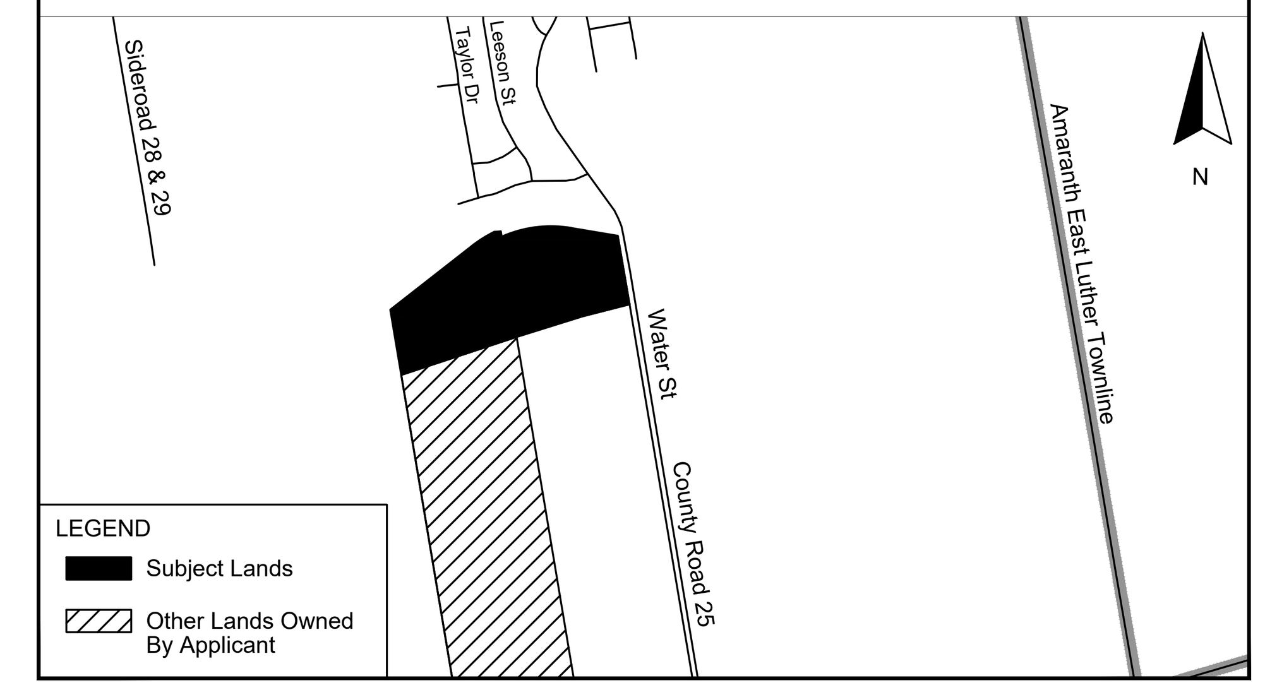
12. The road structure for the internal streets within the proposed development will meet Town standards for local and collector roadways.
13. In order to address the County sight distance requirements at the Corseed Access & Industrial Drive / County Road 25 intersection, it is recommended that the existing 60km/h speed limit zone is converted to a 50km/h speed limit zone.

In summary, the proposed development will not cause any operational issues and will not add significant delay or congestion to the local roadway network.

Appendix A –
Draft Plan of Subdivision



KEY MAP Scale 1:20,000



DRAFT PLAN OF SUBDIVISION

CORSEED FARM

PART OF LOT 30, CONCESSION 2
FORMERLY IN THE TOWNSHIP OF EAST LUTHER
NOW IN THE
TOWNSHIP OF EAST EAST LUTHER - GRAND VALLEY
COUNTY OF DUFFERIN

Scale 1:1,250

0 25 50 75 100 125 150m

LAND USE SCHEDULE

	LOTS/BLOCKS	UNITS	ha	ac	%
RESIDENTIAL LOTS (50')	1-4, 12-18, 34-43, 59-71, 76-79, 82-84	41	2.552	6.31	17.12
RESIDENTIAL LOTS (42')	5-11, 19-33, 44-58, 72-75, 80, 81, 85	44	2.010	4.97	13.49
RESIDENTIAL UNITS (19.7')	Blocks 1-4	30	0.581	1.44	3.90
MIXED USE	Block 5	10	0.445	1.10	2.98
COMMERCIAL	Block 6		0.848	2.10	5.69
STORMWATER MANAGEMENT	Block 7		0.905	2.24	6.07
OPEN SPACE	Block 8		0.315	0.78	2.12
ENVIRONMENTAL PROTECTION	Block 9		4.793	11.84	32.16
3.0m SIDEWALK	Blocks 10 & 11		0.039	0.10	0.26
STREETS			2.416	5.97	16.21
TOTAL		125	14.906	36.83	100

ADDITIONAL INFORMATION REQUIRED UNDER **SECTION 51(17)** OF THE PLANNING ACT

a) SHOWN ON PLAN
b) SHOWN ON PLAN
c) SHOWN ON PLAN
d) SHOWN ON LAND USE SCHEDULE
e) SHOWN ON PLAN
f) SHOWN ON PLAN
f1) NONE
g) SHOWN ON PLAN
h) MUNICIPAL WATER
i) GUELPH LOAM
j) SHOWN ON PLAN
k) ALL MUNICIPAL SERVICES
l) NONE

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE INNOVATIVE PLANNING SOLUTIONS TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

DATE

CORSEED INC.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

DATE

PIER DE ROSA, O.L.S

SCHEDULE OF REVISIONS

No.	Date	Description	By

IPS
INNOVATIVE PLANNING SOLUTIONS
PLANNERS • PROJECT MANAGERS • LAND DEVELOPERS
150 DUNLOP STREET EAST, SUITE 201, BARRIE, ONTARIO L4M 1B1
tel: 705 • 812 • 3281 fax: 705 • 812 • 3438 e: info@ipsconsultinginc.com www.ipsconsultinginc.com

Date:	October 15, 2018	Drawn By:	AM
File:	10-301 - Cortel Grand Valley	Checked By:	CS

Appendix B – Traffic Counts

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:30:00
To: 8:30:00

Municipality: Grand Valley
Site #: 1422800001
Intersection: County Rd 109 & Water St (CR 25)
TFR File #: 21
Count date: 9-Oct-14

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

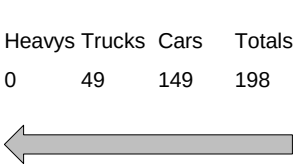
Major Road: County Rd 109 runs W/E

North Leg Total: 298
North Entering: 200
North Peds: 2
Peds Cross: ⋈

Heavys	0	0	0
Trucks	10	2	12
Cars	43	145	188
Totals	53	147	

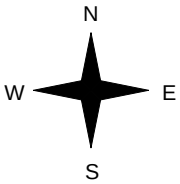
Heavys	0
Trucks	16
Cars	82
Totals	98

East Leg Total: 591
East Entering: 197
East Peds: 0
Peds Cross: ⧖

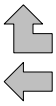


Heavys	Trucks	Cars	Totals
0	49	149	198

County Rd 109

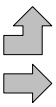


Water St (CR 25)



Cars	Trucks	Heavys	Totals
44	8	0	52
106	39	0	145
150	47	0	

Heavys	Trucks	Cars	Totals
0	8	38	46
0	37	210	247
0	45	248	



County Rd 109

Cars	Trucks	Heavys	Totals
355	39	0	394

Peds Cross: ⧖
West Peds: 0
West Entering: 293
West Leg Total: 491

Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 16:45:00
To: 17:45:00

Municipality: Grand Valley
Site #: 1422800001
Intersection: County Rd 109 & Water St (CR 25)
TFR File #: 21
Count date: 9-Oct-14

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: County Rd 109 runs W/E

North Leg Total: 396
North Entering: 133
North Peds: 0
Peds Cross: ⋈

Heavys	0	0	0
Trucks	6	4	10
Cars	51	72	123
Totals	57	76	

Heavys	0
Trucks	19
Cars	244
Totals	263

East Leg Total: 749
East Entering: 441
East Peds: 0
Peds Cross: ⧖

Water St (CR 25)

Heavys	Trucks	Cars	Totals
0	41	285	326

Cars	Trucks	Heavys	Totals
165	7	0	172
234	35	0	269
399	42	0	

County Rd 109

N
W E
S

Heavys	Trucks	Cars	Totals
0	12	79	91
0	36	196	232
0	48	275	

County Rd 109

Cars	Trucks	Heavys	Totals
268	40	0	308

Peds Cross: ⧖
West Peds: 0
West Entering: 323
West Leg Total: 649

Comments

Ontario Traffic Inc

Total Count Diagram

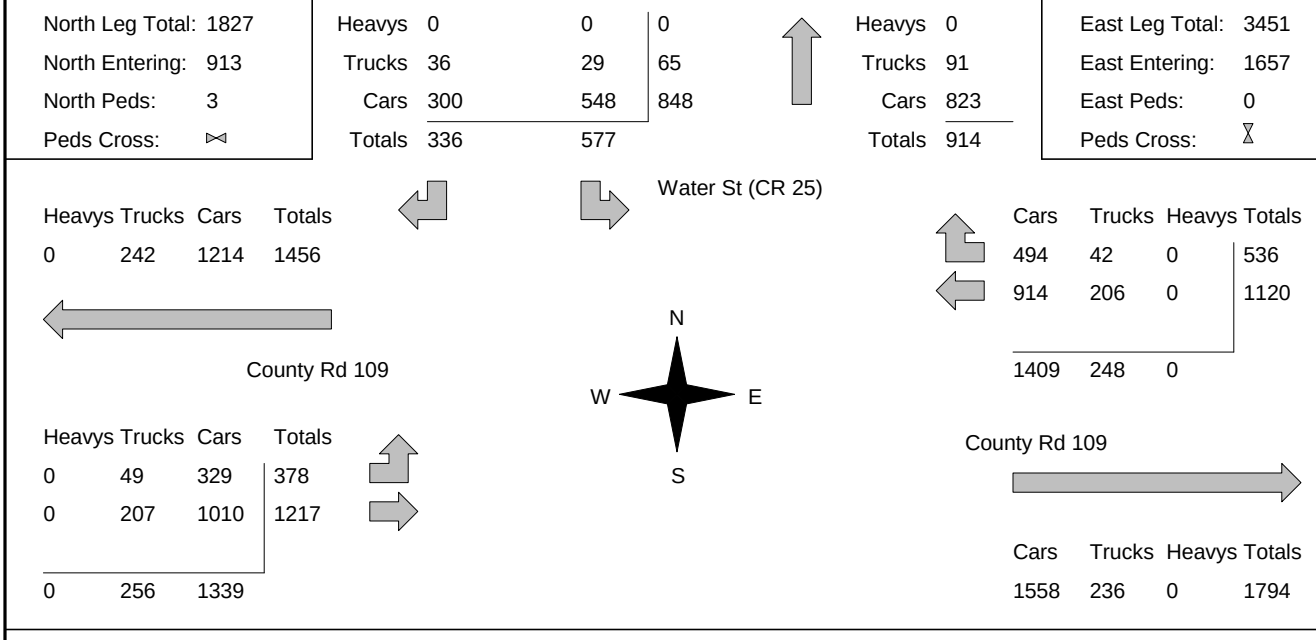
Municipality: Grand Valley
Site #: 1422800001
Intersection: County Rd 109 & Water St (CR 25)
TFR File #: 21
Count date: 9-Oct-14

Weather conditions:

Person(s) who counted:

**** Signalized Intersection ****

Major Road: County Rd 109 runs W/E



Comments

Ontario Traffic Inc

Morning Peak Diagram

Specified Period
From: 7:00:00
To: 10:00:00

One Hour Peak
From: 7:45:00
To: 8:45:00

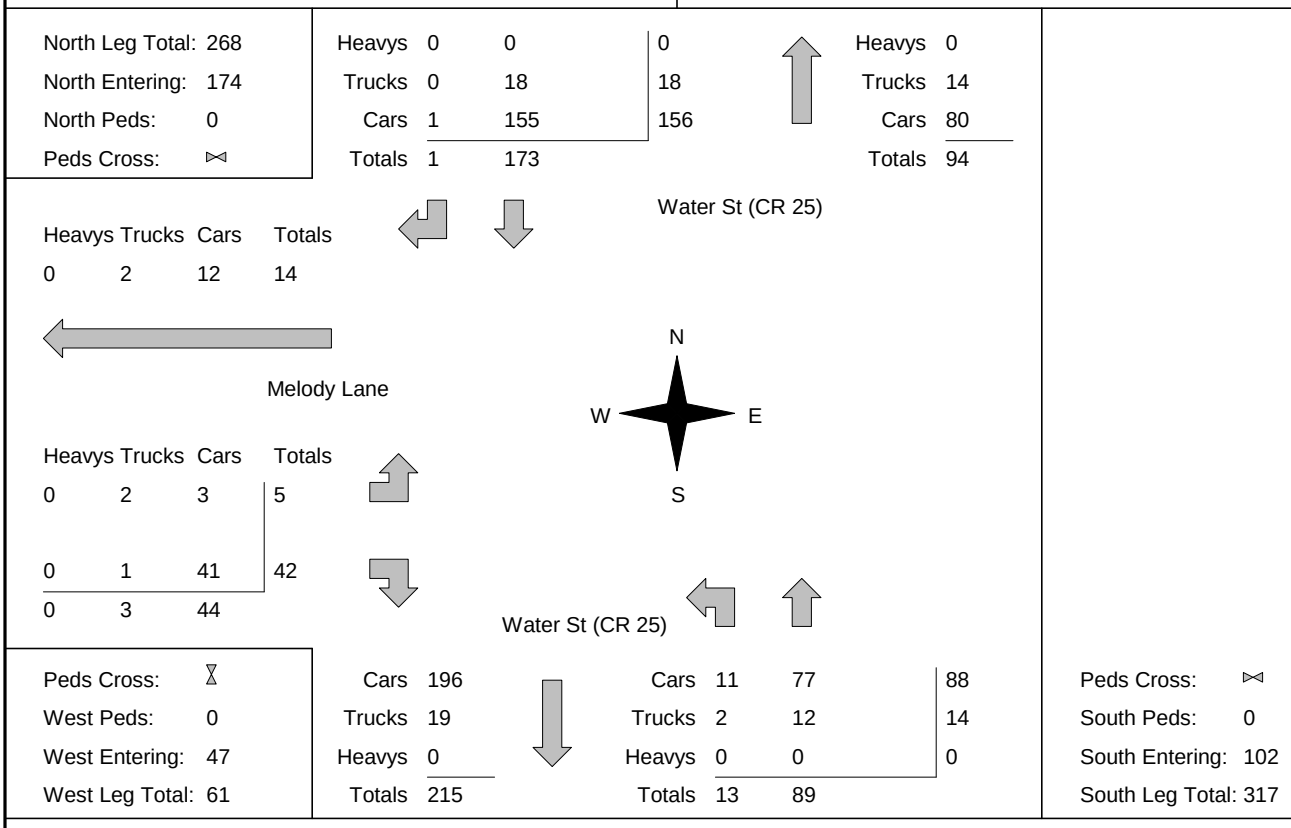
Municipality: Grand Valley
Site #: 1422800002
Intersection: Water St (CR 25) & Melody Lane
TFR File #: 5
Count date: 9-Oct-14

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Water St (CR 25) runs N/S



Comments

Ontario Traffic Inc

Afternoon Peak Diagram

Specified Period
From: 16:00:00
To: 19:00:00

One Hour Peak
From: 17:15:00
To: 18:15:00

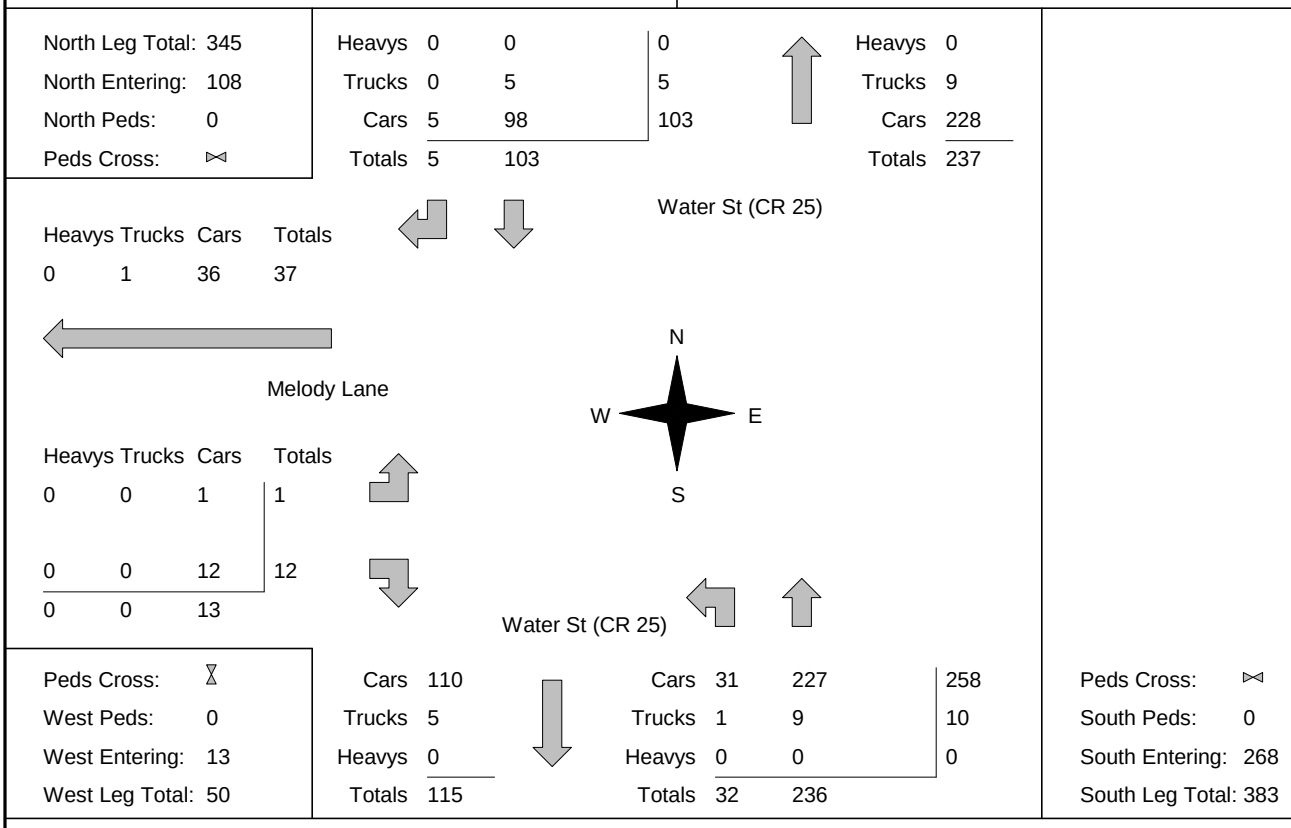
Municipality: Grand Valley
Site #: 1422800002
Intersection: Water St (CR 25) & Melody Lane
TFR File #: 5
Count date: 9-Oct-14

Weather conditions:

Person(s) who counted:

**** Non-Signalized Intersection ****

Major Road: Water St (CR 25) runs N/S



Comments

Ontario Traffic Inc

Total Count Diagram

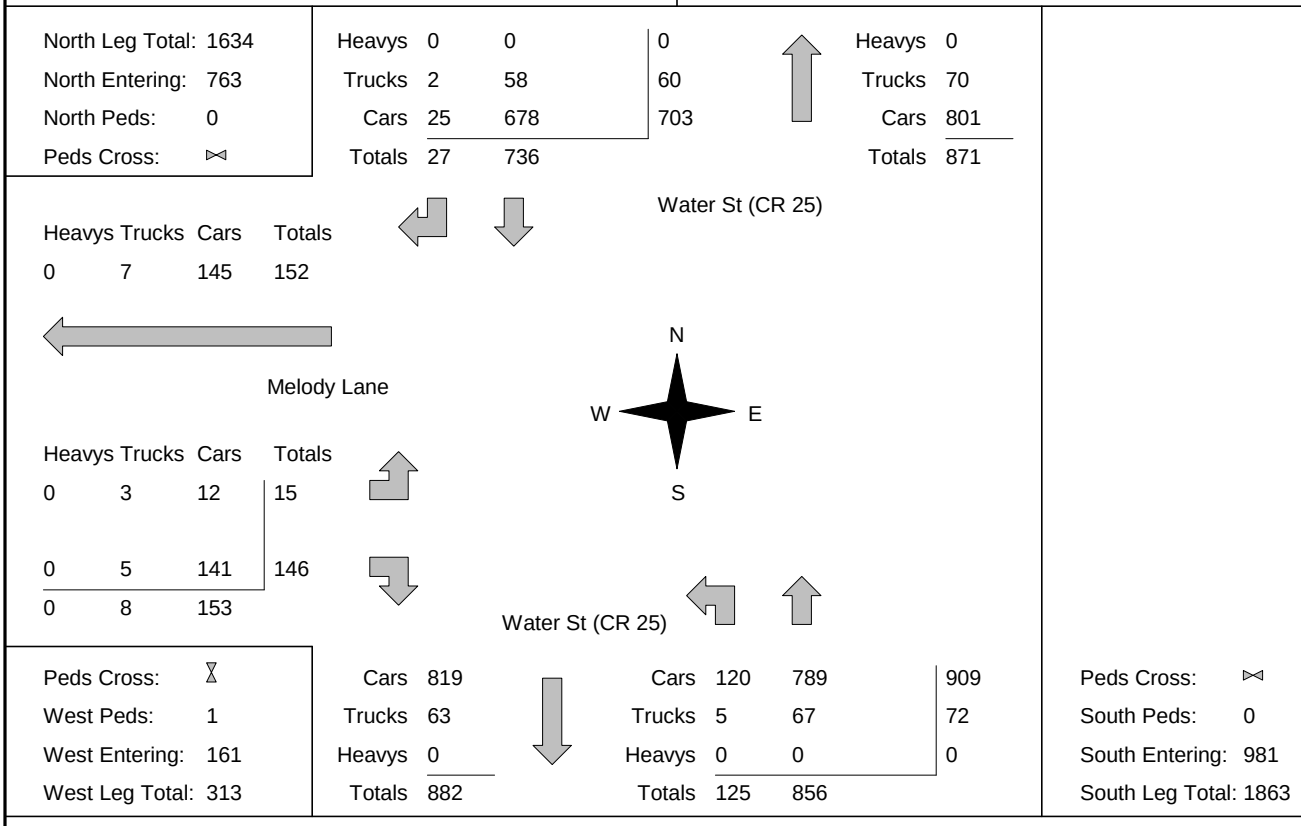
Municipality: Grand Valley
Site #: 1422800002
Intersection: Water St (CR 25) & Melody Lane
TFR File #: 5
Count date: 9-Oct-14

Weather conditions:

Person(s) who counted:

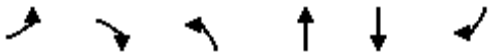
**** Non-Signalized Intersection ****

Major Road: Water St (CR 25) runs N/S



Comments

Appendix C – Synchro Analysis Output – Existing Conditions



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	5	44	14	93	188	1
Future Volume (Veh/h)	5	44	14	93	188	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	6	51	16	108	219	1
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	360	220	220			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	360	220	220			
tC, single (s)	6.8	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.9	3.3	2.3			
p0 queue free %	99	94	99			
cM capacity (veh/h)	563	820	1276			

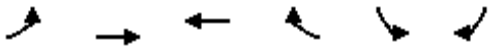
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	57	124	220
Volume Left	6	16	0
Volume Right	51	0	1
cSH	783	1276	1700
Volume to Capacity	0.07	0.01	0.13
Queue Length 95th (m)	1.8	0.3	0.0
Control Delay (s)	10.0	1.1	0.0
Lane LOS	A	A	
Approach Delay (s)	10.0	1.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	26.7%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	48	258	151	54	154
Future Volume (vph)	48	258	151	54	154
Lane Group Flow (vph)	51	272	159	57	220
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.09	0.31	0.20	0.07	0.51
Control Delay	8.5	10.2	9.2	2.7	24.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.5	10.2	9.2	2.7	24.6
Queue Length 50th (m)	3.0	18.2	10.0	0.0	21.7
Queue Length 95th (m)	7.7	31.6	19.0	4.4	41.0
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	565	877	794	772	433
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.09	0.31	0.20	0.07	0.51

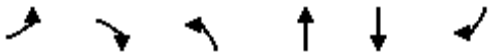
Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 70
Control Type: Semi Act-Uncoord

Splits and Phases: 3: CR 109 & CR 25



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	48	258	151	54	154	55
Future Volume (vph)	48	258	151	54	154	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.96	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1526	1634	1479	1389	1653	
Flt Permitted	0.66	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1054	1634	1479	1389	1653	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	51	272	159	57	162	58
RTOR Reduction (vph)	0	0	0	26	19	0
Lane Group Flow (vph)	51	272	159	31	201	0
Heavy Vehicles (%)	17%	15%	27%	15%	1%	19%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	17.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	17.6	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.25	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	566	877	794	746	415	
v/s Ratio Prot		c0.17	0.11		c0.12	
v/s Ratio Perm	0.05			0.02		
v/c Ratio	0.09	0.31	0.20	0.04	0.49	
Uniform Delay, d1	7.9	9.0	8.4	7.7	22.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.4	0.3	0.0	4.0	
Delay (s)	8.0	9.4	8.7	7.7	26.4	
Level of Service	A	A	A	A	C	
Approach Delay (s)		9.2	8.4		26.4	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	13.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.37		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	13	33	246	108	5
Future Volume (Veh/h)	1	13	33	246	108	5
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	14	34	256	113	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	440	116	118			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	440	116	118			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	99	98			
cM capacity (veh/h)	565	942	1464			

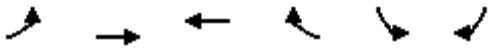
Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	15	290	118
Volume Left	1	34	0
Volume Right	14	0	5
cSH	902	1464	1700
Volume to Capacity	0.02	0.02	0.07
Queue Length 95th (m)	0.4	0.5	0.0
Control Delay (s)	9.1	1.1	0.0
Lane LOS	A	A	
Approach Delay (s)	9.1	1.1	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.0		
Intersection Capacity Utilization	31.4%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	95	242	281	180	79
Future Volume (vph)	95	242	281	180	79
Lane Group Flow (vph)	101	257	299	191	148
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.20	0.30	0.33	0.21	0.34
Control Delay	9.6	10.1	10.5	2.0	16.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	9.6	10.1	10.5	2.0	16.6
Queue Length 50th (m)	6.3	17.1	20.4	0.0	10.0
Queue Length 95th (m)	14.0	29.8	34.8	7.8	23.9
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	516	870	893	913	440
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.20	0.30	0.33	0.21	0.34

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 70
Control Type: Semi Act-Uncoord

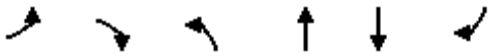
Splits and Phases: 3: CR 109 & CR 25



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	95	242	281	180	79	60
Future Volume (vph)	95	242	281	180	79	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.94	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1580	1620	1663	1536	1599	
Flt Permitted	0.58	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	960	1620	1663	1536	1599	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	101	257	299	191	84	64
RTOR Reduction (vph)	0	0	0	88	39	0
Lane Group Flow (vph)	101	257	299	103	109	0
Heavy Vehicles (%)	13%	16%	13%	4%	5%	11%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	17.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	17.6	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.25	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	515	870	893	825	402	
v/s Ratio Prot		0.16	c0.18		c0.07	
v/s Ratio Perm	0.11			0.07		
v/c Ratio	0.20	0.30	0.33	0.12	0.27	
Uniform Delay, d1	8.4	8.9	9.1	8.0	21.0	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.4	0.5	0.1	1.7	
Delay (s)	8.8	9.3	9.6	8.2	22.7	
Level of Service	A	A	A	A	C	
Approach Delay (s)		9.2	9.1		22.7	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	11.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.31		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

Appendix D –
Synchro Analysis Output –
Background Traffic Volumes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	98	23	124	210	1
Future Volume (Veh/h)	6	98	23	124	210	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	7	114	27	144	244	1
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	442	244	245			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	442	244	245			
tC, single (s)	6.8	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.9	3.3	2.3			
p0 queue free %	99	86	98			
cM capacity (veh/h)	497	794	1249			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	121	171	245
Volume Left	7	27	0
Volume Right	114	0	1
cSH	768	1249	1700
Volume to Capacity	0.16	0.02	0.14
Queue Length 95th (m)	4.2	0.5	0.0
Control Delay (s)	10.6	1.4	0.0
Lane LOS	B	A	
Approach Delay (s)	10.6	1.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.8		
Intersection Capacity Utilization	35.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	2	148	0	2	317
Future Volume (Veh/h)	0	2	148	0	2	317
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)	0	2	161	0	2	345
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	510	161			161	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	510	161			161	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	526	889			1430	

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	2	161	347
Volume Left	0	0	2
Volume Right	2	0	0
cSH	889	1700	1430
Volume to Capacity	0.00	0.09	0.00
Queue Length 95th (m)	0.1	0.0	0.0
Control Delay (s)	9.1	0.0	0.1
Lane LOS	A		A
Approach Delay (s)	9.1	0.0	0.1
Approach LOS	A		

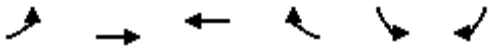
Intersection Summary			
Average Delay	0.1		
Intersection Capacity Utilization	28.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	59	288	168	82	244
Future Volume (vph)	59	288	168	82	244
Lane Group Flow (vph)	62	303	177	86	343
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.11	0.35	0.22	0.11	0.79
Control Delay	8.7	10.6	9.5	2.5	38.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	8.7	10.6	9.5	2.5	38.3
Queue Length 50th (m)	3.7	20.8	11.2	0.0	39.2
Queue Length 95th (m)	9.0	35.4	21.1	5.4	#78.4
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	557	877	794	785	434
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.11	0.35	0.22	0.11	0.79

Intersection Summary

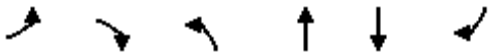
Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 70
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: CR 109 & CR 25



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	59	288	168	82	244	82
Future Volume (vph)	59	288	168	82	244	82
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1526	1634	1479	1389	1658	
Flt Permitted	0.65	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1037	1634	1479	1389	1658	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	62	303	177	86	257	86
RTOR Reduction (vph)	0	0	0	40	17	0
Lane Group Flow (vph)	62	303	177	46	326	0
Heavy Vehicles (%)	17%	15%	27%	15%	1%	19%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	17.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	17.6	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.25	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	557	877	794	746	416	
v/s Ratio Prot		c0.19	0.12		c0.20	
v/s Ratio Perm	0.06			0.03		
v/c Ratio	0.11	0.35	0.22	0.06	0.78	
Uniform Delay, d1	8.0	9.2	8.5	7.8	24.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.5	0.3	0.1	13.7	
Delay (s)	8.2	9.7	8.8	7.8	38.1	
Level of Service	A	A	A	A	D	
Approach Delay (s)		9.4	8.5		38.1	
Approach LOS		A	A		D	

Intersection Summary			
HCM 2000 Control Delay	19.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	79.9%	ICU Level of Service	D
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	39	71	308	150	6
Future Volume (Veh/h)	1	39	71	308	150	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	41	74	321	156	6
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	628	159	162			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	628	159	162			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	95	95			
cM capacity (veh/h)	426	892	1411			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	42	395	162
Volume Left	1	74	0
Volume Right	41	0	6
cSH	869	1411	1700
Volume to Capacity	0.05	0.05	0.10
Queue Length 95th (m)	1.2	1.3	0.0
Control Delay (s)	9.4	1.8	0.0
Lane LOS	A	A	
Approach Delay (s)	9.4	1.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.9		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	0	1	386	0	2	192
Future Volume (Veh/h)	0	1	386	0	2	192
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)	0	1	420	0	2	209
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	633	420			420	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	633	420			420	
tC, single (s)	6.4	6.2			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	100			100	
cM capacity (veh/h)	446	638			1150	

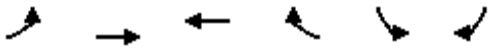
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	1	420	211
Volume Left	0	0	2
Volume Right	1	0	0
cSH	638	1700	1150
Volume to Capacity	0.00	0.25	0.00
Queue Length 95th (m)	0.0	0.0	0.0
Control Delay (s)	10.7	0.0	0.1
Lane LOS	B		A
Approach Delay (s)	10.7	0.0	0.1
Approach LOS	B		

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	30.3%	ICU Level of Service	A
Analysis Period (min)	15		

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	126	270	313	279	138
Future Volume (vph)	126	270	313	279	138
Lane Group Flow (vph)	134	287	333	297	231
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.27	0.33	0.37	0.31	0.53
Control Delay	10.6	10.4	10.9	2.1	23.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	10.6	10.4	10.9	2.1	23.9
Queue Length 50th (m)	8.7	19.4	23.2	0.0	21.4
Queue Length 95th (m)	18.5	33.5	39.1	9.5	41.2
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	500	870	893	962	435
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.27	0.33	0.37	0.31	0.53

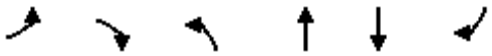
Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 70
Control Type: Semi Act-Uncoord

Splits and Phases: 3: CR 109 & CR 25



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	126	270	313	279	138	79
Future Volume (vph)	126	270	313	279	138	79
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1580	1620	1663	1536	1616	
Flt Permitted	0.56	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	931	1620	1663	1536	1616	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	134	287	333	297	147	84
RTOR Reduction (vph)	0	0	0	137	29	0
Lane Group Flow (vph)	134	287	333	160	202	0
Heavy Vehicles (%)	13%	16%	13%	4%	5%	11%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	17.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	17.6	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.25	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	500	870	893	825	406	
v/s Ratio Prot		0.18	c0.20		c0.12	
v/s Ratio Perm	0.14			0.10		
v/c Ratio	0.27	0.33	0.37	0.19	0.50	
Uniform Delay, d1	8.8	9.1	9.4	8.4	22.4	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.6	0.5	0.6	0.2	4.3	
Delay (s)	9.4	9.6	9.9	8.6	26.7	
Level of Service	A	A	A	A	C	
Approach Delay (s)		9.5	9.3		26.7	
Approach LOS		A	A		C	

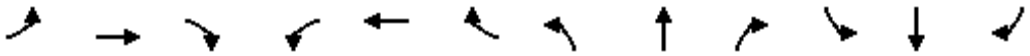
Intersection Summary			
HCM 2000 Control Delay	12.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	95.8%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	89	21	116	224	1
Future Volume (Veh/h)	6	89	21	116	224	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	7	103	24	135	260	1
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	444	260	261			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	444	260	261			
tC, single (s)	6.8	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.9	3.3	2.3			
p0 queue free %	99	87	98			
cM capacity (veh/h)	497	778	1232			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	110	159	261
Volume Left	7	24	0
Volume Right	103	0	1
cSH	751	1232	1700
Volume to Capacity	0.15	0.02	0.15
Queue Length 95th (m)	3.9	0.5	0.0
Control Delay (s)	10.6	1.3	0.0
Lane LOS	B	A	
Approach Delay (s)	10.6	1.3	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.6		
Intersection Capacity Utilization	35.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	50	3	1	8	24	133	21	50	281	0
Future Volume (Veh/h)	0	0	50	3	1	8	24	133	21	50	281	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	54	3	1	9	26	145	23	54	305	0
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	631	633	305	676	622	156	305			168		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	631	633	305	676	622	156	305			168		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	93	99	100	99	98			96		
cM capacity (veh/h)	374	377	740	328	382	894	1267			1422		

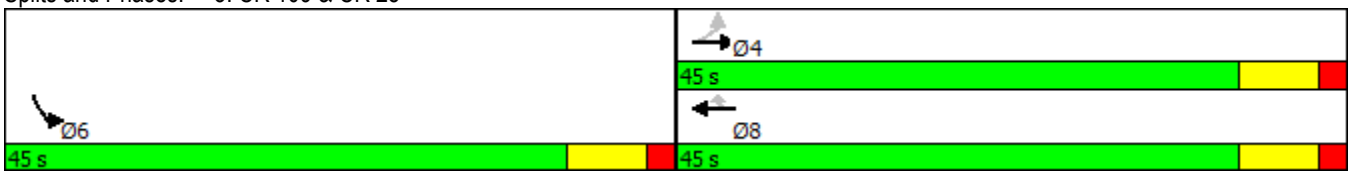
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	54	13	194	359
Volume Left	0	3	26	54
Volume Right	54	9	23	0
cSH	740	596	1267	1422
Volume to Capacity	0.07	0.02	0.02	0.04
Queue Length 95th (m)	1.8	0.5	0.5	0.9
Control Delay (s)	10.3	11.2	1.2	1.4
Lane LOS	B	B	A	A
Approach Delay (s)	10.3	11.2	1.2	1.4
Approach LOS	B	B		

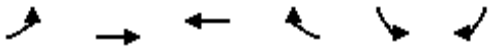
Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	34.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	69	321	188	107	271
Future Volume (vph)	69	321	188	107	271
Lane Group Flow (vph)	73	338	198	113	381
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.17	0.50	0.32	0.17	0.54
Control Delay	17.9	22.4	19.5	4.0	21.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	22.4	19.5	4.0	21.9
Queue Length 50th (m)	7.7	41.7	22.4	0.0	45.1
Queue Length 95th (m)	16.7	65.9	38.4	9.3	71.7
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	424	682	617	646	706
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.17	0.50	0.32	0.17	0.54

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 70
Control Type: Semi Act-Uncoord

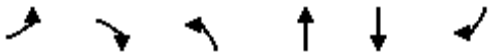
Splits and Phases: 3: CR 109 & CR 25





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	69	321	188	107	271	91
Future Volume (vph)	69	321	188	107	271	91
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1526	1634	1479	1389	1658	
Flt Permitted	0.63	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1017	1634	1479	1389	1658	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	73	338	198	113	285	96
RTOR Reduction (vph)	0	0	0	66	13	0
Lane Group Flow (vph)	73	338	198	47	368	0
Heavy Vehicles (%)	17%	15%	27%	15%	1%	19%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	37.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	37.6	
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	424	682	617	580	692	
v/s Ratio Prot		c0.21	0.13		c0.22	
v/s Ratio Perm	0.07			0.03		
v/c Ratio	0.17	0.50	0.32	0.08	0.53	
Uniform Delay, d1	16.4	19.2	17.6	15.8	19.6	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	1.2	0.6	0.1	2.9	
Delay (s)	16.8	20.4	18.2	15.9	22.5	
Level of Service	B	C	B	B	C	
Approach Delay (s)		19.8	17.4		22.5	
Approach LOS		B	B		C	

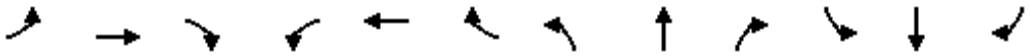
Intersection Summary			
HCM 2000 Control Delay	20.1	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	32	68	314	146	6
Future Volume (Veh/h)	1	32	68	314	146	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	33	71	327	152	6
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	624	155	158			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	624	155	158			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	95			
cM capacity (veh/h)	430	896	1416			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	34	398	158
Volume Left	1	71	0
Volume Right	33	0	6
cSH	868	1416	1700
Volume to Capacity	0.04	0.05	0.09
Queue Length 95th (m)	0.9	1.2	0.0
Control Delay (s)	9.3	1.8	0.0
Lane LOS	A	A	
Approach Delay (s)	9.3	1.8	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	41.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1	33	20	1	47	65	348	5	14	171	0
Future Volume (Veh/h)	0	1	33	20	1	47	65	348	5	14	171	0
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1	36	22	1	51	71	378	5	15	186	0
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	790	741	186	775	738	380	186			383		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	790	741	186	775	738	380	186			383		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	100	100	96	92	100	92	95			99		
cM capacity (veh/h)	272	325	861	289	326	671	1401			1187		

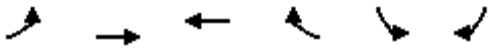
Direction, Lane #	EB 1	WB 1	NB 1	SB 1
Volume Total	37	74	454	201
Volume Left	0	22	71	15
Volume Right	36	51	5	0
cSH	825	477	1401	1187
Volume to Capacity	0.04	0.16	0.05	0.01
Queue Length 95th (m)	1.1	4.1	1.2	0.3
Control Delay (s)	9.6	13.9	1.6	0.7
Lane LOS	A	B	A	A
Approach Delay (s)	9.6	13.9	1.6	0.7
Approach LOS	A	B		

Intersection Summary				
Average Delay	3.0			
Intersection Capacity Utilization	52.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	141	301	349	313	168
Future Volume (vph)	141	301	349	313	168
Lane Group Flow (vph)	150	320	371	333	277
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.32	0.37	0.42	0.34	0.64
Control Delay	11.4	10.9	11.5	2.2	27.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.4	10.9	11.5	2.2	27.7
Queue Length 50th (m)	10.1	22.3	26.7	0.0	27.7
Queue Length 95th (m)	21.2	37.8	44.4	10.0	51.0
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	470	870	893	979	435
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.32	0.37	0.42	0.34	0.64

Intersection Summary
Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 70
Control Type: Semi Act-Uncoord

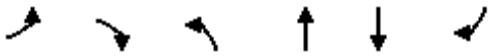
Splits and Phases: 3: CR 109 & CR 25



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	141	301	349	313	168	92
Future Volume (vph)	141	301	349	313	168	92
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1580	1620	1663	1536	1618	
Flt Permitted	0.53	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	875	1620	1663	1536	1618	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	150	320	371	333	179	98
RTOR Reduction (vph)	0	0	0	154	28	0
Lane Group Flow (vph)	150	320	371	179	249	0
Heavy Vehicles (%)	13%	16%	13%	4%	5%	11%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	17.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	17.6	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.25	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	470	870	893	825	406	
v/s Ratio Prot		0.20	c0.22		c0.15	
v/s Ratio Perm	0.17			0.12		
v/c Ratio	0.32	0.37	0.42	0.22	0.61	
Uniform Delay, d1	9.0	9.3	9.7	8.5	23.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.8	0.6	0.7	0.3	6.7	
Delay (s)	9.9	9.9	10.3	8.8	29.9	
Level of Service	A	A	B	A	C	
Approach Delay (s)		9.9	9.6		29.9	
Approach LOS		A	A		C	

Intersection Summary			
HCM 2000 Control Delay	13.6	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.48		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	96.1%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			

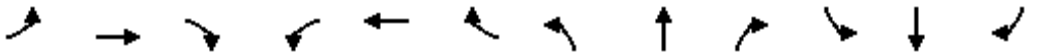
Appendix E –
Synchro Analysis Output –
Total Traffic Volumes



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	89	21	135	230	1
Future Volume (Veh/h)	6	89	21	135	230	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	7	103	24	157	267	1
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	472	268	268			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	472	268	268			
tC, single (s)	6.8	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.9	3.3	2.3			
p0 queue free %	99	87	98			
cM capacity (veh/h)	477	771	1224			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	110	181	268
Volume Left	7	24	0
Volume Right	103	0	1
cSH	742	1224	1700
Volume to Capacity	0.15	0.02	0.16
Queue Length 95th (m)	3.9	0.5	0.0
Control Delay (s)	10.7	1.2	0.0
Lane LOS	B	A	
Approach Delay (s)	10.7	1.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	36.3%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	0	102	3	1	8	38	133	21	50	281	7
Future Volume (Veh/h)	20	0	102	3	1	8	38	133	21	50	281	7
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.92	0.92	0.86	0.92
Hourly flow rate (vph)	22	0	111	3	1	9	41	155	23	54	327	8
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	686	699	331	794	692	166	335			178		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	686	699	331	794	692	166	335			178		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	84	99	100	99	97			96		
cM capacity (veh/h)	341	341	715	246	344	883	1236			1410		

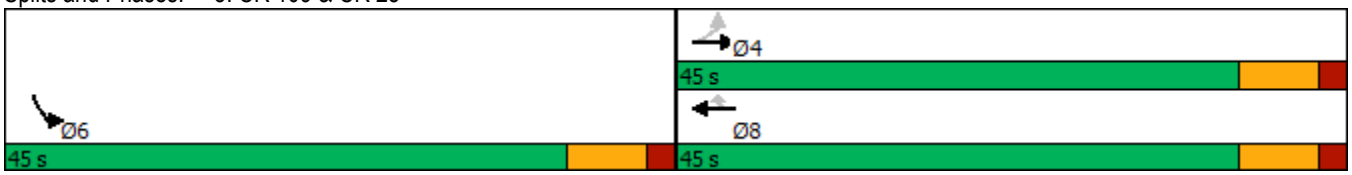
Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	133	13	41	178	54	335
Volume Left	22	3	41	0	54	0
Volume Right	111	9	0	23	0	8
cSH	605	514	1236	1700	1410	1700
Volume to Capacity	0.22	0.03	0.03	0.10	0.04	0.20
Queue Length 95th (m)	6.3	0.6	0.8	0.0	0.9	0.0
Control Delay (s)	12.6	12.2	8.0	0.0	7.7	0.0
Lane LOS	B	B	A		A	
Approach Delay (s)	12.6	12.2	1.5		1.1	
Approach LOS	B	B				

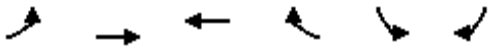
Intersection Summary				
Average Delay	3.4			
Intersection Capacity Utilization	37.4%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	72	321	188	118	306
Future Volume (vph)	72	321	188	118	306
Lane Group Flow (vph)	76	338	198	124	427
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.18	0.50	0.32	0.19	0.60
Control Delay	18.0	22.4	19.5	4.0	23.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	22.4	19.5	4.0	23.7
Queue Length 50th (m)	8.0	41.7	22.4	0.0	53.1
Queue Length 95th (m)	17.2	65.9	38.4	9.7	83.2
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	424	682	617	652	706
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.18	0.50	0.32	0.19	0.60

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 70
Control Type: Semi Act-Uncoord

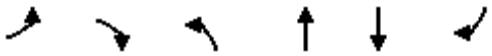
Splits and Phases: 3: CR 109 & CR 25





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	72	321	188	118	306	100
Future Volume (vph)	72	321	188	118	306	100
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1526	1634	1479	1389	1660	
Flt Permitted	0.63	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	1017	1634	1479	1389	1660	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	76	338	198	124	322	105
RTOR Reduction (vph)	0	0	0	72	13	0
Lane Group Flow (vph)	76	338	198	52	414	0
Heavy Vehicles (%)	17%	15%	27%	15%	1%	19%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	37.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	37.6	
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	424	682	617	580	693	
v/s Ratio Prot		c0.21	0.13		c0.25	
v/s Ratio Perm	0.07			0.04		
v/c Ratio	0.18	0.50	0.32	0.09	0.60	
Uniform Delay, d1	16.5	19.2	17.6	15.8	20.3	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	1.2	0.6	0.1	3.8	
Delay (s)	16.9	20.4	18.2	16.0	24.1	
Level of Service	B	C	B	B	C	
Approach Delay (s)		19.8	17.4		24.1	
Approach LOS		B	B		C	

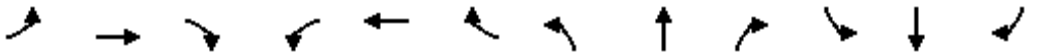
Intersection Summary			
HCM 2000 Control Delay	20.7	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	95.2%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	32	68	327	168	6
Future Volume (Veh/h)	1	32	68	327	168	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	33	71	341	175	6
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	661	178	181			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	661	178	181			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	96	95			
cM capacity (veh/h)	408	870	1388			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	34	412	181
Volume Left	1	71	0
Volume Right	33	0	6
cSH	842	1388	1700
Volume to Capacity	0.04	0.05	0.11
Queue Length 95th (m)	1.0	1.2	0.0
Control Delay (s)	9.5	1.7	0.0
Lane LOS	A	A	
Approach Delay (s)	9.5	1.7	0.0
Approach LOS	A		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	43.5%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	13	1	61	20	1	47	113	348	5	14	171	22
Future Volume (Veh/h)	13	1	61	20	1	47	113	348	5	14	171	22
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	14	1	66	22	1	51	123	378	5	15	186	24
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	904	857	198	909	866	380	210			383		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	904	857	198	909	866	380	210			383		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	94	100	92	90	100	92	91			99		
cM capacity (veh/h)	221	267	848	219	264	671	1373			1187		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	81	74	123	383	15	210
Volume Left	14	22	123	0	15	0
Volume Right	66	51	0	5	0	24
cSH	559	410	1373	1700	1187	1700
Volume to Capacity	0.14	0.18	0.09	0.23	0.01	0.12
Queue Length 95th (m)	3.8	4.9	2.2	0.0	0.3	0.0
Control Delay (s)	12.5	15.7	7.9	0.0	8.1	0.0
Lane LOS	B	C	A		A	
Approach Delay (s)	12.5	15.7	1.9		0.5	
Approach LOS	B	C				

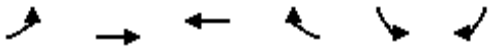
Intersection Summary				
Average Delay	3.7			
Intersection Capacity Utilization	38.7%	ICU Level of Service	A	
Analysis Period (min)	15			

Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	151	301	349	351	190
Future Volume (vph)	151	301	349	351	190
Lane Group Flow (vph)	161	320	371	373	306
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (%)	64.3%	64.3%	64.3%	64.3%	35.7%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.34	0.37	0.42	0.37	0.71
Control Delay	11.8	10.9	11.5	2.2	31.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	11.8	10.9	11.5	2.2	31.7
Queue Length 50th (m)	11.0	22.3	26.7	0.0	32.2
Queue Length 95th (m)	23.0	37.8	44.4	10.5	#64.4
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	470	870	893	997	433
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.34	0.37	0.42	0.37	0.71

Intersection Summary

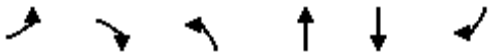
Cycle Length: 70
Actuated Cycle Length: 70
Natural Cycle: 70
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: CR 109 & CR 25



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	151	301	349	351	190	98
Future Volume (vph)	151	301	349	351	190	98
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1580	1620	1663	1536	1621	
Flt Permitted	0.53	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	875	1620	1663	1536	1621	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	161	320	371	373	202	104
RTOR Reduction (vph)	0	0	0	173	26	0
Lane Group Flow (vph)	161	320	371	200	280	0
Heavy Vehicles (%)	13%	16%	13%	4%	5%	11%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	17.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	17.6	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.25	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	470	870	893	825	407	
v/s Ratio Prot		0.20	c0.22		c0.17	
v/s Ratio Perm	0.18			0.13		
v/c Ratio	0.34	0.37	0.42	0.24	0.69	
Uniform Delay, d1	9.2	9.3	9.7	8.6	23.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.9	0.6	0.7	0.3	9.1	
Delay (s)	10.1	9.9	10.3	8.9	32.8	
Level of Service	B	A	B	A	C	
Approach Delay (s)		10.0	9.6		32.8	
Approach LOS		A	A		C	

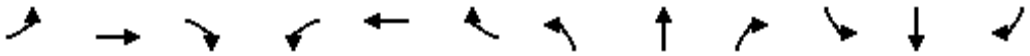
Intersection Summary			
HCM 2000 Control Delay	14.4	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	70.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	6	108	25	189	334	1
Future Volume (Veh/h)	6	108	25	189	334	1
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86
Hourly flow rate (vph)	7	126	29	220	388	1
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	666	388	389			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	666	388	389			
tC, single (s)	6.8	6.2	4.2			
tC, 2 stage (s)						
tF (s)	3.9	3.3	2.3			
p0 queue free %	98	81	97			
cM capacity (veh/h)	361	660	1102			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	133	249	389
Volume Left	7	29	0
Volume Right	126	0	1
cSH	632	1102	1700
Volume to Capacity	0.21	0.03	0.23
Queue Length 95th (m)	6.0	0.6	0.0
Control Delay (s)	12.2	1.2	0.0
Lane LOS	B	A	
Approach Delay (s)	12.2	1.2	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	44.6%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	0	123	3	2	10	50	182	21	50	392	29
Future Volume (Veh/h)	30	0	123	3	2	10	50	182	21	50	392	29
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.92	0.92	0.86	0.92
Hourly flow rate (vph)	33	0	134	3	2	11	54	212	23	54	456	32
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	912	923	472	1030	928	224	488			235		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	912	923	472	1030	928	224	488			235		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	86	100	78	98	99	99	95			96		
cM capacity (veh/h)	235	248	596	155	246	821	1086			1344		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	167	16	54	235	54	488
Volume Left	33	3	54	0	54	0
Volume Right	134	11	0	23	0	32
cSH	457	391	1086	1700	1344	1700
Volume to Capacity	0.37	0.04	0.05	0.14	0.04	0.29
Queue Length 95th (m)	12.6	1.0	1.2	0.0	1.0	0.0
Control Delay (s)	17.3	14.6	8.5	0.0	7.8	0.0
Lane LOS	C	B	A		A	
Approach Delay (s)	17.3	14.6	1.6		0.8	
Approach LOS	C	B				

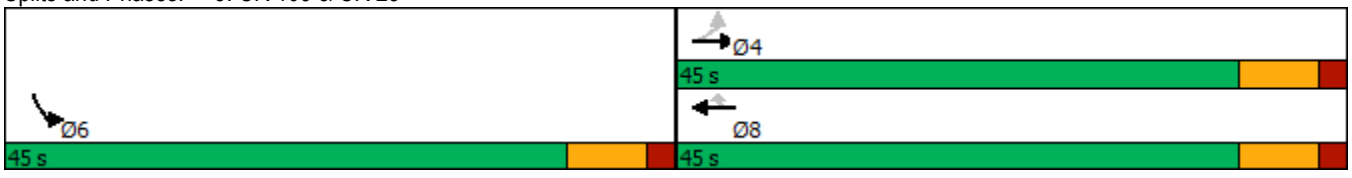
Intersection Summary				
Average Delay	4.0			
Intersection Capacity Utilization	48.0%	ICU Level of Service		A
Analysis Period (min)	15			

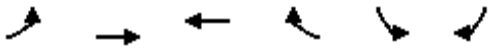
Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	104	358	209	156	411
Future Volume (vph)	104	358	209	156	411
Lane Group Flow (vph)	109	377	220	164	576
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	45.0
Total Split (%)	50.0%	50.0%	50.0%	50.0%	50.0%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.26	0.55	0.36	0.24	0.82
Control Delay	19.3	23.7	20.0	3.8	33.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.3	23.7	20.0	3.8	33.5
Queue Length 50th (m)	12.0	48.0	25.4	0.0	82.5
Queue Length 95th (m)	23.9	75.0	42.7	10.9	#139.4
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	416	682	617	675	706
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.26	0.55	0.36	0.24	0.82

Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Natural Cycle: 80
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

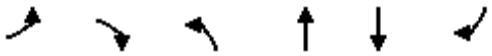
Splits and Phases: 3: CR 109 & CR 25





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	104	358	209	156	411	136
Future Volume (vph)	104	358	209	156	411	136
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.97	
Flt Protected	0.95	1.00	1.00	1.00	0.96	
Satd. Flow (prot)	1526	1634	1479	1389	1659	
Flt Permitted	0.62	1.00	1.00	1.00	0.96	
Satd. Flow (perm)	997	1634	1479	1389	1659	
Peak-hour factor, PHF	0.95	0.95	0.95	0.95	0.95	0.95
Adj. Flow (vph)	109	377	220	164	433	143
RTOR Reduction (vph)	0	0	0	95	13	0
Lane Group Flow (vph)	109	377	220	69	563	0
Heavy Vehicles (%)	17%	15%	27%	15%	1%	19%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	37.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	37.6	
Actuated g/C Ratio	0.42	0.42	0.42	0.42	0.42	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	416	682	617	580	693	
v/s Ratio Prot		c0.23	0.15		c0.34	
v/s Ratio Perm	0.11			0.05		
v/c Ratio	0.26	0.55	0.36	0.12	0.81	
Uniform Delay, d1	17.1	19.8	17.9	16.0	23.1	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	1.7	0.7	0.2	10.0	
Delay (s)	17.8	21.5	18.7	16.2	33.1	
Level of Service	B	C	B	B	C	
Approach Delay (s)		20.7	17.6		33.1	
Approach LOS		C	B		C	

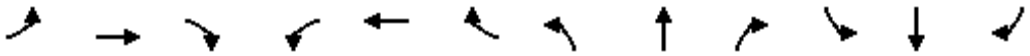
Intersection Summary			
HCM 2000 Control Delay	24.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	112.2%	ICU Level of Service	H
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	1	40	92	548	270	6
Future Volume (Veh/h)	1	40	92	548	270	6
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96
Hourly flow rate (vph)	1	42	96	571	281	6
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	1047	284	287			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1047	284	287			
tC, single (s)	6.4	6.2	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	94	92			
cM capacity (veh/h)	236	760	1269			

Direction, Lane #	EB 1	NB 1	SB 1
Volume Total	43	667	287
Volume Left	1	96	0
Volume Right	42	0	6
cSH	722	1269	1700
Volume to Capacity	0.06	0.08	0.17
Queue Length 95th (m)	1.4	1.9	0.0
Control Delay (s)	10.3	1.9	0.0
Lane LOS	B	A	
Approach Delay (s)	10.3	1.9	0.0
Approach LOS	B		

Intersection Summary			
Average Delay	1.7		
Intersection Capacity Utilization	61.8%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	81	3	94	20	2	48	183	535	5	16	255	51
Future Volume (Veh/h)	81	3	94	20	2	48	183	535	5	16	255	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	88	3	102	22	2	52	199	582	5	17	277	55
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	1372	1324	304	1397	1348	584	332			587		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1372	1324	304	1397	1348	584	332			587		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	8	98	86	75	98	90	84			98		
cM capacity (veh/h)	96	130	740	88	126	515	1239			998		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	SB 1	SB 2
Volume Total	193	76	199	587	17	332
Volume Left	88	22	199	0	17	0
Volume Right	102	52	0	5	0	55
cSH	179	207	1239	1700	998	1700
Volume to Capacity	1.08	0.37	0.16	0.35	0.02	0.20
Queue Length 95th (m)	71.8	12.1	4.3	0.0	0.4	0.0
Control Delay (s)	143.6	32.2	8.5	0.0	8.7	0.0
Lane LOS	F	D	A		A	
Approach Delay (s)	143.6	32.2	2.1		0.4	
Approach LOS	F	D				

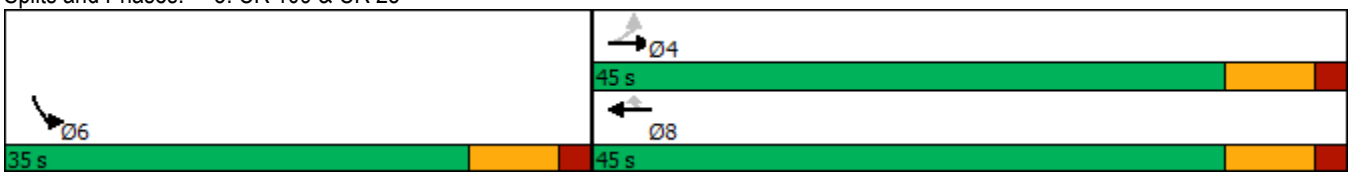
Intersection Summary				
Average Delay	22.8			
Intersection Capacity Utilization	58.8%	ICU Level of Service	B	
Analysis Period (min)	15			

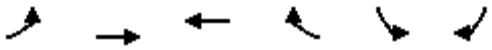
Lane Group	EBL	EBT	WBT	WBR	SBL
Lane Configurations					
Traffic Volume (vph)	241	335	389	538	278
Future Volume (vph)	241	335	389	538	278
Lane Group Flow (vph)	256	356	414	572	462
Turn Type	Perm	NA	NA	Perm	Prot
Protected Phases		4	8		6
Permitted Phases	4			8	
Detector Phase	4	4	8	8	6
Switch Phase					
Minimum Initial (s)	37.6	37.6	37.6	37.6	17.6
Minimum Split (s)	45.0	45.0	45.0	45.0	25.0
Total Split (s)	45.0	45.0	45.0	45.0	35.0
Total Split (%)	56.3%	56.3%	56.3%	56.3%	43.8%
Yellow Time (s)	5.4	5.4	5.4	5.4	5.4
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	7.4	7.4	7.4	7.4	7.4
Lead/Lag					
Lead-Lag Optimize?					
Recall Mode	None	None	None	None	Max
v/c Ratio	0.73	0.47	0.53	0.56	0.79
Control Delay	32.5	17.0	18.1	3.6	33.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	32.5	17.0	18.1	3.6	33.5
Queue Length 50th (m)	30.0	35.1	42.5	0.0	57.4
Queue Length 95th (m)	#69.2	56.9	67.6	15.7	#104.4
Internal Link Dist (m)		1152.8	1187.2		708.3
Turn Bay Length (m)	75.0			95.0	
Base Capacity (vph)	349	761	781	1025	583
Starvation Cap Reductn	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0
Reduced v/c Ratio	0.73	0.47	0.53	0.56	0.79

Intersection Summary

Cycle Length: 80
Actuated Cycle Length: 80
Natural Cycle: 75
Control Type: Semi Act-Uncoord
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 3: CR 109 & CR 25





Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	241	335	389	538	278	156
Future Volume (vph)	241	335	389	538	278	156
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.4	7.4	7.4	7.4	7.4	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	
Frt	1.00	1.00	1.00	0.85	0.95	
Flt Protected	0.95	1.00	1.00	1.00	0.97	
Satd. Flow (prot)	1580	1620	1663	1536	1617	
Flt Permitted	0.45	1.00	1.00	1.00	0.97	
Satd. Flow (perm)	743	1620	1663	1536	1617	
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	256	356	414	572	296	166
RTOR Reduction (vph)	0	0	0	303	26	0
Lane Group Flow (vph)	256	356	414	269	436	0
Heavy Vehicles (%)	13%	16%	13%	4%	5%	11%
Turn Type	Perm	NA	NA	Perm	Prot	
Protected Phases		4	8		6	
Permitted Phases	4			8		
Actuated Green, G (s)	37.6	37.6	37.6	37.6	27.6	
Effective Green, g (s)	37.6	37.6	37.6	37.6	27.6	
Actuated g/C Ratio	0.47	0.47	0.47	0.47	0.35	
Clearance Time (s)	7.4	7.4	7.4	7.4	7.4	
Vehicle Extension (s)	5.0	5.0	5.0	5.0	4.0	
Lane Grp Cap (vph)	349	761	781	721	557	
v/s Ratio Prot		0.22	0.25		c0.27	
v/s Ratio Perm	c0.34			0.18		
v/c Ratio	0.73	0.47	0.53	0.37	0.78	
Uniform Delay, d1	17.1	14.4	15.0	13.6	23.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	9.4	1.0	1.3	0.7	10.6	
Delay (s)	26.5	15.4	16.2	14.3	34.1	
Level of Service	C	B	B	B	C	
Approach Delay (s)		20.0	15.1		34.1	
Approach LOS		C	B		C	

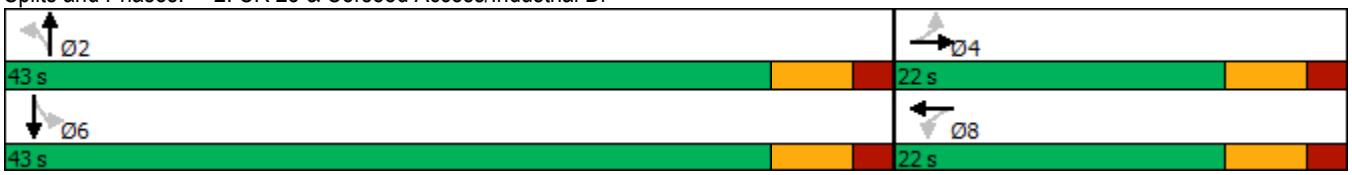
Intersection Summary			
HCM 2000 Control Delay	20.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	80.0	Sum of lost time (s)	14.8
Intersection Capacity Utilization	106.1%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

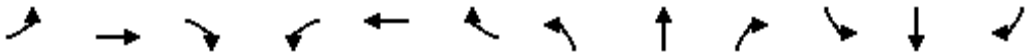
Appendix F –
Synchro Analysis Output –
Total Traffic Volumes with Improvements

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	30	0	3	2	51	182	50	392
Future Volume (vph)	30	0	3	2	51	182	50	392
Lane Group Flow (vph)	0	166	0	16	55	235	54	488
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	43.0	43.0	43.0	43.0
Total Split (%)	33.8%	33.8%	33.8%	33.8%	66.2%	66.2%	66.2%	66.2%
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)		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
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.53		0.08	0.08	0.17	0.06	0.36
Control Delay		13.6		14.9	4.6	4.2	4.4	5.4
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		13.6		14.9	4.6	4.2	4.4	5.4
Queue Length 50th (m)		3.1		0.5	1.6	6.8	1.5	17.4
Queue Length 95th (m)		16.6		4.6	5.9	16.5	5.6	37.7
Internal Link Dist (m)		413.4		408.0		194.7		271.4
Turn Bay Length (m)					65.0		55.0	
Base Capacity (vph)		518		421	649	1351	837	1356
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		0.32		0.04	0.08	0.17	0.06	0.36

Intersection Summary
Cycle Length: 65
Actuated Cycle Length: 59
Natural Cycle: 45
Control Type: Semi Act-Uncoord

Splits and Phases: 2: CR 25 & Corseed Access/Industrial Dr





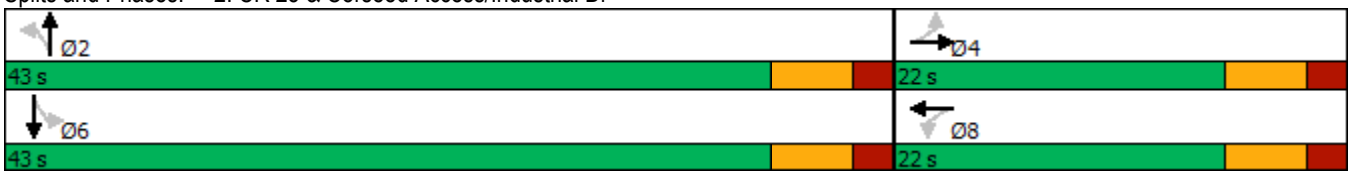
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	30	0	122	3	2	10	51	182	21	50	392	29
Future Volume (vph)	30	0	122	3	2	10	51	182	21	50	392	29
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.89			0.91		1.00	0.99		1.00	0.99	
Flt Protected		0.99			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1659			1689		1785	1851		1785	1860	
Flt Permitted		0.93			0.89		0.48	1.00		0.61	1.00	
Satd. Flow (perm)		1553			1523		893	1851		1151	1860	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.86	0.92	0.92	0.86	0.92
Adj. Flow (vph)	33	0	133	3	2	11	55	212	23	54	456	32
RTOR Reduction (vph)	0	119	0	0	10	0	0	4	0	0	3	0
Lane Group Flow (vph)	0	47	0	0	6	0	55	231	0	54	485	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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)		6.5			6.5		41.7	41.7		41.7	41.7	
Effective Green, g (s)		6.5			6.5		41.7	41.7		41.7	41.7	
Actuated g/C Ratio		0.11			0.11		0.69	0.69		0.69	0.69	
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)		167			164		618	1282		797	1288	
v/s Ratio Prot								0.12			c0.26	
v/s Ratio Perm		c0.03			0.00		0.06			0.05		
v/c Ratio		0.28			0.04		0.09	0.18		0.07	0.38	
Uniform Delay, d1		24.7			24.0		3.0	3.2		3.0	3.8	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		0.9			0.1		0.3	0.3		0.2	0.8	
Delay (s)		25.6			24.1		3.3	3.6		3.1	4.7	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		25.6			24.1			3.5			4.5	
Approach LOS		C			C			A			A	

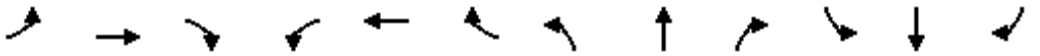
Intersection Summary			
HCM 2000 Control Delay	8.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	60.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	53.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations								
Traffic Volume (vph)	84	3	20	2	185	534	16	255
Future Volume (vph)	84	3	20	2	185	534	16	255
Lane Group Flow (vph)	0	199	0	76	201	585	17	335
Turn Type	Perm	NA	Perm	NA	Perm	NA	Perm	NA
Protected Phases		4		8		2		6
Permitted Phases	4		8		2		6	
Detector Phase	4	4	8	8	2	2	6	6
Switch Phase								
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	22.0	22.0
Total Split (s)	22.0	22.0	22.0	22.0	43.0	43.0	43.0	43.0
Total Split (%)	33.8%	33.8%	33.8%	33.8%	66.2%	66.2%	66.2%	66.2%
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)		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
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	None	None	None	None	Max	Max	Max	Max
v/c Ratio		0.64		0.26	0.30	0.49	0.04	0.28
Control Delay		23.4		12.1	7.6	8.6	5.9	6.1
Queue Delay		0.0		0.0	0.0	0.0	0.0	0.0
Total Delay		23.4		12.1	7.6	8.6	5.9	6.1
Queue Length 50th (m)		11.6		2.2	8.6	29.4	0.6	12.9
Queue Length 95th (m)		28.7		11.1	23.2	63.7	3.0	30.1
Internal Link Dist (m)		413.4		408.0		194.7		271.4
Turn Bay Length (m)					65.0		55.0	
Base Capacity (vph)		426		414	669	1197	467	1176
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		0.47		0.18	0.30	0.49	0.04	0.28

Intersection Summary
Cycle Length: 65
Actuated Cycle Length: 62.6
Natural Cycle: 50
Control Type: Semi Act-Uncoord

Splits and Phases: 2: CR 25 & Corseed Access/Industrial Dr





Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	84	3	97	20	2	48	185	534	5	16	255	53
Future Volume (vph)	84	3	97	20	2	48	185	534	5	16	255	53
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.0			6.0		6.0	6.0		6.0	6.0	
Lane Util. Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Frt		0.93			0.91		1.00	1.00		1.00	0.97	
Flt Protected		0.98			0.99		0.95	1.00		0.95	1.00	
Satd. Flow (prot)		1706			1681		1785	1876		1785	1830	
Flt Permitted		0.82			0.86		0.56	1.00		0.39	1.00	
Satd. Flow (perm)		1425			1461		1050	1876		732	1830	
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)	91	3	105	22	2	52	201	580	5	17	277	58
RTOR Reduction (vph)	0	68	0	0	43	0	0	0	0	0	10	0
Lane Group Flow (vph)	0	131	0	0	33	0	201	585	0	17	325	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
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		39.9	39.9		39.9	39.9	
Effective Green, g (s)		10.6			10.6		39.9	39.9		39.9	39.9	
Actuated g/C Ratio		0.17			0.17		0.64	0.64		0.64	0.64	
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)		241			247		670	1197		467	1168	
v/s Ratio Prot								c0.31			0.18	
v/s Ratio Perm		c0.09			0.02		0.19			0.02		
v/c Ratio		0.54			0.13		0.30	0.49		0.04	0.28	
Uniform Delay, d1		23.7			22.0		5.1	5.9		4.2	5.0	
Progression Factor		1.00			1.00		1.00	1.00		1.00	1.00	
Incremental Delay, d2		2.5			0.2		1.1	1.4		0.1	0.6	
Delay (s)		26.2			22.3		6.2	7.4		4.3	5.6	
Level of Service		C			C		A	A		A	A	
Approach Delay (s)		26.2			22.3			7.1			5.5	
Approach LOS		C			C			A			A	

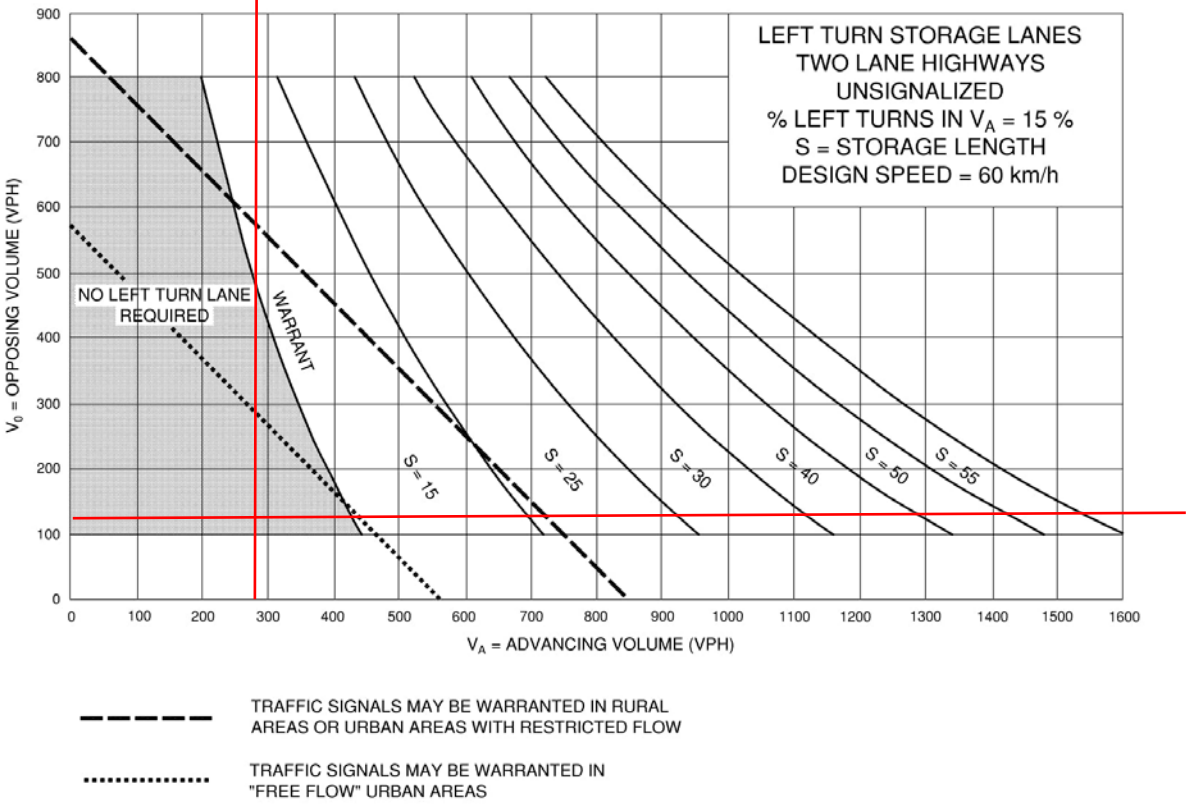
Intersection Summary			
HCM 2000 Control Delay	10.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.50		
Actuated Cycle Length (s)	62.5	Sum of lost time (s)	12.0
Intersection Capacity Utilization	64.2%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Appendix G –
MTO DS Left Turn Lane Warrant Graphs

Melody Lane / County Road 25

2016 Existing Traffic - Northbound **Exhibit 9A-7**

Critical Case - PM Peak Hour



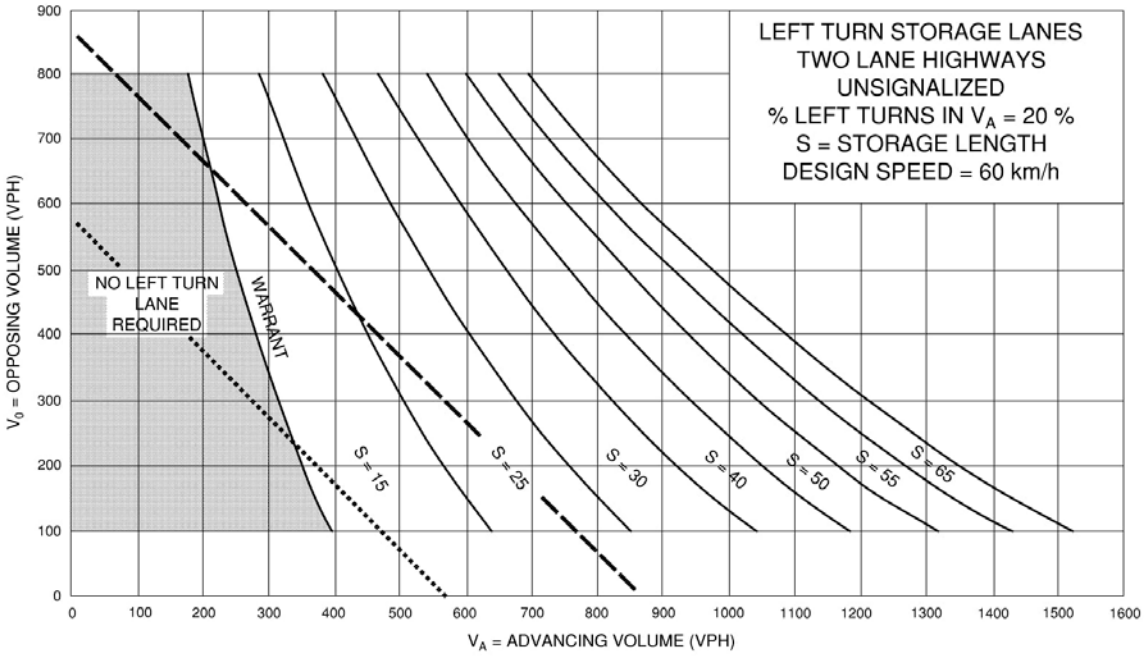
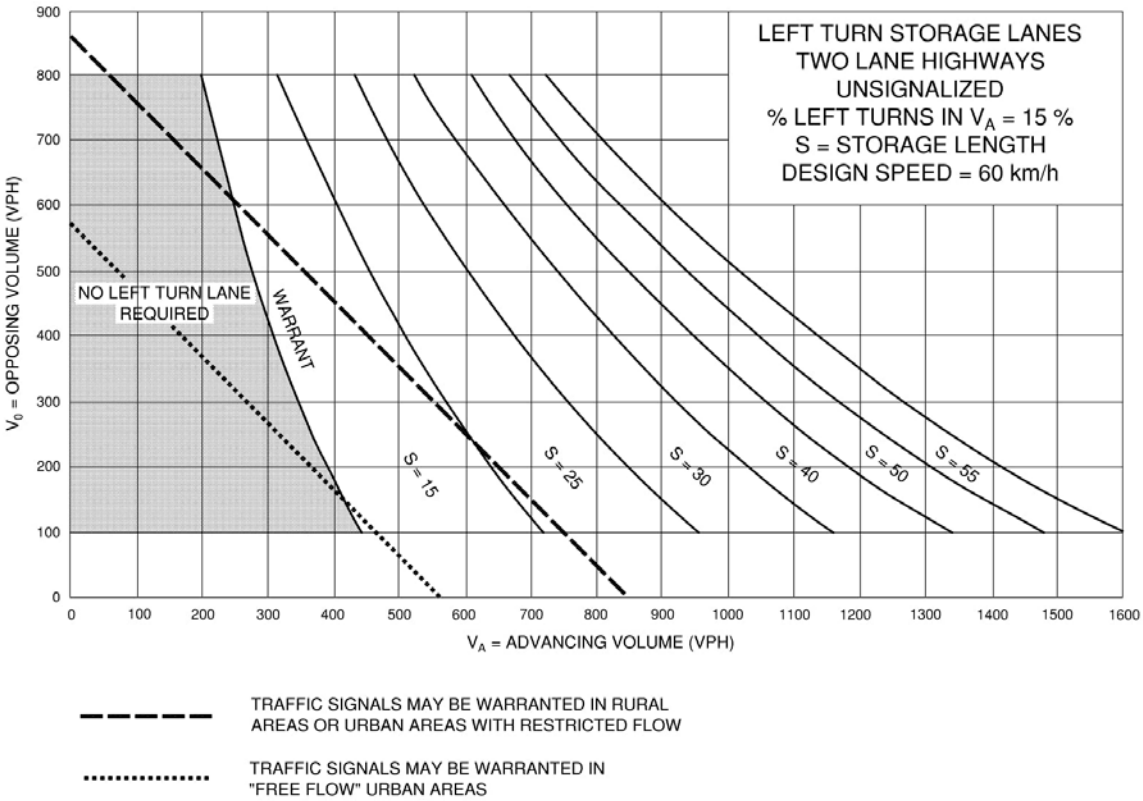


Exhibit 9A-7



Melody Lane / County Road 25
2021 Background Traffic - Northbound
Critical Case - PM Peak Hour

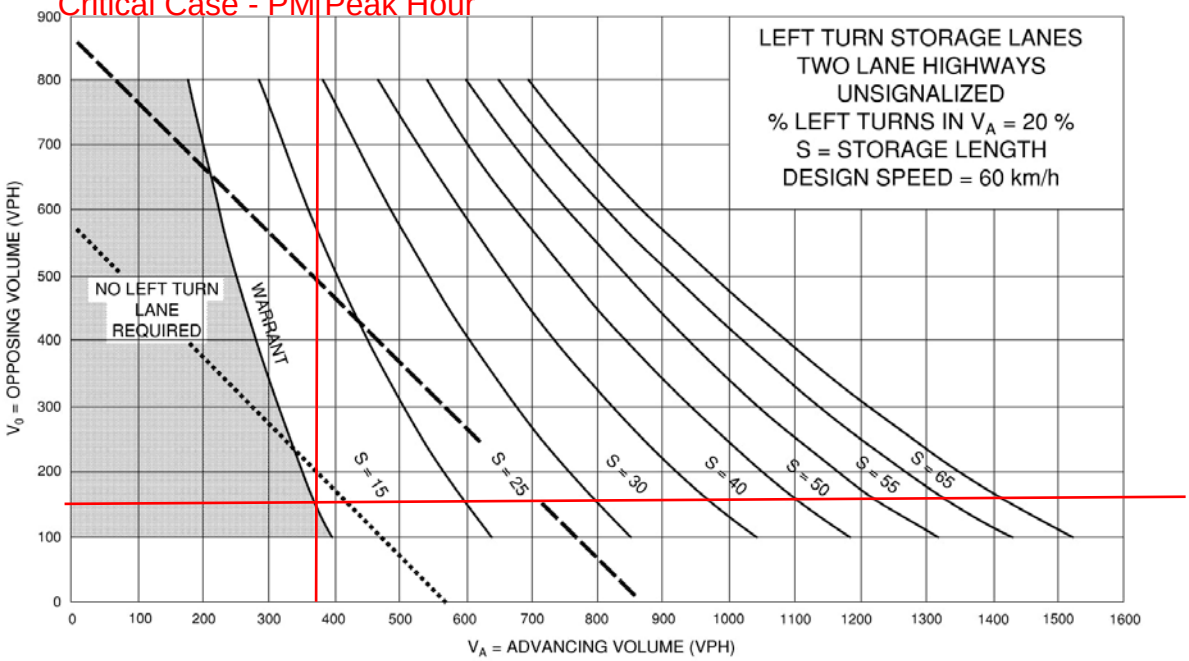
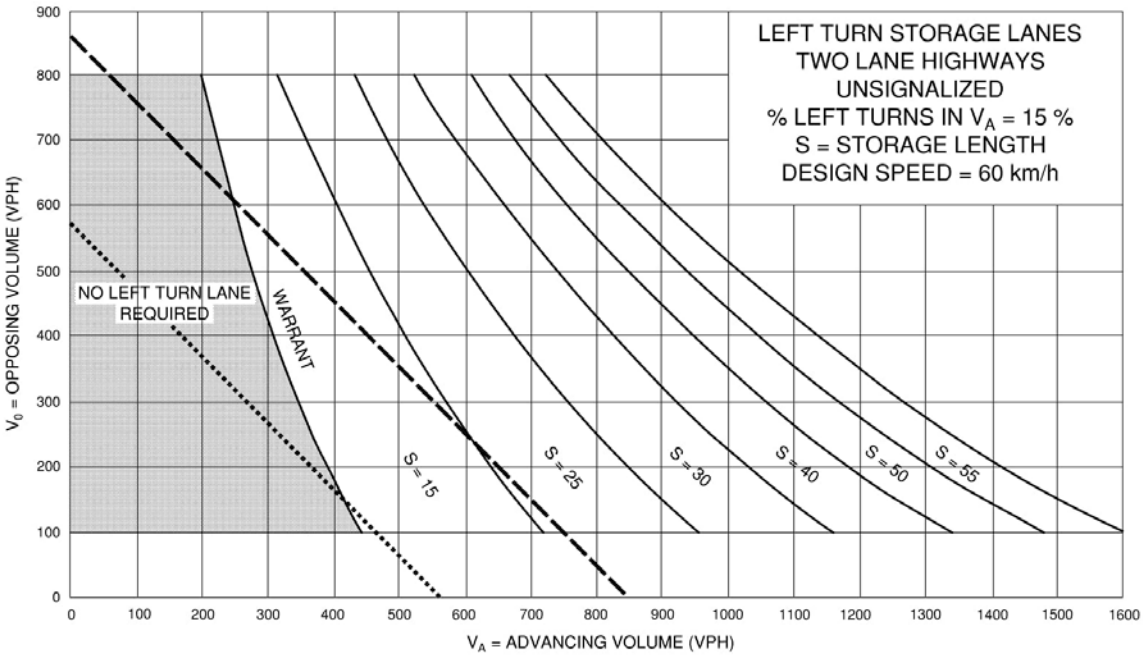
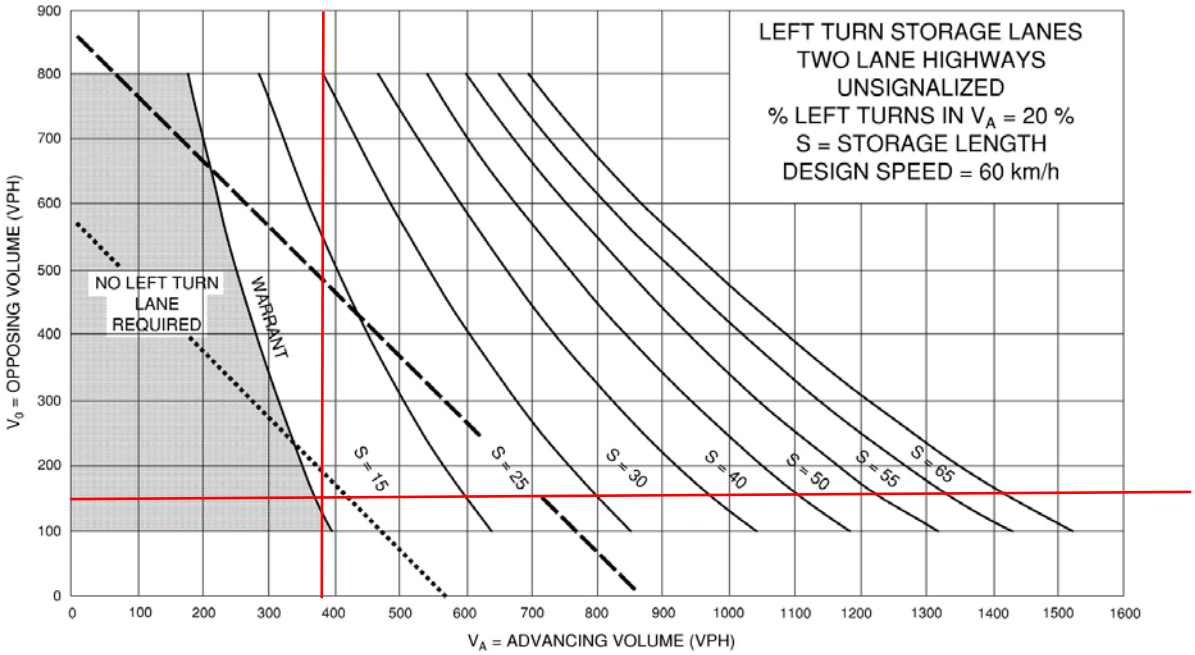


Exhibit 9A-7



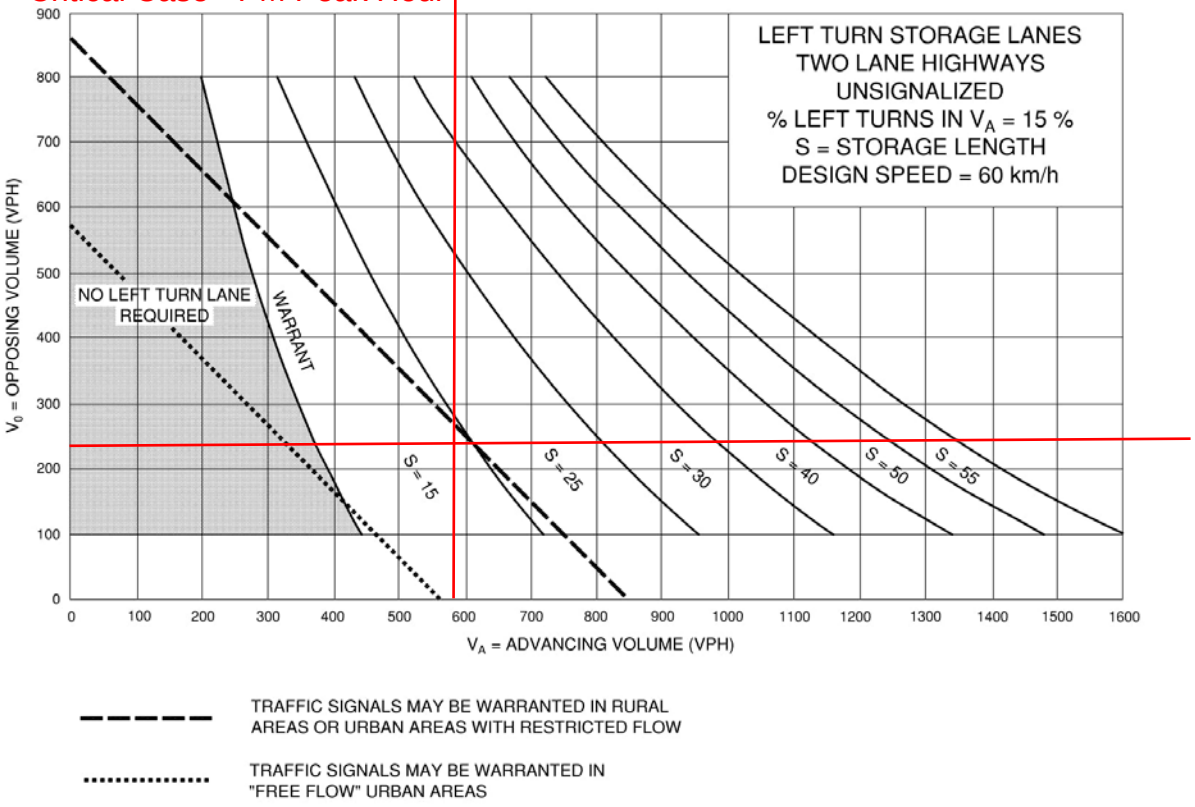
Melody Lane / County Road 25
2026 Background Traffic - Northbound
Critical Case - PM Peak Hour

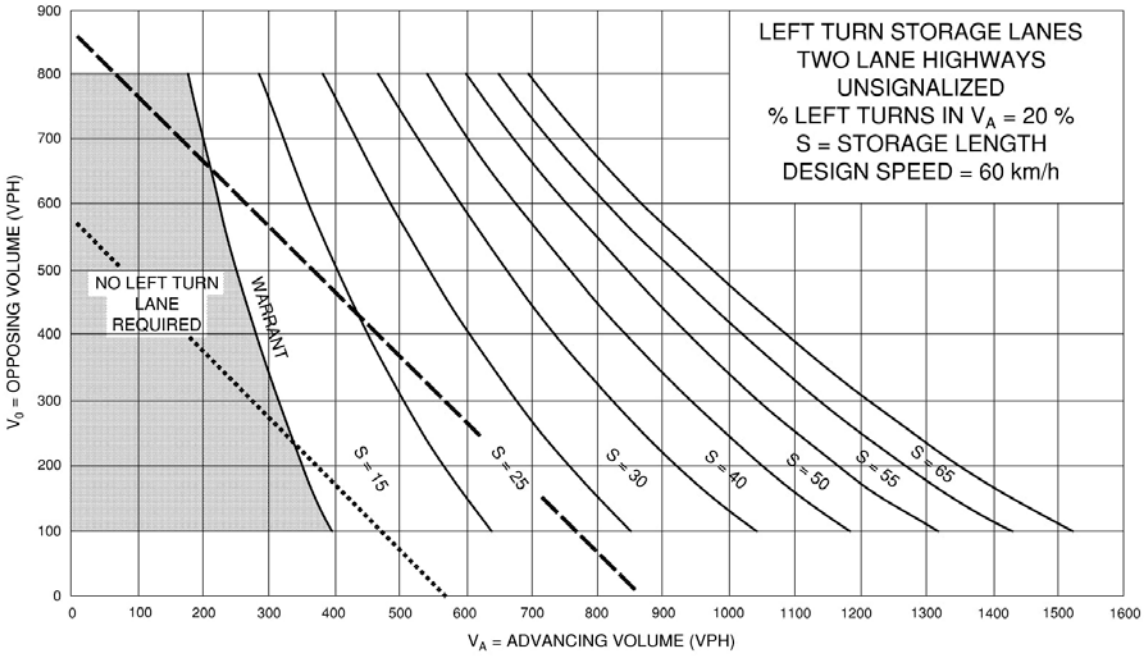


Melody Lane / County Road 25

2031 Total Traffic - Northbound **Exhibit 9A-7**

Critical Case - PM Peak Hour

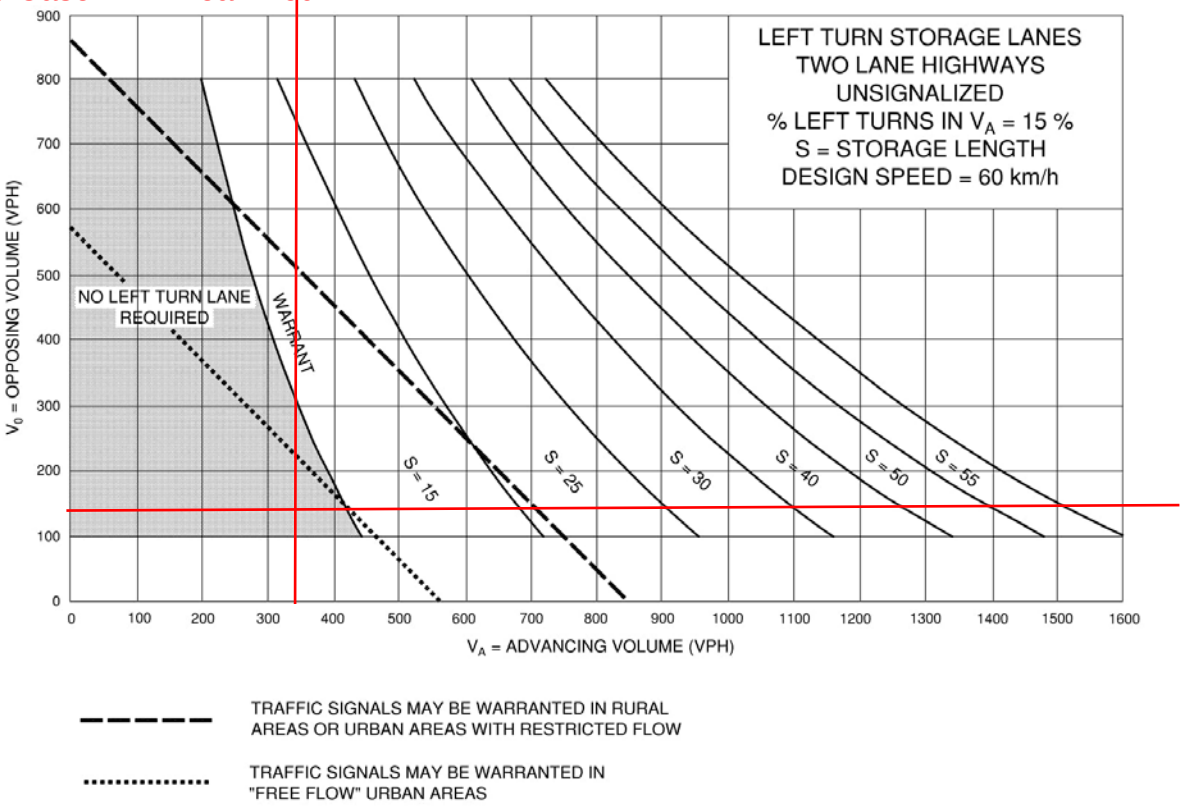


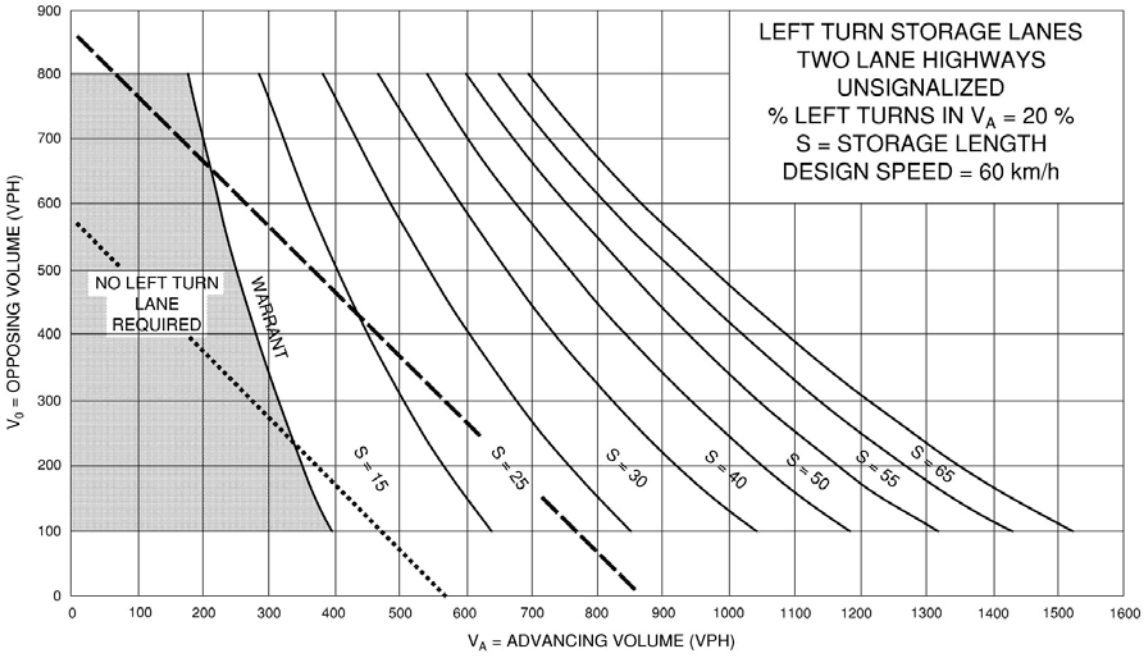


Future Collector & Industrial Drive / County Road 25

2026 Background Traffic - Southbound **Exhibit 9A-7**

Critical Case - AM Peak Hour

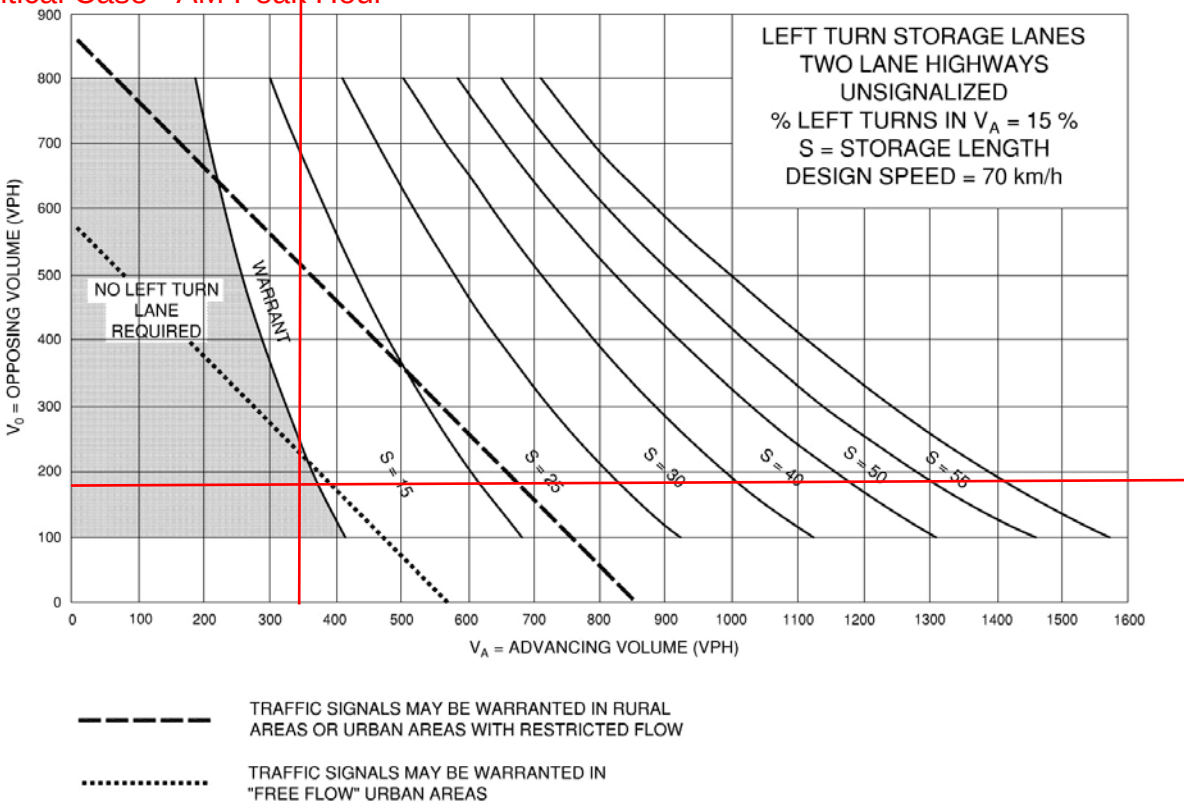




Corseed Access & Industrial Drive / County Road 25

2026 Total Traffic - Southbound **Exhibit 9A-11**

Critical Case - AM Peak Hour



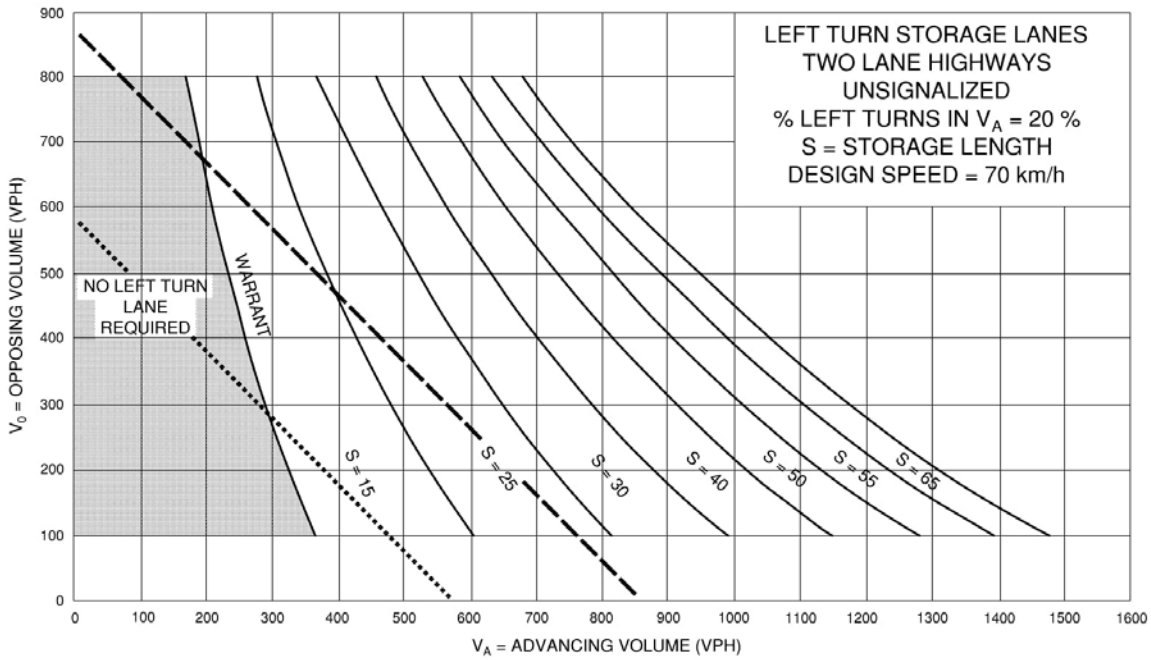
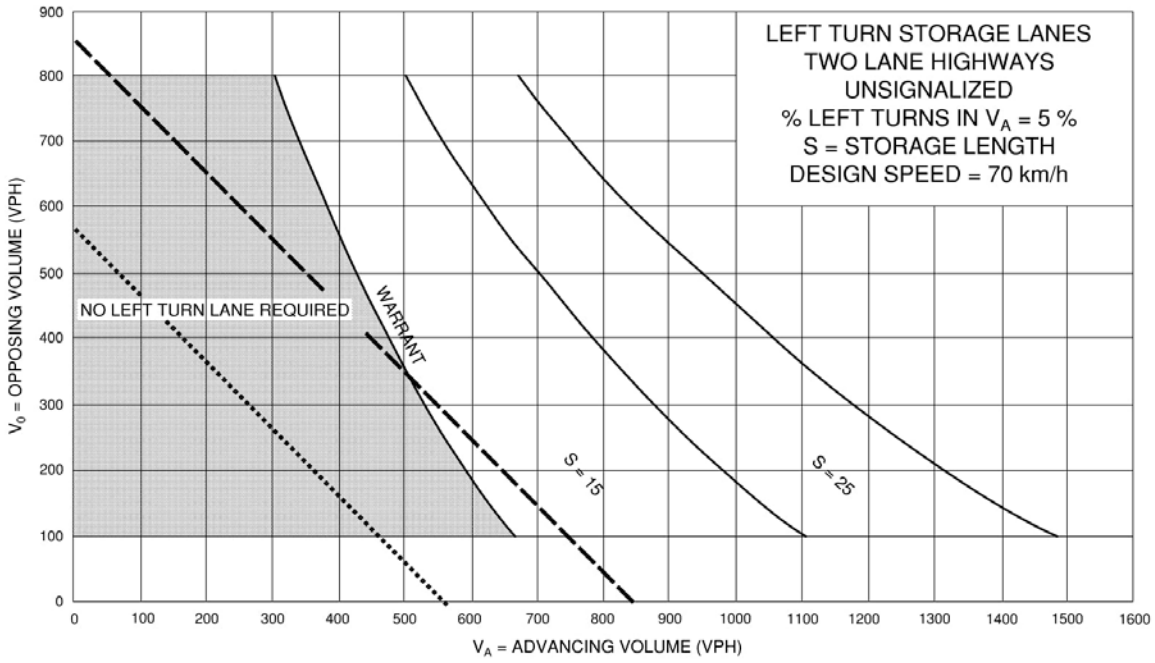


Exhibit 9A-10



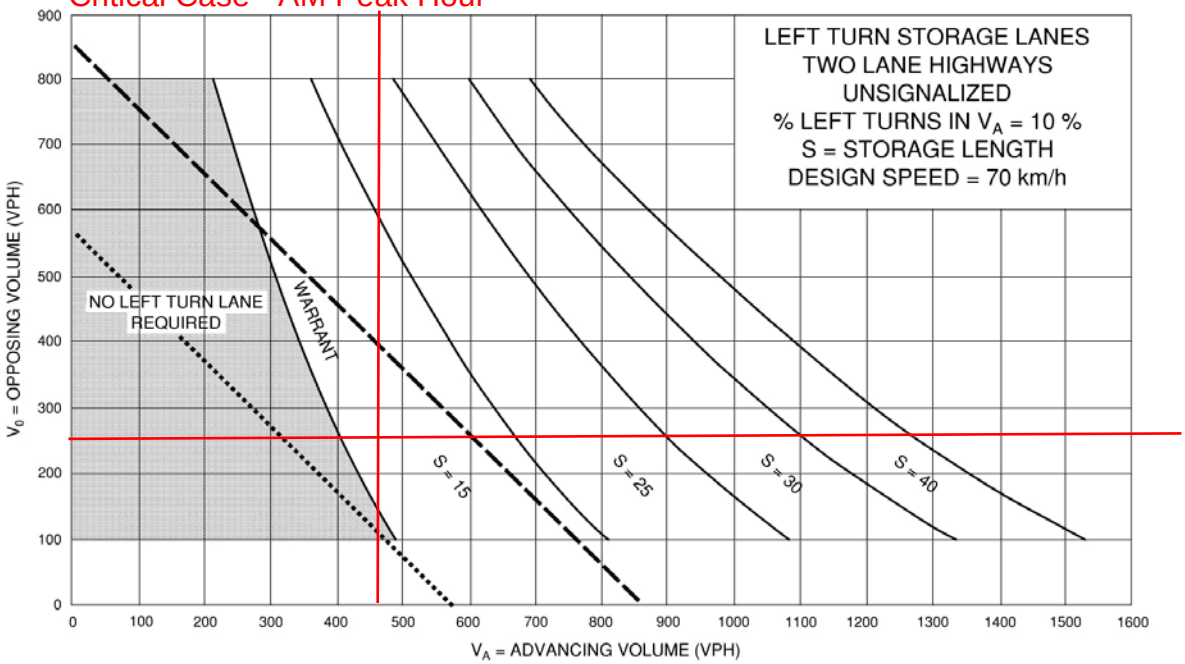
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Corseed Access & Industrial Drive / County Road 25

2031 Total Traffic - Southbound

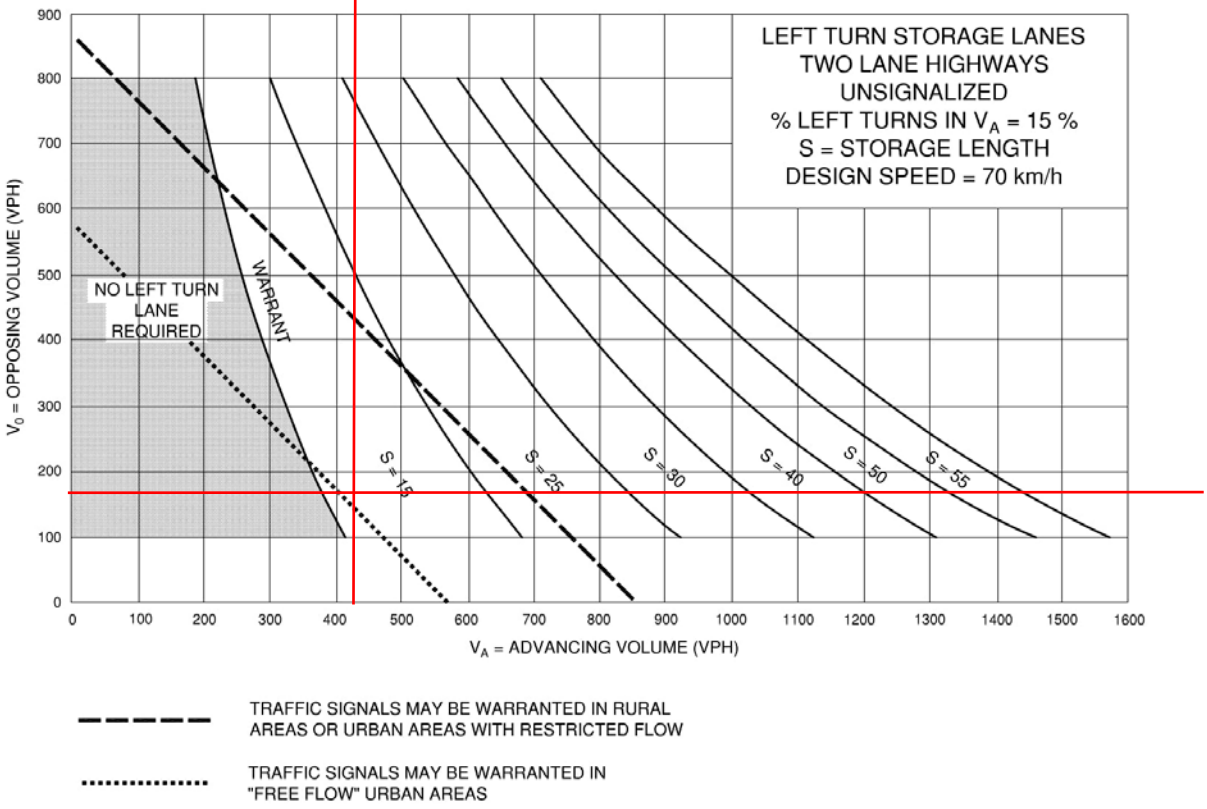
Critical Case - AM Peak Hour



Future Collector & Industrial Drive / County Road 25

2026 Background Traffic - Northbound **Exhibit 9A-11**

Critical Case - PM Peak Hour



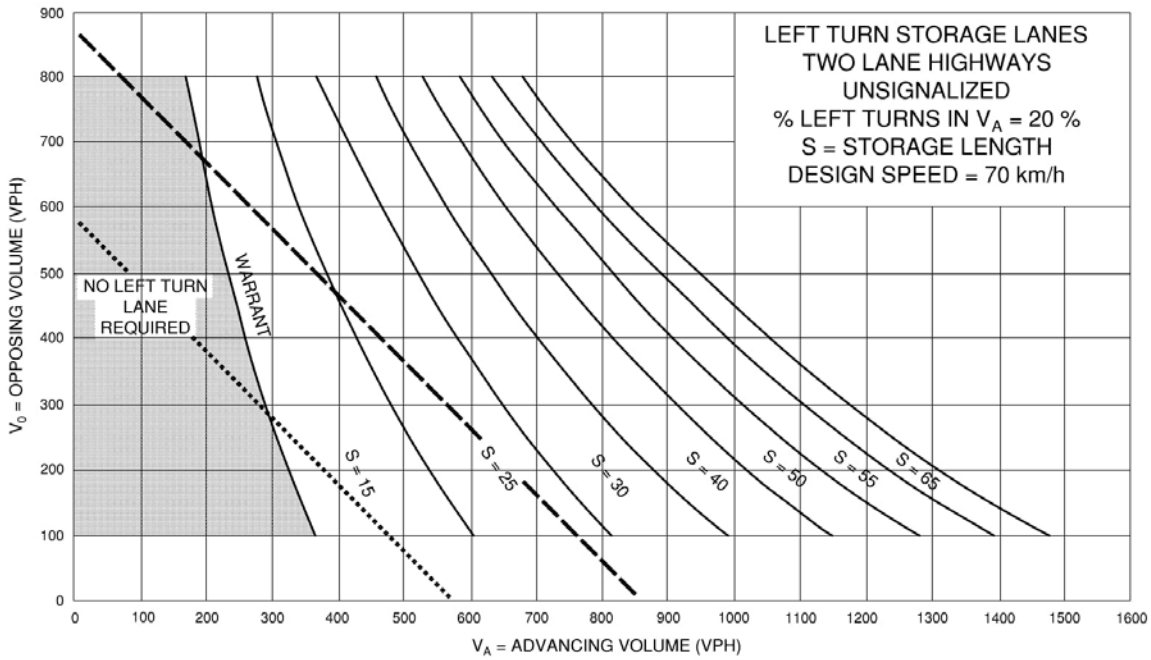
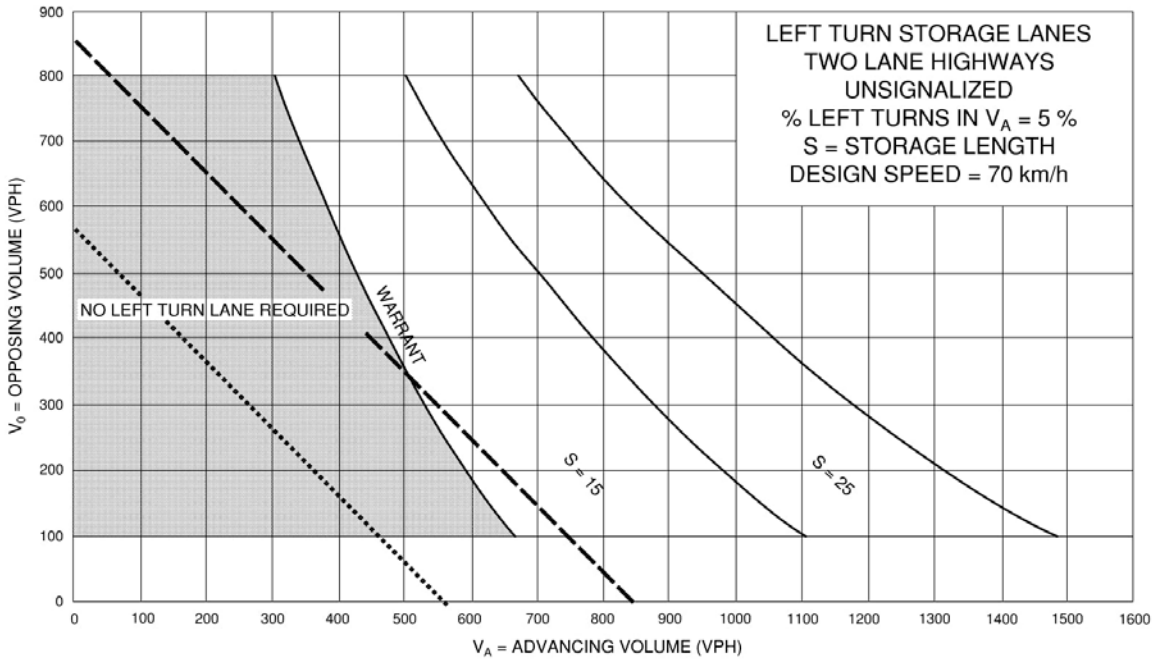


Exhibit 9A-10



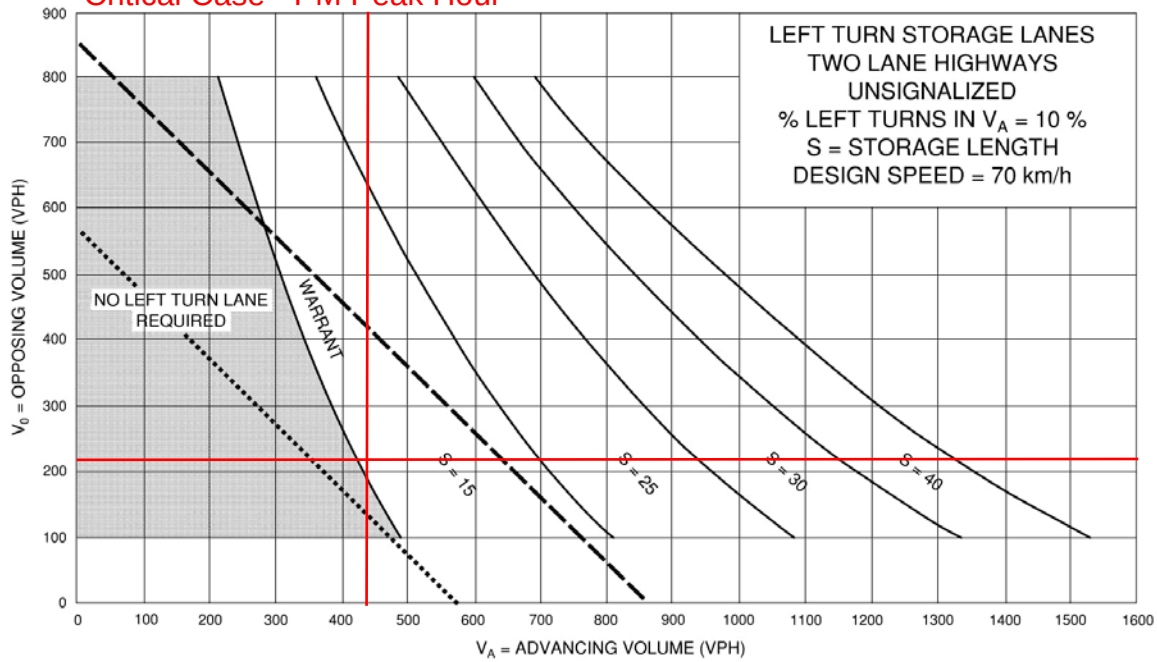
TRAFFIC SIGNALS MAY BE WARRANTED IN RURAL AREAS OR URBAN AREAS WITH RESTRICTED FLOW

TRAFFIC SIGNALS MAY BE WARRANTED IN "FREE FLOW" URBAN AREAS

Corseed Access & Industrial Drive / County Road 25

2021 Total Traffic - Northbound

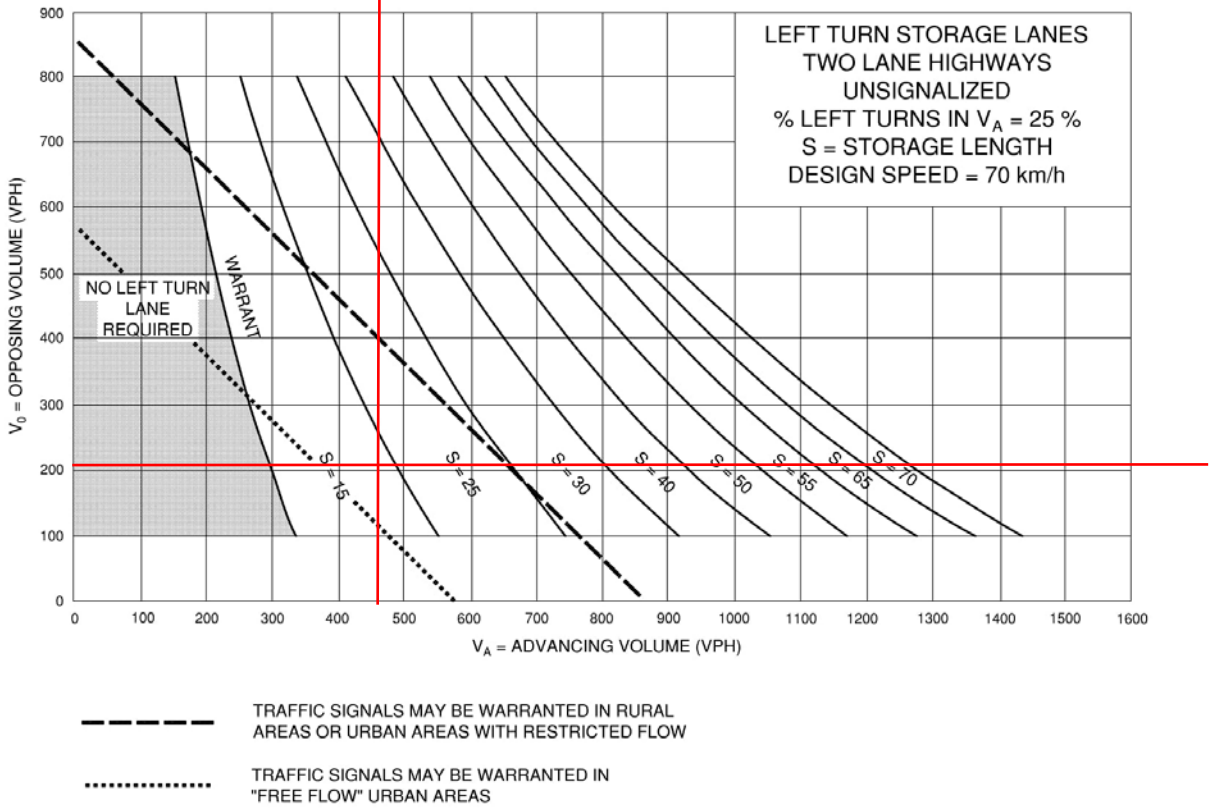
Critical Case - PM Peak Hour

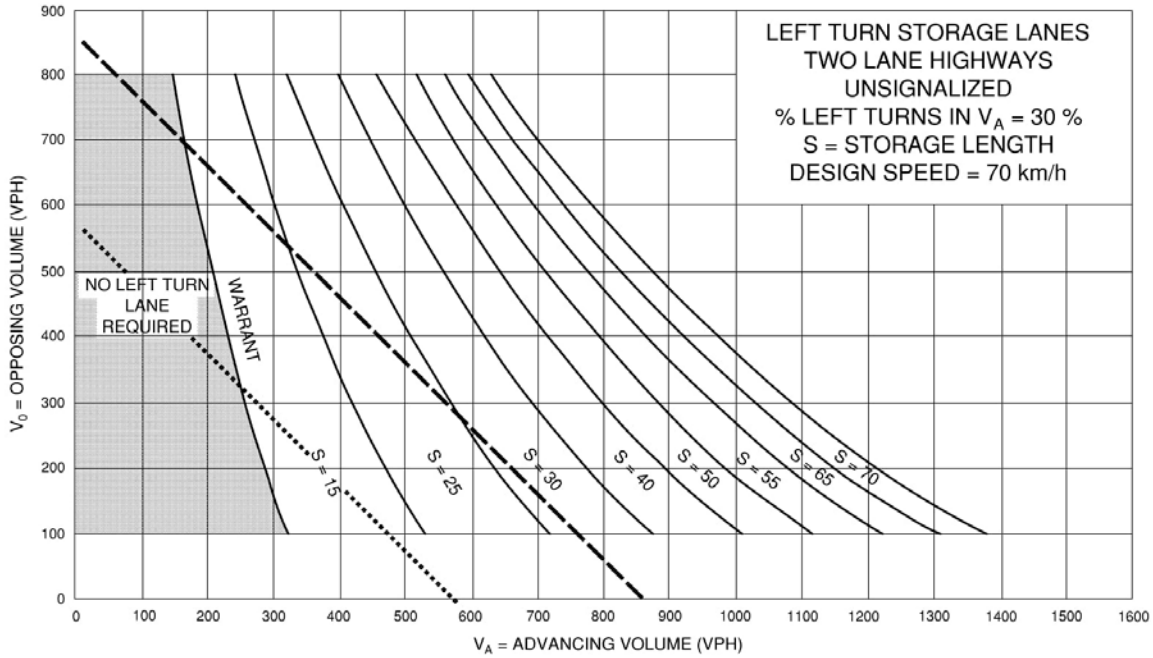


Corseed Access & Industrial Drive / County Road 25

2026 Total Traffic - Northbound **Exhibit 9A-12**

Critical Case - PM Peak Hour



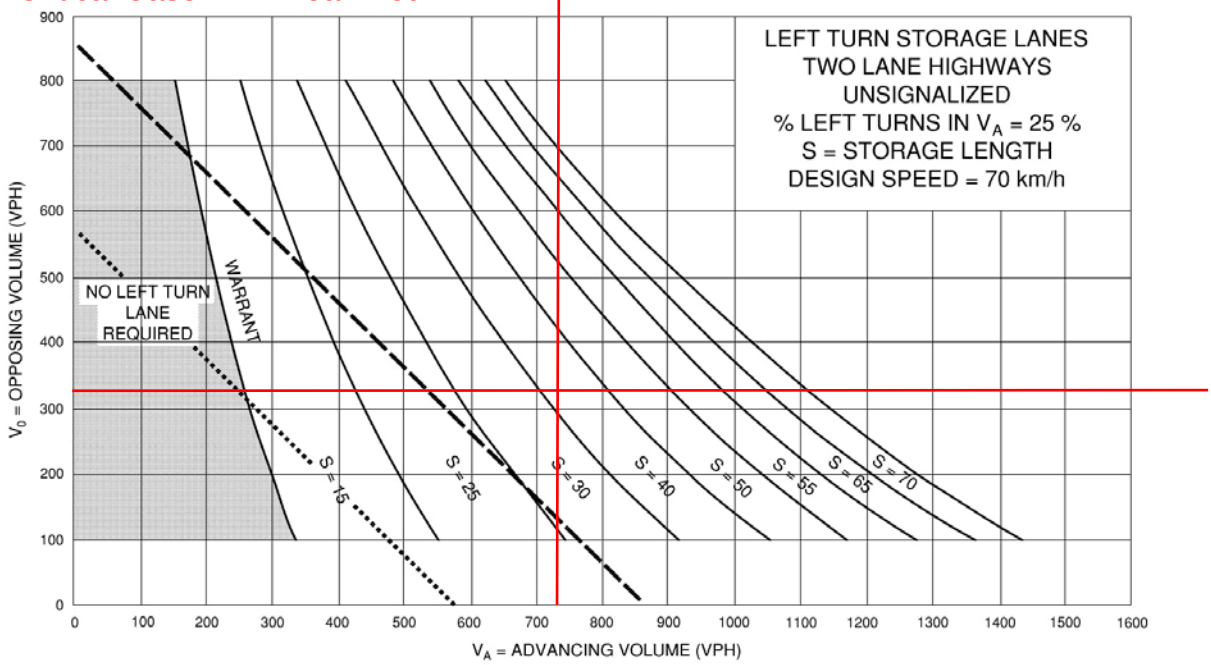


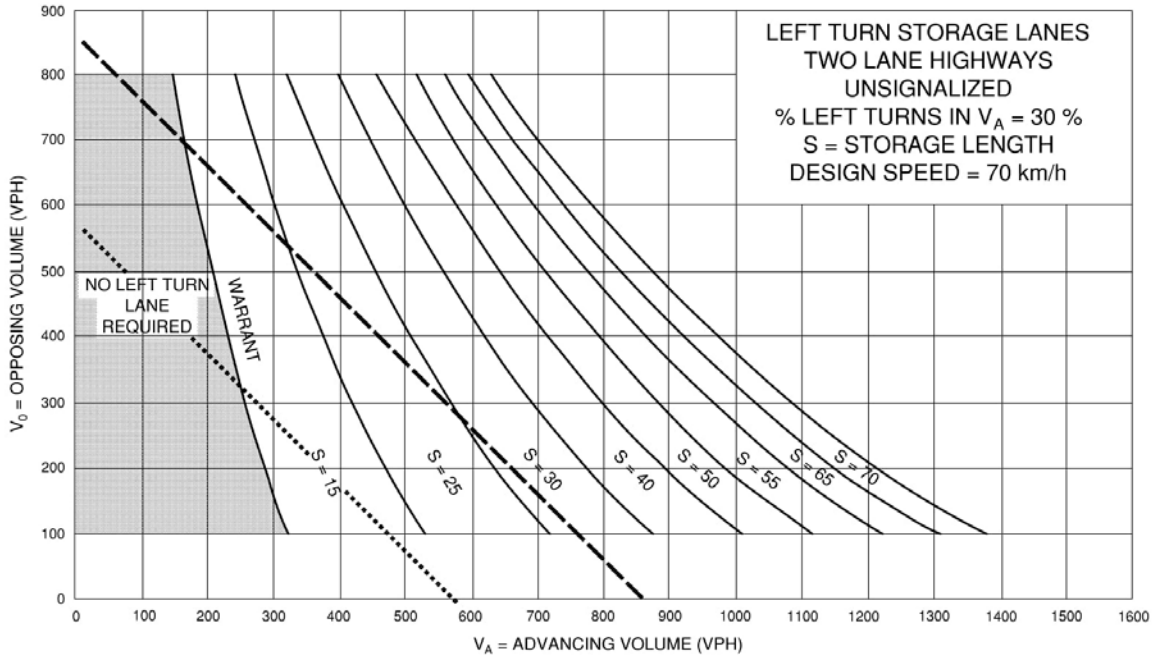
Corseed Access & Industrial Drive / County Road 25

2031 Total Traffic - Northbound

Critical Case - PM Peak Hour

Exhibit 9A-12





Appendix H –
OTM Book 12 – Traffic Signal Justification Sheets

Justification No. 7 - 2031 Total Traffic

Melody Lane / CR 25

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
		Rest. Flow	Numerical	%			
1. Minimum Vehicluar Volume	A. Vehicle volume, all aproaches (average hour)	720	405	56%	10%	NO	NO
	B. Vehicle volume, along minor streets (average hour)	255	39	15%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	365	51%	2%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	2	2%		NO	NO

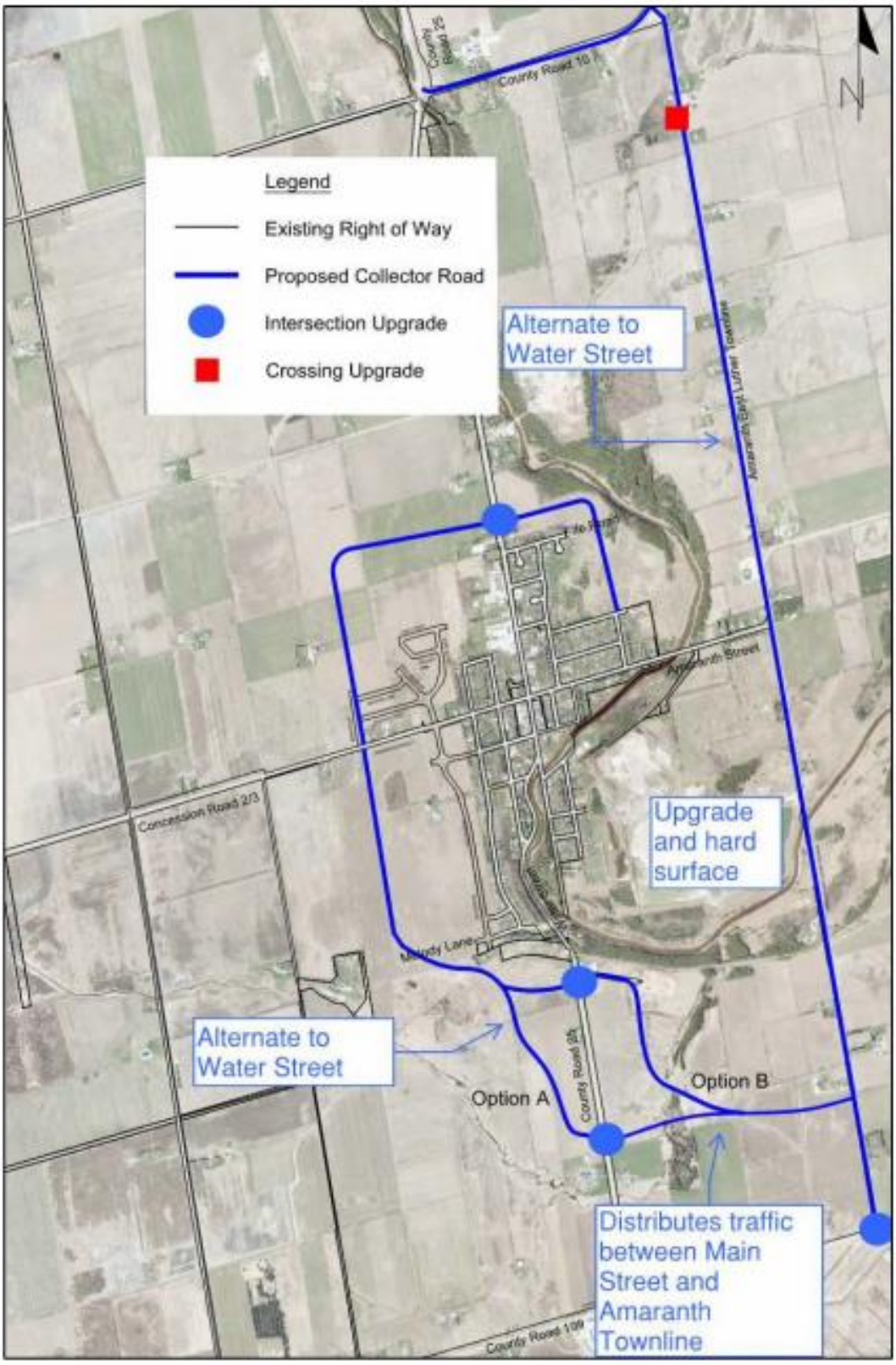
Justification No. 7 - 2031 Total Traffic

Corseed Access & Industrial Drive / CR 25

Justification	Description		Compliance			Signal Warrant	Underground Provisions Warrant
			Sectional		Entire %		
		Rest. Flow	Numerical	%			
1. Minimum Vehicluar Volume	A. Vehicle volume, all aproaches (average hour)	720	546	76%	41%	NO	NO
	B. Vehicle volume, along minor streets (average hour)	170	104	61%		NO	NO
2. Delay to cross traffic	A. Vehicle volume, major street (average hour)	720	416	58%	31%	NO	NO
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	75	35	46%		NO	NO

Appendix I –
Grand Valley TMP Excerpts

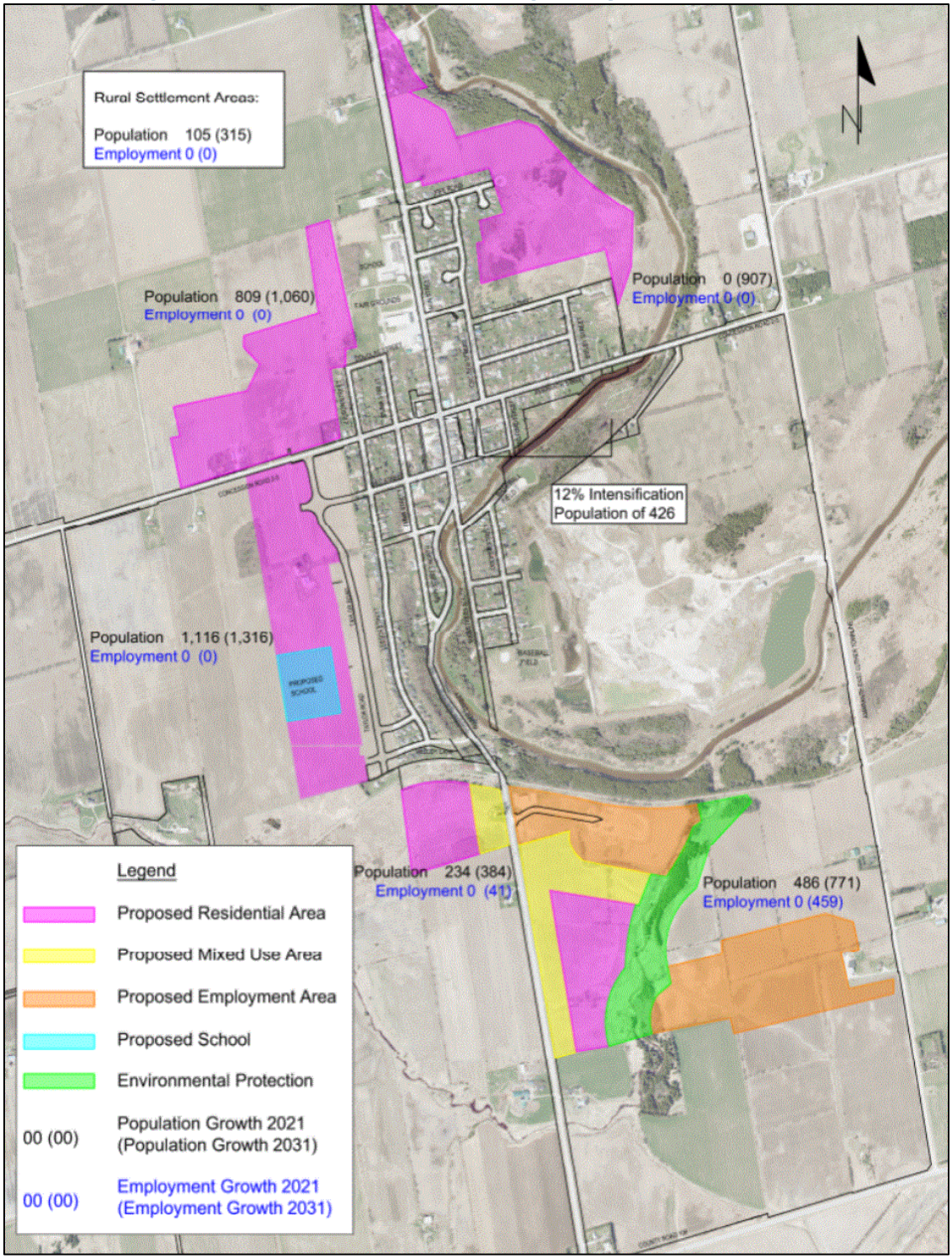
Executive Figure 2: Preferred Transportation Road Network



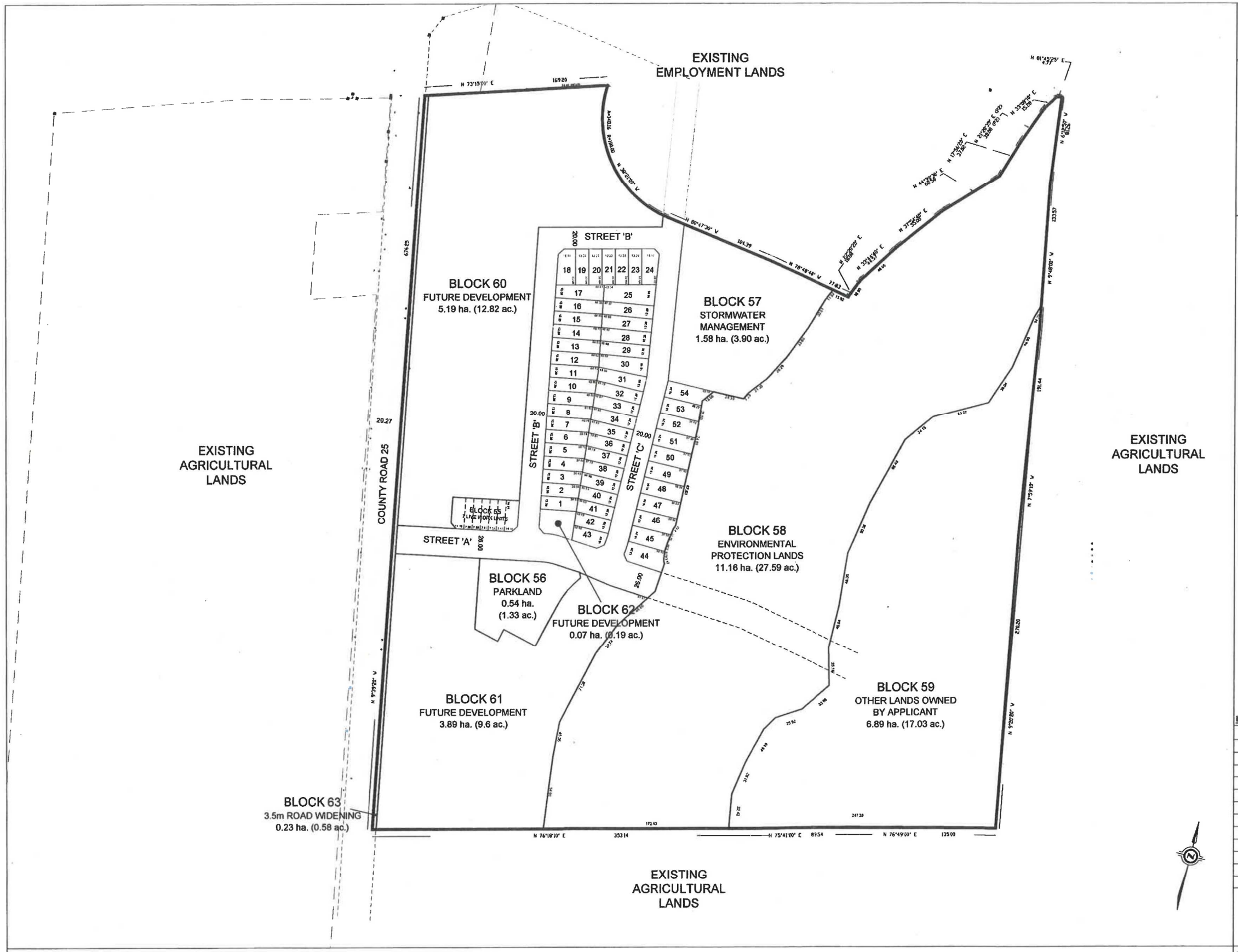
GRAND VALLEY

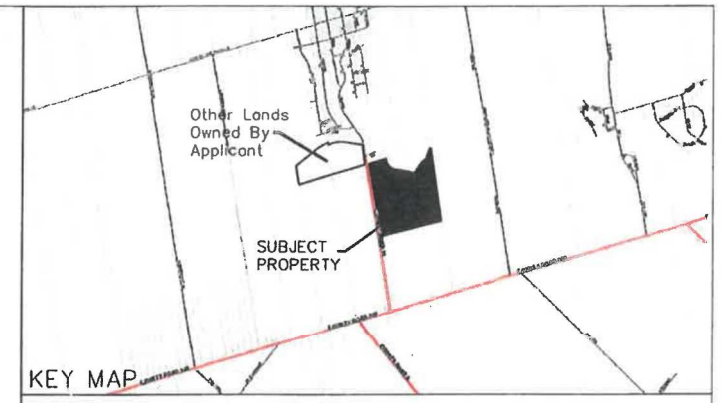
BURNSIDE

Future Population and Employment Distribution



Appendix J –
Moco Subdivision Draft Plan





DRAFT PLAN OF SUBDIVISION

PART OF NORTH HALF OF LOT 31,
CONCESSION 1
FORMERLY IN THE TOWNSHIP OF EAST LUTHER
NOW IN THE
TOWNSHIP OF EAST LUTHER - GRAND VALLEY
COUNTY OF DUFFERIN
2017

0 m 150 m

OWNER'S CERTIFICATE

I HEREBY AUTHORIZE INNOVATIVE PLANNING SOLUTIONS TO PREPARE THIS DRAFT PLAN OF SUBDIVISION AND SUBMIT THIS DRAFT PLAN OF SUBDIVISION FOR APPROVAL.

Oct 31, 2017 — DATE
MOCO FARMS LTD.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT THE BOUNDARIES OF THE LANDS TO BE SUBDIVIDED AND THEIR RELATIONSHIP TO ADJACENT LANDS ARE ACCURATELY AND CORRECTLY SHOWN.

OCT 31, 2017 — DATE
PIER DEROSA, O.L.S

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51(17) OF THE PLANNING ACT

a) SHOWN ON PLAN
b) SHOWN ON PLAN
c) SEE KEY PLAN
d) RESIDENTIAL, MIXED USE, PARKLAND, ENVIRONMENTAL PROTECTION, STORMWATER MANAGEMENT
e) SHOWN ON PLAN
f) SHOWN ON PLAN
g) SHOWN ON PLAN
h) MUNICIPAL WATER
i) GUELPH LOAM
j) SHOWN ON PLAN
k) ALL MUNICIPAL SERVICES
l) NONE

LAND USE STATISTICS

Land Use	Lot / Block No.	Area (ha.)	Units
RESIDENTIAL UNITS (40')	1-43	2.14	43
RESIDENTIAL UNITS (50')	44-54	0.64	11
LIVE WORK UNITS (24.6')	55	0.17	7
FUTURE DEVELOPMENT	60-62	9.15	
PARKLAND	56	0.54	
STORMWATER MANAGEMENT	57	1.58	
ENVIRONMENTAL PROTECTION LANDS	58	11.16	
OTHER LANDS OWNED BY APPLICANT	59	6.89	
20.0 m R.O.W	'B', 'C'	1.38	
26.0 m R.O.W	'A'	0.64	
3.5m ROAD WIDENING	63	0.23	
TOTAL		34.5	61

MOCO FARMS- DRAFT PLAN OF SUBDIVISION
TOWN OF GRAND VALLEY

INNOVATIVE PLANNING SOLUTIONS
PLANNERS • PROJECT MANAGERS • LAND DEVELOPERS
150 Dunlop Street East, Suite 201, Barrie, ON L4M 1B1
P: 705 • 812 • 3281 F: 705 • 812 • 3438 www.ipsconsultinginc.com

FILE NAME: 10-301 MOCO - 010815.dwg	DATE: OCTOBER 31, 2017
PROJECT: 10-301 CORTEL GRAND VALLEY	DRAWN BY: V.L.

Appendix K –
2016 TIS Excerpts

Corseed & Moco Residential Subdivision

Town of Grand Valley
County of Dufferin

Traffic Impact Study for

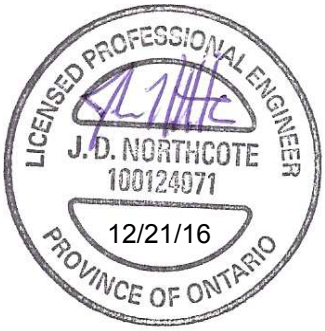
Moco Farms Ltd., Corseed Inc.

Type of Document:
Final Report

Project Number:
JDE – 1417

Date Submitted:
July 22nd, 2015

Date Revised
December 21st, 2016



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The results of the LOS analysis indicate that the study area intersections are operating at a good LOS for all turning movements.

For right turn movements, the criteria outlined in Section E.7 of the MTO GDSOH were applied. Based on the above-noted criteria, right turn lanes are not warranted at all study area intersections.

An analysis was completed for left turn movements at all unsignalized intersections within the study area. Based on the criteria outlined in Section E.B.1 of the MTO GDSOH, a northbound left turn lane is warranted on County Road 25 at Melody Lane with a 15 meter storage length; however, based on our discussions with the Town, widening the road at this intersection is not feasible. Consequently, for the purpose of this analysis, it is assumed that a northbound left turn lane will not be constructed on County Road 25 at Melody Lane. A northbound left turn lane on County Road 25 at the Future Collector is warranted with a 15 meter storage length. MTO GDSOH left turn warrant graphs are provided in **Appendix G**.

Based on the Ontario Traffic Manual Book 12 *Signal Justification*, traffic signals are not warranted at the intersection of Melody Lane / County Road 25 or Future Collector / County Road 25 (results are provided in **Appendix H**).

No additional improvements are required at the existing intersections.

4 Proposed Development Traffic Generation and Assignment

4.1 Traffic Generation

As noted in Section 1.4, development plans for the mixed-use blocks for the Moco Subdivision and Corseed Subdivision have not been finalized at this time. It is anticipated that development of the mixed-use blocks will not commence within 10 years of the current proposed development. Based on our correspondence with the Town and County, although the development of the mixed-use blocks are not anticipated to develop in the short term, a longer-term preliminary review of the anticipated mixed-use development for the year 2031 is required.

A conceptual plan showing a potential configuration of the future mixed-use block in the Moco Subdivision was prepared by IPS Consulting Inc. for the purpose of this analysis (attached in **Appendix A**). A similar conceptual development plan for the mixed-use block in the Corseed Subdivision is not available, consequently, for the purpose of this report, we have assumed that the traffic generated by the Corseed Subdivision would be proportionate to the ratio of the mixed-use developable areas within the Moco and Corseed Subdivisions.

The traffic generation for the Corseed and Moco Subdivisions has been based on the ITE *Trip Generation* data. The following ITE land uses have been applied to estimate the traffic from the proposed development:

- ITE land use 210 (Single-Family Detached Housing)
- ITE land use 230 (Residential Condominium / Townhouse)
- ITE land use 820 (Shopping Center)

The estimated trip generation of the proposed development is illustrated below in **Table 9** and **10**. The AM and PM peak traffic generation for the subject site generally aligns with the AM and PM peak hour in the traffic counts.

Table 9 – Estimated Traffic Generation from Proposed Moco Development

Phase	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
1	Single-Family Detached Housing ITE Land Use: 210	108 units	22	65	86	71	42	113
2	Residential Condominium/Townhouse ITE Land Use: 230	79 units	7	36	43	34	17	50
	Shopping Center ITE Land Use:820	8,177 sq.m. 88,018 sq.ft.	89	55	144	264	286	550
	Internal Capture (10%)[6]		-9	-5	-14	-26	-29	-55
	Pass-by Trips (Shopping Center)		0	0	0	-81	-87	-168
TOTAL PRIMARY TRIPS			**109**	**151**	**259**	**262**	**229**	**490**

Table 10 – Estimated Traffic Generation from Proposed Corseed Development

Phase	Land Use	Size	AM Peak Hour			PM Peak Hour		
			IN	OUT	TOTAL	IN	OUT	TOTAL
1	Single-Family Detached Housing ITE Land Use: 210	75 units	16	47	62	50	30	80
2	Net Mixed Use	25% of Moco	22	22	44	69	69	138
	Pass-by (Mixed Use)		0	0	0	20	22	42
TOTAL PRIMARY TRIPS			**37**	**112**	**149**	**122**	**72**	**194**

In order to be conservative, no transportation modal split has been applied to the above-noted traffic generation calculation.

4.2 Traffic Assignment

For the purposes of this study, it has been assumed that all traffic generated by the proposed development will be new traffic and would not be in the study area if the development was not constructed. The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. The ITE data provides the anticipated percentage of new traffic entering and exiting during the peak hour. Beyond the local area the distribution of traffic from the Moco Subdivision and Corseed Subdivision have been estimated based on the 2011 Transportation Tomorrow Survey [TTS] data (excerpt attached as **Appendix E**). TTS data provides historical origin and destination work trip percentages for specific areas within the County and the Greater Toronto and Hamilton Area [GTHA].

The egress distribution of the residential trips generated by the Moco Subdivision and Corseed Subdivision were based on TTS data for trips originating in Zone 8614 between 07:00 and 09:00. Logically, the distribution of ingress traffic will follow the inverse of the exiting traffic distribution. For each of the individual areas identified in the TTS data, we have selected the probable route of travel, assuming that people will select their route primarily based on travel time.

Commercial trips generated by the Moco and Corseed Subdivisions have been distributed proportionately with the existing traffic volumes on the roads in the study area.

For the Moco Subdivision, it is assumed that all residential trips will access the site via the Moco South Access and all commercial trips will access the site via the Moco North Access.

[6] The internal capture rate (10%) was estimated based on a conservative application of the values provided in Table 7.1 and 7.2 of the ITE *Trip Generation Handbook*.

Appendix L –
Proposed Traffic Distribution Figures

Figure A – Residential Traffic Distribution for the Proposed Moco Development (2021)

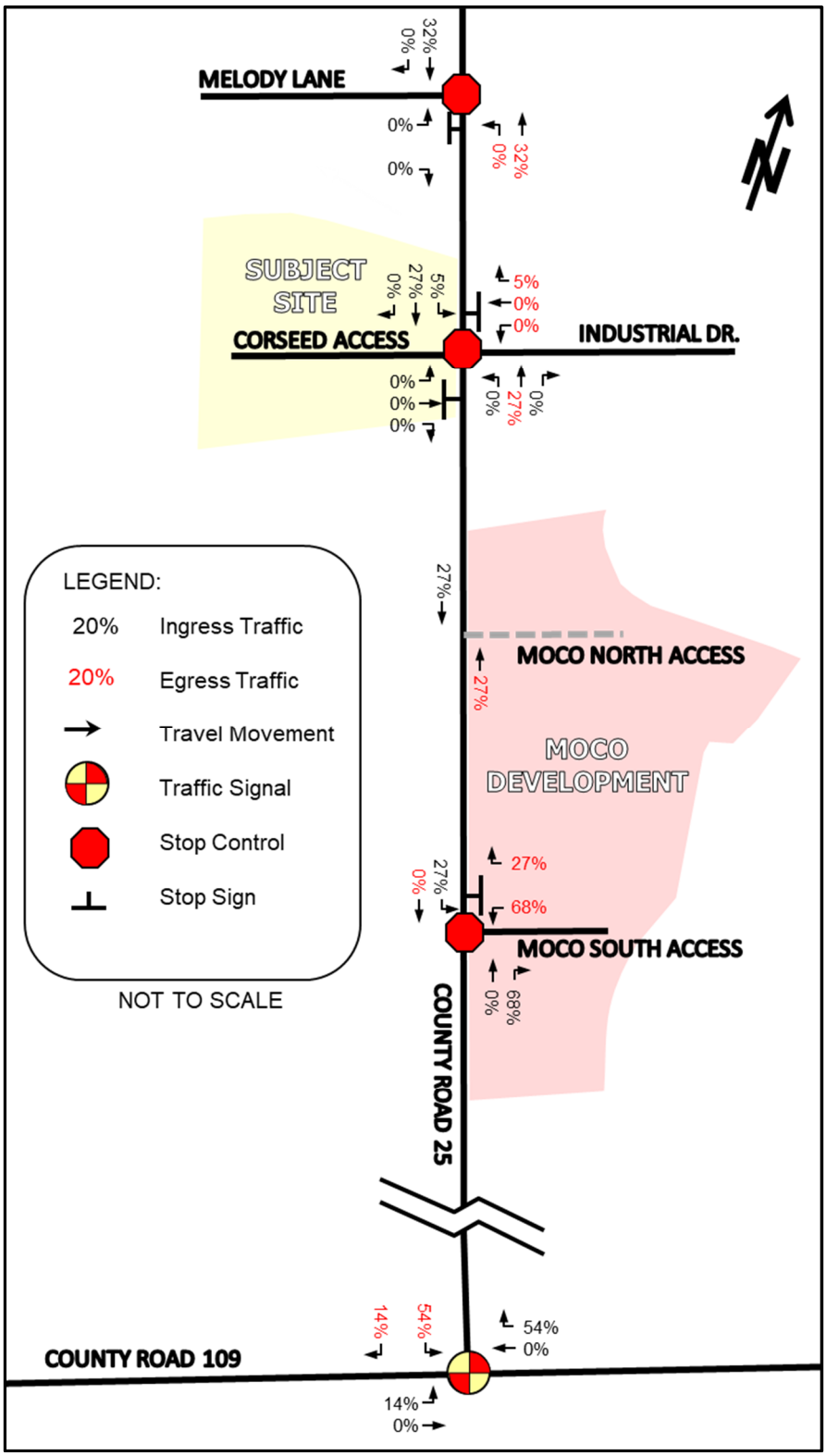


Figure B – Residential Traffic Distribution for the Proposed Moco Development (2026 & 2031)

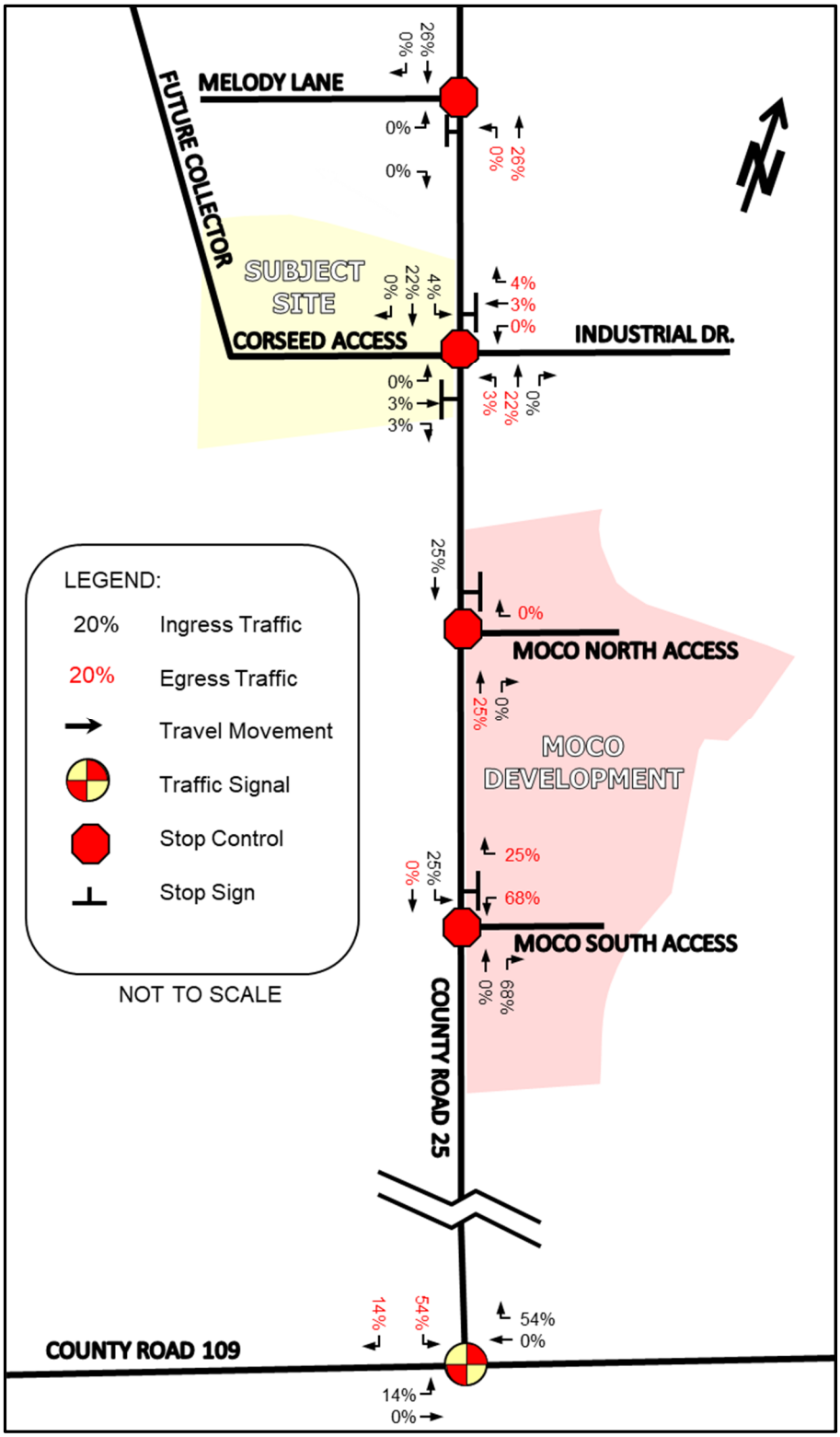


Figure C – Residential Traffic Distribution for the Proposed Corseed Development

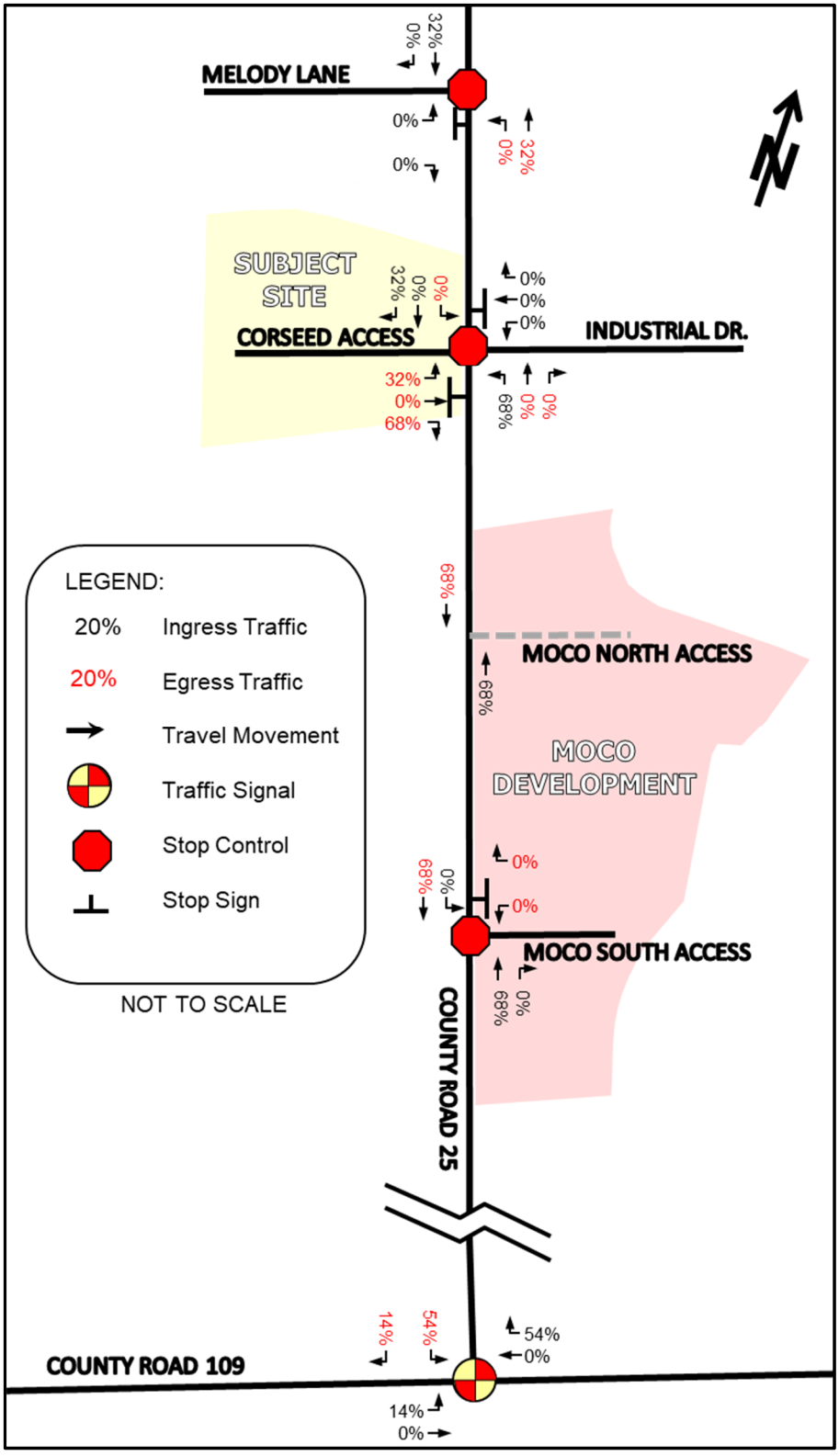


Figure D – Commercial Traffic Distribution for the Proposed Development Moco Development

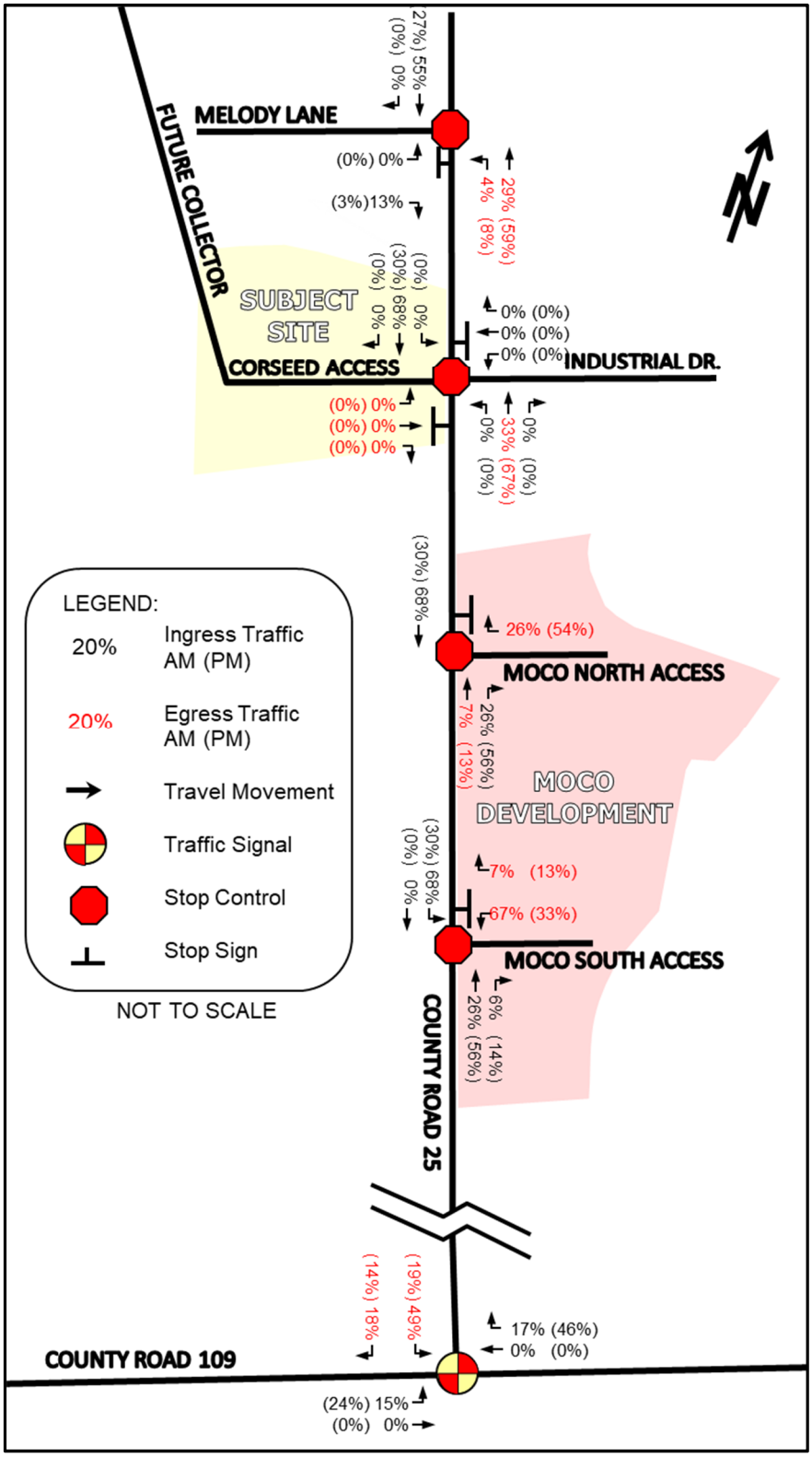
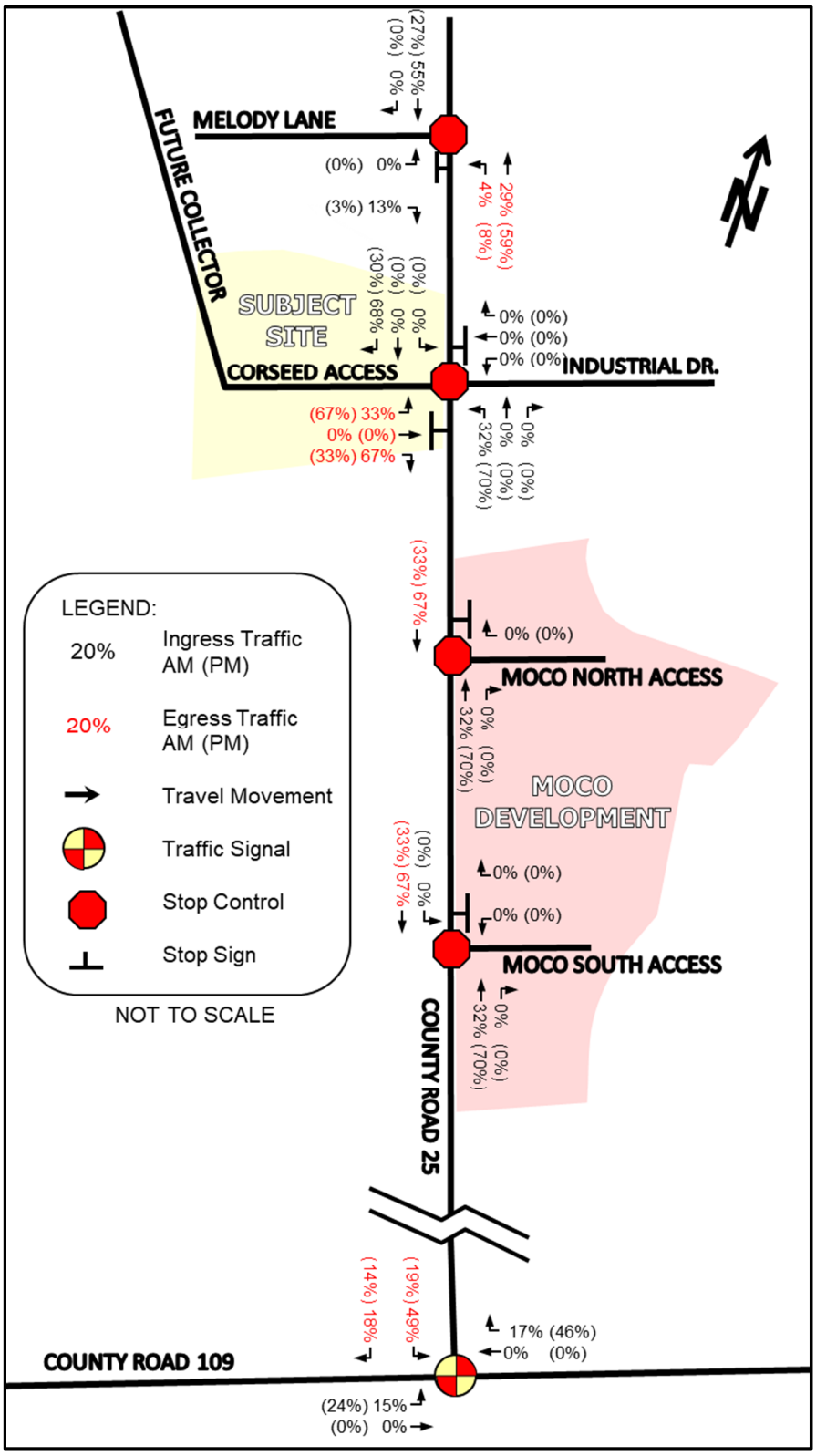


Figure E – Commercial Traffic Distribution for the Proposed Corseed Development



Appendix M –
Transportation Tomorrow Survey Excerpt

Cross Tabulation Query Form - Trip - 2011

Filter Variables

2006 GTA zone of work × ▾ | Planning district of origin × ▾ | (Optional) Table Attribute ▾

Group Attributes

Row Grouping | Column Grouping | Table Grouping

Grouping file: Choose File No file chosen

Filter Selection +

☐ 2006 GTA zone of work ▾ | In ▾ | 8416

Add Delete

Output

○ Comma-delimited table ◉ Column format | Expansion Factor On | Click to Select Load | Load

Execute Query | Select All | Save As

```
Fri Nov 18 2016 11:45:00 GMT-0500 (Eastern Standard Time) - Run Time: 1853ms

Cross Tabulation Query Form - Trip - 2011
Row: 2006 GTA zone of work - gta06_emp
Column: Planning district of origin - pd_orig


Filters:
2006 GTA zone of work - gta06_emp In 8416

Trip 2011
ROW : gta06_emp
COLUMN : pd_orig
   gta06_emp     pd_orig      total
        8416           9         20
        8416          36        258
        8416          39         29
        8416          42         33
        8416          73         67
        8416          80        117
        8416         142         50
        8416         145       1324
```

TTS Cross Tabulation

Cross Tabulation Query Form - Trip - 2011

Filter Variables

2006 GTA zone of origin × | Planning district of desti... × | (Optional) Table Attribute

Group Attributes

Row Grouping | Column Grouping | Table Grouping

Grouping file: Choose File No file chosen

Filter Selection +

2006 GTA zone of origin | In | 8416

And

Start time of trip | In | 700 - 900

Add | Delete

Output

Comma-delimited table | Column format | Expansion Factor On | Click to Select Load | Load

Execute Query | Select All | Save As

```
Wed Nov 23 2016 06:53:39 GMT-0500 (Eastern Standard Time) - Run Time: 2367ms

Cross Tabulation Query Form - Trip - 2011
Row: 2006 GTA zone of origin - gta06_orig
Column: Planning district of destination - pd_dest


Filters:
2006 GTA zone of origin - gta06_orig In 8416
and
Start time of trip - start_time In 700 - 900

Trip 2011
ROW : gta06_orig
COLUMN : pd_dest
  gta06_orig     pd_dest      total
        8416          36         33
        8416          73         67
        8416          79         33
        8416          80        134
        8416         121         33
        8416         141         67
        8416         142         33
        8416         144        100
        8416         145        167
        8416         146         33
        8416         998         33
```