



# Technical Memorandum

To: Brian Hickey, MTO

Date:

2026-02-11

Cc: Tarek Issa

From: Reihaneh Azhdar, Mark Crockford P.Eng.

Project Number:

2025-047

## Re: 6157 Rockdale Road Traffic Impact Study Brief

### 1 Introduction

CGH Transportation has been retained to provide Traffic Impact Study Brief for the proposed redevelopment of the Esso Gas Station in Vars, Ontario to satisfy the Ministry of Transportation of Ontario (MTO) review. The existing Esso Gas Station is located north of Highway 417 at 6175 Rockdale Road and is planned to undergo modernization, including an increase from six vehicle fueling positions to twelve, the relocation and expansion of the attendant service/retail building to the north part of the site, and formalization of the site vehicle parking. The existing car dealer office and storage trailers will remain on the south end of the site. The redevelopment proposes the modification of the existing site access on Rockdale Road to right-in only, the adjustment to the existing northern access on Russland Road, and the severance of the connection between the gas station and car dealership on the site. The car dealership will be retained and have exclusive use of the south access on Russland Road. The build-out year is assumed to be 2027. The MTO scope of work is provided in Attachment 1 and the site concept plan is provided in Attachment 2.

### 2 Existing Conditions

The adjacent roadways to the site include Highway 417, Rockdale Road and Russland Road. Highway 417 is under Ministry of Transportation of Ontario jurisdiction, and both Rockdale Road and Russland Road are City of Ottawa arterial roadways. Rockdale Road is posted at 70 km/h and Russland Road is posted at 80 km/h.

The intersections of Rockdale Road at Russland Road and Rockdale Road at the Highway 417 Westbound Ramp Terminal are both stop-controlled on the minor approach with Rockdale Road functioning as free-flow. The Rockdale Road at the Highway 417 Eastbound Ramp Terminal is a signalized intersection.

### 3 Trip Generation

The ITE Trip Generation Manual 11<sup>th</sup> Edition has been reviewed to determine the average vehicle trip generation rates and directional splits for the existing and proposed land uses by peak hour.

The existing Esso Gas Station land uses fall under the ITE land use code (LUC) 944 for Gasoline/Service Station given the number of vehicle fueling positions and size and function of the attendant retail building. The proposed land uses fall under the ITE land use code (LUC) 945 for Convenience Store/Gas Station given the number of vehicle fueling positions and size and function of the expanded attendant retail building. The trip generation rate was

considered based on the vehicle fueling positions (VFP). The trip generation rates for the existing and proposed land use are provided in Attachment 3.

The total vehicle trip generation for the existing and proposed land uses during the weekday AM peak hour and weekday PM peak hour are summarized in Table 1 along with the net change.

*Table 1: Total Site Vehicle Trip Generation*

Land Use	Land Use Code	VFP	AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
<b>Existing Convenience Store/Gas Station</b>	ITE LUC 944	6 VFP	31	31	62	42	42	84
<b>Proposed Convenience Store/Gas Station</b>	ITE LUC 945	12 VFP	96	96	192	111	111	222
<b>Net Increase</b>			+65	+65	+130	+69	+69	+138

Typical pass-by reductions applied to the Gasoline/Service Station land use's trip generation are 63% AM peak hour and 57% PM peak hour, and for the 9-20 VFP Convenience Store/Gas Station land use are 76% AM peak hour and 75% PM peak hour, which are derived from the recommended value presented in the ITE Trip Generation Manual 11<sup>th</sup> Edition (2011). These rates have been applied to the appropriate land uses and Table 2 summarizes the primary and pass by trip generation.

*Table 2: Trip Generation—Existing and Proposed Land Use*

Horizon	Trip Type	AM Peak Hour				PM Peak Hour			
		Prop.	In	Out	Total	Prop.	In	Out	Total
<b>Existing</b>	Total Trips	<b>100%</b>	<b>31</b>	<b>31</b>	<b>62</b>	<b>100%</b>	<b>42</b>	<b>42</b>	<b>84</b>
	Primary Trips	<b>37%</b>	11	11	22	<b>43%</b>	18	18	36
	Pass-by trips	<b>63%</b>	20	20	40	<b>57%</b>	24	24	48
<b>Proposed</b>	Total Trips	<b>100%</b>	<b>96</b>	<b>96</b>	<b>192</b>	<b>100%</b>	<b>111</b>	<b>111</b>	<b>222</b>
	Primary Trips	<b>24%</b>	23	23	46	<b>25%</b>	27	27	54
	Pass-by trips	<b>76%</b>	73	73	146	<b>75%</b>	84	84	168
<b>Net Increase</b>	Total Trips	-	+65	+65	+130	-	+69	+69	+138
	Primary Trips	-	+12	+12	+24	-	+9	+9	+18
	Pass-by trips	-	+53	+53	+106	-	+60	+60	+120

As shown above, the proposed redevelopment is anticipated to generate 130 additional two-way AM peak hour vehicle trips and 138 new additional two-way PM peak hour vehicle trips from the existing use. Of these additional vehicle trips, 24 two-way AM and 18 two-way PM peak hour primary vehicle trips are forecast, and the remaining 106 two-way AM trips and 120 two-way PM trips are pass-by. From the ITE Trip Generation Manual 11<sup>th</sup> Edition, traffic to and from the existing approximately 850 sq ft used car dealership is forecast to be two (2) two-way AM peak hour trips and three (3) two-way PM peak hour trips. Traffic at this access is therefore considered negligible and it will not be included within the operational analysis. It is noted that given the low magnitude of the increase, rounding errors may be present.

## 4 Vehicle Traffic Distribution and Assignment

Traffic distribution was based on the existing volume splits at study area intersections and a knowledge of the area travel and the nature of the land use. Based on these factors, new primary site-generated trips were assigned to the study area roads as summarized in Table 3 below. The site-generated pass-by trips were considered to predominantly use Highway 417 (70% during the AM peak hour and 75% during the PM peak hour).

Table 3: OD Survey Distribution – Primary Trips

To/From	% of Trips	Via
<b>North</b>	40%	40% Rockdale Rd (N)
<b>South</b>	20%	20% Rockdale Rd (S)
<b>East</b>	25%	15% Russland Rd (E), 10% Highway 417 (E)
<b>West</b>	15%	15% Highway 417 (W)
<b>Total</b>	<b>100%</b>	<b>100%</b>

Attachment 3 includes all the figures referenced in this report including the forecasted net increase in primary auto trips on the study area network, the forecasted net increase in pass-by trips at the site accesses, the redistribution of existing traffic due to the restriction of Access #1 to right-in only, and the forecasted total trip generation for the proposed land use once constructed.

## 5 Traffic Conditions

Synchro 11 was used to model the signalized and stop-controlled intersections. The study area intersection operations are reported using HCM 6<sup>th</sup> Edition calculations for volume-to-capacity ratio (v/c) and delay, and the queues are calculated using Synchro methods. For the unsignalized intersections of Rockdale Road at Russland Road and Rockdale Road at Highway 417 Westbound Ramp Terminal, the level of service (LOS) is based on HCM 6<sup>th</sup> Edition delay calculations for individual movements and the overall intersection. For the signalized intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal, LOS is based on HCM 6<sup>th</sup> Edition v/c for individual lane movements and weighted lane v/c methodology for the overall intersection. Additionally, per MTO capacity analysis guidance, for signalized intersections, movements with a volume-to-capacity ratio (v/c) of over 0.85 throughout the study area are identified as critical, and those with a v/c of over 0.75 on ramp terminal approaches are identified as critical. Within the operational results tables, critical movements will be bolded in red for signalized intersections and movements with LOS F will be bolded in red for unsignalized intersections.

### 5.1 Existing Peak Hour Travel Demand

Existing turning movement counts were acquired from the Ministry of Transportation and the City of Ottawa for the existing study area intersections. Table 4 summarizes the intersection count dates and sources. Detailed turning movement count data and signal timing plans are included in Attachment 4.

Table 4: Intersection Count Date

Intersection	Count Date	Source
<b>Rockdale Road at Russland Road</b>	Thursday, November 23, 2023	City of Ottawa
<b>Rockdale Road at Highway 417 Westbound Ramp Terminal</b>	Thursday, November 14, 2024	Ministry of Transportation
<b>Rockdale Road at Highway 417 Eastbound Ramp Terminal</b>	Thursday, November 14, 2024	Ministry of Transportation

As requested by the MTO, seasonal adjustment factors for all turning movement counts collected during the off-season (colder) months were applied. Highway 417 is identified as “Intermediate Recreation”, all turning movement counts have been increased by a factor of 1.06 to approximate the peak summer traffic volumes.

Attachment 3 provides the existing traffic counts figure and Attachment 5 provides the intersection operation summary tables, and Attachment 6 provides the Synchro worksheets.

Table 5 summarizes the critical movements noted in the existing conditions operations summarized in Attachment 5.

Table 5: Existing Operations – Critical Movements

Intersection	Movement	Volume to Capacity/ Level of Service		Delay (sec)/ Level of Service	
		AM	PM	AM	PM
Rockdale Road at Russland Road <i>(unsignalized)</i>	Westbound Left	-	-	39.6 (E)	36.2 (E)
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>(unsignalized)</i>	Westbound Left	0.72	0.40	107.5 (F)	47.6 (E)
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>(unsignalized)</i>	Northbound Through	0.88 (D)	0.93 (E)	-	-
	Northbound Left	0.08 (A)	0.70 (B)	-	-
	Eastbound Right	0.66 (B)	1.02 (F)	-	-
	Southbound Through/ Right	0.49 (A)	0.86 (D)	-	-

The westbound left-turn movement Rockdale Road at Russland Road operates acceptably.

The westbound left-turn movement at the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal may operate with high delays during the AM peak hour. The movement is still anticipated to have residual capacity, and queues are anticipated to be on the order of four car-lengths.

At the intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal, the northbound through movement is identified as critical during both peak hours and the eastbound right-turn and southbound through/right-turn movements are identified as additional critical movements during the PM peak hour. The interchange serves as the primary connection for Russell and Embrun to the south, and the volumes represent that demand for access to Highway 417. Signal timing adjustments cannot mitigate the existing conditions and widening of the intersection would be required to add capacity for each approach. Widening of each leg of the intersection would have impacts to the overpass and the roundabout southerly at St Pierre Road/Burton Road. Given these are ongoing operational constraints for the area, the review of future conditions will be a relative increase of the background growth and proposed site impacts.

## 5.2 Future Traffic Volumes

### 5.2.1 Background Growth

A review of the background projections from the City’s TRANS Regional Model for the 2011 and 2031 horizons was completed to determine the background growth for each of the study area roadways. The background TRANS model showed negative growth for the study area roads.

As outlined within the United Counties of Prescott and Russell (UCPR) Growth Management Strategy Update, Embrun and Russell forecasts a growth rate of under 1.5%. (Hemson, 2022)

Additionally, background developments were reviewed within the study area. Through this review, only one development was identified within Ottawa, and was found to have negligible impact on the network. Development applications within the industrial lands south of the study area include:

- An addition to an existing building at 960 Burton Road
- Industrial printing facility at 25 Paquet Street

- Industrial building with a gross floor area of 11,266 square metres on Robot Street
- Industrial warehouse facility on Corduroy Street
- Addition to existing building at 940 Burton Road

Moreover, historical Highway 417 annual average daily traffic (AADT) data were reviewed, indicating a growth rate of 1.12% over the past ten years. Based on the foregoing review, to forecast the 2027, 2032, and 2037 future background traffic volumes, a 2.0% compound annual growth rate was bi-directionally applied to the traffic between the Highway and south of the study area, and a 1.0% compound annual growth rate was bidirectionally applied to the traffic between the Highway and north of the study area, for a conservative assessment. The applied growth rates account for the traffic generated by the explicit developments within the study area. The increase in traffic volumes resulting from the applied growth rates for the 2027, 2032, and 2037 horizon is illustrated in Attachment 3.

5.2.2 Future Background Conditions

Attachment 3 includes the 2027, 2032, and 2037 future background traffic volume figures and Attachment 5 includes the future background intersection operation summary tables. The Synchro worksheets are provided in Attachment 6 for the future background conditions. Table 6 summarizes the critical movements noted in the future background conditions operations summarized in Attachment 5.

Table 6: Future Background – Critical Movements

Intersection	Movement	Horizon	Volume to Capacity/ Level of Service		Delay (sec)/ Level of Service	
			AM	PM	AM	PM
<b>Rockdale Road at Russland Road (unsignalized)</b>	Westbound Left	Existing	-	-	39.6 (E)	36.2 (E)
		FB 2027	-	-	42.1 (E)	37.6 (E)
		FB 2032	-	-	46.9 (E)	40.7 (E)
		FB 2037	-	-	53.3 (F)	44.4 (E)
<b>Rockdale Road at Highway 417 Westbound Ramp Terminal (unsignalized)</b>	Westbound Left	Existing	0.72	0.40	107.5 (F)	47.6 (E)
		FB 2027	0.84	0.44	139.8 (F)	51.9 (F)
		FB 2032	1.12	0.52	242.1 (F)	62.5 (F)
		FB 2037	1.52	0.63	420.2 (F)	79.3 (F)
<b>Rockdale Road at Highway 417 Eastbound Ramp Terminal (signalized)</b>	Northbound Through	Existing	0.88 (D)	0.93 (E)	-	-
		FB 2027	0.91 (E)	0.96 (E)	-	-
		FB 2032	0.98 (E)	1.00 (E)	-	-
		FB 2037	1.08 (F)	1.05 (F)	-	-
	Northbound Left	Existing	0.08 (A)	0.70 (B)	-	-

Intersection	Movement	Horizon	Volume to Capacity/ Level of Service		Delay (sec)/ Level of Service	
			AM	PM	AM	PM
		FB 2027	0.09 (A)	0.77 (C)	-	-
		FB 2032	0.10 (A)	0.92 (E)	-	-
		FB 2037	0.12 (A)	1.10 (F)	-	-
	Eastbound Right	Existing	0.66 (B)	1.02 (F)	-	-
		FB 2027	0.67 (B)	1.09 (F)	-	-
		FB 2032	0.70 (B)	1.20 (F)	-	-
		FB 2037	0.71 (C)	1.32 (F)	-	-
	Southbound Through/ Right	Existing	0.49 (A)	0.86 (D)	-	-
		FB 2027	0.49 (A)	0.88 (D)	-	-
		FB 2032	0.50 (A)	0.90 (D)	-	-
		FB 2037	0.53 (A)	0.92 (E)	-	-

At the 2027 future background horizon, the westbound left movement at the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal delay will increase during the PM peak to a level of service F, although the movement is expected to have residual capacity. The northbound left movement at the intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal is identified as critical during the PM peak hour, in addition to the operational issues previously noted in the existing conditions. No additional delay or capacity issues were noted beyond the existing conditions.

At the 2032 future background horizon, the westbound left movement at the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal is noted to have increased from v/c of 0.84 to 1.12 during the AM peak hour, to be over theoretical capacity due to the background growth at this horizon. The northbound through movement at the intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal is noted to have increased from v/c of 0.96 to 1.00 during the PM peak hour to be at theoretical capacity at this horizon. No other operational issues are noted beyond those described in the existing and 2027 future background conditions.

At the 2037 future background horizon, the westbound left movement at the intersection of Rockdale Road at Russland Road may operate with high delays during the AM peak hour. The movement is still anticipated to have residual capacity, however, and queues are anticipated to be on the order of six car-lengths. The northbound through movement at the intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal and is noted to have moved from v/c of 0.98 to 1.08 during the AM peak hour to be over theoretical capacity and the northbound left-turn movement is noted to have increased from v/c 0.92 to 1.10 during the PM peak hour to be over theoretical capacity due to the background growth at this horizon. No other operational issues are noted beyond those described in the existing, and 2027 and 2032 future background conditions.

Overall, the background growth will incrementally reduce the operating conditions for the Rockdale Road at Russland Road intersection for the westbound left-turn movement. Similarly, the Rockdale Road at Highway 417 Eastbound Ramp Terminal will experience the same incremental impacts with level of service F conditions degrading at a higher rate, due to the over capacity condition and modelling constraints. The Rockdale Road at Highway 417 Westbound Ramp Terminal illustrates this as the delay drastically increases by approximately four times from the existing conditions to 2037 due to the increased background growth along Rockdale Road.

5.2.3 Future Total Conditions

Attachment 3 includes the 2027, 2032, and 2037 future total traffic volumes figures, and Attachment 5 includes the future total intersection operation summary tables. The Synchro worksheets are provided in Attachment 6 for the future total conditions. Table 7 summarizes the critical movements noted in the future total conditions operations summarized in Attachment 5.

Table 7: Future Total – Critical Movements

Intersection	Movement	Horizon	Level of Service/ Volume to Capacity		Level of Service/ Delay (sec)	
			AM	PM	AM	PM
<b>Rockdale Road at Russland Road (unsignalized)</b>	Westbound Left	Existing	-	-	39.6 (E)	36.2 (E)
		FB 2027	-	-	42.1 (E)	37.6 (E)
		FT 2027	-	-	116.8 (F)	227.5 (F)
		FB 2032	-	-	46.9 (E)	40.7 (E)
		FT 2032	-	-	135.2 (F)	253.9 (F)
		FB 2037	-	-	53.3 (F)	44.4 (E)
		FT 2037	-	-	156.5 (F)	292.5 (F)
<b>Rockdale Road at Highway 417 Westbound Ramp Terminal (unsignalized)</b>	Westbound Left	Existing	0.72	0.40	107.5 (F)	47.6 (E)
		FB 2027	0.84	0.44	139.8 (F)	51.9 (F)
		FT 2027	1.07	0.57	234.4 (F)	78.6 (F)
		FB 2032	1.12	0.52	242.1 (F)	62.5 (F)
		FT 2032	1.44	0.68	393.7 (F)	99.6 (F)
		FB 2037	1.52	0.63	420.2 (F)	79.3 (F)
		FT 2037	2.00	0.81	664.7 (F)	134.1 (F)
<b>Rockdale Road at Highway 417 Eastbound Ramp Terminal (signalized)</b>	Northbound Through	Existing	0.88 (D)	0.93 (E)	-	-
		FB 2027	0.91 (E)	0.96 (E)	-	-

Intersection	Movement	Horizon	Level of Service/ Volume to Capacity		Level of Service/ Delay (sec)	
			AM	PM	AM	PM
		FT 2027	0.92 (E)	0.96 (E)	-	-
		FB 2032	0.98 (E)	1.00 (E)	-	-
		FT 2032	1.00 (E)	1.01 (F)	-	-
		FB 2037	1.08 (F)	1.05 (F)	-	-
		FT 2037	1.10 (F)	1.06 (F)	-	-
		Existing	0.08 (A)	0.70 (B)	-	-
	Northbound Left	FB 2027	0.09 (A)	0.77 (C)	-	-
		FT 2027	0.10 (A)	0.89 (D)	-	-
		FB 2032	0.10 (A)	0.92 (E)	-	-
		FT 2032	0.11 (A)	1.06 (F)	-	-
		FB 2037	0.12 (A)	1.10 (F)	-	-
		FT 2037	0.13 (A)	1.29 (F)	-	-
	Eastbound Right	Existing	0.66 (B)	1.02 (F)	-	-
		FB 2027	0.67 (B)	1.09 (F)	-	-
		FT 2027	0.64 (B)	1.09 (F)	-	-
		FB 2032	0.70 (B)	1.20 (F)	-	-
		FT 2032	0.66 (B)	1.20 (F)	-	-
		FB 2037	0.71 (C)	1.32 (F)	-	-
	Southbound Through/ Right	FT 2037	0.68 (B)	1.32 (F)	-	-
		Existing	0.49 (A)	0.86 (D)	-	-
		FB 2027	0.49 (A)	0.88 (D)	-	-
		FT 2027	0.54 (A)	0.91 (E)	-	-
		FB 2032	0.50 (A)	0.90 (D)	-	-
	FT 2032	0.56 (A)	0.94 (E)	-	-	

Intersection	Movement	Horizon	Level of Service/ Volume to Capacity		Level of Service/ Delay (sec)	
			AM	PM	AM	PM
		FB 2037	0.53 (A)	0.92 (E)	-	-
		FT 2037	0.58 (A)	0.96 (E)	-	-
Site Access #2 at Russland Road (unsignalized)	Eastbound Left/Right	FT 2027	-	-	11.2 (B)	12.0 (B)
		FT 2032	-	-		
		FT 2037	-	-		

During both the AM and PM peak hours, with the exception of the westbound approach at the intersections of Rockdale Road at Russland Road and Rockdale Road at Highway 417 Westbound Ramp Terminal, the study area network intersections at the future total horizons operate similarly to the corresponding future background conditions.

At the intersection of Rockdale Road at Russland Road, the westbound left movement is forecast to be over theoretical capacity during both peak hours at all future total horizons. This effect is a result of the MTO’s requirement that left turning movements from Site Access #1 onto Rockdale Road. This concentrates the outbound volumes to the westbound left-turn from Russland Road. These forecasted operations are not anticipated to impact free flow north-south corridor of Rockdale Road and delays are contained on the one approach. The inclusion of an auxiliary westbound right-turn lane would reduce delay by 29 seconds during the AM peak hour and by 38 seconds during the PM peak hour, however, the westbound left movement remain over theoretical capacity during both peak hours. Therefore, the inclusion of an additional lane on the approach would not mitigate the anticipated operations. The 95<sup>th</sup> percentile queues are estimated to be approximately 100-110 metres during the peak hours and may reach Site Access #2 if they exceed these lengths.

The intersection of Rockdale Road at Russland Road is an arterial to arterial intersection and will fall within the City of Ottawa development charge program for improvements. Therefore, based on an operational analysis using the parameters defined by the City of Ottawa’s Transportation Impact Assessment Guidelines (2017), the intersection of Rockdale Road at Russland Road would be assessed under a peak hour factor of 1.00 for future conditions. A sensitivity analysis has been provided in Attachment 5 for the 2037 future total horizon to document the change in peak hour factor would have on the anticipated operations. The westbound left movement delays would be reduced approximately 70 seconds during the AM peak and 140 seconds during the PM peak, both would remain at a level of service F, with 95<sup>th</sup> percentile queues of approximately 70 metres during both peak hours.

The westbound left turn movement at the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal is forecast to operate with high delays during all future horizons and the capacity issues noted in the 2032 future background horizon, now appear in the 2027 future total horizon, during the AM peak hour. The operational issues are a result of the background growth and with the site impact limited to additional north-south volume along Rockdale Road and no site volumes are expected to use this movement. The forecasted 95<sup>th</sup> percentile queues, up to 68 metres, would be contained within the existing ramp and would not spill back to the Highway 417. Given the residual capacity of the other movements at this intersection, as shown in Attachment 5, signalization may mitigate the identified operational issues.

The northbound through movement at the intersection of Rockdale Road at the Highway 417 Eastbound Ramp Terminal was forecast to exceed the theoretical capacity during the 2037 future background horizon and with the

site volumes included this is projected to occur during the PM peak for the 2032 future total horizon. The site volumes will have a minimal impact to the degradation of the movement operations.

The northbound left turn movement at the intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal was forecast to operate over theoretical capacity during the PM peak hour by the 2037 future background horizon. With the addition of site generated traffic volumes this condition is projected to be advanced to the 2032 future total horizon. While the site will not use this movement, the increased southbound volumes will reduce the capacity of the northbound left.

The remaining two critical movements at the Rockdale Road at Highway 417 Eastbound Ramp Terminal, the eastbound right turn and southbound through/right-turn, are forecasted to operate similarly between the future background horizons and the future total horizons. The southbound through/right will not exceed capacity in any horizon, and no site volumes will use the eastbound right-turn movement.

Overall, the Rockdale Road at Highway 417 Eastbound Ramp Terminal intersection currently has a number of critical movements and the forecasted background conditions will continue to exacerbate these operational issues. The 2037 future background horizon will see a number of movements over capacity and would require additional lane capacity to address these issues.

Site Access #1 at Rockdale Road operates under free-flow conditions and therefore has no operational summary. The eastbound movement at Site Access #2 at Russland Road intersection is forecast to operate well.

## 6 Warrant Analysis

Signal warrant calculations are provided in Attachment 7.

Signal warrant analysis of the intersections of Rockdale Road at Russland Road and Rockdale Road at Highway 417 Westbound Ramp Terminal, with existing volumes, were performed using the Ontario Traffic Manual (OTM) Book 12, Justifications 1 through 4. The intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal was found to meet Justification 4. Although the warrant was met, the Ministry of Transportation does not use the minimum four-hour vehicle justification for considering a traffic signal for intersections under its jurisdiction per OTM Book 12 Section 4.7.

Signal warrant analysis was performed for the intersections of Rockdale Road at Russland Road and Rockdale Road at Highway 417 Westbound Ramp Terminal for all future background and total conditions, using OTM Book 12 Justification 7. Using the 2027 Future Total Conditions Volumes, the intersection of Rockdale Road at Russland Road is projected to meet the Justification 7 signal warrants for minimum vehicular volume. The intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal is projected to meet the warrants for minimum vehicular volume in the 2027 future background conditions.

Given the intersection of Rockdale Road at Russland Road is an arterial-arterial intersection, signalization would fall under the City of Ottawa development charge program and should be monitored to determine if and whether signalization becomes desirable. With respect to the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal, signalization would likely be the appropriate mitigation measure to facilitate operations at this intersection for the high northbound right-turn and southbound left-turn volumes. The Ministry of Transportation of Ontario should monitor the intersection in the future to determine whether signalization becomes desirable to address background conditions.

The left-turn warrant calculation sheets are provided in Attachment 8.

At the intersection of Rockdale Road at Russland Road, the southbound left-turn lane met the warrants during the PM peak hour in the existing conditions. As this is an arterial-arterial intersection, the implementation of the left-turn lane falls under the City's development charge improvement program. No additional turn lane warrants were noted in the future background and total horizons. As there are no northbound left-turn and eastbound left-turn volumes the warrant does not apply to these approaches. However, the volumes on Rockdale Road are high enough that any turning movements would result in the northbound left-turn warrant being met for consideration.

At the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal, the southbound left-turn lane met the warrants during both peak hours in the existing conditions. The inclusion of the southbound left-turn lane has minimal impact on the overall intersection operations. As there are no eastbound volumes, the warrant does not apply to the westbound approach.

Right turn volumes have been reviewed at the study area intersections. At the intersection of Rockdale Road at Russland Road, northbound right-turn volumes exceed 90 vehicles during the PM peak hour in the existing conditions; therefore, it is recommended that the City of Ottawa further review this intersection to determine whether the provision of an auxiliary right-turn lane would be possible.

At the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal, northbound right-turn volumes exceed 90 vehicles during both peak hours in the existing conditions, and it is recommended that the MTO further review this intersection to determine whether the provision of an auxiliary right-turn lane would be possible.

At the intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal, southbound right turn volumes exceed 90 vehicles during the PM peak hour in the existing conditions; therefore, it is recommended that the MTO further review this intersection to determine whether the provision of an auxiliary right-turn lane would be possible.

## 7 Mitigation Discussion

Some critical and over capacity movements have been noted, as a result of background growth, and possible mitigation measures have been discussed in the operational analysis summary sections 5.1, 5.2.2, and 5.2.3.

It is noted that a factor in the mitigation options discussed below are the net traffic volumes used within the assessment. The volumes were adjusted by the seasonal adjustment factor and compound annual growth, resulting in volumes that may not be realized or overly conservative. Total background forecasts of 600-1000 vehicles in a single lane on Rockdale Road are nearing capacity for the roadway, and this is reflected in the operational constraints.

### 7.1 Rockdale Road at Russland Road

The westbound movement at the intersection of Rockdale Road at Russland Road is forecast to operate with high delays in the future background conditions and over theoretical capacity in the future total conditions due to the restriction of Site Access #1. The intersection operational analysis indicates residual capacity on the other movements, suggesting that signalization may mitigate the operational issues identified for the westbound movement. Signal warrant analysis of justification 7 is also met for this intersection in the 2027 future total conditions and the southbound left-turn lane and northbound right-turn lane at this intersection met the warrants in the existing conditions. Alternatively, permitting the westbound left-turn movement at Site Access #1 could mitigate the need for signalization at the intersection of Rockdale Road at Russland Road. The City of Ottawa will

need to review this intersection to determine whether signalization and auxiliary lane widening improvements are required and timelines to fund these improvements.

With respect to the westbound left-turn being permitted at Site Access #1, a sensitivity review of the operations was completed, and the critical movements are summarized in Table 8. Attachment 3 includes the 2027, 2032, and 2037 future total traffic volume figures and Attachment 5 includes the future total intersection operation summary tables.

*Table 8: Future Total – Critical Movement Sensitivity with Site Access #1 Outbound Left-Turn*

Intersection	Movement	Horizon	Level of Service/ Delay (sec)	
			AM	PM
<b>Rockdale Road at Russland Road (unsignalized)</b>	Westbound Left	FT 2027 w/ Site Access #1 left	116.8 (F)	227.5 (F)
		FT 2027 w/o Site Access #1 left	54.6 (F)	55.0 (F)
		FT 2032 w/ Site Access #1 left	135.2 (F)	253.9 (F)
		FT 2032 w/o Site Access #1 left	62.2 (F)	60.2 (F)
		FT 2037 w/ Site Access #1 left	156.5 (F)	292.5 (F)
		FT 2037 w/o Site Access #1 left	72.3 (F)	69.3 (F)
<b>Rockdale Road at Access #1 (unsignalized)</b>	Westbound Left	FT 2027 w/ Site Access #1 left	-	-
		FT 2027 w/o Site Access #1 left	24.6 (C)	43.0 (E)
		FT 2032 w/ Site Access #1 left	-	-
		FT 2032 w/o Site Access #1 left	25.6 (D)	45.9 (E)
		FT 2037 w/ Site Access #1 left	-	-
		FT 2037 w/o Site Access #1 left	26.9 (D)	49.8 (E)

Permitting the westbound left-turn movement at Site Access #1 would result in a significant reduction in delay for the westbound left movement at the intersection of Rockdale Road at Russland Road. Although the movement may operate with high delays during both peak hours, it is still anticipated to retain residual capacity, with the forecasted 95<sup>th</sup> percentile queues of up to 64 metres. Signal warrant analysis was performed for the intersection of Rockdale Road at Russland Road for all future total conditions, using OTM Book 12 Justification 7, and the warrants were not met.

Site Access #1 at Rockdale Road intersection is forecast to operate acceptably.

Therefore, it is recommended that Site Access #1 operates as right-in/left-out until the City of Ottawa reviews the intersection of Rockdale Road at Russland Road and implements any required improvements. Following the implementation of the improvements, Site Access #1 would be restricted to right-in only.

## 7.2 Rockdale Road at Highway 417 Westbound Ramp Terminal

The westbound left-turn movement at the intersection of Rockdale Road at Highway 417 Westbound Ramp Terminal is expected to operate with high delays in the existing and future background conditions and is forecast to be over theoretical capacity beyond the 2032 future background conditions due to the background growth, specifically during the AM peak. Using Justification 7 it is projected that signals will be warranted by the 2027 future background conditions and the southbound left-turn lane and northbound right-turn lane at this intersection were shown to meet the warrants in the existing conditions. To mitigate the existing and future background operational constraints, it is recommended that the MTO further review this intersection to determine whether signalization and auxiliary lane widening improvements are possible for this intersection.

## 7.3 Rockdale Road at Highway 417 Eastbound Ramp Terminal

At the intersection of Rockdale Road at Highway 417 Eastbound Ramp Terminal, a number of movements were identified as critical during the existing conditions and are forecast to operate over theoretical capacity by the 2037 future background horizon. Given the intersection is already signalized, the improvements are limited to timing changes, such as additional time for northbound left-turns, or widening for additional capacity, such as northbound through. It is therefore recommended that the MTO further review this intersection to determine the preferred improvements for the intersection.

## 8 Site Review

The proposed redevelopment includes the restriction of the site access on Rockdale Road to right-in only (Access #1) and adjustment of the existing access on Russland Road (Access #2). Access #1 on Rockdale Road is located approximately 250 metres from the Highway 417 westbound ramp terminal and approximately 46 metres from the Rockdale Road/Russland Road intersection.

The site accesses have been reviewed for the required vehicle movements, assumed to include fuel trucks accessing the site via Access #1, and fire services accessing the site via Access #1 and #2. Turning templates for the noted vehicles have been provided in Attachment 9. The geometry recommendations include:

- Access #1 – 6.74-metres-wide at its typical width with a compound curve on the south side consisting of a 25.0-metre radius and a 3.0-metre return radius and a 30.0-metre radius on the north side to accommodate the gas supply truck movements
- Access #2 – 6.7-metres-wide at its typical width with corner radii of 3.0 metres to the truck apron for passenger vehicles; and to accommodate truck movements, the access is 9.43-metres wide including the truck apron (from barrier curb to barrier curb) with a compound curve on the north side consisting of a 5.1-metre radius transitioning into a 25.0-metre radius and a 4.0-metre return radius.

According to Ottawa's Private Approach By-Law, private approaches are stated to have a maximum width of 9.0 metres at the street line, and at the curb line or edge of roadway. The truck and loading operations require the access to be in excess of this requirement and an exemption to the City of Ottawa Private Approach By-Law is supported for this use.

According to Ontario Provincial Standard Drawing (OPSD) 350.010, the minimum required width for a one-way driveway is 4.5 metres, and the maximum permitted width is 7.5 metres and the minimum required width for a two-way driveway is 7.2 metres, and the maximum permitted width is 12.0 metres. Additionally, the minimum required radius for a driveway is 4.5 metres, and the maximum permitted is 12.0 metres. All site accesses meet the width requirements of OPSD 350.010.

A review of the TAC Geometric Design Guidelines does not identify a recommended or desirable throat length for the proposed land use. However, the minimum throat length identified by TAC for the land uses considered on an arterial road is 15 metres.

The throat length at Access #1 to the first on-site conflict is approximately 11.5 metres. Given the intent of the access to prohibit all movements except for the right-in movement, the access is curved and thus typical application of the TAC throat length from the end of the curb return results in a lower nominal throat length. The requirement for the large turning radii supporting fuel delivery trucks results in approximately 25.0 metres between the roadway on Rockdale Road and the first on-site conflict. This space will be used to permit vehicles to queue within the site and off the roadway. Therefore, the proposed throat length is considered sufficient.

The throat length at Access #2 to the first on-site conflict is approximately 10.0 metres. Given the requirement for the large turning radii supporting fuel delivery trucks, this results in approximately 13.0 metres between the roadway on Russland Road and the first on-site conflict to permit vehicles to queue within the site and off the roadway. Moreover, approximately 9.0 metres of open area is provided between the access and fueling positions, resulting in a total available storage length of approximately 22.0 metres, which further limits potential spillback onto Russland Road. Therefore, the proposed throat length is considered sufficient.

The Geometric Design Guide for Canadian Roads (TAC, 2017) suggests minimum corner clearance values for driveways of 25.0 metres along arterial road. The corner clearance between Access #1 on Rockdale Road and the intersection of Rockdale Road at Russland Road is approximately 46.0 metres and is therefore considered acceptable.

Collision data has been acquired from the City of Ottawa's open data website ([data.ottawa.ca](http://data.ottawa.ca)) for five years prior to the commencement of this study and no collision history is noted at the site accesses based a on review of coordinates.

## 9 Conclusion

The following summarizes the analysis and results presented in this report:

- The existing Esso Gas Station is located north of Highway 417 at 6175 Rockdale Road, and the proposed site development includes an increase from six vehicle fueling positions to twelve and the relocation and expansion of the attendant service/retail building to the north part of the site, and formalization of the site vehicle parking to be built out by 2027
- The existing site access on Rockdale Road will be restricted to right-in only, the existing northern access on Russland Road will be adjusted, and the southern access on Russland Road will be used exclusively for the adjacent car dealership land use
- The site accesses meet the Private Approach By-Law provisions and the Ontario Provincial Standard Drawing (OPSD) 350.010 width requirements, supporting emergency services and fuel trucks, and can be provided with the following recommendations:
  - Access #1 is recommended to be 6.74-metres-wide at its typical width with a compound curve on the south side consisting of a 25.0-metre radius and a 3.0-metre return radius and a 30.0-metre radius on the north side to accommodate the gas supply truck movements
  - Access #2 is recommended to be 6.7-metres-wide at its typical width with corner radii of 3.0 metres to the truck apron for passenger vehicles; and to accommodate truck movements, the access is 9.48-metres wide including the truck apron (from barrier curb to barrier curb) with a

compound curve on the north side consisting of a 5.1-metre radius transitioning into a 25.0-metre radius and a 4.0-metre return radius

- The proposed throat lengths are considered sufficient, and corner clearance meets the TAC suggested minimum values
- Access #1 on Rockdale Road is restricted to a right-in only as requested by the MTO
- The Rockdale Road at Russland Road intersection operational forecast resulted in the following:
  - The westbound left-turn movement currently operates acceptably
  - The westbound left-turn movement may operate with high delays during the AM peak hour in the 2037 future background conditions
  - In the future total conditions, the westbound left movement may operate over theoretical capacity due to the restriction of the site Access #1 on Rockdale Road to right-in only
  - The inclusion of an auxiliary westbound right-turn lane would not mitigate the anticipated operations
  - A sensitivity analysis under the City of Ottawa Transportation Impact Assessment Guidelines (2017) indicated that the westbound left movement delays would be reduced; however, the level of service would remain at LOS F during both peak hours
  - The intersection met the southbound left-turn lane and northbound right-turn lane warrants in the existing conditions and the Justification 7 signal warrants for the minimum vehicular volumes as of 2027 future total conditions
  - Permitting the westbound left-turn movement at Site Access #1 could mitigate the need for signalization at the intersection of Rockdale Road at Russland Road
  - The need for signalization of this intersection and for auxiliary lane widening is recommended to be reviewed by the City of Ottawa
  - Sensitivity analyses permitting the westbound left-turn movement at Site Access #1 indicated that the westbound left movement delays at the intersection of Rockdale Road at Russland Road would be reduced, with residual capacity maintained for the movement
  - Site Access #1 is recommended to operate as right-in/left-out until the City of Ottawa reviews the intersection of Rockdale Road at Russland Road and implements any required improvements. Following the implementation of the improvements, Site Access #1 would be restricted to right-in only
- The Highway 417 Westbound Ramp Terminal operational forecasts resulted in the following:
  - The westbound left turn movement currently experiences a high delay during the AM peak hour
  - The westbound left turn movement may operate with high delays during both peak hours in the 2027 future background conditions and is expected to operate over theoretical capacity during the AM peak hour in the 2032 future background conditions or 2027 future total conditions
  - The westbound queue will not spill back to the Highway 417
  - The intersection met the southbound left-turn lane and northbound right-turn lane warrants in the existing conditions and the Justification 7 signal warrants for the minimum vehicular volumes as of the 2027 future background conditions and the need for signalization of this intersection and for auxiliary lane widening is recommended to be reviewed by MTO through future monitoring to address background conditions
  - Any improvements to address the existing and background conditions would be expected to accommodate the new gas station site trips

- The Highway 417 Eastbound Ramp Terminal operational forecasts resulted in the following:
  - The existing conditions note critical movements for the northbound through movement during both peak hours, and the eastbound right turn and southbound through/right turn movements during the PM peak hour
  - During the 2027 future background horizon, the northbound left turn movement will become critical during the PM peak hour, with the volume to capacity increasing with continued background growth
  - For movements that the site trips were assigned, the impacts are noted to be minimal with 0.01 to 0.04 v/c increases on the northbound through and southbound through/right-turn
  - The northbound left is expected to see higher v/c increase of 0.19 due to the southbound volumes
  - The eastbound right turn movement will not change from the background conditions
  - Mitigation for the background conditions would require widening the north/south approaches and would be expected to accommodate the forecasted new gas station site trips

Overall, the review of the existing study area intersections notes a number of critical operations for the Highway 417 ramp terminals and the Rockdale Road at Russland Road intersection and are subject to these operational constraints in the forecasted background conditions. Should the intersections be mitigated for the existing and background operational constraints, these would accommodate the development traffic, and the scope of those mitigation measures are beyond the proposed development and reside within other jurisdictional responsibilities. In the interim, and prior to the implementation of the mitigation measures, it is recommended that Site Access #1 on Rockdale Road operates as right-in/left-out and the proposed application proceed.

Prepared By:



Reihaneh Azhdar  
Transportation Engineering-Intern

Reviewed By:



Mark Crockford, P.Eng.  
Senior Transportation Engineer

# Attachment 1

MTO Scope Email

Happy to have a chat - cell: 6132979423.

Thank you ,  
Tarek Issa

Latest message from Brian Hickey, MTO Rep, shown below:

"Good morning Moe,

I apologize for the delayed response as I was away for 2 weeks.

With regards to the Traffic Brief- For developments where little to no impact to the provincial highway network is anticipated and the need for mitigation is not expected, the Ministry can consider the submission of a Traffic Brief in lieu of a Traffic Impact Study.

The Traffic Brief/Letter shall be prepared by a RAQS traffic engineering consultant, and shall address a general set of criteria including, but not limited to, entering/exiting traffic volume on the highway, proposed use, proposed trips associated with development, proposed entrance location and design entrance material (e.g. gravel or asphalt), and a conclusive statement that the proposed development will not adversely affect capacity, safety or operations on the highway network or trigger Highway improvements.

Thanks,

**Brian Hickey**

Corridor Management Planner | Operations Division- East Region  
Ministry of Transportation | Ontario Public Service  
613-612-4326 | [brian.hickey@ontario.ca](mailto:brian.hickey@ontario.ca)

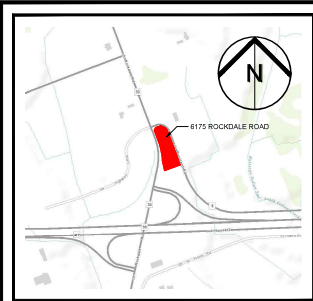


*Taking pride in strengthening Ontario, its places and its people*

"

# Attachment 2

Site Plan



**LEGAL DESCRIPTION: LOT 27 & LOT 28 PN14557-0136**

**PROPERTY:**

PROPERTY AREA: 9115.9 sqm  
 FRONTAGE: 43.77 m  
 DEPTH: 172.86 m  
 PROPOSED BUILDING FOOT PRINT: 336 sqm  
 EXISTING BUILDING FOOT PRINT: 94.64 sqm  
 PROPOSED LOT COVERAGE: 4.7%

**ZONING:**

MINIMUM LOT WIDTH: 30 m  
 MINIMUM LOT AREA: 4000 sqm  
 MINIMUM FRONT YARD SETBACK: 10 m  
 MINIMUM REAR YARD SETBACK: 10 m  
 MINIMUM INTERIOR SIDE YARD SETBACK: 6 m  
 MINIMUM CORNER YARD SETBACK: 11 m  
 MAXIMUM BUILDING HEIGHT: 11 m  
 MAXIMUM LOT COVERAGE: 25%

**SITE BOUNDARY INFORMATION DERIVED FROM SURVEY OF PROPERTY, PART OF LOTS 27 & 28 CONCESSIONS 6 AND CONCESSION 7, CLOSER BY INST. NO. RR63302, GEOGRAPHIC TOWNSHIP OF CUMBERLAND, CITY OF OTTAWA, SURVEYED BY FARLEY, SMITH & DENIS SURVEY LTD., MAY 17, 2024, PLAN 598-8729**

**PARKING REQUIREMENTS:**

USE	RATE	AREA	SPACES REQUIRED	SPACES PROVIDED
FAST FOOD	10 PER 100 SQ.M	50 SQ.M	5	9
RETAIL STORE	3.4 PER 100 SQ.M	256.6 SQ.M	8.72	9
CAR DEALERSHIP	0 PER 100 SQ.M	38.16 SQ.M	1.89	2 EMPLOYEE 13 DISPLAY
ACCESSORY STORAGE TO CAR DEALERSHIP	N/A	56.48 SQ.M	0	N/A
GAS BAR	N/A	N/A	N/A	N/A
ACCESSORY STORAGE TO CAR DEALERSHIP	355/999 SQ.M	336 SQ.M	0	1
TABLE 13A LAND USE (6)				
<b>TOTAL</b>				<b>32 PARKING SPACES 1 LOADING SPACE</b>

BARRIER FREE SPACES PROVIDED: 1  
 BICYCLE PARKING SPACES PROVIDED: 2

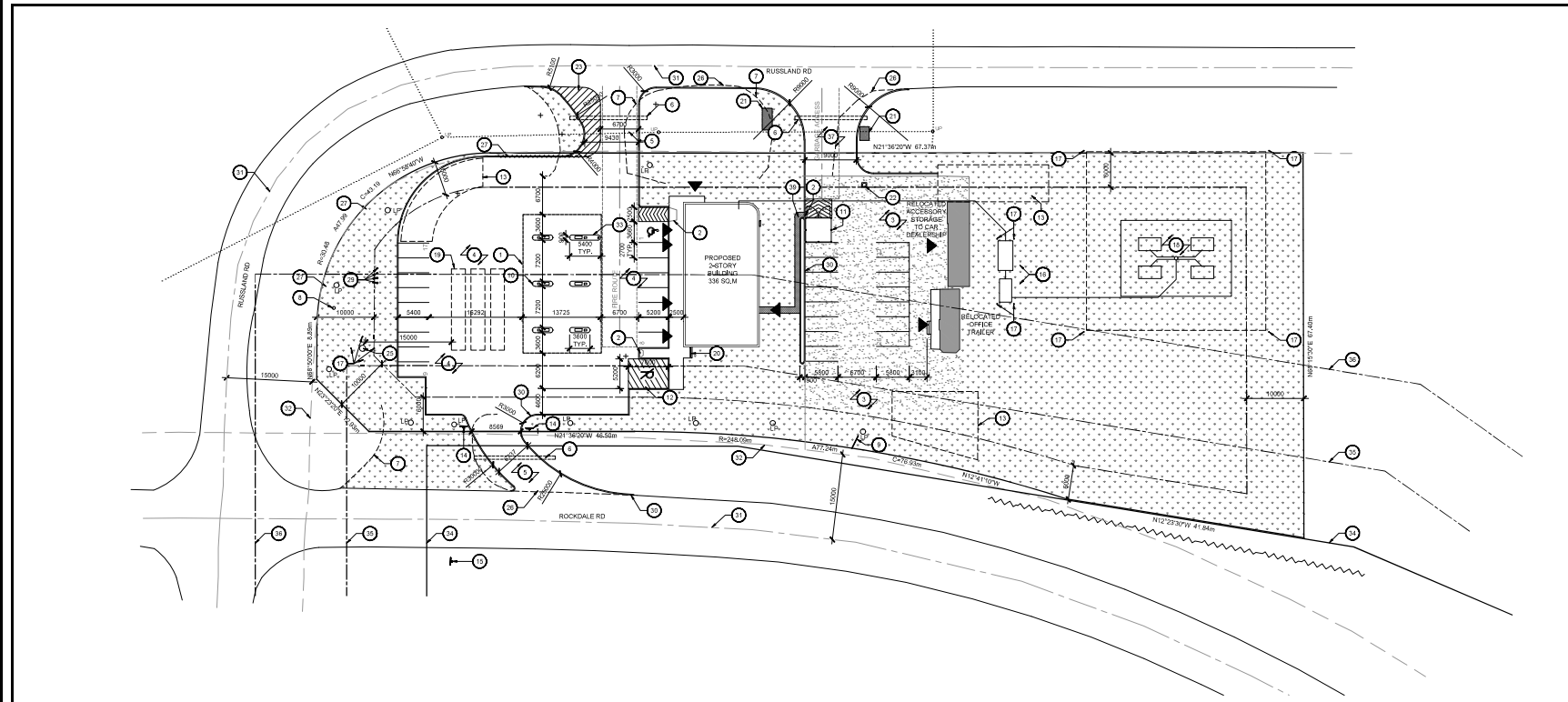
**GENERAL NOTES FOR DRAWING A0:**

- REFER TO L1.1 FOR PLANT LIST.
- CANOPY ABOVE CONCRETE PAD AT GRADE.
- DEPRESSED CURB
- GRAVEL TO REMAIN, REGRADED AS REQUIRED. REFER TO C.M.L.
- ASPHALT.
- PAVED ENTRY.
- CULVERT.
- EXISTING ENTRY TO BE REMOVED.
- EXISTING SIGN TO REMAIN.
- TYPICAL GAS PUMP STATION ON CONCRETE CURB.
- CARBON STORAGE.
- LOADING SPACE.
- SHOW EXISTING.
- DO NOT ENTER SIGN.
- NO LEFT TURN SIGN.
- SEPTIC TANKS.
- BIOLAND.
- SEPTIC FIELD.
- UNDERGROUND GAS TANKS.
- BICYCLE RACK.
- DRAINAGE SPP PAD.
- STORM DRAIN, REFER TO CIVIL.
- MOUNTABLE CURB FOR LARGE VEHICLES.
- RESERVED.
- PROPOSED LOCATION OF NEW WELL, FOUR BOLLARDS TO BE PLACED EQUALLY AROUND.
- EXISTING EXTENT OF PAVEMENT, TO BE MODIFIED TO SUIT NEW LAYOUT.
- WOODEN FENCE, REFER TO LANDSCAPING PLAN FOR DETAIL.
- RESERVED.

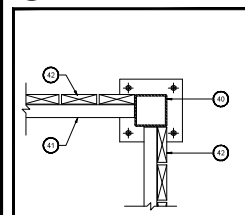
**LEGEND FOR DRAWING A0:**

- DRAWING NOTE ANNOTATION.
- ◀ NEW DOOR
- ▶ BUILDING ENTRANCE
- LIGHT POST
- UP
- 500
- UTILITY POST
- GRAVEL
- PLANTINGS
- PROPERTY LINE
- SET BACK
- OVERHEAD WIRE
- FENCE
- SANITARY

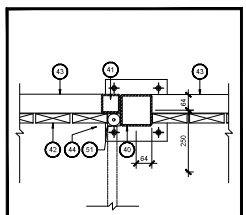
**1 Location Plan**  
 Scale = N/A



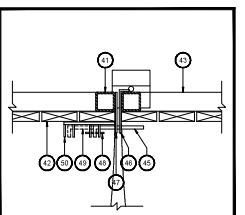
**2 Site Plan**  
 Scale = 1:400



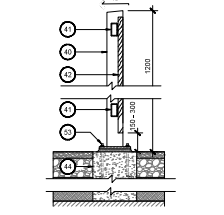
**3 Enclosure Corner Detail**  
 Scale = 1:10



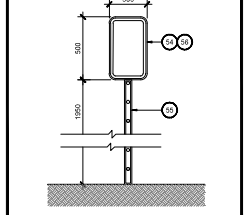
**4 Enclosure Gate Hinge Detail**  
 Scale = 1:10



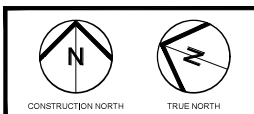
**5 Enclosure Latch Detail**  
 Scale = 1:10



**6 Enclosure Section Detail**  
 Scale = 1:20



**7 Signage Elevation**  
 Scale = 1:20



3	Issued for Site Plan Control / MTO	25.06.25
2	Issued for Site Plan Control	24.06.24
1	Issued for Coordination	03.06.24

No	ISSUE/REVISION	DATE
3	Issued for Site Plan Control / MTO	25.06.25
2	Issued for Site Plan Control	24.06.24
1	Issued for Coordination	03.06.24



1098 Somerset Street West, Suite 200, Ottawa, Ontario, K1Y 4T3  
 Telephone: 613.724.9914 E-mail: architecture@brydengibson.ca

**PROJECT NAME** NOM DU PROJET  
**6175 Rockdale Rd**

**6175 Rockdale Rd, Vars ON, K0A 3H0**

**Site Plan Location Plan Site Details**

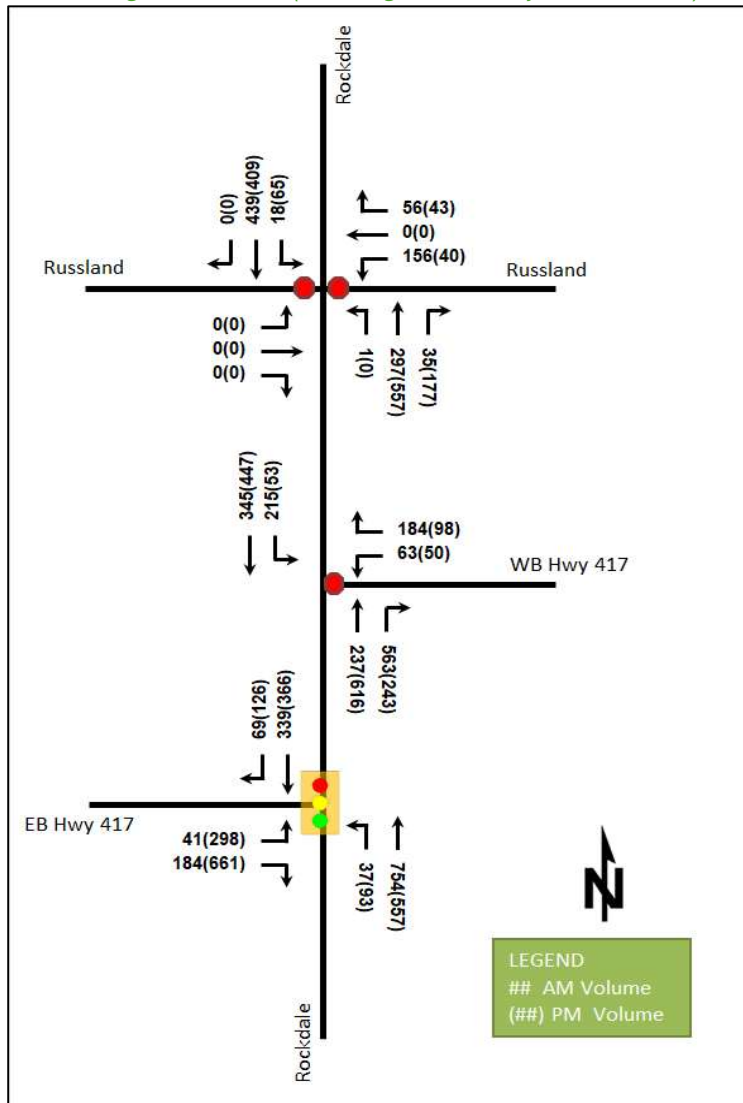
JOB No: 610x24	N° DE PROJET 610x24	DATE May 2024	DATE
SCALE As Noted	ECHELLE As Noted	PRINTING SCALE / ECHELLE D'IMPRESSION	
CONCEPTION BY SG	CONÇUS PAR SG	IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PRINTING SCALE.	
DRAWN BY KS	DESSINÉ PAR KS	SI CETTE BARRE NE MESURE PAS 25mm, AJUSTER VOTRE ECHELLE D'IMPRESSION.	
CHECKED BY SG	VÉRIFIÉ PAR SG		

ARCHITECT'S STAMP	DRAWING No DESIGN No
<b>AO</b>	
REVISION No	REVISION No
	3

# Attachment 3

Existing and Forecasted Figures

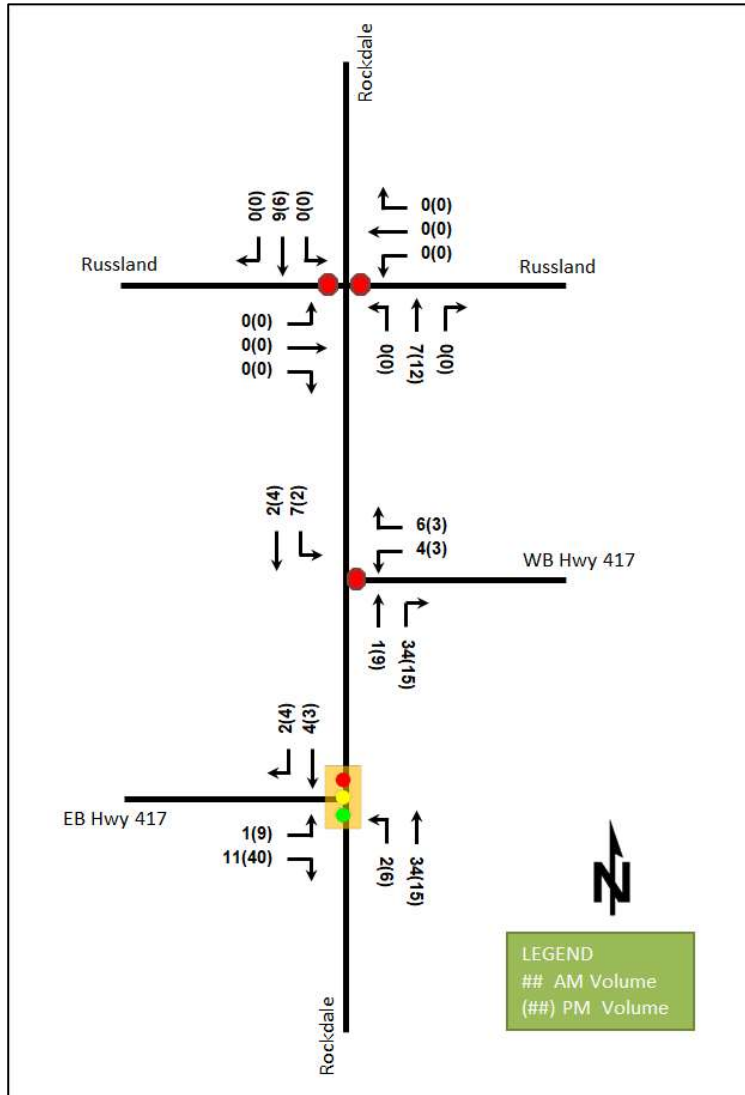
Existing Traffic Counts (Including Seasonal Adjustment Factor)



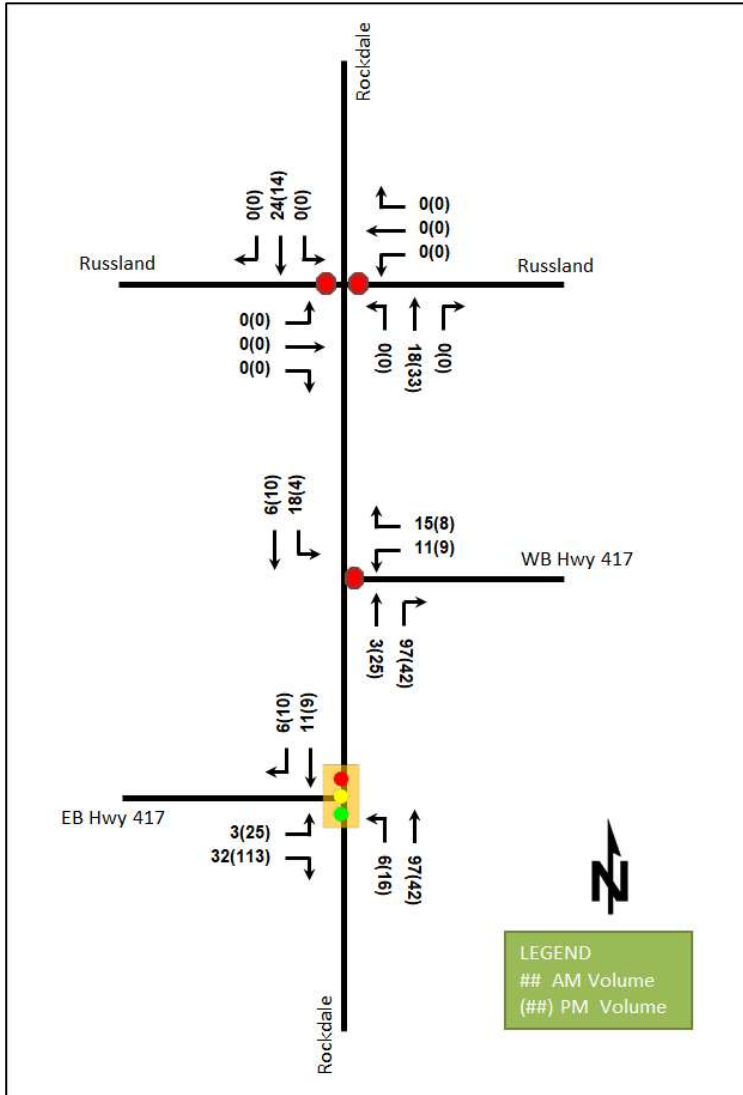
ITE Trip Generation Rates

Land Use	Land Use Code	Peak Hour	Directional Distribution		Vehicle Trip Rate based on VFP
Gasoline/Service Station	ITE LUC 944	AM	In	50%	10.28
			Out	50%	
		PM	In	50%	13.91
			Out	50%	
Convenience Store/Gas Station (2k-4k sq ft)	ITE LUC 945	AM	In	50%	16.06
			Out	50%	
		PM	In	50%	18.42
			Out	50%	

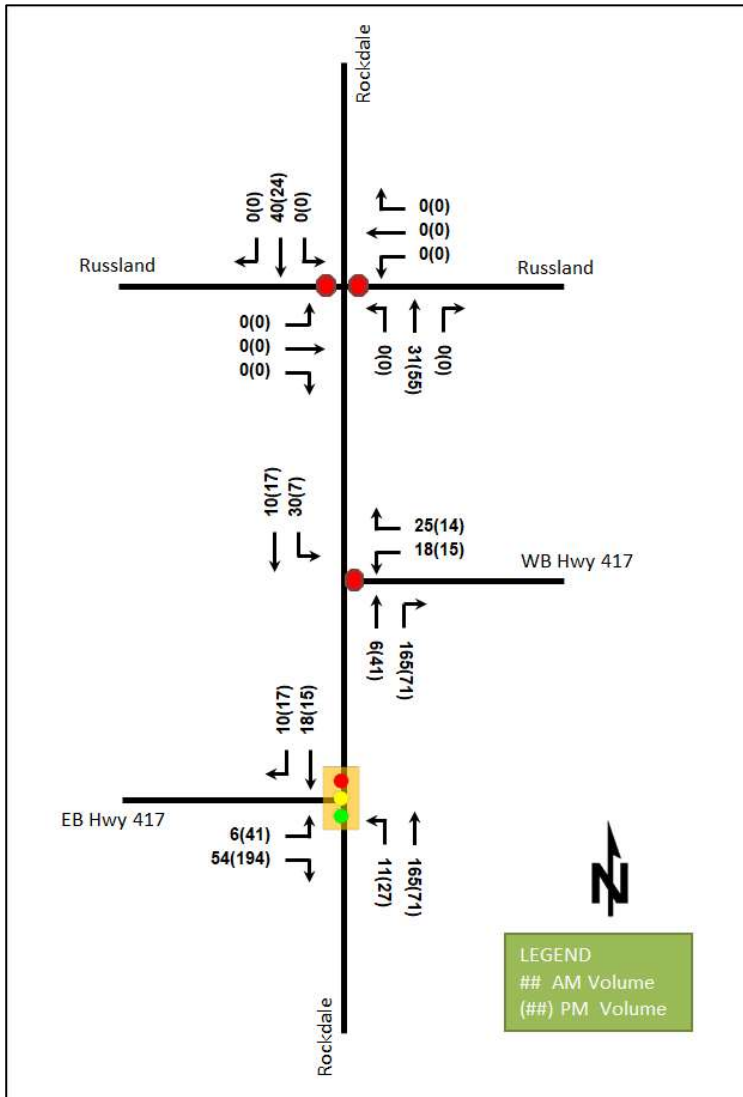
Traffic Volume Growth-2027



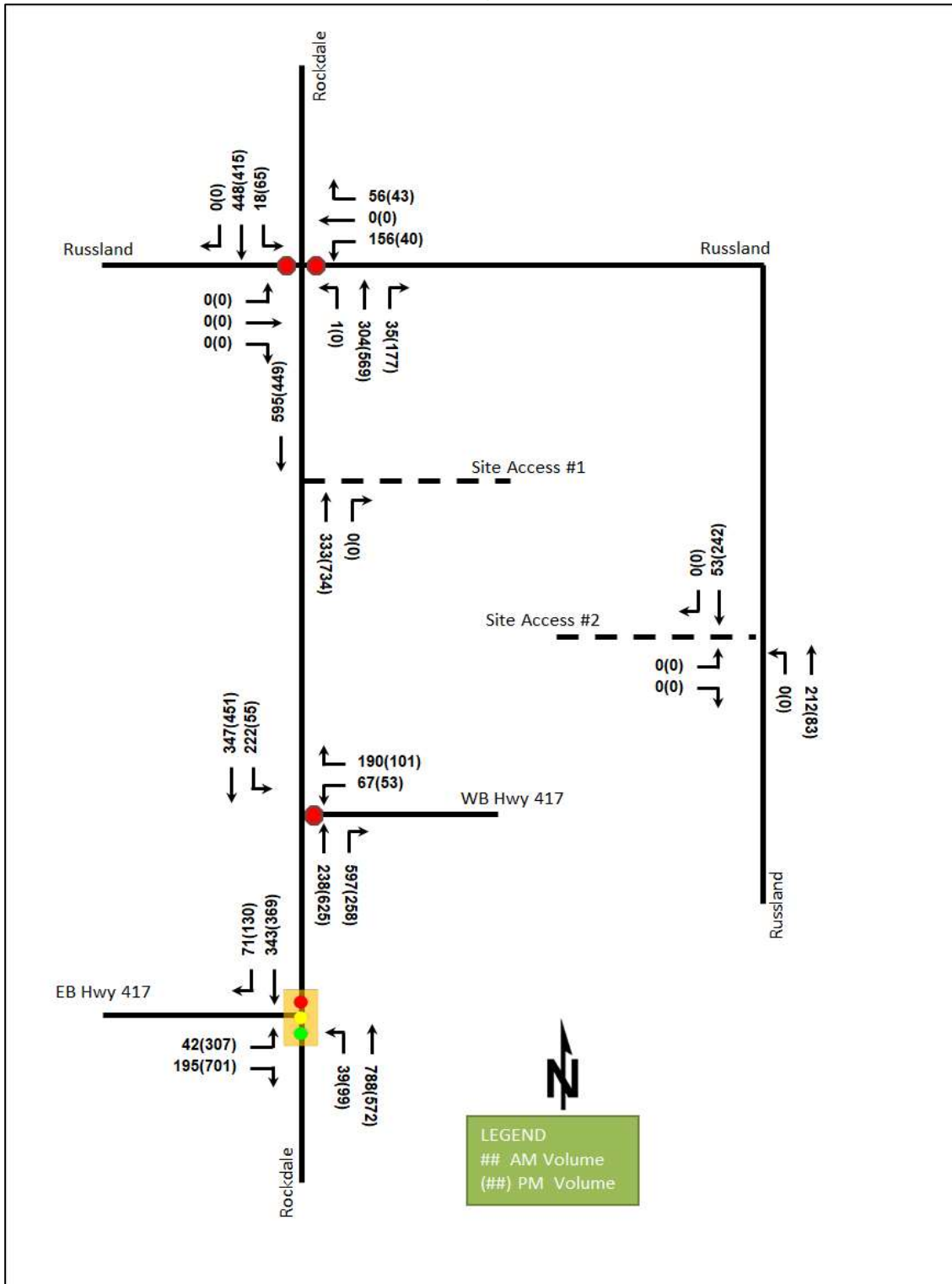
Traffic Volume Growth-2032



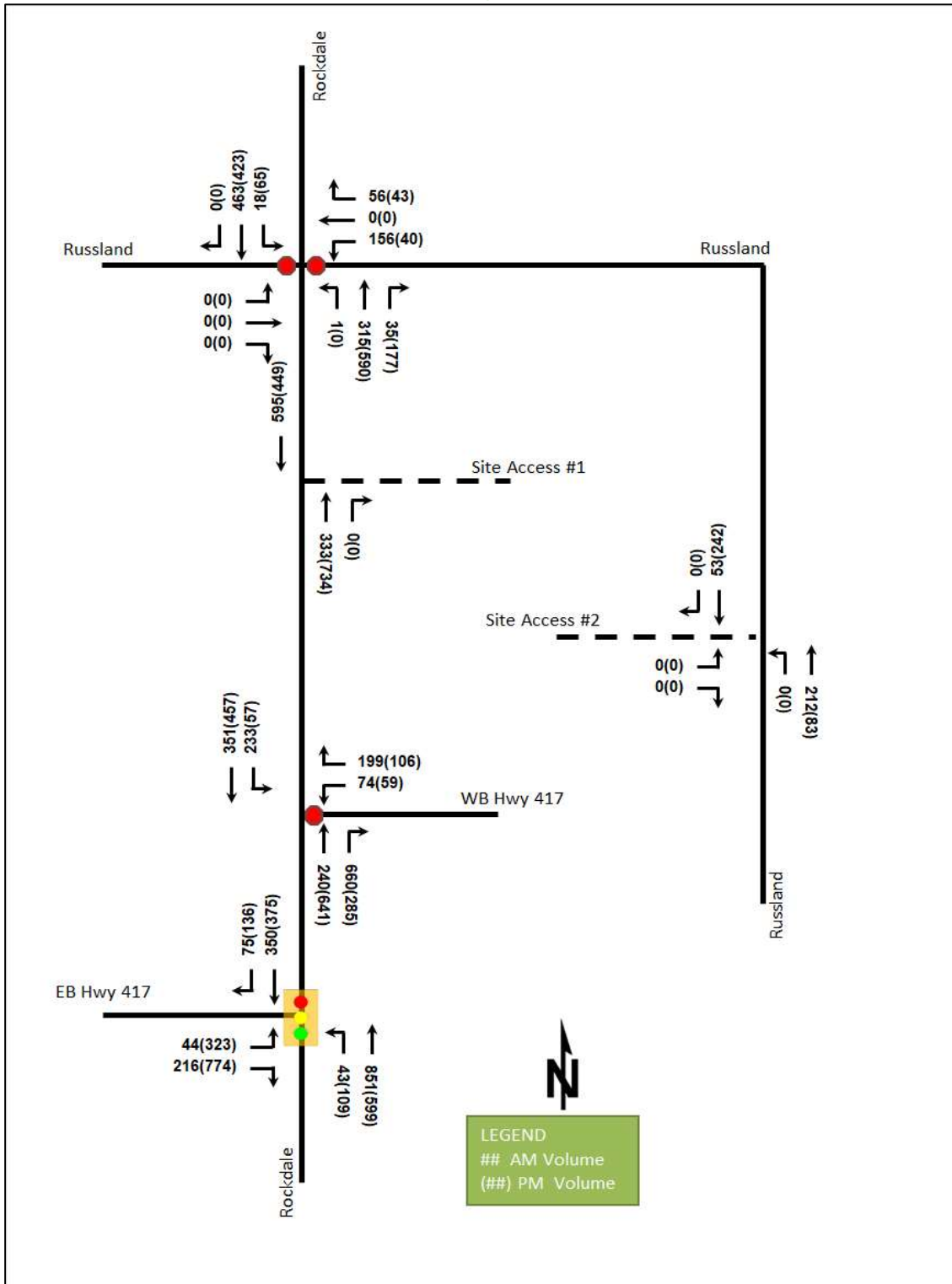
Traffic Volume Growth-2037



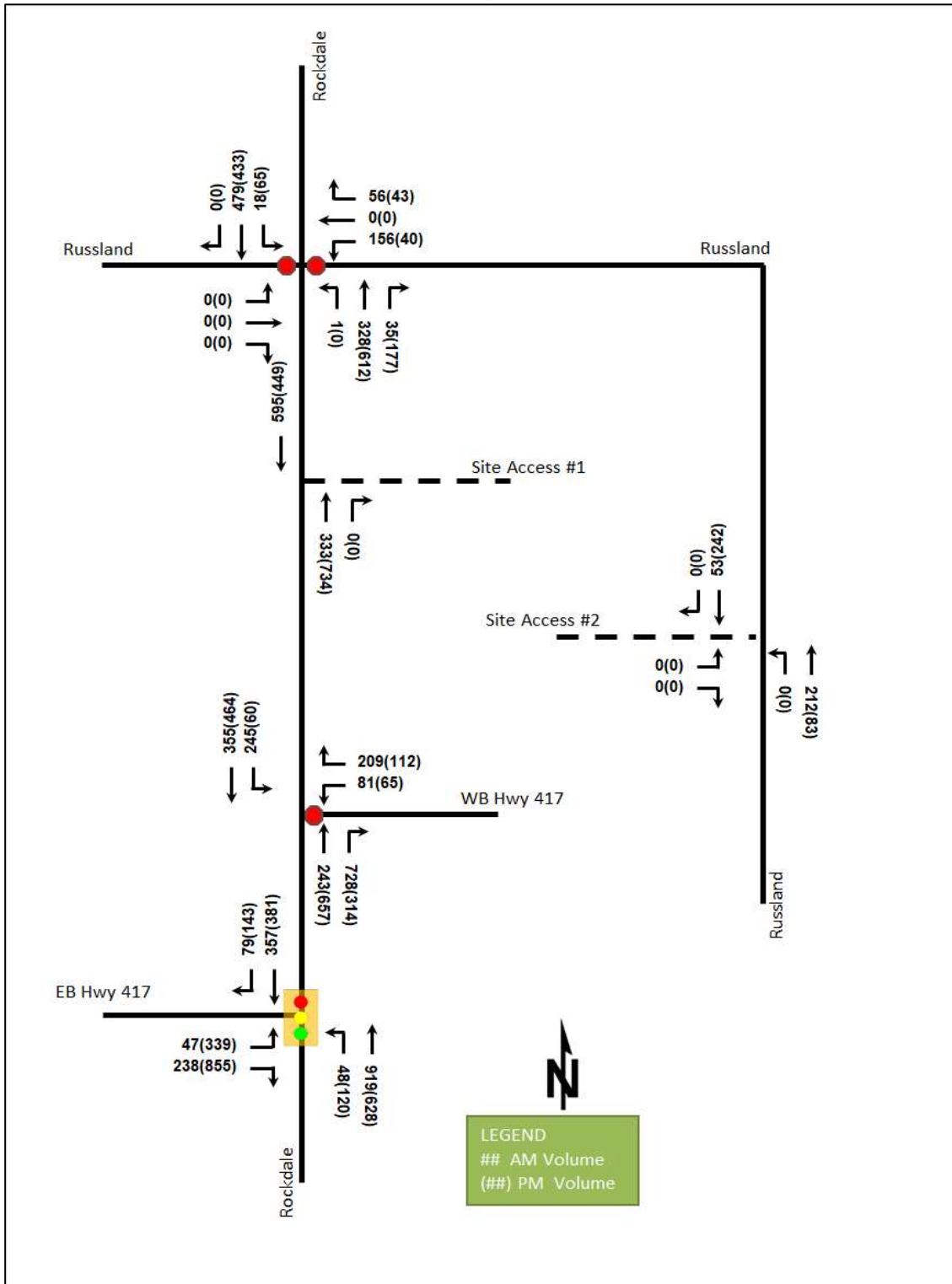
2027 Future Background Volumes



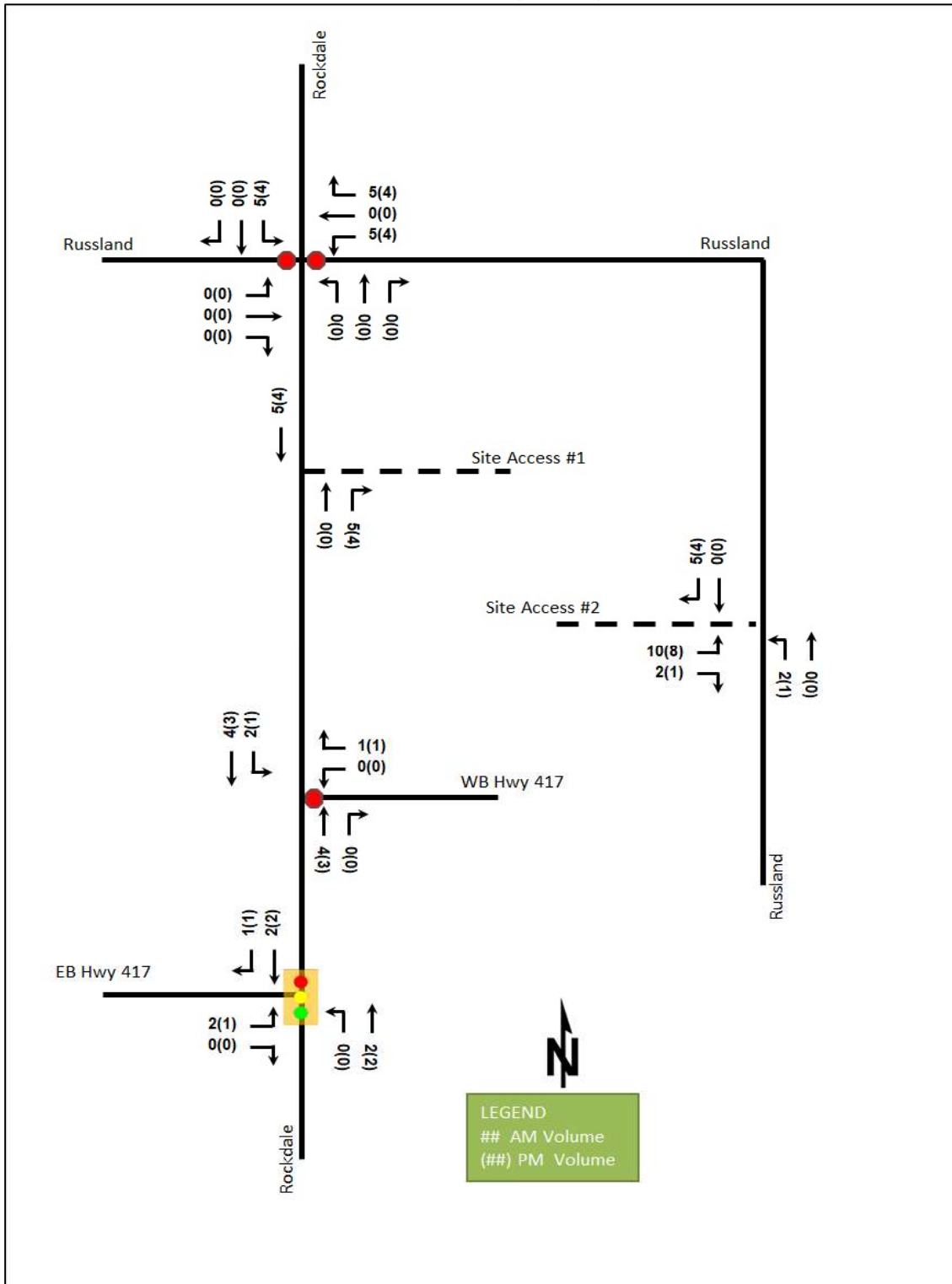
2032 Future Background Volumes



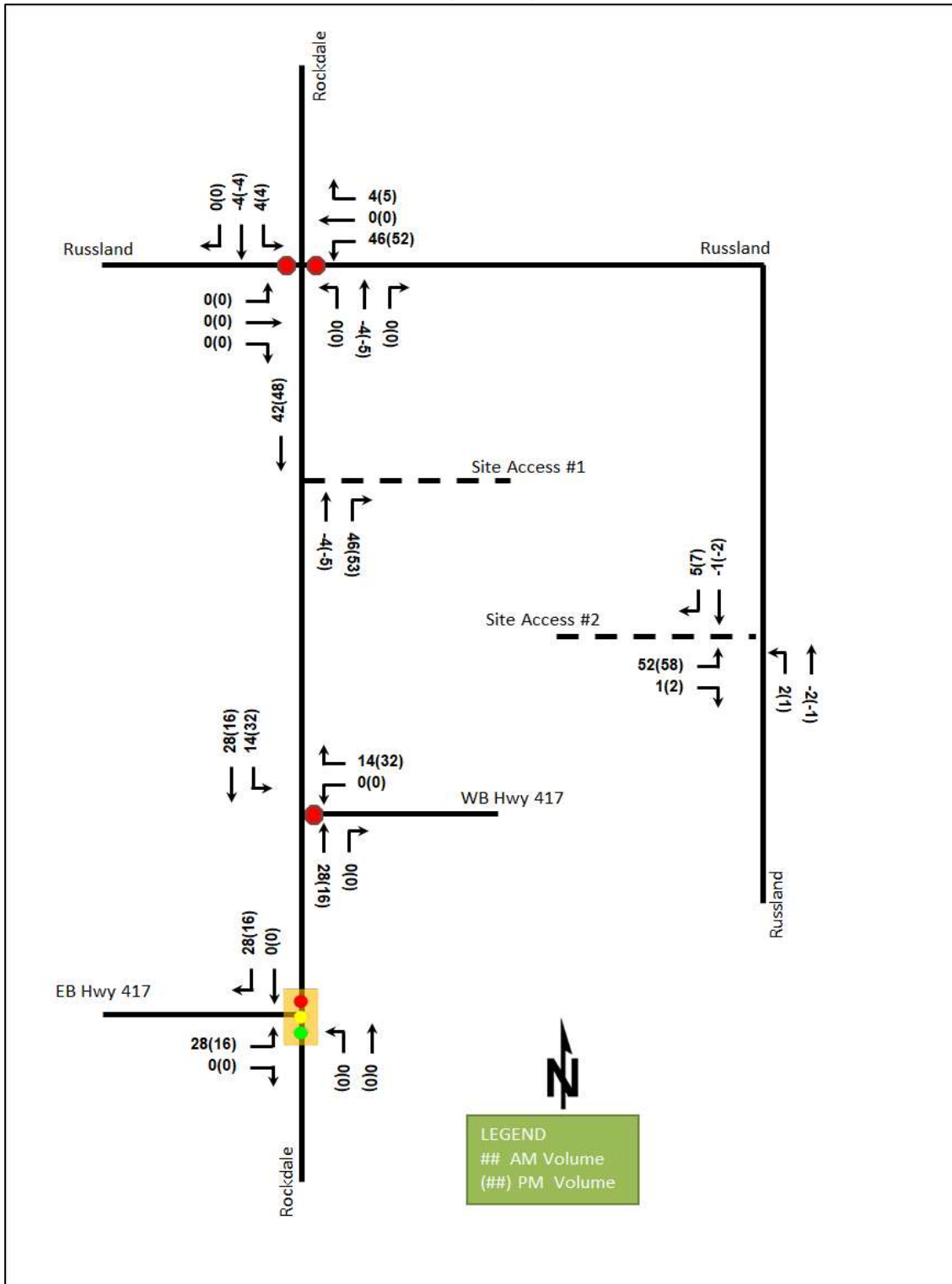
2037 Future Background Volumes



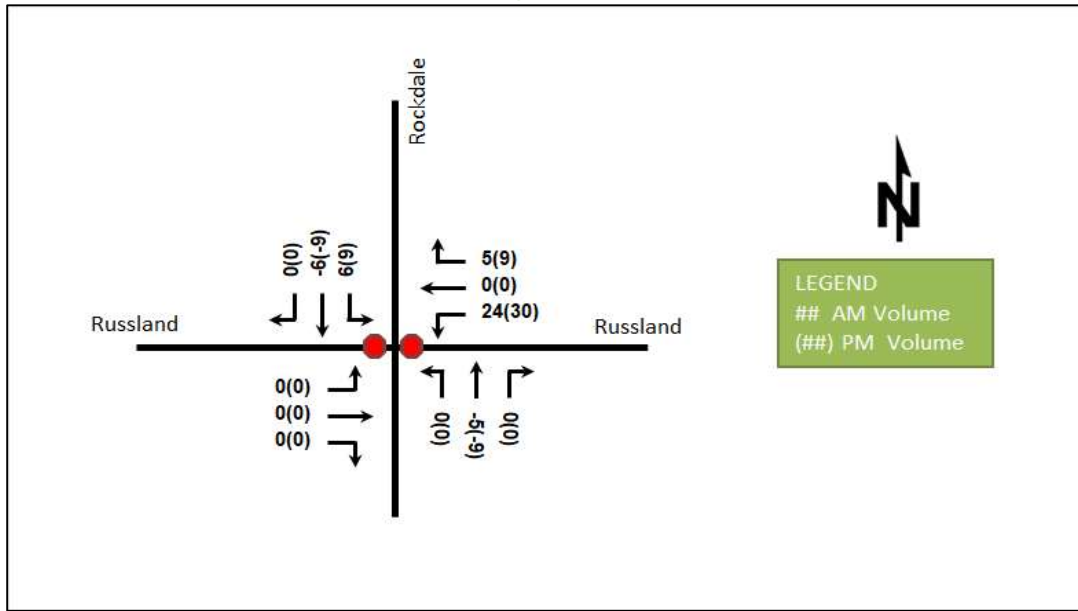
Forecasted Site-Generated Primary Auto Trip – Net Increase



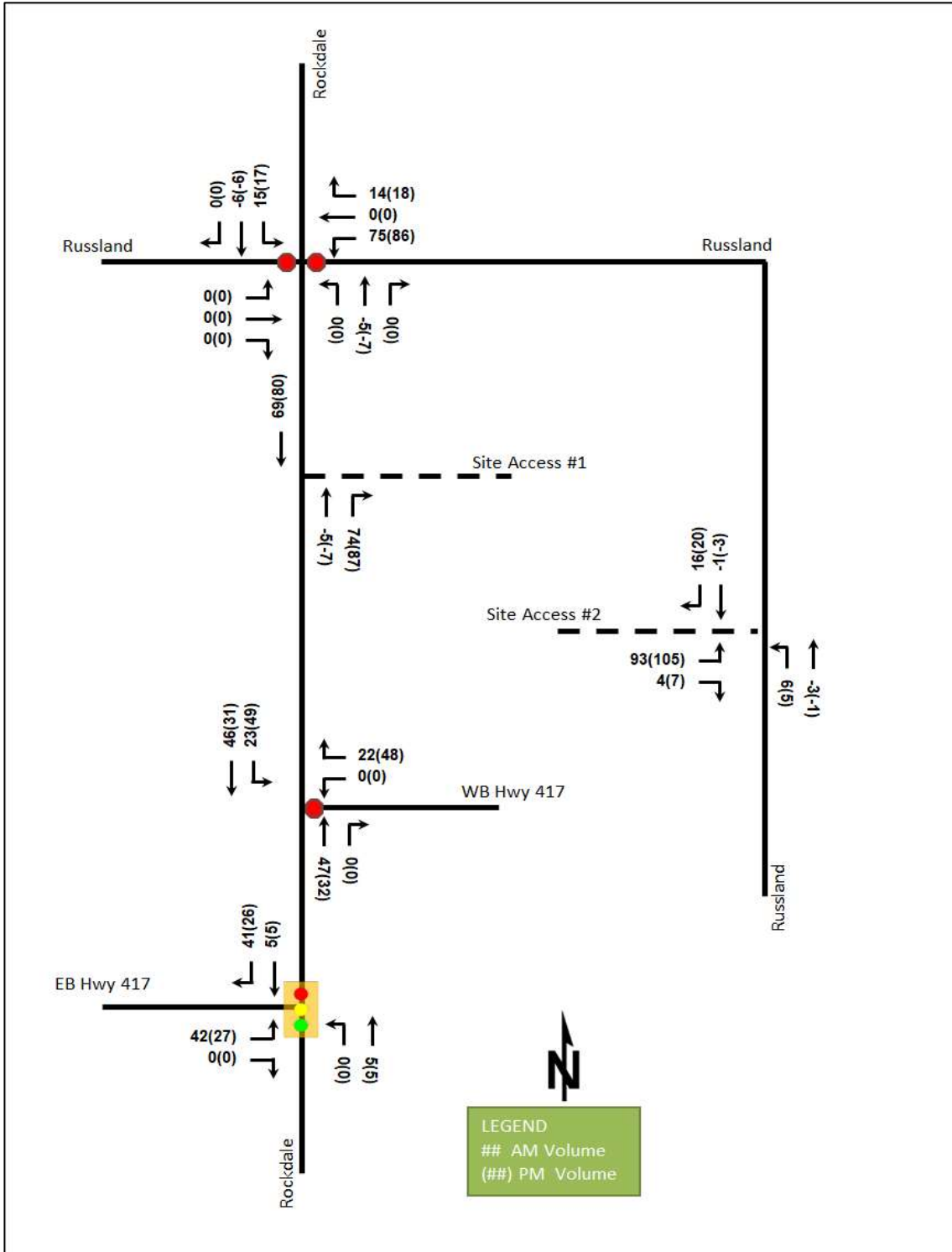
Forecasted Pass-by Auto Trip – Net Increase



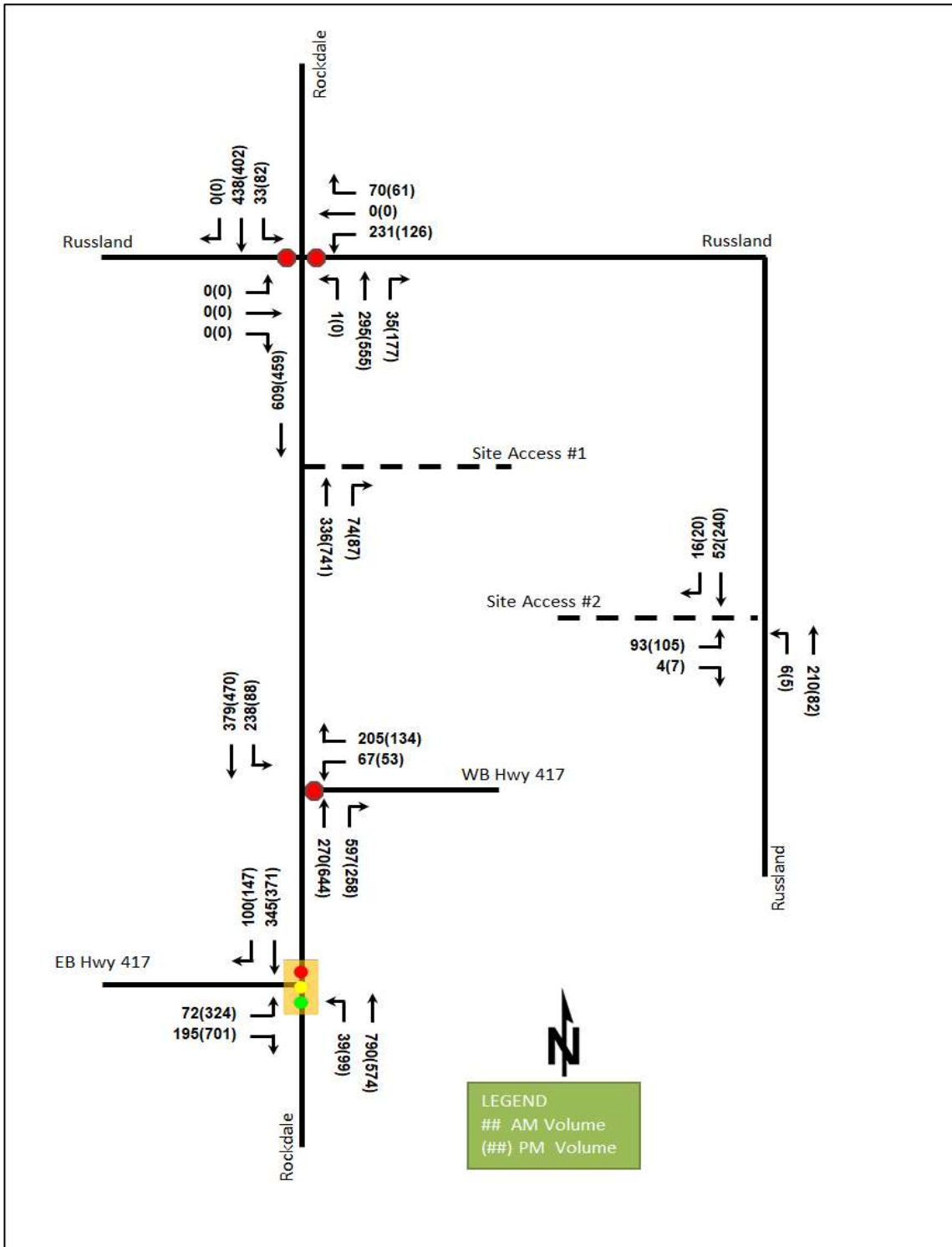
Forecasted Redistribution of Existing Traffic due to RI Restriction of Access #1



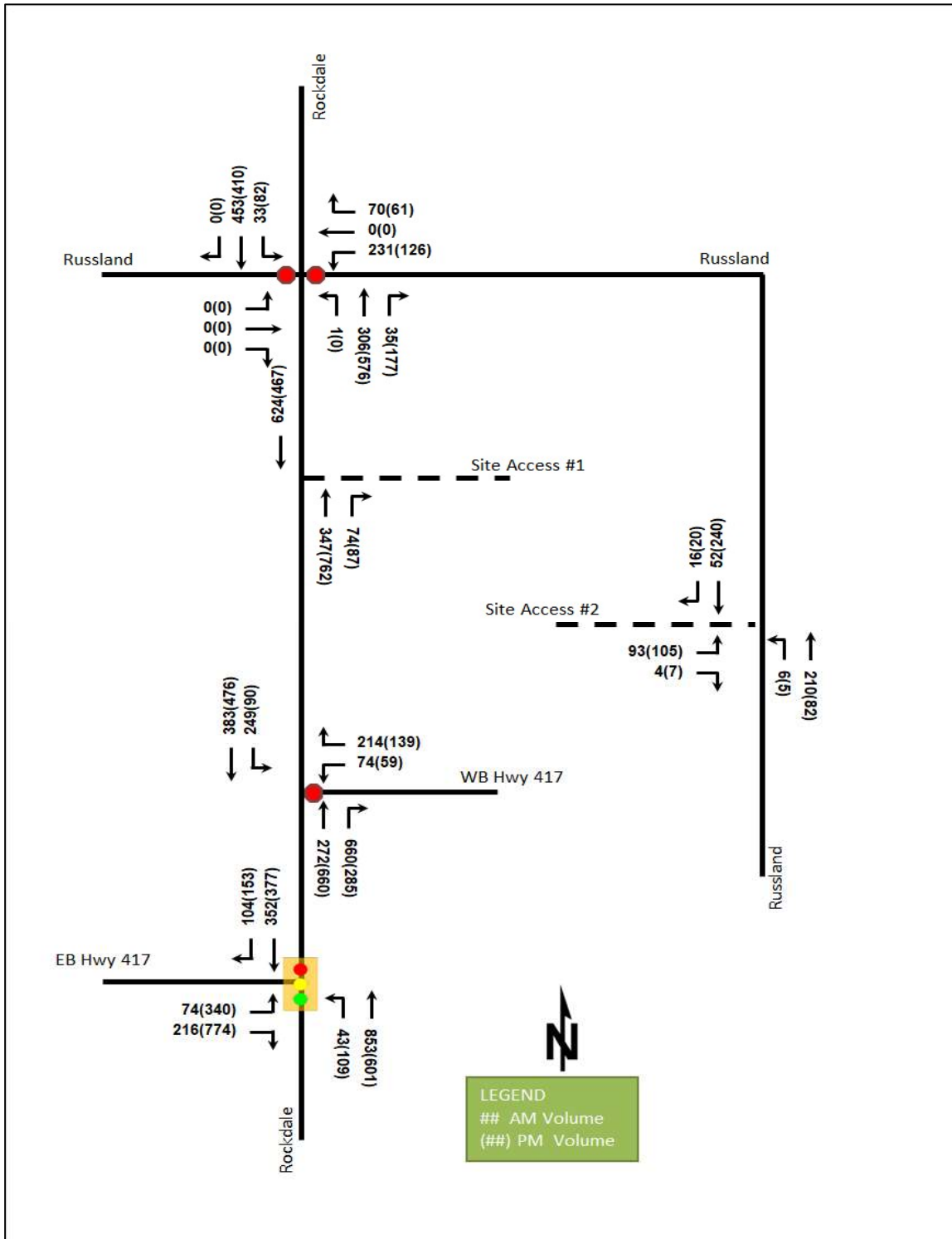
Forecasted Total Site - Generated Trip



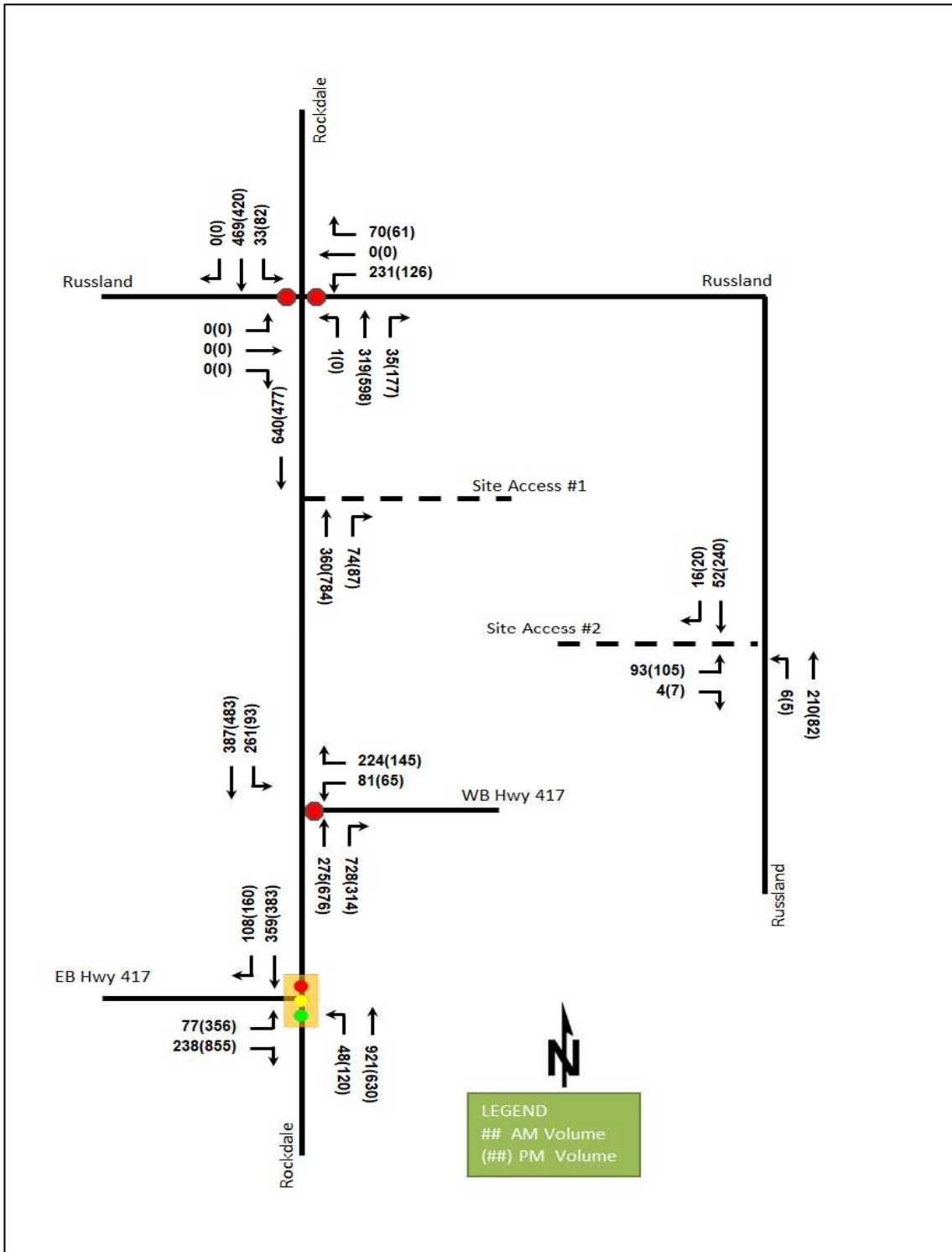
2027 Future Total Traffic Volumes



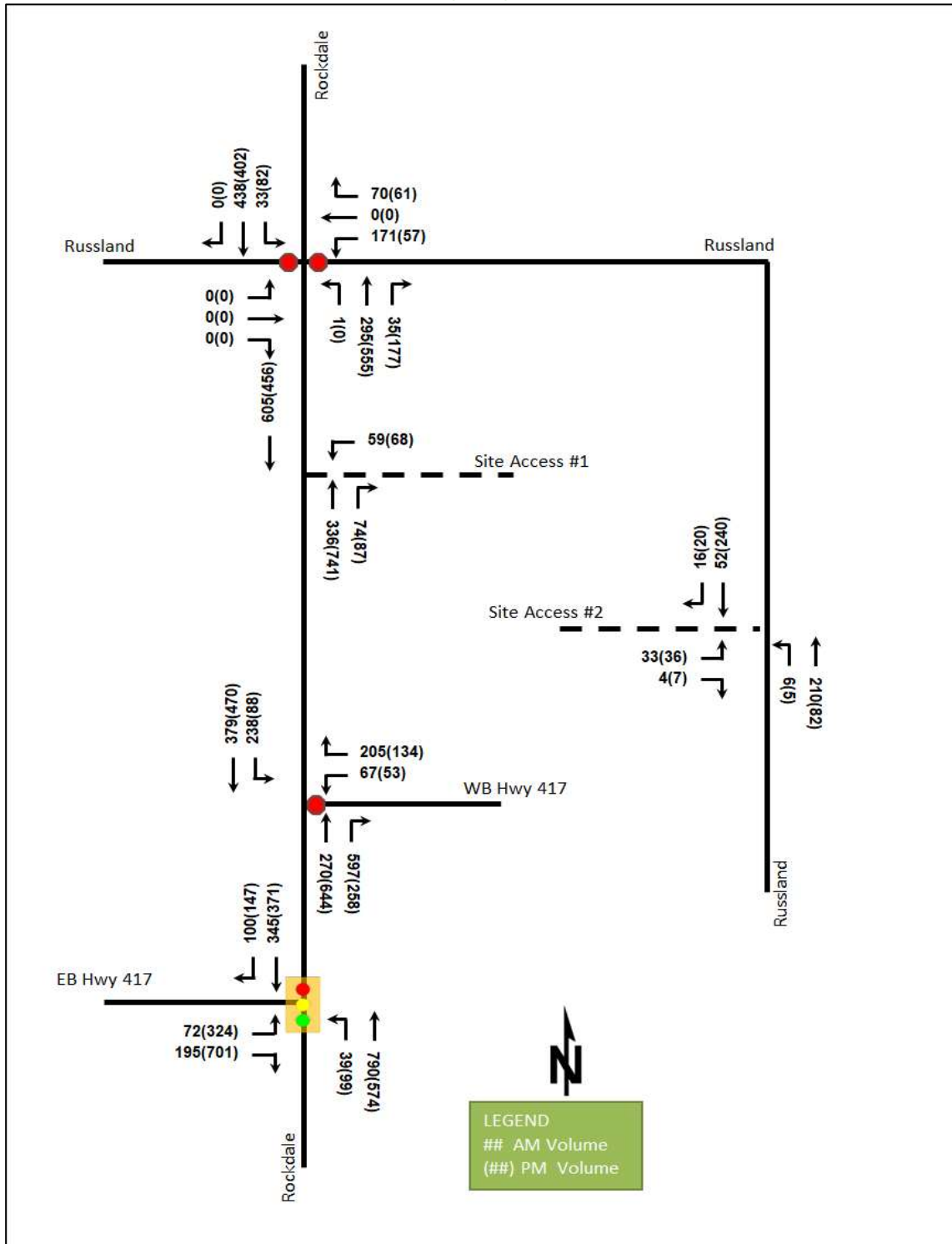
2032 Future Total Traffic Volumes



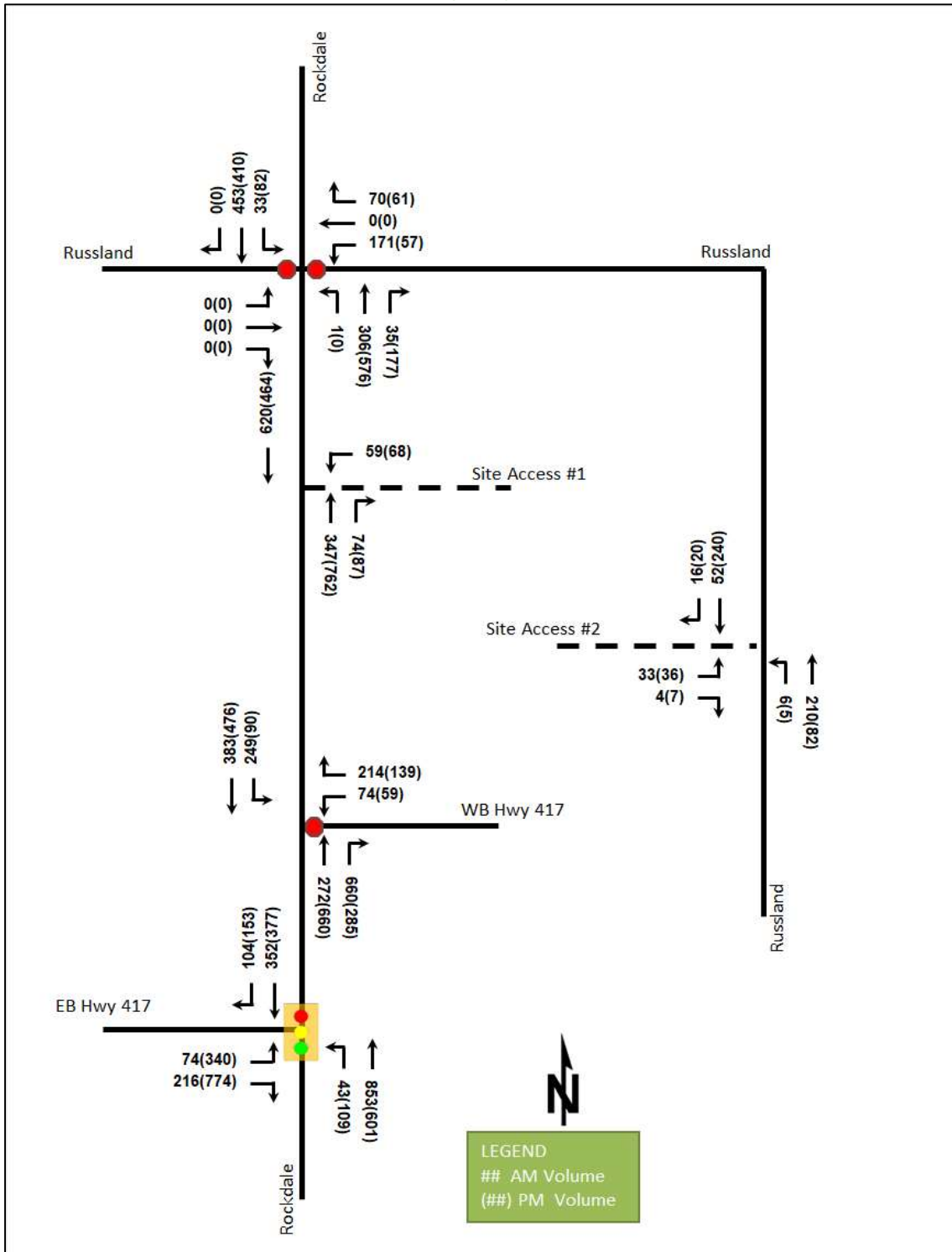
2037 Future Total Traffic Volumes



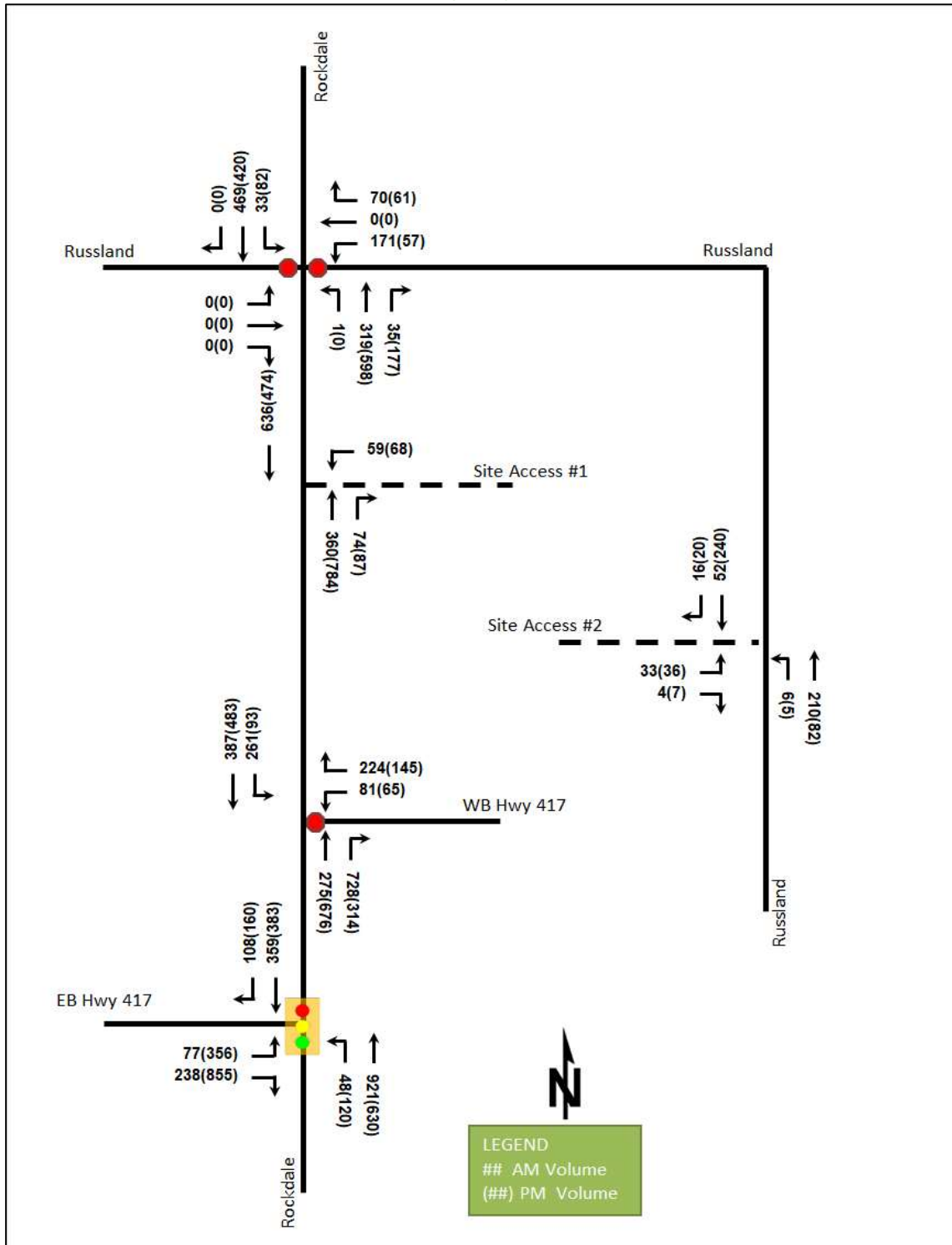
2027 Future Total Traffic Volumes-Sensitivity Analysis with Site Access #1 Outbound Left-Turn



2032 Future Total Traffic Volumes-Sensitivity Analysis with Site Access #1 Outbound Left-Turn



2037 Future Total Traffic Volumes-Sensitivity Analysis with Site Access #1 Outbound Left-Turn



# Attachment 4

Turning Movement Count Data

# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

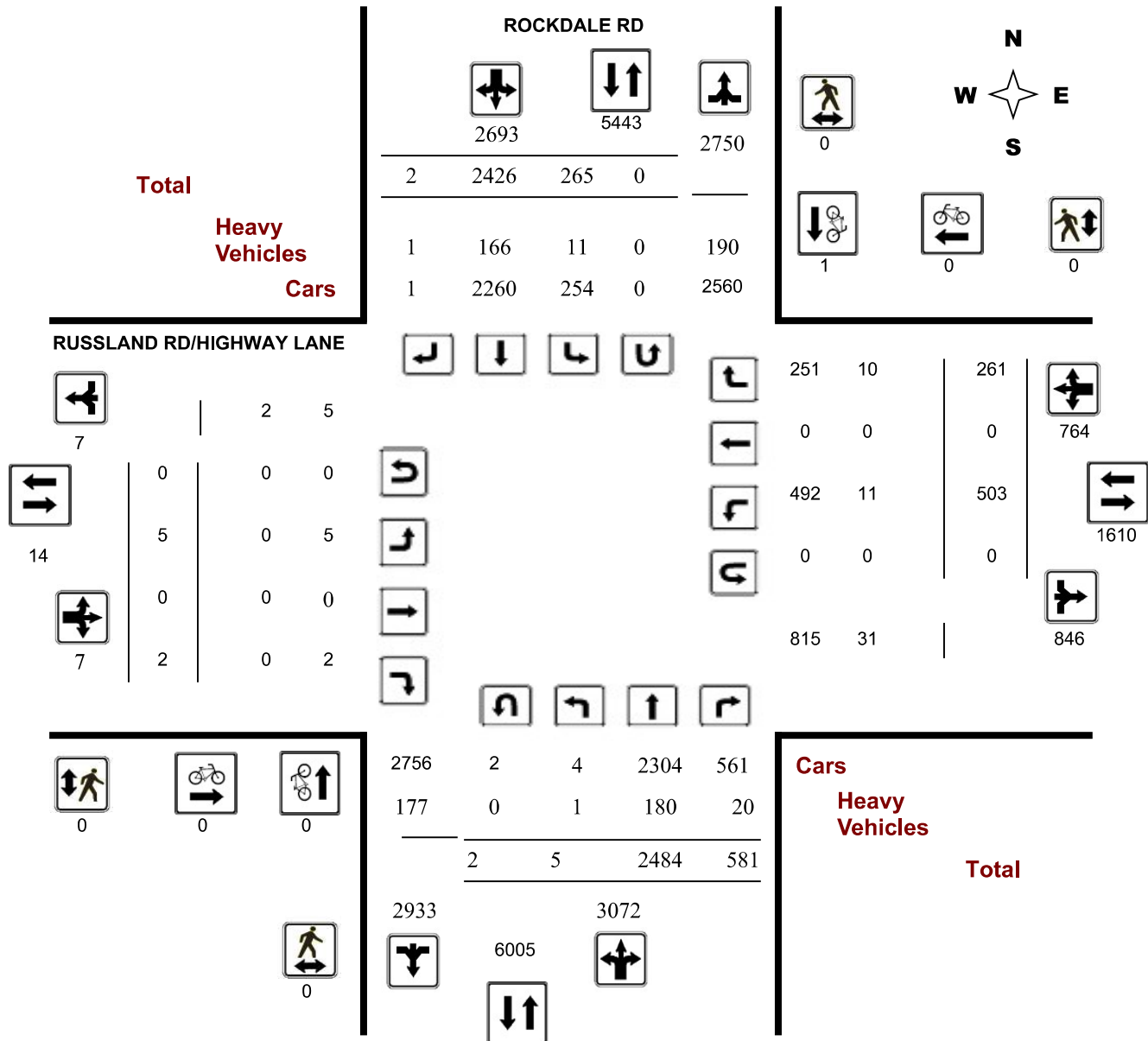
**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### Full Study Diagram



## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

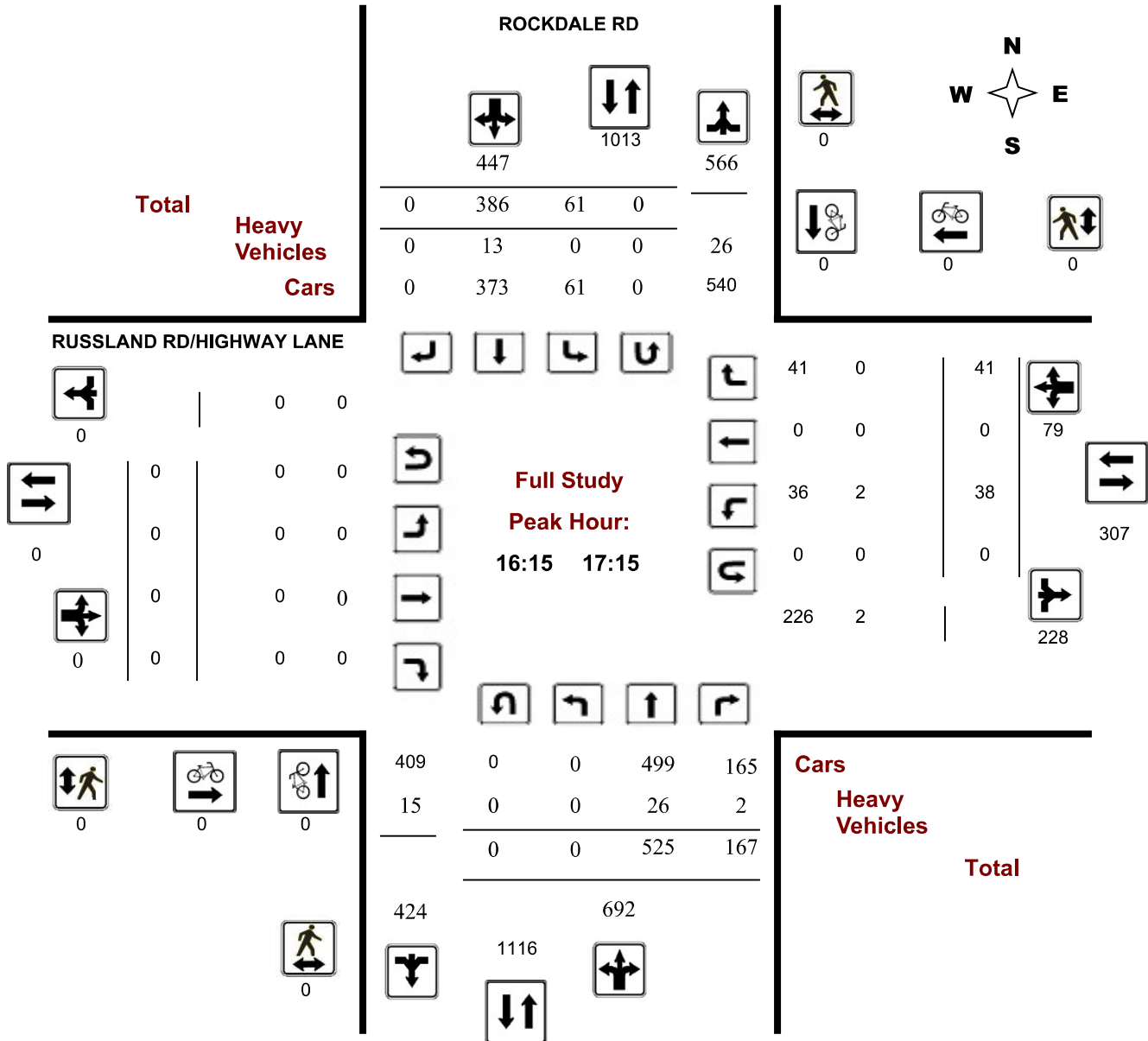
**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### Full Study Peak Hour Diagram



## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

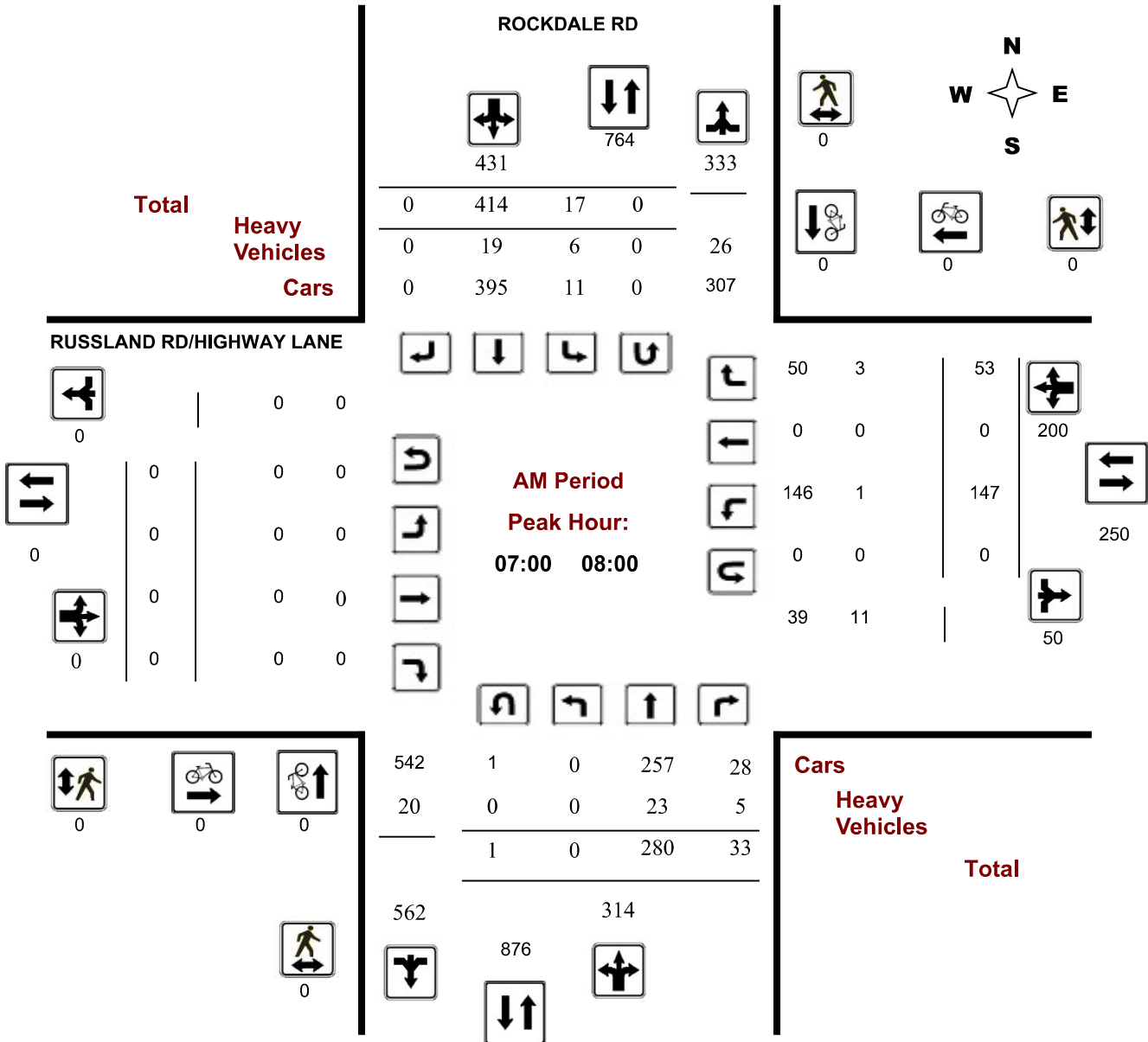
**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### AM Period Peak Hour Diagram



## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

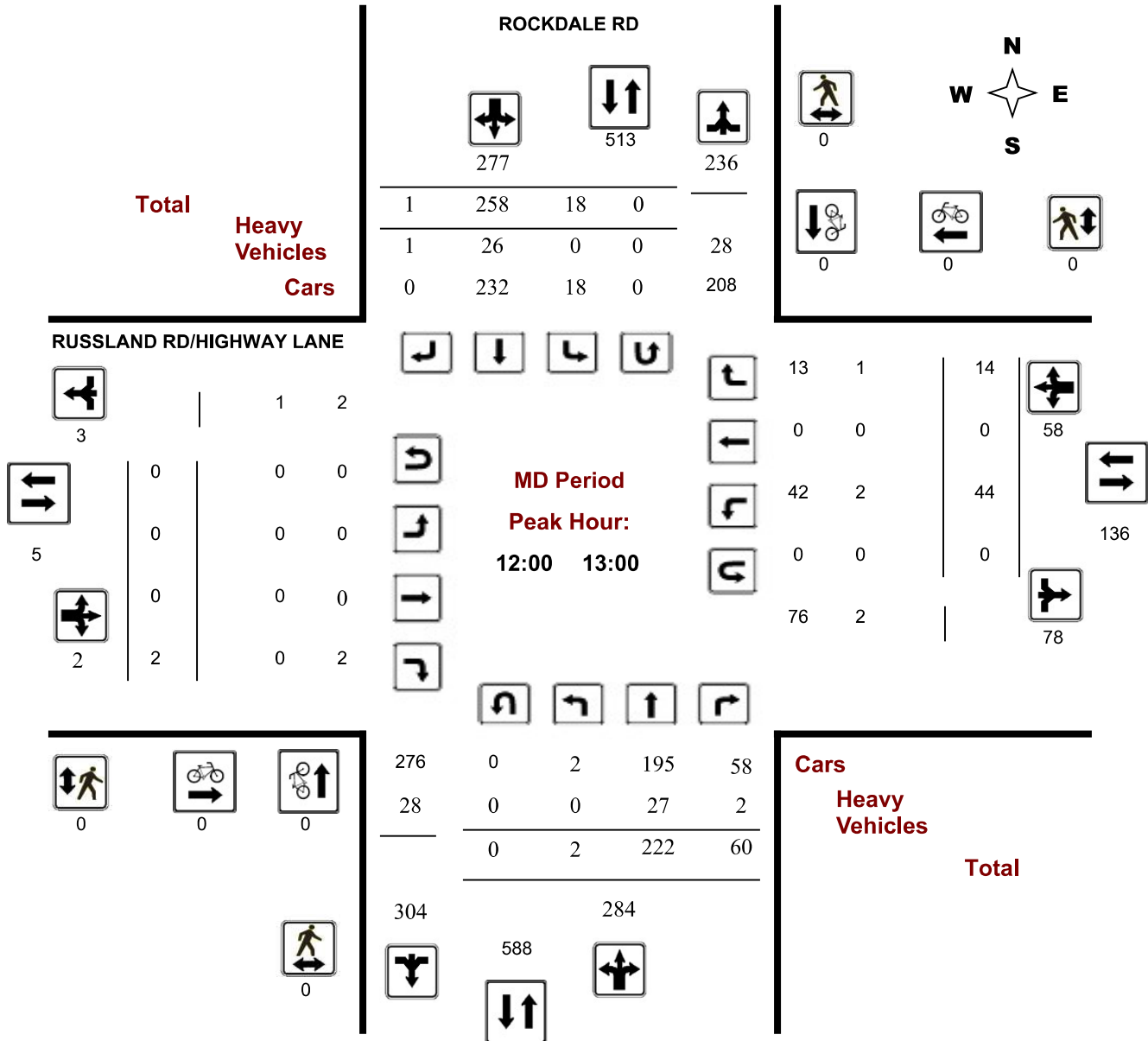
**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### MD Period Peak Hour Diagram



## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

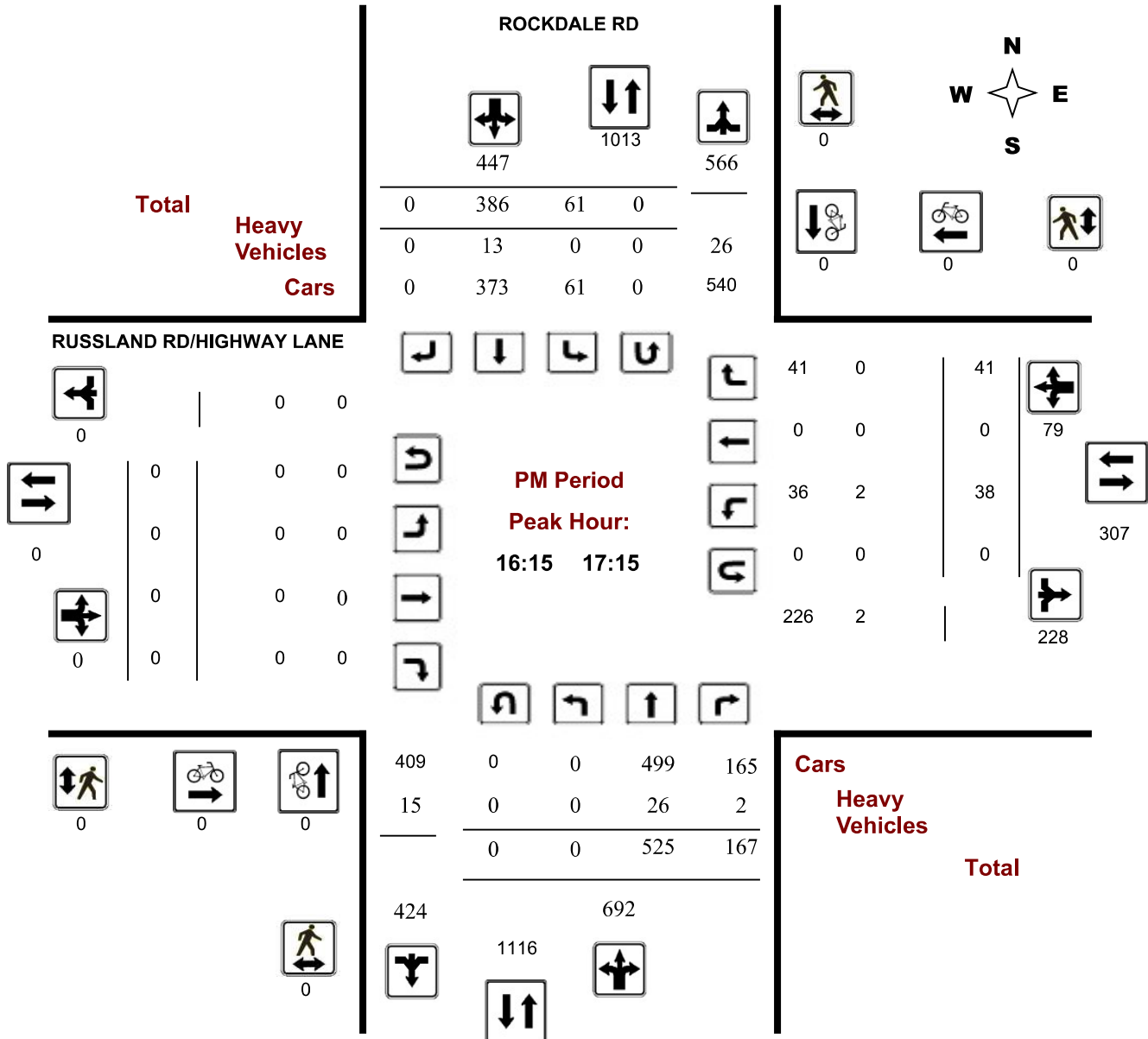
**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### PM Period Peak Hour Diagram





# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### Full Study Summary (8 HR Standard)

**Survey Date:** Thursday, November 23, 2023

**Total Observed U-Turns**

**AADT Factor**

Northbound: 2      Southbound: 0  
 Eastbound: 0      Westbound: 0

.90

**ROCKDALE RD**

**RUSSLAND RD/HIGHWAY LANE**

Period	ROCKDALE RD Northbound					ROCKDALE RD Southbound					RUSSLAND RD/HIGHWAY LANE Eastbound					RUSSLAND RD/HIGHWAY LANE Westbound					Grand Total	
	LT	ST	RT	NB TOT	STR TOT	LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT	STR TOT	LT	ST	RT	WB TOT	STR TOT		
07:00 08:00	0	280	33	313	744	17	414	0	431	576	0	0	0	0	200	147	0	53	200	200	944	
08:00 09:00	1	245	31	277	609	27	305	0	332	609	0	0	0	0	141	101	0	40	141	141	750	
09:00 10:00	1	204	26	231	464	20	212	1	233	464	2	0	0	2	87	54	0	33	87	89	553	
11:30 12:30	1	213	54	268	530	23	239	0	262	530	1	0	0	1	73	48	0	24	72	73	603	
12:30 13:30	2	203	52	257	530	22	250	1	273	530	2	0	2	4	53	36	0	13	49	53	583	
15:00 16:00	0	395	106	501	876	44	331	0	375	876	0	0	0	0	66	42	0	24	66	66	942	
16:00 17:00	0	537	160	697	1136	53	386	0	439	1136	0	0	0	0	82	41	0	41	82	82	1218	
17:00 18:00	0	407	119	526	874	59	289	0	348	874	0	0	0	0	67	34	0	33	67	67	941	
<b>Sub Total</b>	5	2484	581	3070	5763	265	2426	2	2693	5763	5	0	2	7	771	503	0	261	764	771	6534	
<b>U Turns</b>				2				0	2				0				0				0	2
<b>Total</b>	5	2484	581	3072	5765	265	2426	2	2693	5765	5	0	2	7	771	503	0	261	764	771	6536	

**EQ 12Hr**      7    3453    808    4270    368    3372    3    3743    8013    7    0    3    10    699    0    363    1062    1072    9085

Note: These values are calculated by multiplying the totals by the appropriate expansion factor.

**1.39**

**AVG 12Hr**      6    3108    727    3843    331    3976    3    3369    7212    6    0    3    9    629    0    327    956    965    8176

Note: These volumes are calculated by multiplying the Equivalent 12 hr. totals by the AADT factor.

**.90**

**AVG 24Hr**      8    4071    952    5034    434    5209    4    4413    9448    8    0    4    12    824    0    428    1252    1264    10711

Note: These volumes are calculated by multiplying the Average Daily 12 hr. totals by 12 to 24 expansion factor.

**1.31**

Note: U-Turns provided for approach totals. Refer to 'U-Turn' Report for specific breakdown.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### Full Study 15 Minute Increments

#### ROCKDALE RD

#### RUSSLAND RD/HIGHWAY LANE

Northbound

Southbound

Eastbound

Westbound

Time Period	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT	W TOT	STR TOT	Grand Total
07:00 07:15	0	72	6	78	2	99	0	101	179	0	0	0	0	39	0	11	50	50	229
07:15 07:30	0	66	10	76	3	113	0	116	192	0	0	0	0	43	0	15	58	58	250
07:30 07:45	0	85	6	91	9	111	0	120	211	0	0	0	0	36	0	11	47	47	258
07:45 08:00	0	57	11	69	3	91	0	94	163	0	0	0	0	29	0	16	45	45	208
08:00 08:15	1	66	9	76	9	94	0	103	179	0	0	0	0	38	0	10	48	48	227
08:30 08:45	0	60	5	65	2	71	0	73	138	0	0	0	0	18	0	14	32	32	170
09:00 09:15	0	46	9	55	6	54	0	60	115	0	0	0	0	17	0	7	24	24	139
17:45 18:00	0	75	15	90	9	58	0	67	157	0	0	0	0	4	0	5	9	9	166
08:15 08:30	0	69	8	77	8	79	0	87	164	0	0	0	0	28	0	8	36	36	200
08:45 09:00	0	50	9	59	8	61	0	69	128	0	0	0	0	17	0	8	25	25	153
09:15 09:30	0	59	4	63	3	54	0	57	120	0	0	0	0	18	0	10	28	28	148
09:30 09:45	1	62	5	68	6	60	1	67	135	1	0	0	1	11	0	10	21	22	157
09:45 10:00	0	37	8	46	5	44	0	49	95	1	0	0	1	8	0	6	14	15	110
11:45 12:00	0	53	7	60	5	63	0	68	128	0	0	0	0	13	0	5	18	18	146
12:15 12:30	1	58	10	69	4	64	0	68	137	0	0	0	0	9	0	4	13	13	150
12:30 12:45	1	57	16	74	8	62	1	71	145	0	0	0	0	5	0	3	8	8	153
12:45 13:00	0	56	12	68	1	74	0	75	143	0	0	2	2	15	0	4	19	21	164
13:15 13:30	1	48	10	59	6	63	0	69	128	0	0	0	0	4	0	6	10	10	138
15:00 15:15	0	79	17	96	11	74	0	85	181	0	0	0	0	13	0	4	17	17	198
15:30 15:45	0	101	33	134	13	98	0	111	245	0	0	0	0	5	0	6	11	11	256
16:00 16:15	0	144	40	184	8	79	0	87	271	0	0	0	0	14	0	13	27	27	298
16:15 16:30	0	122	33	155	11	108	0	119	274	0	0	0	0	11	0	7	18	18	292
16:30 16:45	0	154	51	205	12	113	0	125	330	0	0	0	0	9	0	8	17	17	347
17:00 17:15	0	132	47	179	16	79	0	95	274	0	0	0	0	11	0	13	24	24	298
17:15 17:30	0	95	25	120	11	74	0	85	205	0	0	0	0	13	0	8	21	21	226
17:30 17:45	0	105	32	137	23	78	0	101	238	0	0	0	0	6	0	7	13	13	251
16:45 17:00	0	117	36	153	22	86	0	108	261	0	0	0	0	7	0	13	20	20	281
13:00 13:15	0	42	14	56	7	51	0	58	114	2	0	0	2	12	0	0	12	14	128
11:30 11:45	0	51	15	66	9	54	0	63	129	1	0	0	1	11	0	12	23	24	153
12:00 12:15	0	51	22	73	5	58	0	63	136	0	0	0	0	15	0	3	18	18	154
15:15 15:30	0	95	26	121	11	80	0	91	212	0	0	0	0	12	0	6	18	18	230
15:45 16:00	0	120	30	150	9	79	0	88	238	0	0	0	0	12	0	8	20	20	258
<b>Total:</b>	<b>5</b>	<b>2484</b>	<b>581</b>	<b>3072</b>	<b>265</b>	<b>2426</b>	<b>2</b>	<b>2693</b>	<b>5765</b>	<b>5</b>	<b>0</b>	<b>2</b>	<b>7</b>	<b>503</b>	<b>0</b>	<b>261</b>	<b>764</b>	<b>771</b>	<b>6,536</b>

Note: U-Turns are included in Totals, cyclist volume is not included in totals. For cyclist volumes refer to Cyclist Volume report.



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### Full Study Cyclist Volume

#### ROCKDALE RD

#### RUSSLAND RD/HIGHWAY LANE

Time Period	Northbound	Southbound	Street Total	Eastbound	Westbound	Street Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	0	0	0	0	0	0	0
07:30 07:45	0	0	0	0	0	0	0
07:45 08:00	0	0	0	0	0	0	0
08:00 08:15	0	0	0	0	0	0	0
08:30 08:45	0	0	0	0	0	0	0
09:00 09:15	0	0	0	0	0	0	0
17:45 18:00	0	0	0	0	0	0	0
08:15 08:30	0	0	0	0	0	0	0
08:45 09:00	0	0	0	0	0	0	0
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:15 12:30	0	0	0	0	0	0	0
12:30 12:45	0	0	0	0	0	0	0
12:45 13:00	0	0	0	0	0	0	0
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	0	0	0	0
15:30 15:45	0	0	0	0	0	0	0
16:00 16:15	0	0	0	0	0	0	0
16:15 16:30	0	0	0	0	0	0	0
16:30 16:45	0	0	0	0	0	0	0
17:00 17:15	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	0	0	0
17:30 17:45	0	1	1	0	0	0	1
16:45 17:00	0	0	0	0	0	0	0
13:00 13:15	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	0	0	0
15:15 15:30	0	0	0	0	0	0	0
15:45 16:00	0	0	0	0	0	0	0
Total	0	1	1	0	0	0	1



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### Full Study Pedestrian Volume

#### ROCKDALE RD

#### RUSSLAND RD/HIGHWAY LANE

Time Period	NB Approach (E or W Crossing)	SB Approach (E or W Crossing)	Total	EB Approach (N or S Crossing)	WB Approach (N or S Crossing)	Total	Grand Total
07:00 07:15	0	0	0	0	0	0	0
07:15 07:30	0	0	0	0	0	0	0
07:30 07:45	0	0	0	0	0	0	0
07:45 08:00	0	0	0	0	0	0	0
08:00 08:15	0	0	0	0	0	0	0
08:30 08:45	0	0	0	0	0	0	0
09:00 09:15	0	0	0	0	0	0	0
17:45 18:00	0	0	0	0	0	0	0
08:15 08:30	0	0	0	0	0	0	0
08:45 09:00	0	0	0	0	0	0	0
09:15 09:30	0	0	0	0	0	0	0
09:30 09:45	0	0	0	0	0	0	0
09:45 10:00	0	0	0	0	0	0	0
11:45 12:00	0	0	0	0	0	0	0
12:15 12:30	0	0	0	0	0	0	0
12:30 12:45	0	0	0	0	0	0	0
12:45 13:00	0	0	0	0	0	0	0
13:15 13:30	0	0	0	0	0	0	0
15:00 15:15	0	0	0	0	0	0	0
15:30 15:45	0	0	0	0	0	0	0
16:00 16:15	0	0	0	0	0	0	0
16:15 16:30	0	0	0	0	0	0	0
16:30 16:45	0	0	0	0	0	0	0
17:00 17:15	0	0	0	0	0	0	0
17:15 17:30	0	0	0	0	0	0	0
17:30 17:45	0	0	0	0	0	0	0
16:45 17:00	0	0	0	0	0	0	0
13:00 13:15	0	0	0	0	0	0	0
11:30 11:45	0	0	0	0	0	0	0
12:00 12:15	0	0	0	0	0	0	0
15:15 15:30	0	0	0	0	0	0	0
15:45 16:00	0	0	0	0	0	0	0
<b>Total .....</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

### Full Study Heavy Vehicles

#### ROCKDALE RD

#### RUSSLAND RD/HIGHWAY LANE

Northbound

Southbound

Eastbound

Westbound

Time Period	Northbound				Southbound				Eastbound				Westbound				Grand Total		
	LT	ST	RT	N TOT	LT	ST	RT	S TOT	STR TOT	LT	ST	RT	E TOT	LT	ST	RT		W TOT	STR TOT
07:00 07:15	0	4	0	4	1	5	0	6	10	0	0	0	0	0	0	0	0	0	10
07:15 07:30	0	3	2	5	1	4	0	5	10	0	0	0	0	1	0	1	2	2	12
07:30 07:45	0	13	1	14	3	4	0	7	21	0	0	0	0	0	0	1	1	1	22
07:45 08:00	0	3	2	5	1	6	0	7	12	0	0	0	0	0	0	1	1	1	13
08:00 08:15	0	3	2	5	0	8	0	8	13	0	0	0	0	1	0	0	1	1	14
08:30 08:45	0	8	1	9	0	7	0	7	16	0	0	0	0	0	0	1	1	1	17
09:00 09:15	0	4	0	4	0	4	0	4	8	0	0	0	0	1	0	0	1	1	9
17:45 18:00	0	1	0	1	0	3	0	3	4	0	0	0	0	0	0	0	0	0	4
08:15 08:30	0	1	1	2	0	10	0	10	12	0	0	0	0	1	0	0	1	1	13
08:45 09:00	0	6	0	6	0	6	0	6	12	0	0	0	0	0	0	1	1	1	13
09:15 09:30	0	7	1	8	1	3	0	4	12	0	0	0	0	0	0	1	1	1	13
09:30 09:45	0	13	0	13	0	7	0	7	20	0	0	0	0	0	0	0	0	0	20
09:45 10:00	0	5	1	6	0	4	0	4	10	0	0	0	0	0	0	0	0	0	10
11:45 12:00	0	5	1	6	0	6	0	6	12	0	0	0	0	1	0	0	1	1	13
12:15 12:30	0	9	0	9	0	8	0	8	17	0	0	0	0	0	0	0	0	0	17
12:30 12:45	0	8	2	10	0	9	1	10	20	0	0	0	0	1	0	0	1	1	21
12:45 13:00	0	3	0	3	0	2	0	2	5	0	0	0	0	1	0	1	2	2	7
13:15 13:30	1	7	0	8	1	7	0	8	16	0	0	0	0	0	0	0	0	0	16
15:00 15:15	0	3	0	3	0	8	0	8	11	0	0	0	0	0	0	0	0	0	11
15:30 15:45	0	7	0	7	0	10	0	10	17	0	0	0	0	0	0	0	0	0	17
16:00 16:15	0	4	1	5	0	4	0	4	9	0	0	0	0	0	0	1	1	1	10
16:15 16:30	0	5	0	5	0	8	0	8	13	0	0	0	0	1	0	0	1	1	14
16:30 16:45	0	7	1	8	0	1	0	1	9	0	0	0	0	1	0	0	1	1	10
17:00 17:15	0	2	0	2	0	2	0	2	4	0	0	0	0	0	0	0	0	0	4
17:15 17:30	0	3	0	3	1	6	0	7	10	0	0	0	0	0	0	1	1	1	11
17:30 17:45	0	2	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	2
16:45 17:00	0	12	1	13	0	2	0	2	15	0	0	0	0	0	0	0	0	0	15
13:00 13:15	0	1	0	1	0	3	0	3	4	0	0	0	0	1	0	0	1	1	5
11:30 11:45	0	11	1	12	1	5	0	6	18	0	0	0	0	0	0	1	1	1	19
12:00 12:15	0	7	0	7	0	7	0	7	14	0	0	0	0	0	0	0	0	0	14
15:15 15:30	0	8	0	8	0	3	0	3	11	0	0	0	0	1	0	0	1	1	12
15:45 16:00	0	5	2	7	1	4	0	5	12	0	0	0	0	0	0	0	0	0	12
Total: None	1	180	20	201	11	166	1	178	379	0	0	0	0	11	0	10	21	21	400



# Transportation Services - Traffic Services

## Turning Movement Count - Study Results

### ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

**Survey Date:** Thursday, November 23, 2023

**WO No:** 41324

**Start Time:** 07:00

**Device:** Miovision

#### Full Study 15 Minute U-Turn Total

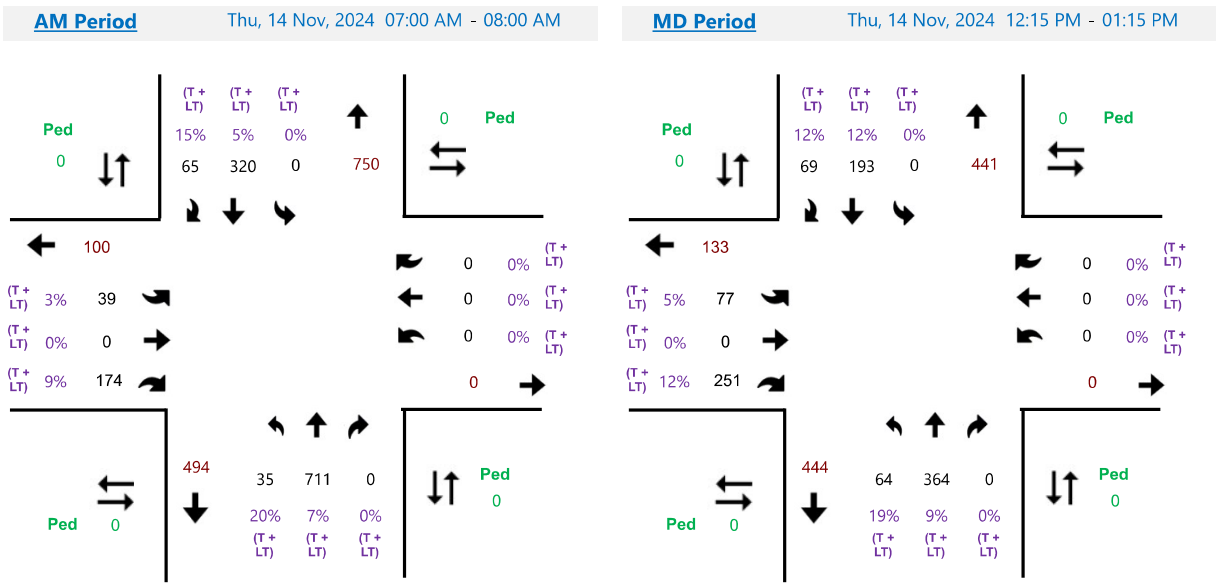
ROCKDALE RD                      RUSSLAND RD/HIGHWAY LANE

Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	1	0	0	0	1
08:00	08:15	0	0	0	0	0
08:30	08:45	0	0	0	0	0
09:00	09:15	0	0	0	0	0
17:45	18:00	0	0	0	0	0
08:15	08:30	0	0	0	0	0
08:45	09:00	0	0	0	0	0
09:15	09:30	0	0	0	0	0
09:30	09:45	0	0	0	0	0
09:45	10:00	1	0	0	0	1
11:45	12:00	0	0	0	0	0
12:15	12:30	0	0	0	0	0
12:30	12:45	0	0	0	0	0
12:45	13:00	0	0	0	0	0
13:15	13:30	0	0	0	0	0
15:00	15:15	0	0	0	0	0
15:30	15:45	0	0	0	0	0
16:00	16:15	0	0	0	0	0
16:15	16:30	0	0	0	0	0
16:30	16:45	0	0	0	0	0
17:00	17:15	0	0	0	0	0
17:15	17:30	0	0	0	0	0
17:30	17:45	0	0	0	0	0
16:45	17:00	0	0	0	0	0
13:00	13:15	0	0	0	0	0
11:30	11:45	0	0	0	0	0
12:00	12:15	0	0	0	0	0
15:15	15:30	0	0	0	0	0
15:45	16:00	0	0	0	0	0
Total		2	0	0	0	2



## TES - Traffic Engineering System Turning Movement Total Count and Peak Summary Report

<b>Description:</b>	HWY 417 @ ROCKDALE RD - RAMP 51		
<b>Region:</b>	EAST	<b>Hwy #:</b>	HWY 417
<b>LHRS_Offset:</b>	49330_0000_51T	<b>Int. Type:</b>	T-Intersection
<b>Count Date:</b>	Thursday, 14 November, 2024		

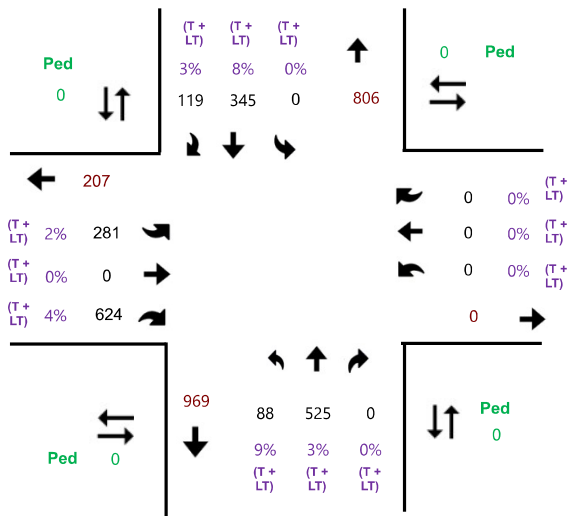




# TES - Traffic Engineering System Turning Movement Total Count and Peak Summary Report

**Description:** HWY 417 @ ROCKDALE RD - RAMP 51  
**Region:** EAST **Hwy #:** HWY 417  
**LHRS\_Offset:** 49330\_0000\_51T **Int. Type:** T-Intersection  
**Count Date:** Thursday, 14 November, 2024

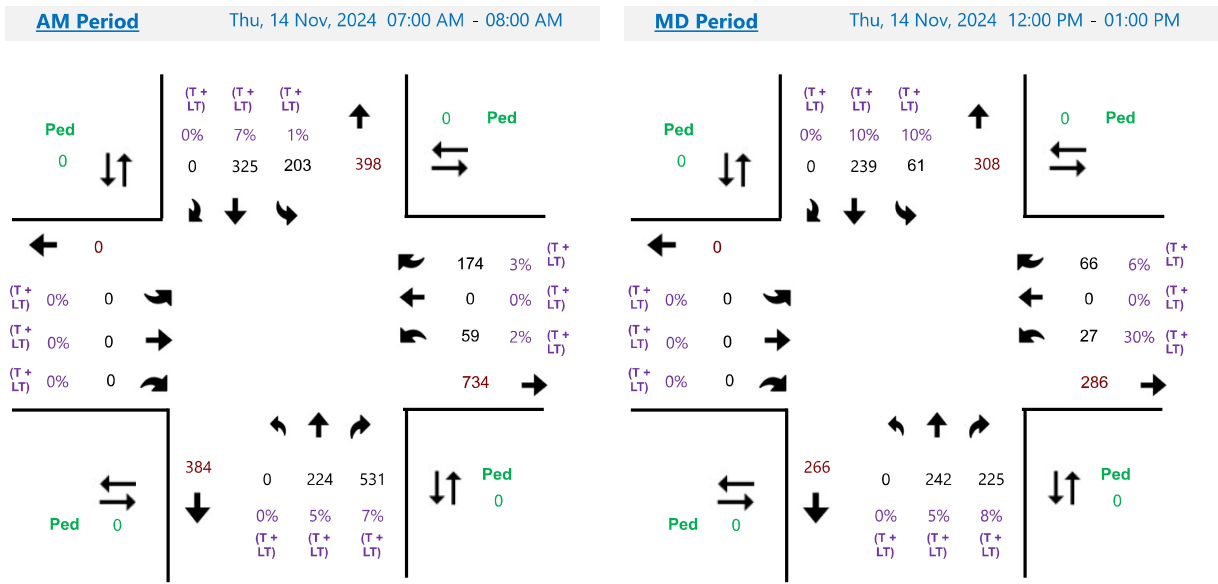
**PM Period** Thu, 14 Nov, 2024 04:00 PM - 05:00 PM





## TES - Traffic Engineering System Turning Movement Total Count and Peak Summary Report

<b>Description:</b>	HWY 417 @ ROCKDALE RD - RAMP 61		
<b>Region:</b>	EAST	<b>Hwy #:</b>	HWY 417
<b>LHRS_Offset:</b>	49330_0000_61T	<b>Int. Type:</b>	T-Intersection
<b>Count Date:</b>	Thursday, 14 November, 2024		

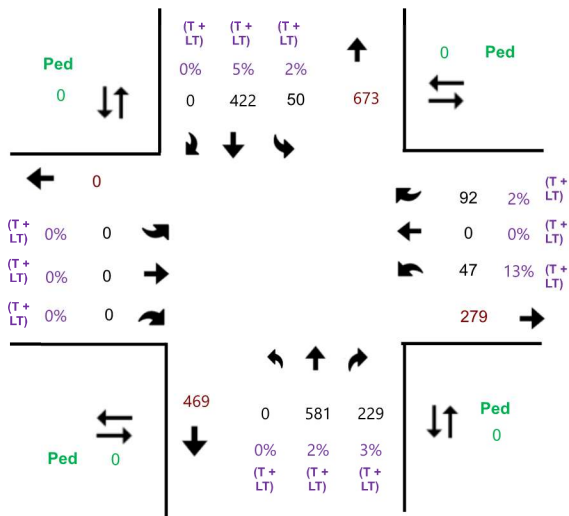




### TES - Traffic Engineering System Turning Movement Total Count and Peak Summary Report

**Description:** HWY 417 @ ROCKDALE RD - RAMP 61  
**Region:** EAST **Hwy #:** HWY 417  
**LHRS\_Offset:** 49330\_0000\_61T **Int. Type:** T-Intersection  
**Count Date:** Thursday, 14 November, 2024

**PM Period** Thu, 14 Nov, 2024 04:00 PM - 05:00 PM



**Cover Sheet**

Location: Highway 417 EB Ramps at Rockdale Road

Area/District: Ottawa

Timing Based On T.M. Dated: June 01, 2015

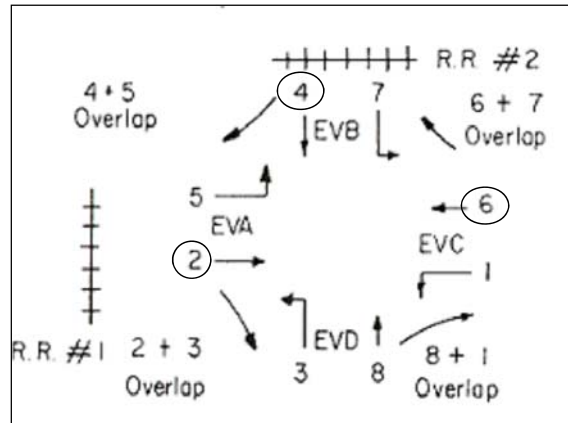
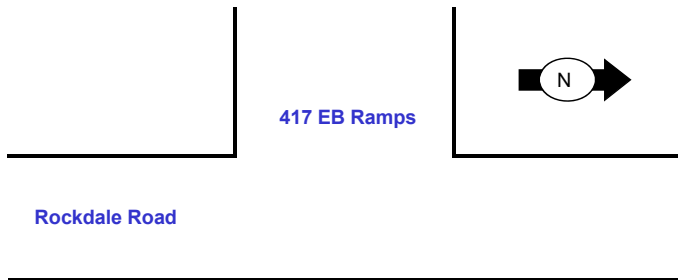
Traffic Signal # 228

Timing Developed By: David Brake

Approved By: Paul Webster

Installed By: Terra Flex

Installation Date: October 18, 2019



Circle Movements and Operations

**COMMUNICATIONS ADDRESSING**

COMM ADDRESS  
(C/0+0+0) = 1

CELL #: (416) 524-8459

ZONE ADDRESS  
(C/0+0+1) = 1

UDP PORT: 8037

AREA NUMBER  
(C/0+0+2) = 4

IP ADDRESS: 10.151.193.106

AREA ADDRESS 228  
(C/0+0+3) =

AMPLIFIER:

PROGRAM: 233ON1.D

**DISABLE ALARM REPORTING**

		Column F							
		1	2	3	4	5	6	7	8
0	OMIT ALARMS					X			

< C + 0 + C = 5 >

- 1 = STOP TIME
- 2 = FLASH SENSE
- 3 = KEYBOARD ENTRY
- 4 = MANUAL PLAN SELECT
- 5 = ENABLE POLICE CNTRL (Not Used)
- 6 = EXTERNAL ALARM (Door Alarm)
- 7 = DETECTOR FAILURE

# ACTUATED INTERVAL TIMING AND FAZE FUNCTIONS

		PHASE							
		1	2	3	4	5	6	7	8
0	WALK				7	7			
1	DON'T WALK				34	12			
2	MIN INITIAL		20		10	20			
3	TYPE 3 LIMIT								
4	ADD PER VEH		2.0			2.0			
5	VEH EXT		4.5		4.0	4.5			
6	MAX GAP		4.5		4.0	4.5			
7	MIN GAP		4.5		4.0	4.5			
8	MAX LIMIT		40		30	40			
9	MAXIMUM 2								
A	ADV /DLY WALK								
B	SEQUENCE TO								
C	COND SRV MIN								
D	REDUCE EVERY								
E	YELLOW		5.9		4.5	5.9			
F	RED CLEAR		2.0		2.2	2.0			

		9	A	B	C	D	E
0							RR1 DLY
1	PHASE 1	-					RR1 CLR
2	PHASE 2	35					EVA DLY
3	PHASE 3	-					EVA CLR
4	PHASE 4	-					EVB DLY
5	PHASE 5	-					EVB CLR
6	PHASE 6	35					EVC DLY
7	PHASE 7	-					EVC CLR
8	PHASE 8	-					EVD DLY
							EVD CLR
							RR2 DLY
							RR2 CLR
							EV CLR
							EV DLY
							RR CLR
							RR DLY

ALL RED START  
(F/1 + C + O) = **5.0**

RED REVERT  
(F/1 + O + F) = **5.0**

PHASE BANK # 1 < C + O + F = 1 >

### COLUMN F PHASES

		1	2	3	4	5	6	7	8
0	PERMIT		X		X		X		
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL		X				X		
4	PED RECALL								
5	PEDESTRIANS								
6	YIELD AT FLSH D/W								
7	RED REST								
8	DOUBLE ENTRY		X				X		
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	COND SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X				X		
F	FIRST PHASES				X				

< C + O + F = 1 >

Date: 19-Jun-18

LOCATION  
Hwy: 417 EB Ramps  
At: Rockdale Rd

	A	B	C
PREEMPT MINIMUMS	RR1-2 SPEV1	SP EV2	EMER VEH
A	WLK (DFLT)	4	4
B	FD WALK		
C	INITIAL		

< C + O + F = 1 >

### Column E Phases / Bits

		1	2	3	4	5	6	7	8
0	EXCLUSIVE								
1	RR1 CLEAR								
2	RR2 CLEAR								
3	RR2 LTD SRV								
4	PROT/PERM								
5	FLH TO PREMT								
6	FLASH ENTRY								
7	DISABL MIN YEL			-					
8	DISABL OVP YEL								
9	OVP FLH YEL								
A	EM VEH A								
B	EM VEH B								
C	EM VEH C								
D	EM VEH D								
E	EXTRA 1	X		X		X			
F	IC SELECT		X						

< C + O + E = 125 >

### Column F Phases / Bits

		1	2	3	4	5	6	7	8
0									
1	EXT PERMIT 1								
2	EXT PERMIT 2								
3	EXCLU PED								
4									
5	PED 2P OUT								
6	PED 6P OUT						X		
7	PED 4P OUT				X				
8	PED 8P OUT								
9	FLH YELLOW								
A									
B									
C									
D									
E	RESTRICTED								
F	EXTRA 2								

### Column F Phases / Bits

		1	2	3	4	5	6	7	8
0	ADV GRN FLH								
1	PHASE FLASH								
2	FLASH WALK								
3	GUAR PASS								
4	SIMUL GAP		X				X		
5	SEQ TIMING								
6	ADV WALK								
7	DELAY WALK								
8	EXT RECALL								
9									
A	MAX EXTEN								
B	INH PED RSRV								
C	SEMI ACTUATED								
D									
E	STRT VEH CALL		X		X		X		
F	STRT PED CALL				X		X		

SPECIALS < C + O + F = 2 >

MANUAL PLAN	14
< C/O + A + 1 >	
MANUAL OFFSET	0
< C/O + B + 1 >	
<b>MANUAL SELECTION</b>	

### MANUAL PLAN

- 0 = Automatic (Master)
- 9 = Control Plan 1 - 9
- 14 (E) = Free ( Isolated )
- 15 (F) = Software Flash

### MANUAL OFFSET

- 0 = Automatic (Master)
- 1 = Offset A
- 2 = Offset B
- 3 = Offset C

### FLASH TO PREEMPT

- 1 = EVA
- 2 = EVB
- 3 = EVC
- 4 = EVD
- 5 = RR1
- 6 = RR2
- 7 = SE1
- 8 = SE2
- 1 = TBC TYPE 1
- 2 = NEMA EXT. COORD.
- 3 = DAYLIGHT SAVINGS
- 4 =

### EXTRA 1

- 5 = EXPANDED STATUS REPORTING
- 6 = INTERNATIONAL PED
- 7 = CLEAR OUTPUTS DURING FLASH
- 8 = SPLIT RING

### EXTRA 2

- 1 = AWR ON DURING PHASE INITIAL
- 2 = LMU INSTALLED

### IC SELECT

- 2 = 2 WAY MODEM
- 3 = 7 WIRE SLAVE
- 4 = FLASH / FREE
- 5 = SIMPLEX MASTER
- 7 = 7 WIRE MASTER
- 8 = OFFSET INTURP

# Pretimed

	20							
	1	2	3	4	5	6	6	8
WALK				7		7		
DON'T WALK				34		12		
MIN INTIAL		20		10		20		
TYPE 3 LIMIT								
ADD PER VEH		2.0				2.0		
VEH EXT		4.5		4.0		4.5		
MAX GAP		4.5		4.0		4.5		
MIN GAP		4.5		4.0		4.5		
MAX LIMIT		30		30		30		
MAXIMUM 2								
ADV / DLY WALK								
SEQUENCE TO								
COND SRV MIN								
REDUCE EVERY								
YELLOW		5.9		4.5		5.9		
RED CLEAR		2.0		2.2		2.0		

PHASE BANK # < C + O + F = 1 >

		Column F PHASES							
		1	2	3	4	5	6	7	8
0	PERMIT		X		X		X		
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL		X				X		
4	PED RECALL								
5	PEDESTRIANS								
6	REST IN WALK								
7	RED REST								
8	DOUBLE ENTRY		X				X		
9	VEH MAX CALL		X		X		X		
A	SOFT RECALL								
B	MAXIMUM 2								
C	CORD SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X				X		
F	FIRST PHASES				X				

< C + O + F = 1 >

**LOCATION:** Highway 417 EB Ramps at Rockdale Road

**Issued Date:** 19-Jun-18

**Installed Date:** -



## DETECTOR ASSIGNMENTS

STANDARD 332 CABINET LOCATION	column	1	3	Column 0 C1 Pin #	Column 1 ATTRIBUTES								Column 2 PHASE(S)								Column 3 ASSIGNMENTS								DETECTOR ASSIGNMENT SHEET ONTARIO 233 PROGRAM				
		delay	carry		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8					
			20																														
I-2 U	0			0	39																						<b>LOCATION:</b>						
J-2 U	1			1	40			X	X	X					X				X	X	X					X	Hwy	417 EB Ramps					
I-6 U	2	5		2	41			X	X	X				X					X	X	X					X	at	Rockdale Road					
J-6 U	3			3	42																						Issued Date:	19-Jun-18					
1-2 L	4			4	43			X	X	X		X							X	X	X					X	Installed Date:						
J-2 L	5			5	44																						<b>DETECTOR ATTRIBUTES</b>						
1-6 L	6			6	45			X						X					X	X	X						1 = FULL TIME DELAY						
J-6 L	7			7	46																						2 = PEDESTRIAN CALL						
I-4	8			8	47																						3 =						
J-4	9			9	48																						4 = COUNT						
I-8	A			A	49																						5 = EXTENSION						
J-8	B			B	50																						6 = TYPE 3						
J-1	C			C	55			X	X	X				X					X	X	X					X	7 = CALLING						
I-1	D			D	56																						8 = ALTERNATE						
J-5	E			E	57																						<b>DETECTOR ASSIGNMENTS</b>						
I-5	F			F	58																						1 = DET. SET # 1						
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												2 = DET. SET # 2	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												3 = DET. SET # 3	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												4 =	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												5 =	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												6 = MIN RECALL ON FAILURE	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												7 = MAX RECALL ON FAILURE	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												8 - REPORT ON FAILURE	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												<b>DETECTOR MONITOR</b>	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												MAX OFF: D/0+0+1=120	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												MAX ON: D/0+0+2=60	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												<b>ADVANCE WARNING BEACONS</b>	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												SIGN #1	SIGN #2
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												PHASE NUMBER	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												(F/1+C+F)=	(F/1+D+F)=
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												TIME BEFORE YELLOW	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												(F/1+C+E)=	(F/1+D+E)=
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												OUTPUT PIN NUMBER	
< C + O + D = 0 >				DETECTOR ASSIGNMENTS < C + O + E = 126 >																												(E/127+E+8)=	(E/127+E+9)=

# Input File Layout

Input File Slot No. →	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>"I" FILE</b>	<b>1</b> Ext, Cnt, Call <C1-56>	<b>2</b> Cnt <C1-39>	<b>2</b> Ext, Cnt, Call <C1-63>	<b>2</b> Type 3, Call <C1-47>	<b>3</b> Ext, Cnt, Call <C1-58>	<b>4</b> Ext, Cnt, Call <C1-41>	<b>4</b> Ext, Cnt, Call <C1-65>	<b>4</b> Type 3, Call <C1-49>	<b>1</b> Ext, Cnt, Call <C1-60>	NOT WIRED	Door Alarm <C1-80>	<b>2</b> Ped Call <C1-67>	<b>6</b> Ped Call <C1-68>	Flash Sense <C1-81>
		<b>2</b> Ext, Cnt, Call <C1-43>	<b>2</b> Ext, Cnt, Call <C1-76>			<b>4</b> Cnt <C1-45>	<b>4</b> Ext, Cnt, Call <C1-78>		<b>3</b> Ext, Cnt, Call <C1-62>		Not Assigned <C1-53>	<b>4</b> Ped Call <C1-69>	<b>8</b> Ped Call <C1-70>	Stop Time <C1-82>
<b>"J" FILE</b>	<b>5</b> Cnt <C1-55>	<b>6</b> Ext, Cnt, Call <C1-40>	<b>6</b> Ext, Cnt, Call <C1-64>	<b>6</b> Type 3, Call <C1-48>	<b>7</b> Ext, Cnt, Call <C1-57>	<b>8</b> Ext, Cnt, Call <C1-42>	<b>8</b> Ext, Cnt, Call <C1-66>	<b>8</b> Type 3, Call <C1-50>	<b>5</b> Cnt <C1-59>	NOT WIRED	Not Assigned <C1-54>	EV A Preempt <C1-71>	EV B Preempt <C1-72>	Railroad 1 <C1-51>
		<b>6</b> Cnt <C1-44>	<b>6</b> Ext, Cnt, Call <C1-77>			<b>8</b> Cnt <C1-46>	<b>8</b> Ext, Cnt, Call <C1-79>		<b>7</b> Ext, Cnt, Call <C1-61>		Not Assigned <C1-75>	EV C Preempt <C1-73>	EV D Preempt <C1-74>	Railroad 2 <C1-52>

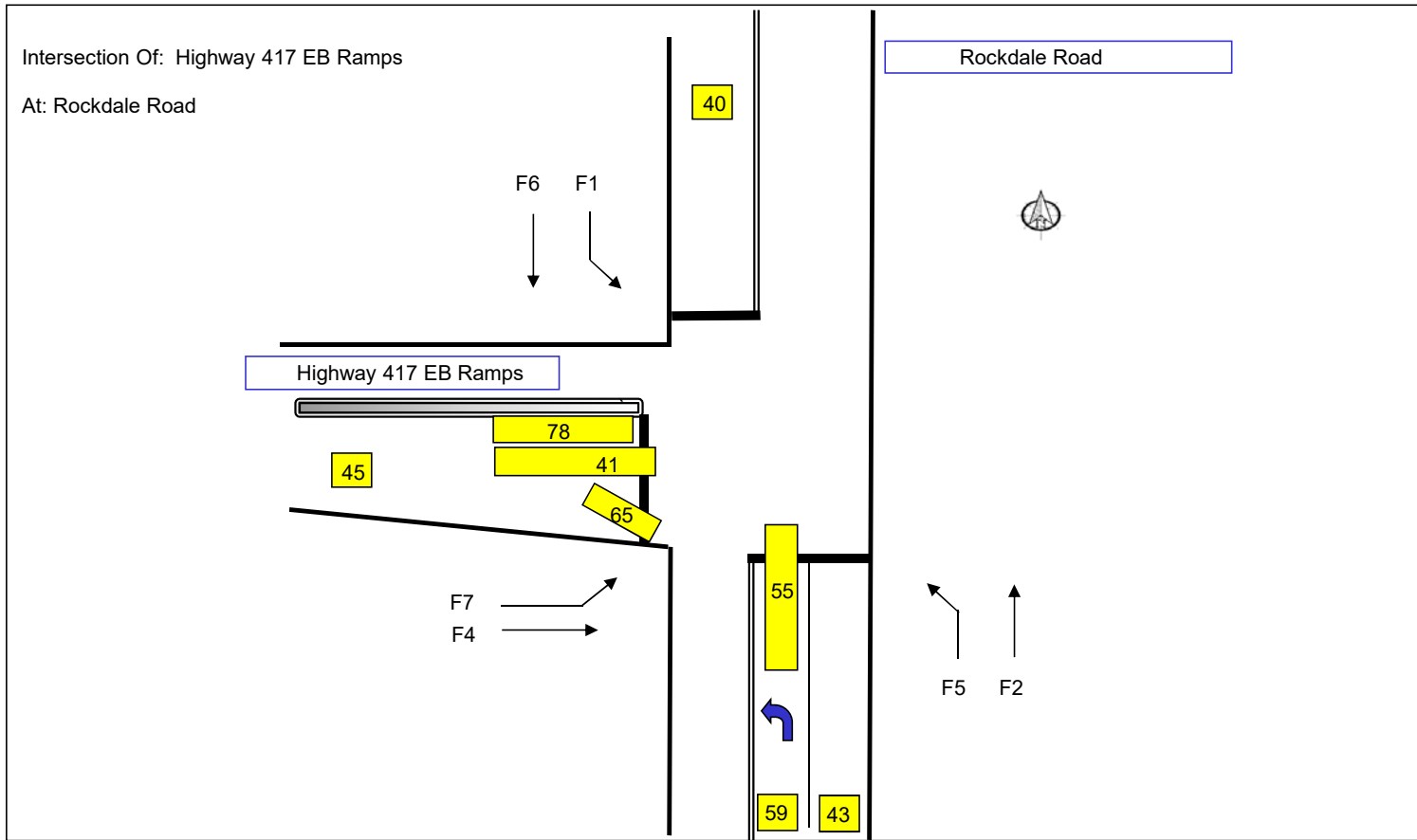
**DETECTOR TYPES**

Ext = Extension Detector  
Detector is only active during the Phase's GREEN Intervals (ie, will NOT Call the Phase)

Cnt = Count Detector  
Used in computing "Added Initial"

Call = Calling Detector  
Detector is only active during the Phase's NON-GREEN Intervals (ie, will NOT Extend the Phase)

Type 3 = Type 3 Disconnect  
Will allow a Calling Detector to Extend its Phase until the Call first drops or the "Type 3 Limit" is reached



# OVERLAPS AND AAWS

		PED/PHASE/OVERLAP							
		1	2	3	4	5	6	7	8
0	WALK								
1	DON'T WALK								
2	PHASE GREEN								
3	PHASE AMBER								
4	PHASE RED								
5	OVERLAP GREEN								
6	OVERLAP AMBER								
7	OVERLAP RED								

		1								2								3								4							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
0	LOAD SW #																																
1	VEH SET 1																																
2	VEH SET 2																																
3	VEH SET 3																																
4	NEG VEH																																
5	NEG PED																																
6	GREEN OMIT																																
7	GRN CLR OMIT																																

**REDIRECT PHASE OUTPUTS** (C + 0 + E = 127)

Enable/Disable  
Phase Redirection

CABINET TYPE :  
(E/125 + D + 0) = 0 ( For 332 cabinet )  
(enable redirection = 30)

PROGRAMMING OVERLAP SETS		
ASSIGNABLE INPUTS	OVERLAP SET 1	No Programming Required
	OVERLAP SET 2	E/126 + D + C = _____
	OVERLAP SET 3	E/126 + D + D = _____

DATE: 03-Sep-12

LOCATION: \_\_\_\_\_

D	GREEN CLEAR				
E	AMBER CLEAR				
F	RED CLEAR				

**OVERLAP ASSIGNMENTS** (C + 0 + E = 29)

**ADVANCE WARNING FLASHERS**

Time Before Amber	0.0	< F/1+C+E >
Phase Number	0	< F/1+C+F >
Output Pin Number		< E/127+E+8 >

**Advance Warning Beacon - Sign #1**

Time Before Amber	0.0	< F/1+D+E >
Phase Number	0	< F/1+D+F >
Output Pin Number		< E/127+E+9 >

**Advance Warning Beacon - Sign #2**



# COORDINATION

		PLAN								
Column Numbers ---->		1	2	3	4	5	6	7	8	9
Row	Plan Name ---->									
0	Cycle Length	0	0	0	0	0	0	0	0	0
1	Phase 1 - ForceOff	0	0	0	0	0	0	0	0	0
2	Phase 2 - ForceOff	0	0	0	0	0	0	0	0	0
3	Phase 3 - ForceOff	0	0	0	0	0	0	0	0	0
4	Phase 4 - ForceOff	0	0	0	0	0	0	0	0	0
5	Phase 5 - ForceOff	0	0	0	0	0	0	0	0	0
6	Phase 6 - ForceOff	0	0	0	0	0	0	0	0	0
7	Phase 7 - ForceOff	0	0	0	0	0	0	0	0	0
8	Phase 8 - ForceOff	0	0	0	0	0	0	0	0	0
9	Ring Offset	0	0	0	0	0	0	0	0	0
A	Offset 1	0	0	0	0	0	0	0	0	0
B	Offset 2	0	0	0	0	0	0	0	0	0
C	Offset 3	0	0	0	0	0	0	0	0	0
D	Perm 1 - End	0	0	0	0	0	0	0	0	0
E	Hold Release	255	255	255	255	255	255	255	255	255
F	Zone Offset	0	0	0	0	0	0	0	0	0

Coordination - Bank 1 <C+0+C=1>

Row										
0	Ped Adjustment	0	0	0	0	0	0	0	0	0
1	Perm 2 - Start	0	0	0	0	0	0	0	0	0
2	Perm 2 - End	0	0	0	0	0	0	0	0	0
3	Perm 3 - Start	0	0	0	0	0	0	0	0	0
4	Perm 3 - End	0	0	0	0	0	0	0	0	0
5	Reservice Time	0	0	0	0	0	0	0	0	0
6	Reservice Phases									
7										
8	Pretimed Phases									
9	Max Recall									
A	Perm 1 Veh Phase	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7
B	Perm 1 Ped Phase	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7	1_345_7
C	Perm 2 Veh Phase									
D	Perm 2 Ped Phase									
E	Perm 3 Veh Phase									
F	Perm 3 Ped Phase									

Coordination - Bank 2 <C+0+C=2>

Row		2
0		
1	Phase 1	10
2	Phase 2	10
3	Phase 3	10
4	Phase 4	10
5	Phase 5	10
6	Phase 6	10
7	Phase 7	10
8	Phase 8	10

Coordination Transition  
Minimums < C+0+C = 5 >

Transition Type  < C/5+1+9 >  
**TBC TRANSITION**

Lag Hold Phases  < C/5+1+A >  
**Coordinated Lag Hold Phases**

Sync Output Time  < C/5+1+C >  
**7 - Wire Master**

Transition Type  
0.X = Shortway  
1.X = Lengthen  
X.1 thru X.4 = # of cycles  
when lengthening

DATE: 03-Sep-12

(Coord Extra Bit 1 = Programmed WALK Time for Sync Phases)

	E	Row	Time	Plan	Offset	Day of Week
		0	0:00	0	0	
Plan 1 - Sync	2_6_	1	0:00	0	0	
Plan 2 - Sync	2_6_	2	0:00	0	0	
Plan 3 - Sync	2_6_	3	0:00	0	0	
Plan 4 - Sync	2_6_	4	0:00	0	0	
Plan 5 - Sync	2_6_	5	0:00	0	0	
Plan 6 - Sync	2_6_	6	0:00	0	0	
Plan 7 - Sync	2_6_	7	0:00	0	0	
Plan 8 - Sync	2_6_	8	0:00	0	0	
Plan 9 - Sync	2_6_	9	0:00	0	0	
NEMA Sync		A	0:00	0	0	
NEMA Hold		B	0:00	0	0	
		C	0:00	0	0	
		D	0:00	0	0	
Coord Extra	#NAME?	E	0:00	0	0	
		F	0:00	0	0	

Sync Phases < C+0+C = 1 >

TOD Coordination < C+0+9 = 0.1 >  
(Bank 1)

	F	Row	Time	Plan	Offset	Day of Week
Free Lag	2_4_6_8	0	0:00	0	0	
Plan 1 - Lag	2_4_6_8	1	0:00	0	0	
Plan 2 - Lag	2_4_6_8	2	0:00	0	0	
Plan 3 - Lag	2_4_6_8	3	0:00	0	0	
Plan 4 - Lag	2_4_6_8	4	0:00	0	0	
Plan 5 - Lag	2_4_6_8	5	0:00	0	0	
Plan 6 - Lag	2_4_6_8	6	0:00	0	0	
Plan 7 - Lag	2_4_6_8	7	0:00	0	0	
Plan 8 - Lag	2_4_6_8	8	0:00	0	0	
Plan 9 - Lag	2_4_6_8	9	0:00	0	0	
External Lag		A	0:00	0	0	
		B	0:00	0	0	
		C	0:00	0	0	
		D	0:00	0	0	
		E	0:00	0	0	
		F	0:00	0	0	

Lag Phases <C+0+C=1>

TOD Coordination < C+0+9 = 0.2 >  
(Bank 2)

LOCATION: \_\_\_\_\_

Assignable Inputs&Outputs

	Column A		Column B		Column C		Column D		Column E		Column F		
0	NOT 3	0	MAX 2	0	PRETIME	0	WEEKDAY	0	DIAL 2	0		0	0
1	NOT 4	0	SYSDET 1	0	PLAN 1	0	X PERM 1	0	DIAL 3	0	EVA	71	1
2	OR 4	0	SYSDET 2	0	PLAN 2	0	X PERM 2	0	OFFSET 1	0	EVB	72	2
3	OR 4	0	SYSDET 3	0	PLAN 3	0	DIM	0	OFFSET 2	0	EVC	73	3
4	OR 5	0	SYSDET 4	0	PLAN 4	0	X CLOCK	0	OFFSET 3	0	EVD	74	4
5	OR 5	0	SYSDET 5	0	PLAN 5	0	STOP TIME	82	FREE	0	RR 1	51	5
6	OR 6	0	SYSDET 6	0	PLAN 6	0	FL SENSE	81	FLASH	0	RR 2	52	6
7	OR 6	0	SYSDET 7	0	PLAN 7	0	ENABLE	0	XPED OMIT	0	SP EVNT 1	0	7
8		0	SYSDET 8	0	PLAN 8	0	ADVANCE	0	NOT 1	0	SP EVNT 2	0	8
9		0	MAX INBT	0	PLAN 9	0	ALARM	80	NOT 2	0	EXT LAG	0	9
A	AND 4	0	FORCE A	0	DELAY A	0	PH BNK 2	0	OR 1	0	AND 1	0	A
B	AND 4	0	FORCE B	0	DELAY B	0	PH BNK 3	0	OR 1	0	AND 1	0	B
C	NAND 1	0	C NA	0	DELAY C	0	OLAP SET 2	0	OR 2	0	AND 2	0	C
D	NAND 1	0	HOLD	0	DELAY D	0	OLAP SET 3	0	OR 2	0	AND 2	0	D
E	NAND 2	0	VE CALL	0	DELAY E	0	DET SET 2	0	OR 3	0	AND 3	0	E
F	NAND 2	0	RECALL	0	DELAY F	0	DET SET 3	0	OR 3	0	AND 3	0	F

ASSIGNABLE INPUTS < C + O + E = 126>

	Column A		Column B		Column C		Column D		Column E		Column F		
0		0	FLASHER 0	0	FREE	0	NOT 1	0	TOD 1	0	DIAL 2	0	0
1	SP EV 1	0	FLASHER 1	0	PLAN 1	0	OR 1	0	TOD 2	0	DIAL 3	0	1
2	SP EV 2	0	FAST FLSHR	0	PLAN 2	0	OR 2	0	TOD 3	0	OFFSET 1	0	2
3	SP EV 3	0		0	PLAN 3	0	OR 3	0	TOD 4	0	OFFSET 2	0	3
4	SP EV 4	0		0	PLAN 4	0	AND 1	0	TOD 5	0	OFFSET 3	0	4
5	SP EV 5	0		0	PLAN 5	0	AND 2	0	TOD 6	0	FREE	0	5
6	SP EV 6	0		0	PLAN 6	0	AND 3	0	TOD 7	0	FLASH	0	6
7	SP EV 7	0		0	PLAN 7	0	NOT 2	0	TOD 8	0	PREEMPT	0	7
8	SP EV 8	0	NOT 3	0	PLAN 8	0	EVA	0	WARN 1	0		231	8
9		0	NOT 4	0	PLAN 9	0	EVB	0	WARN 2	0		232	9
A	DET FAIL	0	OR 4	0		0	EVC	0	DEALY A	0		233	A
B		0	OR 5	0		0	EVD	0	DELAY B	0		234	B
C		0	OR 6	0		0	RR1	0	DELAY C	0		235	C
D	CENT. CTRL	0	AND 4	0		0	RR2	0	DELAY D	0		236	D
E	EXCL FDW	0	NAND 1	0		0	SP EVNT 1	0	DELAY E	0		233	E
F	EXCL WALK	0	NAND 2	0		0	SP EVNT 2	0	DELAY F	0		238	F

ASSIGNABLE OUTPUTS < C + O + E = 127>

# DEFAULT DETECTOR ASSIGNMENTS

Standard 332 Cabinet Location	Column 0 C1 PIN NUMBER	Column 1 ATTRIBUTES								Column 2 PHASE(S)								Column 3 ASSIGNMENTS							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
		I-2 U	0	39		X	X	X		X				X	X	X		X							
J-2 U	1	40		X	X	X				X			X	X	X		X								X
I-6 U	2	41		X	X	X				X			X	X	X		X								X
J-6 U	3	42		X	X	X						X	X	X	X		X								X
I-2 L	4	43		X	X	X		X					X	X	X		X								X
J-2 L	5	44		X	X	X				X			X	X	X		X								X
I-6 L	6	45		X	X	X				X			X	X	X		X								X
J-6 L	7	46		X	X	X						X	X	X	X		X								X
I-4	8	47			X	X		X					X	X	X		X								X
J-4	9	48			X	X				X			X	X	X		X								X
I-8	A	49			X	X				X			X	X	X		X								X
J-8	B	50			X	X						X	X	X	X		X								X
J-1	C	55		X	X	X				X			X	X	X		X								X
I-1	D	56		X	X	X		X					X	X	X		X								X
J-5	E	57		X	X	X						X	X	X		X									X
I-5	F	58		X	X	X				X			X	X	X		X								X

"INITIALIZED" DETECTOR ASSIGNMENTS  
< C + 0 + E = 126 >

Standard 332 Cabinet Location	Column 4 C1 PIN NUMBER	Column 5 ATTRIBUTES								Column 6 PHASE(S)								Column 7 ASSIGNMENTS							
		1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
		J-9 U	0	59		X	X	X				X			X	X	X		X						
I-9 U	1	60		X	X	X		X					X	X	X		X								X
J-9 L	2	61		X	X	X							X	X	X		X								X
I-9 L	3	62		X	X	X				X			X	X	X		X								X
I-3 U	4	63		X	X	X		X					X	X	X		X								X
J-3 U	5	64		X	X	X						X	X	X		X									X
I-7 U	6	65		X	X	X				X			X	X	X		X								X
J-7 U	7	66		X	X	X							X	X	X		X								X
I-12 U	8	67	X							X			X	X	X		X								X
I-13 U	9	68	X									X	X	X		X									X
I-12 L	A	69	X							X			X	X	X		X								X
I-13 L	B	70	X										X	X	X		X								X
I-3 L	C	76		X	X	X		X					X	X	X		X								X
J-3 L	D	77		X	X	X						X	X	X		X									X
I-7 L	E	78		X	X	X				X			X	X	X		X								X
J-7 L	F	79		X	X	X							X	X	X		X								X

"INITIALIZED" DETECTOR ASSIGNMENTS  
< C + 0 + E = 126 >

**DETECTOR ATTRIBUTES**

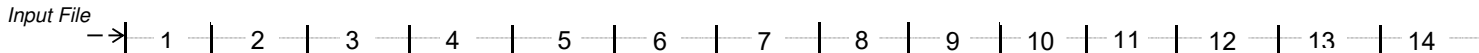
- 1 = Full time Delay
- 2 = Pedestrian call
- 3 =
- 4 = Count
- 5 = Extension
- 6 = Type 3
- 7 = Calling
- 8 = Alternate

**DETECTOR ASSIGNMENTS**

- 1 = Det. Set #1
- 2 = Det. Set #2
- 3 = Det. Set #3
- 4 =
- 5 =
- 6 = MIN Recall On Failure
- 7 = MAX Recall On Failure
- 8 = Report On Failure

**DETECTOR TYPES**

- Ext = Extension Detector  
Detector is only active during the Phase's GREEN Intervals (ie. will NOT Call the Phase)
- Cnt = Count Detector  
Used in computing "Added Initial"
- Call = Calling Detector  
Detector is only active during the Phase's NON-GREEN Intervals (ie. will NOT Extend the Phase)
- Type 3 = Type 3 Disconnect  
Will allow a Calling Detector to Extend its Phase until the Call first drops or the "Type 3 Limit" is reached



<b>"I" FILE</b>	<b>1</b> Ext, Cnt, Call <C1-56>	<b>2</b> Ext, Cnt, Call <C1-39>	<b>2</b> Ext, Cnt, Call <C1-63>	<b>2</b> Type 3, Call <C1-47>	<b>3</b> Ext, Cnt, Call <C1-58>	<b>4</b> Ext, Cnt, Call <C1-41>	<b>4</b> Ext, Cnt, Call <C1-65>	<b>4</b> Type 3, Call <C1-49>	<b>1</b> Ext, Cnt, Call <C1-60>	NOT WIRED	Not Assigned <C1-80>	<b>2</b> Ped Call <C1-67>	<b>6</b> Ped Call <C1-68>	Flash Sense <C1-81>
		<b>2</b> Ext, Cnt, Call <C1-43>	<b>2</b> Ext, Cnt, Call <C1-76>			<b>4</b> Ext, Cnt, Call <C1-45>	<b>4</b> Ext, Cnt, Call <C1-78>		<b>3</b> Ext, Cnt, Call			Not Assigned <C1-53>	<b>4</b> Ped Call <C1-69>	<b>8</b> Ped Call <C1-82>

<b>"J" FILE</b>	<b>5</b> Ext, Cnt, Call <C1-55>	<b>6</b> Ext, Cnt, Call <C1-40>	<b>6</b> Ext, Cnt, Call <C1-64>	<b>6</b> Type 3, Call <C1-48>	<b>7</b> Ext, Cnt, Call <C1-57>	<b>8</b> Ext, Cnt, Call <C1-42>	<b>8</b> Ext, Cnt, Call <C1-66>	<b>8</b> Type 3, Call <C1-50>	<b>5</b> Ext, Cnt, Call <C1-59>	NOT WIRED	Not Assigned <C1-54>	<b>EV A</b> Preempt <C1-71>	<b>EV B</b> Preempt <C1-72>	Railroad 1 <C1-51>
		<b>6</b> Ext, Cnt, Call <C1-44>	<b>6</b> Ext, Cnt, Call <C1-77>			<b>8</b> Ext, Cnt, Call <C1-46>	<b>8</b> Ext, Cnt, Call <C1-79>		<b>7</b> Ext, Cnt, Call <C1-61>		Not Assigned <C1-75>	<b>EV C</b> Ped Call <C1-73>	<b>EV D</b> Preempt <C1-74>	Railroad 2 <C1-52>

# REFERENCE SHEET

## Controller Intervals

0 = Walk	8 = Red Rest
1 = FDW	9 = Preemption
2 = Min. Green	A = Stop Time
3 =	B = Red Revert
4= Var. Initial	C = Yellow-Gap Termination
5 = Extension	D = Yellow-Max. Termination
6 =	E = Yellow-Forceoff Termination
7 = Reduce Gap	F = Red Clearance

## Continuous Memory Error Monitoring

The controller's RAM and EPROM memories are continuously checked for errors. If an error is found, the intersection will go into FLASH (via Watch Dog Timer), and one of the following will be shown on the controller's display:

- bAd A = An error was detected in the CPU's RAM, or a new program has been installed on the memory module.  
Often caused by a bad controller "gel-cell" battery.
- bAd b = An error was detected in the memory module's RAM.  
Often caused by a bad "lithium" battery on the memory module.
- bAd E = An error was detected in the 233 Program EPROM.
- bAd F = An error was detected in the Z-RAM (Dallas chip) on the memory module.

## 412/C Memory Module Lithium Battery Condition

To check the condition of the 3.6 volt Lithium Battery on the 412/C Memory Module:

- If  $E/112 + 0 + A = 84$  - the battery is BAD
- If  $E/112 + 0 + A = 85$  - the battery is O.K.

### Monitor "Activate" Flags

(Also Requires T.O.D. Function "E" Flag)  
Detector Count Recording:

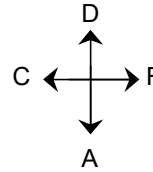
$$E/2 + 0 + 9 = \text{Not Zero}$$

Real Time Split Monitor:

$$E/2 + 0 + E = \text{Not Zero}$$

**E Page Enable:  $F/1 + 9 + E = \text{Not Zero}$**

## Display Movement Codes



- A = Advance ROW
- D = Decrement ROW
- C = COLUMN Back
- F = Forward COLUMN

## Special Event Schedules

- Special Event #1:  $C + 0 + E = 27$
- Special Event #2:  $C + 0 + E = 28$

- Current Interval =  $E + 5 + 0$
- Current Interval Timer =  $E + 5 + B$
- Current Interval Clearance Phases =  $E + 5 + C$

## Time of Day Function (7 Key)

- Current T.O.D. "E Function"  
Control Bits =  $C/0 + E + E$
- Current T.O.D. "F Function"  
Output Bits =  $C/0 + E + F$

## Logic DELAY Gate

### Delay Timer Display

- DELAY A Timer =  $C/0 + 9 + A$
- DELAY B Timer =  $C/0 + 9 + B$   
thru thru
- DELAY F Timer =  $C/0 + 9 + F$

### Interval Timer Display

- Ring A =  $F/0 + A + \text{Interval Row}$
- Ring B =  $F/0 + B + (\text{Interval Row From PHASE BANK data})$

## Display Locations

### Plan Select      Offset Select

- Manual =  $C/0 + A + 1$        $C/0 + B + 1$
- Master =  $C/0 + A + 2$        $C/0 + B + 2$
- Current =  $C/0 + A + 3$        $C/0 + B + 3$
- Next =  $C/0 + A + 4$        $C/0 + B + 4$
- TOD =  $C/0 + A + 5$        $C/0 + B + 5$
- Master Cycle =  $C/0 + A + 0$
- Ring A Cycle =  $C/0 + B + 0$
- Ring B Cycle =  $C/0 + D + 0$

- MIN Cycle =  $C/0 + A + E$
- MAX Cycle =  $C/0 + B + E$

- Phase Hold =  $C/0 + F + D$
- Phase Next =  $C/0 + F + E$
- Force Off =  $C/0 + F + F$   
(with Ring A Cycle Timer)

- Current Calculated Cycle Length =  $C/0 + B + F$
- Current Permitted Phases =  $E/0 + 7 + 8$
- Current Phase Bank =  $F/0 + C + E$

- Last Power Failure:  
(HR-MIN-DOW) =  $8 + 4$   
(DOW-YR-MONTH) =  $8 + 5$

- Last Cabinet Flash  
(HR-MIN-DOW) =  $8 + 6$   
(DOW-YR-MONTH) =  $8 + 7$

- Power Fail Counts:  
(Long Failures) =  $F/1 + 0 + C$   
(Short Failures) =  $F/1 + 0 + D$

- Current Time:  
(HR-MIN-DOW) =  $8 + 0$   
(DOW-YR-MONTH) =  $8 + 1$   
(MIN-SEC-1/10SEC) =  $8 + F$

**INTERSECTION: R4 Hwy 417 EB @ Rockdale Road**

Group Assignment: **NONE**

N/S Street Name: **Rockdale Road**

Last Database Change: **5/29/2024 5:23:10 P**

Field Master Assignment: **NONE**

E/W Street Name: **Hwy 417 EB Ramps**

System Reference Number: **372**

Change Record					
Change	By	Date	Change	By	Date

Notes:

Manual Plan  
 0 = Automatic  
 1-9 = Plan 1-9  
 14 = Free  
 15 = Flash

Manual Offset  
 0 = Automatic  
 1 = Offset A  
 2 = Offset B  
 3 = Offset C

Drop Number	<b>1</b>	<C/0+0+0>
Zone Number	<b>1</b>	<C/0+0+1>
Area Number	<b>4</b>	<C/0+0+2>
Area Address	<b>228</b>	<C/0+0+3>
QuicNet Channel	<b>8037:10.151.193</b>	(QuicNet)

Manual Plan		<C/0+A+1>
Manual Offset		<C/0+B+1>

Red Revert	<b>5.0</b>	<F/1+0+F>
All Red Start	<b>5.0</b>	<F/1+C+0>

Exclusive Walk	<b>0</b>	<F/1+0+0>
Exclusive FDW	<b>0</b>	<F/1+0+1>
All Red Clear	<b>0.0</b>	<F/1+0+2>

**Communication Addresses**

**Manual Selection**

**Start / Revert Times**

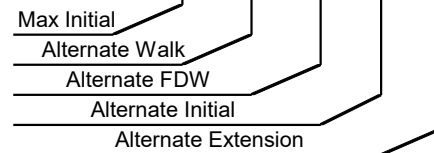
**Exclusive Ped Phase**

(Outputs specified in Assignable Outputs at E/127+A+E & F)

Row	Phase Names ---->	Phase							
		1	2	3	4	5	6	7	8
0	Ped Walk	0	0	0	7	0	7	0	0
1	Ped FDW	0	0	0	34	0	12	0	0
2	Min Green	0	20	0	10	0	20	0	0
3	Type 3 Disconnect	0	0	0	0	0	0	0	0
4	Added per Vehicle	0.0	2.0	0.0	0.0	0.0	2.0	0.0	0.0
5	Veh Extension	0.0	4.5	0.0	4.0	0.0	4.5	0.0	0.0
6	Max Gap	0.0	4.5	0.0	4.0	0.0	4.5	0.0	0.0
7	Min Gap	0.0	4.5	0.0	4.0	0.0	4.5	0.0	0.0
8	Max Limit	0	40	0	30	0	40	0	0
9	Max Limit 2	0	0	0	0	0	0	0	0
A	Adv. / Delay Walk	0	0	0	0	0	0	0	0
B	Sequence To	0	0	0	0	0	0	0	0
C	Cond Serv Check	0	0	0	0	0	0	0	0
D	Reduce Every	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	Yellow Change	0.0	5.9	3.0	4.5	0.0	5.9	0.0	0.0
F	Red Clear	0.0	2.0	0.0	2.2	0.0	2.0	0.0	0.0

**Phase Timing - Bank 1** <C+0+F=1>

	9	A	B	C	D
Phase 1	0	0	0	0	0.0
Phase 2	35	0	0	0	0.0
Phase 3	0	0	0	0	0.0
Phase 4	0	0	0	0	0.0
Phase 5	0	0	0	0	0.0
Phase 6	35	0	0	0	0.0
Phase 7	0	0	0	0	0.0
Phase 8	0	0	0	0	0.0



**Alternate Timing** <C+0+F=1>

	E
RR-1 Delay	0
RR-1 Clear	0
EV-A Delay	0
EV-A Clear	0
EV-B Delay	0
EV-B Clear	0
EV-C Delay	0
EV-C Clear	0
EV-D Delay	0
EV-D Clear	0
RR-2 Delay	0
RR-2 Clear	0
View EV Delay	---
View EV Clear	---
View RR Delay	---
View RR Clear	---

**Preempt Timing**

	F	Row
Permit	<u>2_4_6</u>	0
Red Lock	_____	1
Yellow Lock	_____	2
Min Recall	<u>2_6</u>	3
Ped Recall	_____	4
View Set Peds	-----	5
Rest In Walk	_____	6
Red Rest	_____	7
Dual Entry	<u>2_6</u>	8
Max Recall	_____	9
Soft Recall	_____	A
Max 2	_____	B
Cond. Service	_____	C
Man Cntrl Calls	_____	D
Yellow Start	<u>2_6</u>	E
First Phases	<u>4</u>	F

**Phase Functions** <C+0+F=1>

		Overlap							
Column Numbers ---->		1	2	3	4	5	6	7	8
Row	Overlap Name ---->								
0	Load Switch Number	0	0	0	0	0	0	0	0
1	Veh Set 1 - Phases								
2	Veh Set 2 - Phases								
3	Veh Set 3 - Phases								
4	Neg Veh Phases								
5	Neg Ped Phases								
6	Green Omit Phases								
7	Green Clear Omit Phs.								
8									
9									
A									
B									
C									
D	Green Clear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
E	Yellow Change	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
F	Red Clear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Overlap Assignments <C+0+E=29>

Extra 1 Flags

- 1 = TBC Type 1
- 2 = NEMA Ext. Coord
- 3 = Auto Daylight Savings
- 4 = Reserved
- 5 = Extended Status
- 6 = International Ped
- 7 = Flash - Clear Outputs
- 8 = Split Ring

Extra 2 Flags

- 1 = AWB During Initial
- 2 = LMU Installed
- 3 = Reserved
- 4 = Reserved
- 5 = Reserved
- 6 = Reserved
- 7 = Reserved
- 8 = Reserved

		E
Row	Column Numbers ---->	
0	Exclusive Phases	
1	RR-1 Clear Phases	
2	RR-2 Clear Phases	
3	RR-2 Limited Service	
4	Prot / Perm Phases	
5	Flash to PE Circuits	
6	Flash Entry Phases	
7	Disable Yellow Range	
8	Disable Ovp Yel Range	
9	Overlap Yellow Flash	
A	EV-A Phases	
B	EV-B Phases	
C	EV-C Phases	
D	EV-D Phases	
E	Extra 1 Config. Bits	1_3_5
F	IC Select (Interconnect)	2

Configuration <C+0+E=125>

		F
	Ext. Permit 1 Phases	
	Ext. Permit 2 Phases	
	Exclusive Ped Assign	
	Ped for 2P Output	
	Ped for 6P Output	6
	Ped for 4P Output	4
	Ped for 8P Output	
	Yellow Flash Phases	
	Restricted Phases	
	Extra 2 Config. Bits	

Configuration <C+0+E=125>

		F
	Adv Green Flash Phase	
	Green Flash Phases	
	Flashing Walk Phases	
	Guaranteed Passage	
	Simultaneous Gap Term	2_6
	Sequential Timing	
	Advance Walk Phases	
	Delay Walk Phases	
	External Recall	
	Max Extension	
	Inhibit Ped Reservice	
	Semi-Actuated	
	Start-up Vehicle Calls	2_4_6
	Start-up Ped Calls	4_6

Specials <C+0+F=2>

- Flash to PE & PE Non-Lock
- 1 = EV A    5 = RR 1
  - 2 = EV B    6 = RR 2
  - 3 = EV C    7 = SE 1
  - 4 = EV D    8 = SE 2

- IC Select Flags
- 1 =
  - 2 = Modem
  - 3 = 7-Wire Slave
  - 4 = Flash / Free
  - 5 =
  - 6 = Simplex Master
  - 7 = 7-Wire Master
  - 8 = Offset Interrupter

		2	Row
	Phase 1	10	0
	Phase 2	10	1
	Phase 3	10	2
	Phase 4	10	3
	Phase 5	10	4
	Phase 6	10	5
	Phase 7	10	6
	Phase 8	10	7
	<b>Coordination Transition Minimums</b>		8
	<C+0+C=5>		9
			A
			B
			C
			D
			E
			F

		Plan								
Column Numbers ---->		1	2	3	4	5	6	7	8	9
Row	Plan Name ---->									
0	Cycle Length	100	100	100	100	100	100	100	100	100
1	Phase 1 - ForceOff	55	55	55	55	55	55	55	55	55
2	Phase 2 - ForceOff	0	0	0	0	0	0	0	0	0
3	Phase 3 - ForceOff	20	20	20	20	20	20	20	20	20
4	Phase 4 - ForceOff	40	40	40	40	40	40	40	40	40
5	Phase 5 - ForceOff	55	55	55	55	55	55	55	55	55
6	Phase 6 - ForceOff	0	0	0	0	0	0	0	0	0
7	Phase 7 - ForceOff	20	20	20	20	20	20	20	20	20
8	Phase 8 - ForceOff	40	40	40	40	40	40	40	40	40
9	Ring Offset	0	0	0	0	0	0	0	0	0
A	Offset 1	0	0	0	0	0	0	0	0	0
B	Offset 2	0	0	0	0	0	0	0	0	0
C	Offset 3	0	0	0	0	0	0	0	0	0
D	Perm 1 - End	15	15	15	15	15	15	15	15	15
E	Hold Release	255	255	255	255	255	255	255	255	255
F	Zone Offset	0	0	0	0	0	0	0	0	0

Coordination - Bank 1 <C+0+C=1>

(Coord Extra Bit 1 = Programmed WALK Time for Sync Phases)

		E	Row
			0
Plan 1 - Sync	<u>2 6</u>		1
Plan 2 - Sync	<u>2 6</u>		2
Plan 3 - Sync	<u>2 6</u>		3
Plan 4 - Sync	<u>2 6</u>		4
Plan 5 - Sync	<u>2 6</u>		5
Plan 6 - Sync	<u>2 6</u>		6
Plan 7 - Sync	<u>2 6</u>		7
Plan 8 - Sync	<u>2 6</u>		8
Plan 9 - Sync	<u>2 6</u>		9
NEMA Sync	_____		A
NEMA Hold	_____		B
			C
			D
Coord Extra	_____		E
			F

Sync Phases <C+0+C=1>

Row										
0	Ped Adjustment	0	0	0	0	0	0	0	0	0
1	Perm 2 - Start	0	0	0	0	0	0	0	0	0
2	Perm 2 - End	0	0	0	0	0	0	0	0	0
3	Perm 3 - Start	0	0	0	0	0	0	0	0	0
4	Perm 3 - End	0	0	0	0	0	0	0	0	0
5	Reservice Time	0	0	0	0	0	0	0	0	0
6	Reservice Phases	_____	_____	_____	_____	_____	_____	_____	_____	_____
7										
8	Pretimed Phases	_____	_____	_____	_____	_____	_____	_____	_____	_____
9	Max Recall	_____	_____	_____	_____	_____	_____	_____	_____	_____
A	Perm 1 Veh Phase	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
B	Perm 1 Ped Phase	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
C	Perm 2 Veh Phase	_____	_____	_____	_____	_____	_____	_____	_____	_____
D	Perm 2 Ped Phase	_____	_____	_____	_____	_____	_____	_____	_____	_____
E	Perm 3 Veh Phase	_____	_____	_____	_____	_____	_____	_____	_____	_____
F	Perm 3 Ped Phase	_____	_____	_____	_____	_____	_____	_____	_____	_____

Coordination - Bank 2 <C+0+C=2>

		F	Row
Free Lag	<u>2 4 6 8</u>		0
Plan 1 - Lag	<u>2 4 6 8</u>		1
Plan 2 - Lag	<u>2 4 6 8</u>		2
Plan 3 - Lag	<u>2 4 6 8</u>		3
Plan 4 - Lag	<u>2 4 6 8</u>		4
Plan 5 - Lag	<u>2 4 6 8</u>		5
Plan 6 - Lag	<u>2 4 6 8</u>		6
Plan 7 - Lag	<u>2 4 6 8</u>		7
Plan 8 - Lag	<u>2 4 6 8</u>		8
Plan 9 - Lag	<u>2 4 6 8</u>		9
External Lag	_____		A
			B
			C
			D
			E
			F

Lag Phases <C+0+C=1>

Row	Column A	Column B	Column C	Column D	Column E	Column F	Row
0	NOT-3	0 Max 2	0 Pretimed	0 Set Monday	0 Dial 2 (7-Wire)	0 Reserved	0
1	NOT-4	0 System Det 1	0 Plan 1	0 Ext. Perm 1	0 Dial 3 (7-Wire)	0 EV-A	71
2	OR-4 (a)	0 System Det 2	0 Plan 2	0 Ext. Perm 2	0 Offset 1 (7-Wire)	0 EV-B	72
3	OR-4 (b)	0 System Det 3	0 Plan 3	0 Dimming	0 Offset 2 (7-Wire)	0 EV-C	73
4	OR-5 (a)	0 System Det 4	0 Plan 4	0 Set Clock	0 Offset 3 (7-Wire)	0 EV-D	74
5	OR-5 (b)	0 System Det 5	0 Plan 5	0 Stop Time	82 Free (7-Wire)	0 RR-1	51
6	OR-6 (a)	0 System Det 6	0 Plan 6	0 Flash Sense	81 Flash (7-Wire)	0 RR-2	52
7	OR-6 (b)	0 System Det 7	0 Plan 7	0 Manual Enable	0 Excl. Ped Omit	0 Spec. Event 1	0
8	Reserved	0 System Det 8	0 Plan 8	0 Man. Advance	0 NOT-1	0 Spec. Event 2	0
9	Reserved	0 Max Inhibit (nema)	0 Plan 9	0 External Alarm	0 NOT-2	0 External Lag	0
A	AND-4 (a)	0 Force A (nema)	0 DELAY-A	0 Phase Bank 2	0 OR-1 (a)	0 AND-1 (a)	0
B	AND-4 (b)	0 Force B (nema)	0 DELAY-B	0 Phase Bank 3	0 OR-1 (b)	0 AND-1 (b)	0
C	NAND-1 (a)	0 C.N.A. (nema)	0 DELAY-C	0 Overlap Set 2	0 OR-2 (a)	0 AND-2 (a)	0
D	NAND-1 (b)	0 Hold (nema)	0 DELAY-D	0 Overlap Set 3	0 OR-2 (b)	0 AND-2 (b)	0
E	NAND-2 (a)	0 Max Recall	0 DELAY-E	0 Detector Set 2	0 OR-3 (a)	0 AND-3 (a)	0
F	NAND-2 (b)	0 Min Recall	0 DELAY-F	0 Detector Set 3	0 OR-3 (b)	0 AND-3 (b)	0

**Assignable Inputs**

<C+0+E=126>

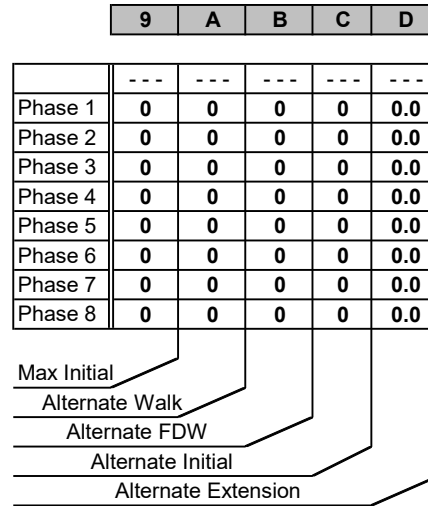
Row	Column A	Column B	Column C	Column D	Column E	Column F	Row
0	Reserved	0 Flasher 0	0 Free	0 NOT-1	0 TOD Out 1	0 Dial 2 (7-Wire)	0
1	Sp Evnt Out 1	0 Flasher 1	0 Plan 1	0 OR-1	0 TOD Out 2	0 Dial 3 (7-Wire)	0
2	Sp Evnt Out 2	0 Fast Flasher	0 Plan 2	0 OR-2	0 TOD Out 3	0 Offset 1 (7-Wire)	0
3	Sp Evnt Out 3	0 Reserved	0 Plan 3	0 OR-3	0 TOD Out 4	0 Offset 2 (7-Wire)	0
4	Sp Evnt Out 4	0 Reserved	0 Plan 4	0 AND-1	0 TOD Out 5	0 Offset 3 (7-Wire)	0
5	Sp Evnt Out 5	0 Reserved	0 Plan 5	0 AND-2	0 TOD Out 6	0 Free (7-Wire)	0
6	Sp Evnt Out 6	0 Reserved	0 Plan 6	0 AND-3	0 TOD Out 7	0 Flash (7-Wire)	0
7	Sp Evnt Out 7	0 Reserved	0 Plan 7	0 NOT-2	0 TOD Out 8	0 Preempt	0
8	Sp Evnt Out 8	0 NOT-3	0 Plan 8	0 EV-A	0 Adv. Warn - 1		
9	Reserved	0 NOT-4	0 Plan 9	0 EV-B	0 Adv. Warn - 2		
A	Detector Fail	0 OR-4	0 Reserved	0 EV-C	0 DELAY-A		
B	Monitor Reset	0 OR-5	0 Reserved	0 EV-D	0 DELAY-B		
C	Reserved	0 OR-6	0 Reserved	0 RR-1	0 DELAY-C		
D	Central Control	0 AND-4	0 Reserved	0 RR-2	0 DELAY-D		
E	Excl. Ped DW	0 NAND-1	0 Reserved	0 Spec. Event 1	0 DELAY-E		
F	Excl. Ped WK	0 NAND-2	0 Reserved	0 Spec. Event 2	0 DELAY-F		

**Assignable Outputs**

<C+0+E=127>

Row	Phase Names ---->	Phase							
		1	2	3	4	5	6	7	8
0	Ped Walk	0	7	0	7	0	7	0	7
1	Ped FDW	0	15	0	15	0	15	0	15
2	Min Green	4	7	4	4	4	7	4	4
3	Type 3 Disconnect	0	20	0	20	0	20	0	20
4	Added per Vehicle	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
5	Veh Extension	2.0	4.0	2.0	2.5	2.0	4.0	2.0	2.5
6	Max Gap	3.0	6.0	3.0	3.0	3.0	6.0	3.0	3.0
7	Min Gap	0.5	2.0	0.5	1.5	0.5	2.0	0.5	1.5
8	Max Limit	20	30	20	25	20	30	20	25
9	Max Limit 2	30	50	30	40	30	50	30	40
A	Adv. / Delay Walk	0	0	0	0	0	0	0	0
B	Sequence To	0	0	0	0	0	0	0	0
C	Cond Serv Check	10	10	10	10	10	10	10	10
D	Reduce Every	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
E	Yellow Change	3.0	4.0	3.0	3.0	3.0	4.0	3.0	3.0
F	Red Clear	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Phase Timing - Bank 2 <C+0+F=2>



Alternate Timing

Transition Type  
 0.X = Shortway  
 1.X = Lengthen  
 X.1 thru X.4 =  
 Number of  
 cycles when  
 lengthening

Transition Type | 0.3 <C/5+1+9>

**TBC Transition**

Lag Hold Phases | <C/5+1+A>

**Coordinated Lag Hold Phases**

Sync Output Time | 0.0 <C/5+1+C>

**7-Wire Master**

Time Before Yellow | 0.0 <F/1+C+E>

Phase Number | 0 <F/1+C+F>

**Advance Warning Beacon - Sign 1**

Time Before Yellow | 0.0 <F/1+D+E>

Phase Number | 0 <F/1+D+F>

**Advance Warning Beacon - Sign 2**

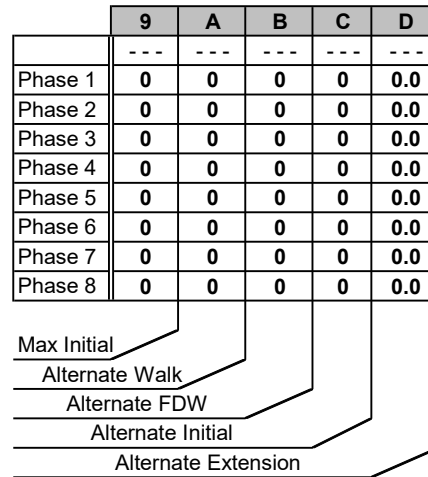
Long Failure | 0.0 <F/1+0+6>

Short Failure | 0.0 <F/1+0+7>

**Power Cycle Correction** (Default = 0.5)

Row	Phase Names ---->	Phase							
		1	2	3	4	5	6	7	8
0	Ped Walk	0	7	0	7	0	7	0	7
1	Ped FDW	0	15	0	15	0	15	0	15
2	Min Green	4	7	4	4	4	7	4	4
3	Type 3 Disconnect	0	20	0	20	0	20	0	20
4	Added per Vehicle	0.0	2.0	0.0	2.0	0.0	2.0	0.0	2.0
5	Veh Extension	2.0	4.0	2.0	2.5	2.0	4.0	2.0	2.5
6	Max Gap	3.0	6.0	3.0	3.0	3.0	6.0	3.0	3.0
7	Min Gap	0.5	2.0	0.5	1.5	0.5	2.0	0.5	1.5
8	Max Limit	20	30	20	25	20	30	20	25
9	Max Limit 2	30	50	30	40	30	50	30	40
A	Adv. / Delay Walk	0	0	0	0	0	0	0	0
B	Sequence To	0	0	0	0	0	0	0	0
C	Cond Serv Check	10	10	10	10	10	10	10	10
D	Reduce Every	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
E	Yellow Change	3.0	4.0	3.0	3.0	3.0	4.0	3.0	3.0
F	Red Clear	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Phase Timing - Bank 3 <C+0+F=3>



Alternate Timing

	A	B	C	Row
RR1-2, Sp Ev 1		Sp Ev 2	Emer Veh	A
Ped F.D.W.	0	0	0	B
Initial	0	0	0	C

**Preempt Minimums** <C+0+F=1>

Column Numbers ---->		0	1	2	3	1	3
Row	Detector Name	C1 Pin Number	Attributes	Phase(s)	Assign	Delay	Carry-over
0		39				0.0	0.0
1		40	45_7	6	123	0.0	0.0
2		41	45_7	4	123	10.0	0.0
3		42				0.0	0.0
4		43	45_7	2	123	0.0	0.0
5		44				0.0	0.0
6		45	4	4	123	10.0	0.0
7		46				0.0	0.0
8		47				0.0	0.0
9		48				0.0	0.0
A		49				0.0	0.0
B		50				0.0	0.0
C		55	45_7	5	123	0.0	0.0
D		56				0.0	0.0
E		57				0.0	0.0
F		58				0.0	0.0

Column Numbers ---->		4	5	6	7	2	4
Row	Detector Name	C1 Pin Number	Attributes	Phase(s)	Assign	Delay	Carry-over
0		59	4	5	123	0.0	0.0
1		60				0.0	0.0
2		61				0.0	0.0
3		62				0.0	0.0
4		63				0.0	0.0
5		64				0.0	0.0
6		65	45_7	4	123	10.0	0.0
7		66				0.0	0.0
8		67				0.0	0.0
9		68	2	6	123	0.0	0.0
A		69	2	4	123	0.0	0.0
B		70				0.0	0.0
C		76				0.0	0.0
D		77				0.0	0.0
E		78	45_7	4	123	10.0	0.0
F		79				0.0	0.0

Detector Assignments <C+0+E=126>

<C+0+D=0>

Detector Attributes

- 1 = Full Time Delay
- 2 = Ped Call
- 3 =
- 4 = Count
- 5 = Extension
- 6 = Type 3
- 7 = Calling
- 8 = Alternate

Det. Assignments

- 1 = Det. Set 1
- 2 = Det. Set 2
- 3 = Det. Set 3
- 4 =
- 5 =
- 6 = Failure - Min Recall
- 7 = Failure - Max Recall
- 8 = Report on Failure

Column Numbers ---->		Ped / Phase / Overlap								Row
		1	2	3	4	5	6	7	8	
Walk		0	0	0	0	0	0	0	0	0
Don't Walk		0	0	0	0	0	0	0	0	1
Phase Green		0	0	0	0	0	0	0	0	2
Phase Yellow		0	0	0	0	0	0	0	0	3
Phase Red		0	0	0	0	0	0	0	0	4
Overlap Green		0	0	0	0	0	0	0	0	5
Overlap Yellow		0	0	0	0	0	0	0	0	6
Overlap Red		0	0	0	0	0	0	0	0	7

Redirect Phase Outputs <C+0+E=127>

Cabinet Type	0	<E/125+D+0>	D	Row
<b>Enable Redirection</b>				0
(Enable Redirection = 30)				
Output Port 1				1
Output Port 2				2
Output Port 3				3
Output Port 4				4
Output Port 5				5
Output Port 6				6
Output Port 7				7

Max OFF (minutes)	20	<D/0+0+1>
Max ON (minutes)	7	<D/0+0+2>

Detector Failure Monitor

D	Row
Number of Digits	0
1 st Digit	0
2 ed Digit	0
3 ed Digit	0
4 th Digit	0
5 th Digit	0
6 th Digit	0
7 th Digit	0
8 th Digit	0
9 th Digit	0
10 th Digit	0
11 th Digit	0
12 th Digit	0
13 th Digit	0
14 th Digit	0
15 th Digit	0

Dimming <C+0+E=125>

B	Row
DELAY-A	0
DELAY-B	0
DELAY-C	0
DELAY-D	0
DELAY-E	0
DELAY-F	0

Disable Alarms

- 1 = Stop Time
- 2 = Flash Sense
- 3 = Keyboard Entry
- 4 = Manual Plan
- 5 = Police Control
- 6 = External Alarm
- 7 = Detector Failure
- 8 =

Delay Logic Times

<C+0+D=0> (seconds)

Omit Alarm <C/5+F+0>

Disable Alarm Reporting

Time 0 <C/5+C+0>

Redial Time (minutes)

Dial-Back Telephone Number <C+0+C=5>

Row	Time	Plan	Offset	Day of Week
0	00:00	0	0	
1	00:00	0	0	
2	00:00	0	0	
3	00:00	0	0	
4	00:00	0	0	
5	00:00	0	0	
6	00:00	0	0	
7	00:00	0	0	
8	00:00	0	0	
9	00:00	0	0	
A	00:00	0	0	
B	00:00	0	0	
C	00:00	0	0	
D	00:00	0	0	
E	00:00	0	0	
F	00:00	0	0	

**TOD Coordination** <C+0+9=0.1>  
(Bank 1)

Time	Funct.	Day of Week	Column 4 Phases/Bits
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		

**TOD Function** <C+0+7=1> <C+0+E=27>

Day	Year	Month	Holiday Type
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	

**Holiday Dates** <C+0+8=1.1>  
(Bank 1)

Time	Plan	Offset	Holiday Type
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	

**Holiday Events** <C+0+9=1.1>  
(Bank 1)

- T.O.D. Functions  
 0 = Permit Phases  
 1 = Red Lock  
 2 = Yellow Lock  
 3 = Veh Min Recall  
 4 = Ped Recall  
 5 =  
 6 = Rest In Walk  
 7 = Red Rest  
 8 = Double Entry  
 9 = Veh Max Recall  
 A = Veh Soft Recall  
 B = Maximum 2  
 C = Conditional Service  
 D = Free Lag Phases  
 E = Bit 1 - Local Override  
     Bit 4 - Disable Detector  
         OFF Monitor  
     Bit 7 - Detector Count  
         Monitor  
     Bit 8 - Real Time Split  
         Monitor

Row	Time	Plan	Offset	Day of Week
0	00:00	0	0	
1	00:00	0	0	
2	00:00	0	0	
3	00:00	0	0	
4	00:00	0	0	
5	00:00	0	0	
6	00:00	0	0	
7	00:00	0	0	
8	00:00	0	0	
9	00:00	0	0	
A	00:00	0	0	
B	00:00	0	0	
C	00:00	0	0	
D	00:00	0	0	
E	00:00	0	0	
F	00:00	0	0	

**TOD Coordination** <C+0+9=0.2>  
(Bank 2)

Time	Funct.	Day of Week	Column 4 Phases/Bits
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		
00:00	0		

**Holiday TOD Function** <C+0+7=2> <C+0+E=28>

Day	Year	Month	Holiday Type
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	
00	00	0	

**Holiday Dates** <C+0+8=1.2>  
(Bank 2)

Time	Plan	Offset	Holiday Type
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	
00:00	0	0	

**Holiday Events** <C+0+9=1.2>  
(Bank 2)

- Plan Select  
 1 thru 9 = Coordination  
     Plan 1 thru 9  
 14 or E = Free  
 15 or F = Flash
- Offset Select  
 A = Offset A  
 B = Offset B  
 C = Offset C
- Month Select  
 1 = January  
 2 = February  
 3 = March  
 4 = April  
 5 = May  
 6 = June  
 7 = July  
 8 = August  
 9 = September  
 A = October  
 B = November  
 C = December

Row	6 Clear	7 Time	8 Ped Call	9 Hold	A Advance	B Force Off	C Vehicle Call	D Permit Phases	E Ped Omit	F Output
0		0								
1		0								
2		0								
3		0								
4		0								
5		0								
6		0								
7		0								
8		0								
9		0								
A		0								
B		0								
C		0								
D		0								
E		0								
F		0								

Special Event Schedule -- Table 1 <C+0+E=27>

Notes:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

0 <E/27+5+F>  
**Limited Service Interval**

Row	6 Clear	7 Time	8 Ped Call	9 Hold	A Advance	B Force Off	C Vehicle Call	D Permit Phases	E Ped Omit	F Output
0		0								
1		0								
2		0								
3		0								
4		0								
5		0								
6		0								
7		0								
8		0								
9		0								
A		0								
B		0								
C		0								
D		0								
E		0								
F		0								

Special Event Schedule -- Table 2 <C+0+E=28>

Notes:  
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0 <E/28+5+F>  
**Limited Service Interval**

# Attachment 5

Existing, Future Background, and Future Total Intersection Operations

*Existing Intersection Operations*

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	E	0.71	39.6	39.0	E	0.44	36.2	15.8
	NB	A	0.00	8.3	0.0	A	-	0.0	0.0
	SB	A	0.02	8.1	0.8	A	0.09	9.8	2.3
	<b>Overall</b>	<b>A</b>	-	<b>8.5</b>	-	-	<b>A</b>	-	<b>2.8</b>
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	<b>F</b>	<b>0.72</b>	<b>107.5</b>	<b>27.8</b>	E	0.40	47.6	12.8
	WBR	C	0.38	16.0	13.5	C	0.28	17.9	8.3
	NB	-	-	-	-	-	-	-	-
	SB	B	0.30	11.6	9.8	B	0.08	10.3	2.3
	<b>Overall</b>	<b>A</b>	-	<b>7.6</b>	-	-	<b>A</b>	-	<b>3.1</b>
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>Signalized</i>	EBL	A	0.13	17.9	9.5	A	0.41	15.9	55.2
	EBR	B	0.66	23.2	10.7	<b>F</b>	<b>1.02</b>	<b>63.2</b>	<b>#150.3</b>
	NBL	A	0.08	11.6	11.4	B	0.70	57.6	#37.0
	NBT	<b>D</b>	<b>0.88</b>	<b>19.9</b>	<b>#244.2</b>	<b>E</b>	<b>0.93</b>	<b>47.6</b>	<b>#162.2</b>
	SBT/R	A	0.49	8.8	94.8	<b>D</b>	<b>0.86</b>	<b>38.5</b>	<b>#135.3</b>
<b>Overall</b>	<b>C</b>	-	<b>16.9</b>	-	-	<b>E</b>	-	<b>46.3</b>	-

Saturation flow rate of 1800 veh/h/lane

Delay = average vehicle delay in seconds

**Notes:** Queue is measured in metres

m = metered queue

Peak Hour Factor = 0.92

# = volume for the 95th %ile cycle exceeds capacity

*2027 Future Background Intersection Operations*

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	E	0.73	42.1	40.5	E	0.46	37.6	16.5
	NB	A	0.00	8.3	0.0	A	-	0.0	0.0
	SB	A	0.02	8.1	0.8	A	0.09	9.8	2.3
	<b>Overall</b>	<b>A</b>	-	<b>8.9</b>	-	-	<b>A</b>	-	<b>2.9</b>
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	<b>F</b>	<b>0.84</b>	<b>139.8</b>	<b>33.0</b>	<b>F</b>	<b>0.44</b>	<b>51.9</b>	<b>14.3</b>
	WBR	C	0.40	16.7	14.3	C	0.29	18.5	9.0
	NB	-	-	-	-	-	-	-	-
	SB	B	0.32	12.1	10.5	B	0.08	10.5	2.3
	<b>Overall</b>	<b>A</b>	-	<b>9.2</b>	-	-	<b>A</b>	-	<b>3.4</b>
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>Signalized</i>	EBL	A	0.13	18.4	9.6	A	0.42	16.0	57.0
	EBR	B	0.67	24.1	10.9	<b>F</b>	<b>1.09</b>	<b>82.8</b>	<b>#168.3</b>
	NBL	A	0.09	12.0	11.8	<b>C</b>	<b>0.77</b>	<b>67.6</b>	<b>#42.3</b>
	NBT	<b>E</b>	<b>0.91</b>	<b>24.0</b>	<b>#258.0</b>	<b>E</b>	<b>0.96</b>	<b>52.9</b>	<b>#168.9</b>
	SBT/R	A	0.49	9.1	96.7	<b>D</b>	<b>0.88</b>	<b>39.9</b>	<b>#137.7</b>
<b>Overall</b>	<b>C</b>	-	<b>19.3</b>	-	-	<b>E</b>	-	<b>55.0</b>	-

Saturation flow rate of 1800 veh/h/lane

Delay = average vehicle delay in seconds

**Notes:** Queue is measured in metres

m = metered queue

Peak Hour Factor = 0.92

# = volume for the 95th %ile cycle exceeds capacity

2032 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	E	0.76	46.9	43.5	E	0.48	40.7	17.3
	NB	A	0.00	8.4	0.0	A	-	0.0	0.0
	SB	A	0.02	8.1	0.8	A	0.09	9.9	2.3
	<b>Overall</b>	<b>A</b>	-	<b>9.7</b>	-	-	<b>A</b>	-	<b>3.0</b>
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	<b>F</b>	<b>1.12</b>	<b>242.1</b>	<b>45.0</b>	<b>F</b>	<b>0.52</b>	<b>62.5</b>	<b>18.8</b>
	WBR	C	0.44	18.1	16.5	C	0.32	19.7	10.5
	NB	-	-	-	-	-	-	-	-
	SB	B	0.36	12.9	12.0	B	0.09	10.8	2.3
	<b>Overall</b>	<b>B</b>	-	<b>14.0</b>	-	-	<b>A</b>	-	<b>4.0</b>
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>Signalized</i>	EBL	A	0.13	18.9	10.0	A	0.44	16.3	60.3
	EBR	B	0.70	25.2	11.4	<b>F</b>	<b>1.20</b>	<b>125.9</b>	<b>#199.9</b>
	NBL	A	0.10	13.1	12.9	<b>E</b>	<b>0.92</b>	<b>98.8</b>	<b>#49.7</b>
	NBT	<b>E</b>	<b>0.98</b>	<b>37.9</b>	<b>#283.5</b>	<b>E</b>	<b>1.00</b>	<b>64.1</b>	<b>#179.9</b>
	SBT/R	A	0.50	9.7	99.9	<b>D</b>	<b>0.90</b>	<b>43.0</b>	<b>#144.0</b>
	<b>Overall</b>	<b>C</b>	-	<b>27.4</b>	-	-	<b>F</b>	-	<b>75.0</b>

Notes: Saturation flow rate of 1800 veh/h/lane  
Queue is measured in metres  
Peak Hour Factor = 0.92

Delay = average vehicle delay in seconds  
m = metered queue  
# = volume for the 95th %ile cycle exceeds capacity

2037 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>0.80</b>	<b>53.3</b>	<b>48.0</b>	E	0.51	44.4	18.8
	NB	A	0.00	8.4	0.0	A	-	0.0	0.0
	SB	A	0.02	8.1	0.8	B	0.09	10.1	2.3
	<b>Overall</b>	<b>B</b>	-	<b>10.7</b>	-	-	<b>A</b>	-	<b>3.2</b>
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	<b>F</b>	<b>1.52</b>	<b>420.2</b>	<b>59.3</b>	<b>F</b>	<b>0.63</b>	<b>79.3</b>	<b>23.3</b>
	WBR	C	0.49	20.0	20.3	C	0.35	21.1	12.0
	NB	-	-	-	-	-	-	-	-
	SB	B	0.40	14.1	15.0	B	0.10	11.1	2.3
	<b>Overall</b>	<b>C</b>	-	<b>22.4</b>	-	-	<b>A</b>	-	<b>4.9</b>
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>Signalized</i>	EBL	A	0.13	18.5	10.5	A	0.47	16.5	63.9
	EBR	C	0.71	25.1	12.0	<b>F</b>	<b>1.32</b>	<b>178.7</b>	<b>#234.7</b>
	NBL	A	0.12	14.5	14.1	<b>F</b>	<b>1.10</b>	<b>155.1</b>	<b>#56.9</b>
	NBT	<b>F</b>	<b>1.08</b>	<b>68.8</b>	<b>#311.1</b>	<b>F</b>	<b>1.05</b>	<b>77.9</b>	<b>#191.9</b>
	SBT/R	A	0.53	10.7	#104.5	<b>E</b>	<b>0.92</b>	<b>46.5</b>	<b>#148.6</b>
	<b>Overall</b>	<b>D</b>	-	<b>44.7</b>	-	-	<b>F</b>	-	<b>101.5</b>

Notes: Saturation flow rate of 1800 veh/h/lane  
Queue is measured in metres  
Peak Hour Factor = 0.92

Delay = average vehicle delay in seconds  
m = metered queue  
# = volume for the 95th %ile cycle exceeds capacity

2027 Future Total Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Site Access #2 at Russland Road <i>Unsignalized</i>	EBL/R	B	0.15	11.2	3.8	B	0.19	12.0	5.3
	NBL/T	A	0.00	7.4	0.0	A	0.00	7.8	0.0
	SBT/R	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>3.0</b>	-	<b>A</b>	-	<b>3.0</b>	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>1.09</b>	<b>116.8</b>	<b>96.8</b>	<b>F</b>	<b>1.30</b>	<b>227.5</b>	<b>90.8</b>
	NB	A	0.00	8.3	0.0	A	-	0.0	0.0
	SB	A	0.03	8.1	0.8	A	0.11	9.9	3.0
	<b>Overall</b>	<b>D</b>	-	<b>32.1</b>	-	<b>D</b>	-	<b>30.9</b>	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	<b>F</b>	<b>1.07</b>	<b>234.4</b>	<b>41.3</b>	<b>F</b>	<b>0.57</b>	<b>78.6</b>	<b>19.5</b>
	WBR	C	0.46	18.4	17.3	C	0.40	21.3	14.3
	NB	-	-	-	-	-	-	-	-
	SB	B	0.36	12.6	12.0	B	0.14	10.9	3.8
	<b>Overall</b>	<b>B</b>	-	<b>12.8</b>	-	<b>A</b>	-	<b>4.8</b>	-
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>Signalized</i>	EBL	A	0.21	18.8	14.6	A	0.45	16.3	60.7
	EBR	B	0.64	23.3	10.9	<b>F</b>	<b>1.09</b>	<b>82.8</b>	<b>#168.5</b>
	NBL	A	0.10	13.5	11.9	<b>D</b>	<b>0.89</b>	<b>92.8</b>	<b>#45.0</b>
	NBT	<b>E</b>	<b>0.92</b>	<b>26.3</b>	<b>#258.7</b>	<b>E</b>	<b>0.96</b>	<b>53.6</b>	<b>#169.3</b>
	SBT/R	A	0.54	10.0	#114.7	<b>E</b>	<b>0.91</b>	<b>45.2</b>	<b>#146.1</b>
	<b>Overall</b>	<b>C</b>	-	<b>20.6</b>	-	<b>E</b>	-	<b>57.2</b>	-

Saturation flow rate of 1800 veh/h/lane

**Notes:** Queue is measured in metres

Peak Hour Factor = 0.92

Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

2032 Future Total Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Site Access #2 at Russland Road <i>Unsignalized</i>	EBL/R	B	0.15	11.2	3.8	B	0.19	12.0	5.3
	NBL/T	A	0.00	7.4	0.0	A	0.00	7.8	0.0
	SBT/R	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>3.0</b>	-	<b>A</b>	-	<b>3.0</b>	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>1.14</b>	<b>135.2</b>	<b>104.3</b>	<b>F</b>	<b>1.36</b>	<b>253.9</b>	<b>95.3</b>
	NB	A	0.00	8.4	0.0	A	-	0.0	0.0
	SB	A	0.03	8.1	0.8	A	0.11	10.0	3.0
	<b>Overall</b>	<b>E</b>	-	<b>36.3</b>	-	<b>D</b>	-	<b>33.7</b>	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	<b>F</b>	<b>1.44</b>	<b>393.7</b>	<b>54.0</b>	<b>F</b>	<b>0.68</b>	<b>99.6</b>	<b>24.8</b>
	WBR	C	0.50	20.2	20.3	C	0.43	22.9	15.8
	NB	-	-	-	-	-	-	-	-
	SB	B	0.40	13.7	14.3	B	0.15	11.2	3.8
	<b>Overall</b>	<b>C</b>	-	<b>19.9</b>	-	<b>A</b>	-	<b>5.9</b>	-
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>Signalized</i>	EBL	A	0.20	19.1	14.9	A	0.47	16.5	64.4
	EBR	B	0.66	24.2	11.4	<b>F</b>	<b>1.20</b>	<b>125.9</b>	<b>#200.3</b>
	NBL	A	0.11	14.7	13.1	<b>F</b>	<b>1.06</b>	<b>144.2</b>	<b>#52.2</b>
	NBT	<b>E</b>	<b>1.00</b>	<b>42.9</b>	<b>#284.2</b>	<b>F</b>	<b>1.01</b>	<b>64.8</b>	<b>#180.6</b>
	SBT/R	A	0.56	10.8	#119.9	<b>E</b>	<b>0.94</b>	<b>49.1</b>	<b>#151.3</b>
	<b>Overall</b>	<b>C</b>	-	<b>29.7</b>	-	<b>F</b>	-	<b>78.0</b>	-

Saturation flow rate of 1800 veh/h/lane

**Notes:** Queue is measured in metres  
Peak Hour Factor = 0.92

Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

2037 Future Total Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Site Access #2 at Russland Road <i>Unsignalized</i>	EBL/R	B	0.15	11.2	3.8	B	0.19	12.0	5.3
	NBL/T	A	0.00	7.4	0.0	A	0.00	7.8	0.0
	SBT/R	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>3.0</b>	-	<b>A</b>	-	<b>3.0</b>	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>1.19</b>	<b>156.5</b>	<b>111.8</b>	<b>F</b>	<b>1.44</b>	<b>292.5</b>	<b>100.5</b>
	NB	A	0.00	8.4	0.0	A	-	0.0	0.0
	SB	A	0.03	8.2	0.8	B	0.11	10.1	3.0
	<b>Overall</b>	<b>E</b>	-	<b>40.9</b>	-	<b>E</b>	-	<b>37.9</b>	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	<b>F</b>	<b>2.00</b>	<b>664.7</b>	<b>68.3</b>	<b>F</b>	<b>0.81</b>	<b>134.1</b>	<b>31.5</b>
	WBR	C	0.55	22.7	24.8	D	0.47	25.0	18.0
	NB	-	-	-	-	-	-	-	-
	SB	C	0.44	15.0	17.3	B	0.16	11.6	4.5
	<b>Overall</b>	<b>D</b>	-	<b>32.1</b>	-	<b>A</b>	-	<b>7.6</b>	-
Rockdale Road at Highway 417 Eastbound Ramp Terminal <i>Signalized</i>	EBL	A	0.20	18.7	15.6	A	0.49	16.8	67.9
	EBR	B	0.68	24.2	12.0	<b>F</b>	<b>1.32</b>	<b>178.7</b>	<b>#235.1</b>
	NBL	A	0.13	16.2	14.3	<b>F</b>	<b>1.29</b>	<b>230.4</b>	<b>#59.6</b>
	NBT	<b>F</b>	<b>1.10</b>	<b>76.2</b>	<b>#311.8</b>	<b>F</b>	<b>1.06</b>	<b>78.9</b>	<b>#192.9</b>
	SBT/R	A	0.58	11.9	#124.3	<b>E</b>	<b>0.96</b>	<b>54.0</b>	<b>#156.6</b>
	<b>Overall</b>	<b>D</b>	-	<b>47.8</b>	-	<b>F</b>	-	<b>106.0</b>	-

Saturation flow rate of 1800 veh/h/lane

Delay = average vehicle delay in seconds

Notes: Queue is measured in metres

m = metered queue

Peak Hour Factor = 0.92

# = volume for the 95th %ile cycle exceeds capacity

2037 Future Total Intersection Operations– Peak Hour Factor Sensitivity Analysis of Rockdale Road at Russland Road

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>0.98</b>	<b>84.4</b>	<b>77.3</b>	<b>F</b>	<b>1.10</b>	<b>153.5</b>	<b>71.3</b>
	NB	A	0.00	8.3	0.0	A	-	0.0	0.0
	SB	A	0.03	8.1	0.8	A	0.10	9.7	2.3
	<b>Overall</b>	<b>C</b>	-	<b>22.2</b>	-	<b>C</b>	-	<b>20.2</b>	-

Saturation flow rate of 1800 veh/h/lane

Delay = average vehicle delay in seconds

Notes: Queue is measured in metres

m = metered queue

Peak Hour Factor = 1.00

# = volume for the 95th %ile cycle exceeds capacity

2027 Future Total Intersection Operations- Sensitivity Analysis with Site Access #1 Outbound Left-Turn

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Site Access #1 at Rockdale Road <i>Unsignalized</i>	WBL	C	0.26	24.6	7.5	E	0.45	43.0	15.0
	NBR	-	-	-	-	-	-	-	-
	SBT	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>1.4</b>	-	<b>A</b>	-	<b>2.2</b>	-
Site Access #2 at Russland Road <i>Unsignalized</i>	EBL/R	B	0.06	10.4	1.5	B	0.07	11.0	1.5
	NBL/T	A	0.00	7.4	0.0	A	0.00	7.8	0.0
	SBT/R	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>1.3</b>	-	<b>A</b>	-	<b>1.3</b>	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>0.83</b>	<b>54.6</b>	<b>54.0</b>	<b>F</b>	<b>0.67</b>	<b>55.0</b>	<b>30.0</b>
	NB	A	0.00	8.3	0.0	A	-	0.0	0.0
	SB	A	0.03	8.1	0.8	A	0.11	9.9	3.0
	<b>Overall</b>	<b>B</b>	-	<b>12.9</b>	-	<b>A</b>	-	<b>5.5</b>	-

Saturation flow rate of 1800 veh/h/lane

Delay = average vehicle delay in seconds

Notes: Queue is measured in metres

m = metered queue

Peak Hour Factor = 0.92

# = volume for the 95th %ile cycle exceeds capacity

2032 Future Total Intersection Operations- Sensitivity Analysis with Site Access #1 Outbound Left-Turn

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Site Access #1 at Rockdale Road <i>Unsignalized</i>	WBL	D	0.27	25.6	8.3	E	0.47	45.9	16.5
	NBR	-	-	-	-	-	-	-	-
	SBT	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>1.4</b>	-	<b>A</b>	-	<b>2.3</b>	-
Site Access #2 at Russland Road <i>Unsignalized</i>	EBL/R	B	0.06	10.4	1.5	B	0.07	11.0	1.5
	NBL/T	A	0.00	7.4	0.0	A	0.00	7.8	0.0
	SBT/R	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>1.3</b>	-	<b>A</b>	-	<b>1.3</b>	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>0.87</b>	<b>62.2</b>	<b>58.5</b>	<b>F</b>	<b>0.70</b>	<b>60.2</b>	<b>32.3</b>
	NB	A	0.00	8.4	0.0	A	-	0.0	0.0
	SB	A	0.03	8.1	0.8	A	0.11	10.0	3.0
	<b>Overall</b>	<b>B</b>	-	<b>14.3</b>	-	<b>A</b>	-	<b>5.8</b>	-

Saturation flow rate of 1800 veh/h/lane

Delay = average vehicle delay in seconds

Notes: Queue is measured in metres

m = metered queue

Peak Hour Factor = 0.92

# = volume for the 95th %ile cycle exceeds capacity

2037 Future Total Intersection Operations- Sensitivity Analysis with Site Access #1 Outbound Left-Turn

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 <sup>th</sup> )	LOS	V/C	Delay	Q (95 <sup>th</sup> )
Site Access #1 at Rockdale Road <i>Unsignalized</i>	WBL	D	0.28	26.9	8.3	E	0.49	49.8	17.3
	NBR	-	-	-	-	-	-	-	-
	SBT	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>1.4</b>	-	<b>A</b>	-	<b>2.4</b>	-
Site Access #2 at Russland Road <i>Unsignalized</i>	EBL/R	B	0.06	10.4	1.5	B	0.07	11.0	1.5
	NBL/T	A	0.00	7.4	0.0	A	0.00	7.8	0.0
	SBT/R	-	-	-	-	-	-	-	-
	<b>Overall</b>	<b>A</b>	-	<b>1.3</b>	-	<b>A</b>	-	<b>1.3</b>	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	<b>F</b>	<b>0.91</b>	<b>72.3</b>	<b>63.8</b>	<b>F</b>	<b>0.74</b>	<b>69.3</b>	<b>35.3</b>
	NB	A	0.00	8.4	0.0	A	-	0.0	0.0
	SB	A	0.03	8.2	0.8	A	0.11	10.1	3.0
	<b>Overall</b>	<b>B</b>	-	<b>16.1</b>	-	<b>A</b>	-	<b>6.5</b>	-

Saturation flow rate of 1800 veh/h/lane

**Notes:** Queue is measured in metres  
Peak Hour Factor = 0.92

Delay = average vehicle delay in seconds

m = metered queue

# = volume for the 95th %ile cycle exceeds capacity

# Attachment 6

Synchro Intersection Worksheets – Existing, Future Background, and Future Total Conditions

Intersection												
Int Delay, s/veh	8.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	156	0	56	1	297	35	18	439	0
Future Vol, veh/h	0	0	0	156	0	56	1	297	35	18	439	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	170	0	61	1	323	38	20	477	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	892	880	477	861	861	342	477	0	0	361	0	0
Stage 1	517	517	-	344	344	-	-	-	-	-	-	-
Stage 2	375	363	-	517	517	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	263	286	588	276	293	701	1085	-	-	1198	-	-
Stage 1	541	534	-	671	637	-	-	-	-	-	-	-
Stage 2	646	625	-	541	534	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	236	279	588	271	286	701	1085	-	-	1198	-	-
Mov Cap-2 Maneuver	236	279	-	271	286	-	-	-	-	-	-	-
Stage 1	540	522	-	670	636	-	-	-	-	-	-	-
Stage 2	589	624	-	529	522	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		39.6		0		0.3	
HCM LOS	A		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1085	-	-	-	323	1198	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.713	0.016	-	-
HCM Control Delay (s)	8.3	0	-	0	39.6	8.1	0	-
HCM Lane LOS	A	A	-	A	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	5.2	0.1	-	-

Intersection						
Int Delay, s/veh	7.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	63	184	237	563	215	345
Future Vol, veh/h	63	184	237	563	215	345
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	68	200	258	612	234	375

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1407	564	0	0	870
Stage 1	564	-	-	-	-
Stage 2	843	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	153	525	-	-	775
Stage 1	569	-	-	-	-
Stage 2	422	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	95	525	-	-	775
Mov Cap-2 Maneuver	95	-	-	-	-
Stage 1	569	-	-	-	-
Stage 2	261	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	39.3	0	4.5
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	95	525	775	-
HCM Lane V/C Ratio	-	-	0.721	0.381	0.302	-
HCM Control Delay (s)	-	-	107.5	16	11.6	0
HCM Lane LOS	-	-	F	C	B	A
HCM 95th %tile Q(veh)	-	-	3.7	1.8	1.3	-

Queues  
3: Rockdale & Hwy 417 EB

Existing AM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	45	200	40	820	443
v/c Ratio	0.12	0.41	0.09	0.89	0.49
Control Delay	17.7	5.4	12.2	30.1	14.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	5.4	12.2	30.1	14.4
Queue Length 50th (m)	4.0	0.0	1.7	60.9	22.7
Queue Length 95th (m)	9.5	10.7	11.4	#244.2	94.8
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	1103	1028	442	924	905
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	0.04	0.19	0.09	0.89	0.49

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
3: Rockdale & Hwy 417 EB

Existing AM Peak Hour  
6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	41	184	37	754	339	69
Future Volume (veh/h)	41	184	37	754	339	69
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	45	200	40	820	368	75
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	342	304	476	934	752	153
Arrive On Green	0.20	0.20	0.53	0.53	0.53	0.53
Sat Flow, veh/h	1688	1502	945	1772	1427	291
Grp Volume(v), veh/h	45	200	40	820	0	443
Grp Sat Flow(s),veh/h/ln	1688	1502	945	1772	0	1718
Q Serve(g_s), s	1.2	6.6	1.5	22.0	0.0	8.9
Cycle Q Clear(g_c), s	1.2	6.6	10.4	22.0	0.0	8.9
Prop In Lane	1.00	1.00	1.00			0.17
Lane Grp Cap(c), veh/h	342	304	476	934	0	906
V/C Ratio(X)	0.13	0.66	0.08	0.88	0.00	0.49
Avail Cap(c_a), veh/h	1281	1140	540	1053	0	1021
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.6	19.8	11.4	11.2	0.0	8.1
Incr Delay (d2), s/veh	0.2	3.4	0.1	8.6	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	1.9	0.2	5.4	0.0	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	17.9	23.2	11.6	19.9	0.0	8.8
LnGrp LOS	B	C	B	B	A	A
Approach Vol, veh/h	245			860	443	
Approach Delay, s/veh	22.3			19.5	8.8	
Approach LOS	C			B	A	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		36.4		17.6		36.4
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		24.0		8.6		10.9
Green Ext Time (p_c), s		4.5		2.6		3.3

Intersection Summary

HCM 6th Ctrl Delay	16.9
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	2.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	40	0	43	0	557	177	65	409	0
Future Vol, veh/h	0	0	0	40	0	43	0	557	177	65	409	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	43	0	47	0	605	192	71	445	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1312	1384	445	1288	1288	701	445	0	0	797	0	0
Stage 1	587	587	-	701	701	-	-	-	-	-	-	-
Stage 2	725	797	-	587	587	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	136	143	613	141	164	439	1115	-	-	825	-	-
Stage 1	496	497	-	429	441	-	-	-	-	-	-	-
Stage 2	416	399	-	496	497	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	111	127	613	129	145	439	1115	-	-	825	-	-
Mov Cap-2 Maneuver	111	127	-	129	145	-	-	-	-	-	-	-
Stage 1	496	440	-	429	441	-	-	-	-	-	-	-
Stage 2	372	399	-	439	440	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		36.2		0		1.3	
HCM LOS	A		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1115	-	-	-	203	825	-	-
HCM Lane V/C Ratio	-	-	-	-	0.444	0.086	-	-
HCM Control Delay (s)	0	-	-	0	36.2	9.8	0	-
HCM Lane LOS	A	-	-	A	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	2.1	0.3	-	-

Intersection						
Int Delay, s/veh	3.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	50	98	616	243	53	447
Future Vol, veh/h	50	98	616	243	53	447
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	54	107	670	264	58	486

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1404	802	0	0	934
Stage 1	802	-	-	-	-
Stage 2	602	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	154	384	-	-	733
Stage 1	441	-	-	-	-
Stage 2	547	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	137	384	-	-	733
Mov Cap-2 Maneuver	137	-	-	-	-
Stage 1	441	-	-	-	-
Stage 2	488	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	27.9	0	1.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	137	384	733
HCM Lane V/C Ratio	-	-	0.397	0.277	0.079
HCM Control Delay (s)	-	-	47.6	17.9	10.3
HCM Lane LOS	-	-	E	C	B
HCM 95th %tile Q(veh)	-	-	1.7	1.1	0.3

Queues  
3: Rockdale & Hwy 417 EB

Existing PM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	324	718	101	605	535
v/c Ratio	0.44	0.91	0.61	0.93	0.84
Control Delay	17.9	31.4	41.7	49.0	37.5
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	31.4	41.7	49.0	37.5
Queue Length 50th (m)	34.6	72.9	13.7	97.0	78.7
Queue Length 95th (m)	55.2	#150.3	#37.0	#162.2	#135.3
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	825	847	173	680	664
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	0.39	0.85	0.58	0.89	0.81

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

Existing PM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	298	661	93	557	366	126
Future Volume (veh/h)	298	661	93	557	366	126
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	324	718	101	605	398	137
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	789	702	145	649	460	158
Arrive On Green	0.47	0.47	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1688	1502	870	1772	1258	433
Grp Volume(v), veh/h	324	718	101	605	0	535
Grp Sat Flow(s),veh/h/ln	1688	1502	870	1772	0	1690
Q Serve(g_s), s	11.1	41.0	6.4	28.8	0.0	25.7
Cycle Q Clear(g_c), s	11.1	41.0	32.1	28.8	0.0	25.7
Prop In Lane	1.00	1.00	1.00			0.26
Lane Grp Cap(c), veh/h	789	702	145	649	0	619
V/C Ratio(X)	0.41	1.02	0.70	0.93	0.00	0.86
Avail Cap(c_a), veh/h	789	702	145	649	0	619
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.4	23.3	41.9	26.8	0.0	25.8
Incr Delay (d2), s/veh	0.5	39.9	15.7	20.9	0.0	12.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	18.2	2.6	13.3	0.0	10.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	15.9	63.2	57.6	47.6	0.0	38.5
LnGrp LOS	B	F	E	D	A	D
Approach Vol, veh/h	1042			706	535	
Approach Delay, s/veh	48.5			49.1	38.5	
Approach LOS	D			D	D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		47.7		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		43.0		27.7
Green Ext Time (p_c), s		0.0		0.0		1.6

Intersection Summary

HCM 6th Ctrl Delay	46.3
HCM 6th LOS	D

Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	8.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	156	0	56	1	304	35	18	448	0
Future Vol, veh/h	0	0	0	156	0	56	1	304	35	18	448	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	170	0	61	1	330	38	20	487	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	909	897	487	878	878	349	487	0	0	368	0	0
Stage 1	527	527	-	351	351	-	-	-	-	-	-	-
Stage 2	382	370	-	527	527	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	256	279	581	268	287	694	1076	-	-	1191	-	-
Stage 1	535	528	-	666	632	-	-	-	-	-	-	-
Stage 2	640	620	-	535	528	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	229	272	581	263	280	694	1076	-	-	1191	-	-
Mov Cap-2 Maneuver	229	272	-	263	280	-	-	-	-	-	-	-
Stage 1	534	516	-	665	631	-	-	-	-	-	-	-
Stage 2	583	619	-	523	516	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		42.1		0		0.3	
HCM LOS	A		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1076	-	-	-	315	1191	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.732	0.016	-	-
HCM Control Delay (s)	8.3	0	-	0	42.1	8.1	0	-
HCM Lane LOS	A	A	-	A	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	5.4	0.1	-	-

Intersection						
Int Delay, s/veh	9.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	67	190	238	597	222	347
Future Vol, veh/h	67	190	238	597	222	347
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	207	259	649	241	377

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1443	584	0	0	908
Stage 1	584	-	-	-	-
Stage 2	859	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	146	512	-	-	750
Stage 1	557	-	-	-	-
Stage 2	415	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	87	512	-	-	750
Mov Cap-2 Maneuver	87	-	-	-	-
Stage 1	557	-	-	-	-
Stage 2	246	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	48.8	0	4.7
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	87	512	750
HCM Lane V/C Ratio	-	-	0.837	0.403	0.322
HCM Control Delay (s)	-	-	139.8	16.7	12.1
HCM Lane LOS	-	-	F	C	B
HCM 95th %tile Q(veh)	-	-	4.4	1.9	1.4

Queues  
3: Rockdale & Hwy 417 EB

FB2027AM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	46	212	42	857	450
v/c Ratio	0.12	0.42	0.10	0.93	0.50
Control Delay	17.7	5.4	12.3	35.7	14.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.7	5.4	12.3	35.7	14.6
Queue Length 50th (m)	4.1	0.0	1.7	66.3	23.2
Queue Length 95th (m)	9.6	10.9	11.8	#258.0	96.7
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	1113	1040	433	918	898
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	0.04	0.20	0.10	0.93	0.50

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FB2027AM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	42	195	39	788	343	71
Future Volume (veh/h)	42	195	39	788	343	71
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	46	212	42	857	373	77
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	354	315	471	943	758	156
Arrive On Green	0.21	0.21	0.53	0.53	0.53	0.53
Sat Flow, veh/h	1688	1502	939	1772	1424	294
Grp Volume(v), veh/h	46	212	42	857	0	450
Grp Sat Flow(s),veh/h/ln	1688	1502	939	1772	0	1717
Q Serve(g_s), s	1.3	7.3	1.7	24.8	0.0	9.4
Cycle Q Clear(g_c), s	1.3	7.3	11.1	24.8	0.0	9.4
Prop In Lane	1.00	1.00	1.00			0.17
Lane Grp Cap(c), veh/h	354	315	471	943	0	914
V/C Ratio(X)	0.13	0.67	0.09	0.91	0.00	0.49
Avail Cap(c_a), veh/h	1224	1089	505	1006	0	975
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.2	20.6	11.9	12.0	0.0	8.4
Incr Delay (d2), s/veh	0.2	3.5	0.1	12.0	0.0	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	2.1	0.2	6.9	0.0	1.6
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.4	24.1	12.0	24.0	0.0	9.1
LnGrp LOS	B	C	B	C	A	A
Approach Vol, veh/h	258			899	450	
Approach Delay, s/veh	23.1			23.4	9.1	
Approach LOS	C			C	A	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		38.0		18.6		38.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		26.8		9.3		11.4
Green Ext Time (p_c), s		3.3		2.7		3.4

Intersection Summary

HCM 6th Ctrl Delay	19.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.  
 \* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	2.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	40	0	43	0	569	177	65	415	0
Future Vol, veh/h	0	0	0	40	0	43	0	569	177	65	415	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	43	0	47	0	618	192	71	451	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1331	1403	451	1307	1307	714	451	0	0	810	0	0
Stage 1	593	593	-	714	714	-	-	-	-	-	-	-
Stage 2	738	810	-	593	593	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	132	140	608	137	160	431	1109	-	-	816	-	-
Stage 1	492	493	-	422	435	-	-	-	-	-	-	-
Stage 2	410	393	-	492	493	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	107	124	608	125	141	431	1109	-	-	816	-	-
Mov Cap-2 Maneuver	107	124	-	125	141	-	-	-	-	-	-	-
Stage 1	492	436	-	422	435	-	-	-	-	-	-	-
Stage 2	366	393	-	435	436	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		37.6		0		1.3	
HCM LOS	A		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1109	-	-	-	198	816	-	-
HCM Lane V/C Ratio	-	-	-	-	0.456	0.087	-	-
HCM Control Delay (s)	0	-	-	0	37.6	9.8	0	-
HCM Lane LOS	A	-	-	A	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	2.2	0.3	-	-

Intersection						
Int Delay, s/veh	3.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	53	101	625	258	55	451
Future Vol, veh/h	53	101	625	258	55	451
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	58	110	679	280	60	490

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1429	819	0	0	959
Stage 1	819	-	-	-	-
Stage 2	610	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	149	375	-	-	717
Stage 1	433	-	-	-	-
Stage 2	542	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	132	375	-	-	717
Mov Cap-2 Maneuver	132	-	-	-	-
Stage 1	433	-	-	-	-
Stage 2	480	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	30	0	1.1
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	132	375	717
HCM Lane V/C Ratio	-	-	0.436	0.293	0.083
HCM Control Delay (s)	-	-	51.9	18.5	10.5
HCM Lane LOS	-	-	F	C	B
HCM 95th %tile Q(veh)	-	-	1.9	1.2	0.3

Queues  
3: Rockdale & Hwy 417 EB

FB2027PM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	334	762	108	622	542
v/c Ratio	0.44	0.95	0.70	0.96	0.85
Control Delay	18.0	39.0	50.9	55.4	39.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.0	39.0	50.9	55.4	39.4
Queue Length 50th (m)	35.9	86.1	15.3	101.2	80.1
Queue Length 95th (m)	57.0	#168.3	#42.3	#168.9	#137.7
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	788	819	155	649	635
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	0.42	0.93	0.70	0.96	0.85

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FB2027PM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	307	701	99	572	369	130
Future Volume (veh/h)	307	701	99	572	369	130
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	334	762	108	622	401	141
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	789	702	140	649	457	161
Arrive On Green	0.47	0.47	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1688	1502	864	1772	1250	439
Grp Volume(v), veh/h	334	762	108	622	0	542
Grp Sat Flow(s),veh/h/ln	1688	1502	864	1772	0	1689
Q Serve(g_s), s	11.5	41.0	5.8	30.1	0.0	26.3
Cycle Q Clear(g_c), s	11.5	41.0	32.1	30.1	0.0	26.3
Prop In Lane	1.00	1.00	1.00			0.26
Lane Grp Cap(c), veh/h	789	702	140	649	0	618
V/C Ratio(X)	0.42	1.09	0.77	0.96	0.00	0.88
Avail Cap(c_a), veh/h	789	702	140	649	0	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.5	23.3	42.3	27.2	0.0	26.0
Incr Delay (d2), s/veh	0.5	59.5	25.3	25.7	0.0	14.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	22.0	3.1	14.6	0.0	10.7
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.0	82.8	67.6	52.9	0.0	39.9
LnGrp LOS	B	F	E	D	A	D
Approach Vol, veh/h	1096			730	542	
Approach Delay, s/veh	62.5			55.1	39.9	
Approach LOS	E			E	D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		47.7		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		43.0		28.3
Green Ext Time (p_c), s		0.0		0.0		1.4

Intersection Summary

HCM 6th Ctrl Delay	55.0
HCM 6th LOS	E

Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	9.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	156	0	56	1	315	35	18	463	0
Future Vol, veh/h	0	0	0	156	0	56	1	315	35	18	463	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	170	0	61	1	342	38	20	503	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	937	925	503	906	906	361	503	0	0	380	0	0
Stage 1	543	543	-	363	363	-	-	-	-	-	-	-
Stage 2	394	382	-	543	543	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	245	269	569	257	276	684	1061	-	-	1178	-	-
Stage 1	524	520	-	656	625	-	-	-	-	-	-	-
Stage 2	631	613	-	524	520	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	219	262	569	252	269	684	1061	-	-	1178	-	-
Mov Cap-2 Maneuver	219	262	-	252	269	-	-	-	-	-	-	-
Stage 1	523	508	-	655	624	-	-	-	-	-	-	-
Stage 2	574	612	-	511	508	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		46.9		0		0.3	
HCM LOS	A		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1061	-	-	-	302	1178	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.763	0.017	-	-
HCM Control Delay (s)	8.4	0	-	0	46.9	8.1	0	-
HCM Lane LOS	A	A	-	A	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	5.8	0.1	-	-

Intersection						
Int Delay, s/veh	14					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	74	199	240	660	233	351
Future Vol, veh/h	74	199	240	660	233	351
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	216	261	717	253	382

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1508	620	0	0	978
Stage 1	620	-	-	-	-
Stage 2	888	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	133	488	-	-	706
Stage 1	536	-	-	-	-
Stage 2	402	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	~ 72	488	-	-	706
Mov Cap-2 Maneuver	~ 72	-	-	-	-
Stage 1	536	-	-	-	-
Stage 2	219	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	78.8	0	5.2
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	72	488	706	-
HCM Lane V/C Ratio	-	-	1.117	0.443	0.359	-
HCM Control Delay (s)	-	-	242.1	18.1	12.9	0
HCM Lane LOS	-	-	F	C	B	A
HCM 95th %tile Q(veh)	-	-	6	2.2	1.6	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Queues  
3: Rockdale & Hwy 417 EB

FB2032AM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	48	235	47	925	462
v/c Ratio	0.12	0.45	0.11	1.01	0.51
Control Delay	17.8	5.5	12.4	51.2	14.9
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.8	5.5	12.4	51.2	14.9
Queue Length 50th (m)	4.2	0.0	2.0	77.4	24.0
Queue Length 95th (m)	10.0	11.4	12.9	#283.5	99.9
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	1113	1048	423	917	898
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	0.04	0.22	0.11	1.01	0.51

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
3: Rockdale & Hwy 417 EB

FB2032AM Peak Hour  
6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	44	216	43	851	350	75
Future Volume (veh/h)	44	216	43	851	350	75
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	48	235	47	925	380	82
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	378	336	455	945	753	162
Arrive On Green	0.22	0.22	0.53	0.53	0.53	0.53
Sat Flow, veh/h	1688	1502	929	1772	1411	304
Grp Volume(v), veh/h	48	235	47	925	0	462
Grp Sat Flow(s),veh/h/ln	1688	1502	929	1772	0	1715
Q Serve(g_s), s	1.4	8.7	2.0	30.7	0.0	10.4
Cycle Q Clear(g_c), s	1.4	8.7	12.4	30.7	0.0	10.4
Prop In Lane	1.00	1.00	1.00			0.18
Lane Grp Cap(c), veh/h	378	336	455	945	0	915
V/C Ratio(X)	0.13	0.70	0.10	0.98	0.00	0.50
Avail Cap(c_a), veh/h	1150	1023	455	945	0	915
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.6	21.5	12.9	13.7	0.0	9.0
Incr Delay (d2), s/veh	0.2	3.7	0.2	24.2	0.0	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	2.5	0.3	11.7	0.0	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.9	25.2	13.1	37.9	0.0	9.7
LnGrp LOS	B	C	B	D	A	A
Approach Vol, veh/h	283			972	462	
Approach Delay, s/veh	24.1			36.7	9.7	
Approach LOS	C			D	A	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		20.2		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		32.7		10.7		12.4
Green Ext Time (p_c), s		0.0		2.9		3.4

Intersection Summary

HCM 6th Ctrl Delay			27.4			
HCM 6th LOS			C			

Notes

User approved pedestrian interval to be less than phase max green.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	40	0	43	0	590	177	65	423	0
Future Vol, veh/h	0	0	0	40	0	43	0	590	177	65	423	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	43	0	47	0	641	192	71	460	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1363	1435	460	1339	1339	737	460	0	0	833	0	0
Stage 1	602	602	-	737	737	-	-	-	-	-	-	-
Stage 2	761	833	-	602	602	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	125	134	601	130	153	418	1101	-	-	800	-	-
Stage 1	486	489	-	410	425	-	-	-	-	-	-	-
Stage 2	398	384	-	486	489	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	101	118	601	118	135	418	1101	-	-	800	-	-
Mov Cap-2 Maneuver	101	118	-	118	135	-	-	-	-	-	-	-
Stage 1	486	431	-	410	425	-	-	-	-	-	-	-
Stage 2	353	384	-	428	431	-	-	-	-	-	-	-

Approach	EB		WB		NB			SB		
HCM Control Delay, s	0		40.7		0			1.3		
HCM LOS	A		E							

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1101	-	-	-	188	800	-	-
HCM Lane V/C Ratio	-	-	-	-	0.48	0.088	-	-
HCM Control Delay (s)	0	-	-	0	40.7	9.9	0	-
HCM Lane LOS	A	-	-	A	E	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	2.3	0.3	-	-

Intersection						
Int Delay, s/veh	4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	59	106	641	285	57	457
Future Vol, veh/h	59	106	641	285	57	457
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	64	115	697	310	62	497

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1473	852	0	0	1007
Stage 1	852	-	-	-	-
Stage 2	621	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	140	359	-	-	688
Stage 1	418	-	-	-	-
Stage 2	536	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	123	359	-	-	688
Mov Cap-2 Maneuver	123	-	-	-	-
Stage 1	418	-	-	-	-
Stage 2	470	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	35	0	1.2
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	123	359	688
HCM Lane V/C Ratio	-	-	0.521	0.321	0.09
HCM Control Delay (s)	-	-	62.5	19.7	10.8
HCM Lane LOS	-	-	F	C	B
HCM 95th %tile Q(veh)	-	-	2.5	1.4	0.3



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	351	841	118	651	556
v/c Ratio	0.45	1.04	0.87	1.02	0.89
Control Delay	18.2	62.0	79.1	70.5	43.8
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.2	62.0	79.1	70.5	43.8
Queue Length 50th (m)	38.3	~130.7	18.0	~112.1	83.3
Queue Length 95th (m)	60.3	#199.9	#49.7	#179.9	#144.0
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	775	807	136	638	625
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	0.45	1.04	0.87	1.02	0.89

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FB2032PM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	323	774	109	599	375	136
Future Volume (veh/h)	323	774	109	599	375	136
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	351	841	118	651	408	148
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	789	702	129	649	453	164
Arrive On Green	0.47	0.47	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1688	1502	853	1772	1238	449
Grp Volume(v), veh/h	351	841	118	651	0	556
Grp Sat Flow(s),veh/h/ln	1688	1502	853	1772	0	1687
Q Serve(g_s), s	12.3	41.0	4.8	32.1	0.0	27.3
Cycle Q Clear(g_c), s	12.3	41.0	32.1	32.1	0.0	27.3
Prop In Lane	1.00	1.00	1.00			0.27
Lane Grp Cap(c), veh/h	789	702	129	649	0	618
V/C Ratio(X)	0.44	1.20	0.92	1.00	0.00	0.90
Avail Cap(c_a), veh/h	789	702	129	649	0	618
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.7	23.3	42.9	27.8	0.0	26.3
Incr Delay (d2), s/veh	0.6	102.6	55.9	36.3	0.0	16.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	30.4	4.3	17.1	0.0	11.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.3	125.9	98.8	64.1	0.0	43.0
LnGrp LOS	B	F	F	F	A	D
Approach Vol, veh/h	1192			769	556	
Approach Delay, s/veh	93.6			69.4	43.0	
Approach LOS	F			E	D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		47.7		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		43.0		29.3
Green Ext Time (p_c), s		0.0		0.0		1.1
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			75.0			
HCM 6th LOS			E			
<b>Notes</b>						
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.						

Intersection												
Int Delay, s/veh	10.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	156	0	56	1	328	35	18	479	0
Future Vol, veh/h	0	0	0	156	0	56	1	328	35	18	479	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	170	0	61	1	357	38	20	521	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	970	958	521	939	939	376	521	0	0	395	0	0
Stage 1	561	561	-	378	378	-	-	-	-	-	-	-
Stage 2	409	397	-	561	561	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	233	257	555	244	264	670	1045	-	-	1164	-	-
Stage 1	512	510	-	644	615	-	-	-	-	-	-	-
Stage 2	619	603	-	512	510	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	208	251	555	239	257	670	1045	-	-	1164	-	-
Mov Cap-2 Maneuver	208	251	-	239	257	-	-	-	-	-	-	-
Stage 1	511	498	-	643	614	-	-	-	-	-	-	-
Stage 2	562	602	-	500	498	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		53.3		0		0.3	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1045	-	-	-	288	1164	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.8	0.017	-	-
HCM Control Delay (s)	8.4	0	-	0	53.3	8.1	0	-
HCM Lane LOS	A	A	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	6.4	0.1	-	-

Intersection						
Int Delay, s/veh	22.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	81	209	243	728	245	355
Future Vol, veh/h	81	209	243	728	245	355
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	88	227	264	791	266	386

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1578	660	0	0	1055
Stage 1	660	-	-	-	-
Stage 2	918	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	120	463	-	-	660
Stage 1	514	-	-	-	-
Stage 2	389	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	~ 58	463	-	-	660
Mov Cap-2 Maneuver	~ 58	-	-	-	-
Stage 1	514	-	-	-	-
Stage 2	189	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	131.8	0	5.8
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	58	463	660	-
HCM Lane V/C Ratio	-	-	1.518	0.491	0.403	-
HCM Control Delay (s)	-	-	\$ 420.2	20	14.1	0
HCM Lane LOS	-	-	F	C	B	A
HCM 95th %tile Q(veh)	-	-	7.9	2.7	2	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	51	259	52	999	474
v/c Ratio	0.13	0.48	0.13	1.09	0.53
Control Delay	17.9	5.6	12.5	76.3	15.2
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	17.9	5.6	12.5	76.3	15.2
Queue Length 50th (m)	4.5	0.0	2.2	~94.6	24.9
Queue Length 95th (m)	10.5	12.0	14.1	#311.1	#104.5
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	1113	1056	414	917	898
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	0.05	0.25	0.13	1.09	0.53

**Intersection Summary**

~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FB2037AM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	47	238	48	919	357	79
Future Volume (veh/h)	47	238	48	919	357	79
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	51	259	52	999	388	86
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	407	362	428	924	732	162
Arrive On Green	0.24	0.24	0.52	0.52	0.52	0.52
Sat Flow, veh/h	1688	1502	919	1772	1403	311
Grp Volume(v), veh/h	51	259	52	999	0	474
Grp Sat Flow(s),veh/h/ln	1688	1502	919	1772	0	1714
Q Serve(g_s), s	1.5	9.7	2.4	32.1	0.0	11.3
Cycle Q Clear(g_c), s	1.5	9.7	13.7	32.1	0.0	11.3
Prop In Lane	1.00	1.00	1.00			0.18
Lane Grp Cap(c), veh/h	407	362	428	924	0	894
V/C Ratio(X)	0.13	0.71	0.12	1.08	0.00	0.53
Avail Cap(c_a), veh/h	1124	1000	428	924	0	894
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.3	21.4	14.3	14.7	0.0	9.7
Incr Delay (d2), s/veh	0.2	3.7	0.2	54.1	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	2.8	0.4	19.9	0.0	2.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.5	25.1	14.5	68.8	0.0	10.7
LnGrp LOS	B	C	B	F	A	B
Approach Vol, veh/h	310			1051	474	
Approach Delay, s/veh	24.0			66.1	10.7	
Approach LOS	C			E	B	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		21.6		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		11.7		13.3
Green Ext Time (p_c), s		0.0		3.2		3.5

Intersection Summary	
HCM 6th Ctrl Delay	44.7
HCM 6th LOS	D

**Notes**  
 User approved pedestrian interval to be less than phase max green.  
 \* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	3.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	40	0	43	0	612	177	65	433	0
Future Vol, veh/h	0	0	0	40	0	43	0	612	177	65	433	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	43	0	47	0	665	192	71	471	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1398	1470	471	1374	1374	761	471	0	0	857	0	0
Stage 1	613	613	-	761	761	-	-	-	-	-	-	-
Stage 2	785	857	-	613	613	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	118	127	593	123	145	405	1091	-	-	783	-	-
Stage 1	480	483	-	398	414	-	-	-	-	-	-	-
Stage 2	386	374	-	480	483	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	95	111	593	111	127	405	1091	-	-	783	-	-
Mov Cap-2 Maneuver	95	111	-	111	127	-	-	-	-	-	-	-
Stage 1	480	424	-	398	414	-	-	-	-	-	-	-
Stage 2	341	374	-	421	424	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		44.4		0		1.3	
HCM LOS	A		E					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1091	-	-	-	178	783	-	-
HCM Lane V/C Ratio	-	-	-	-	0.507	0.09	-	-
HCM Control Delay (s)	0	-	-	0	44.4	10.1	0	-
HCM Lane LOS	A	-	-	A	E	B	A	-
HCM 95th %tile Q(veh)	0	-	-	-	2.5	0.3	-	-

Intersection						
Int Delay, s/veh	4.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	112	657	314	60	464
Future Vol, veh/h	65	112	657	314	60	464
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	122	714	341	65	504

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1519	885	0	0	1055
Stage 1	885	-	-	-	-
Stage 2	634	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	131	344	-	-	660
Stage 1	403	-	-	-	-
Stage 2	529	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	113	344	-	-	660
Mov Cap-2 Maneuver	113	-	-	-	-
Stage 1	403	-	-	-	-
Stage 2	457	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	42.5	0	1.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	113	344	660
HCM Lane V/C Ratio	-	-	0.625	0.354	0.099
HCM Control Delay (s)	-	-	79.3	21.1	11.1
HCM Lane LOS	-	-	F	C	B
HCM 95th %tile Q(veh)	-	-	3.1	1.6	0.3

Queues  
3: Rockdale & Hwy 417 EB

FB2037PM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	368	929	130	683	569
v/c Ratio	0.47	1.16	1.02	1.07	0.91
Control Delay	18.6	104.2	116.9	85.2	46.7
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	104.2	116.9	85.2	46.7
Queue Length 50th (m)	40.7	~163.8	~22.2	~128.6	86.3
Queue Length 95th (m)	63.9	#234.7	#56.9	#191.9	#148.6
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	775	803	128	638	625
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	0.47	1.16	1.02	1.07	0.91

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FB2037PM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	339	855	120	628	381	143
Future Volume (veh/h)	339	855	120	628	381	143
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	368	929	130	683	414	155
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	789	702	118	649	449	168
Arrive On Green	0.47	0.47	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1688	1502	843	1772	1226	459
Grp Volume(v), veh/h	368	929	130	683	0	569
Grp Sat Flow(s),veh/h/ln	1688	1502	843	1772	0	1686
Q Serve(g_s), s	13.0	41.0	3.8	32.1	0.0	28.3
Cycle Q Clear(g_c), s	13.0	41.0	32.1	32.1	0.0	28.3
Prop In Lane	1.00	1.00	1.00			0.27
Lane Grp Cap(c), veh/h	789	702	118	649	0	617
V/C Ratio(X)	0.47	1.32	1.10	1.05	0.00	0.92
Avail Cap(c_a), veh/h	789	702	118	649	0	617
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.9	23.3	43.3	27.8	0.0	26.6
Incr Delay (d2), s/veh	0.6	155.3	111.9	50.1	0.0	19.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	40.7	6.0	19.6	0.0	12.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.5	178.7	155.1	77.9	0.0	46.5
LnGrp LOS	B	F	F	F	A	D
Approach Vol, veh/h	1297			813	569	
Approach Delay, s/veh	132.7			90.3	46.5	
Approach LOS	F			F	D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		47.7		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		43.0		30.3
Green Ext Time (p_c), s		0.0		0.0		0.8

Intersection Summary

HCM 6th Ctrl Delay	101.5
HCM 6th LOS	F

Notes

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Intersection												
Int Delay, s/veh	32.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	231	0	70	1	295	35	33	438	0
Future Vol, veh/h	0	0	0	231	0	70	1	295	35	33	438	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	251	0	76	1	321	38	36	476	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	928	909	476	890	890	340	476	0	0	359	0	0
Stage 1	548	548	-	342	342	-	-	-	-	-	-	-
Stage 2	380	361	-	548	548	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	248	275	589	264	282	702	1086	-	-	1200	-	-
Stage 1	521	517	-	673	638	-	-	-	-	-	-	-
Stage 2	642	626	-	521	517	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	214	263	589	256	270	702	1086	-	-	1200	-	-
Mov Cap-2 Maneuver	214	263	-	256	270	-	-	-	-	-	-	-
Stage 1	520	496	-	672	637	-	-	-	-	-	-	-
Stage 2	572	625	-	500	496	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		116.8		0		0.6	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1086	-	-	-	300	1200	-	-
HCM Lane V/C Ratio	0.001	-	-	-	1.091	0.03	-	-
HCM Control Delay (s)	8.3	0	-	0	116.8	8.1	0	-
HCM Lane LOS	A	A	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	12.9	0.1	-	-

Intersection						
Int Delay, s/veh	12.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	67	205	270	597	238	379
Future Vol, veh/h	67	205	270	597	238	379
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	73	223	293	649	259	412

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1548	618	0	0	942
Stage 1	618	-	-	-	-
Stage 2	930	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	126	489	-	-	728
Stage 1	538	-	-	-	-
Stage 2	384	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	~ 68	489	-	-	728
Mov Cap-2 Maneuver	~ 68	-	-	-	-
Stage 1	538	-	-	-	-
Stage 2	207	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	71.6	0	4.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	68	489	728	-
HCM Lane V/C Ratio	-	-	1.071	0.456	0.355	-
HCM Control Delay (s)	-	-	234.4	18.4	12.6	0
HCM Lane LOS	-	-	F	C	B	A
HCM 95th %tile Q(veh)	-	-	5.5	2.3	1.6	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Queues  
3: Rockdale & Hwy 417 EB

FT2027AM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	78	212	42	859	484
v/c Ratio	0.20	0.42	0.10	0.94	0.54
Control Delay	18.7	5.3	12.5	36.8	15.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.7	5.3	12.5	36.8	15.6
Queue Length 50th (m)	7.1	0.0	1.8	66.5	25.3
Queue Length 95th (m)	14.6	10.9	11.9	#258.7	#114.7
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	1110	1038	403	914	890
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	0.07	0.20	0.10	0.94	0.54

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
3: Rockdale & Hwy 417 EB

FT2027AM Peak Hour  
6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	72	195	39	790	345	100
Future Volume (veh/h)	72	195	39	790	345	100
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	78	212	42	859	375	109
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	375	334	432	933	694	202
Arrive On Green	0.22	0.22	0.53	0.53	0.53	0.53
Sat Flow, veh/h	1688	1502	910	1772	1318	383
Grp Volume(v), veh/h	78	212	42	859	0	484
Grp Sat Flow(s),veh/h/ln	1688	1502	910	1772	0	1701
Q Serve(g_s), s	2.2	7.4	1.9	25.9	0.0	10.9
Cycle Q Clear(g_c), s	2.2	7.4	12.8	25.9	0.0	10.9
Prop In Lane	1.00	1.00	1.00			0.23
Lane Grp Cap(c), veh/h	375	334	432	933	0	895
V/C Ratio(X)	0.21	0.64	0.10	0.92	0.00	0.54
Avail Cap(c_a), veh/h	1191	1060	455	979	0	940
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.4	20.5	13.3	12.6	0.0	9.1
Incr Delay (d2), s/veh	0.4	2.8	0.2	13.7	0.0	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	2.1	0.3	7.9	0.0	2.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.8	23.3	13.5	26.3	0.0	10.0
LnGrp LOS	B	C	B	C	A	B
Approach Vol, veh/h	290			901	484	
Approach Delay, s/veh	22.1			25.7	10.0	
Approach LOS	C			C	B	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		38.5		19.6		38.5
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		27.9		9.4		12.9
Green Ext Time (p_c), s		2.7		3.6		3.6

Intersection Summary

HCM 6th Ctrl Delay	20.6
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings  
 4: Rockdale & Access 1

FT2027AM Peak Hour  
 6175 Rockdale Dr

	↑	↓
Lane Group	NBT	SBT
Lane Configurations	↗	↖
Traffic Volume (vph)	336	609
Future Volume (vph)	336	609
Lane Group Flow (vph)	445	662
Sign Control	Free	Free
<b>Intersection Summary</b>		
Control Type: Unsignalized		
Intersection Capacity Utilization 37.2%		ICU Level of Service A
Analysis Period (min) 15		

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	93	4	6	210	52	16
Future Vol, veh/h	93	4	6	210	52	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	101	4	7	228	57	17

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	308	66	74	0	0
Stage 1	66	-	-	-	-
Stage 2	242	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	684	998	1526	-	-
Stage 1	957	-	-	-	-
Stage 2	798	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	681	998	1526	-	-
Mov Cap-2 Maneuver	681	-	-	-	-
Stage 1	952	-	-	-	-
Stage 2	798	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	690	-	-
HCM Lane V/C Ratio	0.004	-	0.153	-	-
HCM Control Delay (s)	7.4	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection												
Int Delay, s/veh	30.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	126	0	61	0	555	177	82	402	0
Future Vol, veh/h	0	0	0	126	0	61	0	555	177	82	402	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	137	0	66	0	603	192	89	437	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1347	1410	437	1314	1314	699	437	0	0	795	0	0
Stage 1	615	615	-	699	699	-	-	-	-	-	-	-
Stage 2	732	795	-	615	615	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	128	138	620	~ 135	158	440	1123	-	-	826	-	-
Stage 1	479	482	-	430	442	-	-	-	-	-	-	-
Stage 2	413	399	-	479	482	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	97	118	620	~ 120	136	440	1123	-	-	826	-	-
Mov Cap-2 Maneuver	97	118	-	~ 120	136	-	-	-	-	-	-	-
Stage 1	479	414	-	430	442	-	-	-	-	-	-	-
Stage 2	351	399	-	411	414	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	227.5	0	1.7
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1123	-	-	-	157	826	-	-
HCM Lane V/C Ratio	-	-	-	-	1.295	0.108	-	-
HCM Control Delay (s)	0	-	-	0	227.5	9.9	0	-
HCM Lane LOS	A	-	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	12.1	0.4	-	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Intersection						
Int Delay, s/veh	4.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	53	134	644	258	88	470
Future Vol, veh/h	53	134	644	258	88	470
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	58	146	700	280	96	511

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1543	840	0	0	980
Stage 1	840	-	-	-	-
Stage 2	703	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	126	365	-	-	704
Stage 1	424	-	-	-	-
Stage 2	491	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	102	365	-	-	704
Mov Cap-2 Maneuver	102	-	-	-	-
Stage 1	424	-	-	-	-
Stage 2	398	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	37.5	0	1.7
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	102	365	704
HCM Lane V/C Ratio	-	-	0.565	0.399	0.136
HCM Control Delay (s)	-	-	78.6	21.3	10.9
HCM Lane LOS	-	-	F	C	B
HCM 95th %tile Q(veh)	-	-	2.6	1.9	0.5

Queues  
3: Rockdale & Hwy 417 EB

FT2027PM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	352	762	108	624	563
v/c Ratio	0.46	0.95	0.78	0.96	0.89
Control Delay	18.4	39.2	63.2	56.1	43.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.4	39.2	63.2	56.1	43.0
Queue Length 50th (m)	38.4	86.2	15.9	101.8	84.6
Queue Length 95th (m)	60.7	#168.5	#45.0	#169.3	#146.1
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	788	818	139	648	635
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	0.45	0.93	0.78	0.96	0.89

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FT2027PM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	324	701	99	574	371	147
Future Volume (veh/h)	324	701	99	574	371	147
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	352	762	108	624	403	160
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	789	702	122	649	441	175
Arrive On Green	0.47	0.47	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1688	1502	847	1772	1204	478
Grp Volume(v), veh/h	352	762	108	624	0	563
Grp Sat Flow(s),veh/h/ln	1688	1502	847	1772	0	1682
Q Serve(g_s), s	12.3	41.0	4.1	30.2	0.0	28.0
Cycle Q Clear(g_c), s	12.3	41.0	32.1	30.2	0.0	28.0
Prop In Lane	1.00	1.00	1.00			0.28
Lane Grp Cap(c), veh/h	789	702	122	649	0	616
V/C Ratio(X)	0.45	1.09	0.89	0.96	0.00	0.91
Avail Cap(c_a), veh/h	789	702	122	649	0	616
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.7	23.3	43.1	27.2	0.0	26.5
Incr Delay (d2), s/veh	0.6	59.5	49.7	26.4	0.0	18.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	22.0	3.8	14.8	0.0	12.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.3	82.8	92.8	53.6	0.0	45.2
LnGrp LOS	B	F	F	D	A	D
Approach Vol, veh/h	1114			732	563	
Approach Delay, s/veh	61.8			59.4	45.2	
Approach LOS	E			E	D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		47.7		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		43.0		30.0
Green Ext Time (p_c), s		0.0		0.0		0.9
<b>Intersection Summary</b>						
HCM 6th Ctrl Delay			57.2			
HCM 6th LOS			E			

Notes

User approved pedestrian interval to be less than phase max green.  
 \* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings  
4: Rockdale & Access 1

FT2027PM Peak Hour  
6175 Rockdale Dr

	↑	↓
Lane Group	NBT	SBT
Lane Configurations	↗	↖
Traffic Volume (vph)	741	459
Future Volume (vph)	741	459
Lane Group Flow (vph)	900	499
Sign Control	Free	Free
<b>Intersection Summary</b>		
Control Type: Unsignalized		
Intersection Capacity Utilization 50.1%	ICU Level of Service A	
Analysis Period (min) 15		

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	7	5	82	240	20
Future Vol, veh/h	105	7	5	82	240	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	8	5	89	261	22

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	371	272	283	0	-	0
Stage 1	272	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	630	767	1279	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	627	767	1279	-	-	-
Mov Cap-2 Maneuver	627	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	634	-	-
HCM Lane V/C Ratio	0.004	-	0.192	-	-
HCM Control Delay (s)	7.8	0	12	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Intersection												
Int Delay, s/veh	36.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	231	0	70	1	306	35	33	453	0
Future Vol, veh/h	0	0	0	231	0	70	1	306	35	33	453	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	251	0	76	1	333	38	36	492	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	956	937	492	918	918	352	492	0	0	371	0	0
Stage 1	564	564	-	354	354	-	-	-	-	-	-	-
Stage 2	392	373	-	564	564	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	238	265	577	252	272	692	1071	-	-	1188	-	-
Stage 1	510	508	-	663	630	-	-	-	-	-	-	-
Stage 2	633	618	-	510	508	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	205	254	577	~ 244	260	692	1071	-	-	1188	-	-
Mov Cap-2 Maneuver	205	254	-	~ 244	260	-	-	-	-	-	-	-
Stage 1	509	487	-	662	629	-	-	-	-	-	-	-
Stage 2	563	617	-	489	487	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	135.2	0	0.6
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1071	-	-	-	287	1188	-	-
HCM Lane V/C Ratio	0.001	-	-	-	1.14	0.03	-	-
HCM Control Delay (s)	8.4	0	-	0	135.2	8.1	0	-
HCM Lane LOS	A	A	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	13.9	0.1	-	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Intersection						
Int Delay, s/veh	19.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	74	214	272	660	249	383
Future Vol, veh/h	74	214	272	660	249	383
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	80	233	296	717	271	416

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1613	655	0	0	1013
Stage 1	655	-	-	-	-
Stage 2	958	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	115	466	-	-	684
Stage 1	517	-	-	-	-
Stage 2	373	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	~ 56	466	-	-	684
Mov Cap-2 Maneuver	~ 56	-	-	-	-
Stage 1	517	-	-	-	-
Stage 2	181	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	116.2	0	5.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	56	466	684
HCM Lane V/C Ratio	-	-	1.436	0.499	0.396
HCM Control Delay (s)	-	-	\$ 393.7	20.2	13.7
HCM Lane LOS	-	-	F	C	B
HCM 95th %tile Q(veh)	-	-	7.2	2.7	1.9

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Queues  
3: Rockdale & Hwy 417 EB

FT2032AM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	80	235	47	927	496
v/c Ratio	0.20	0.45	0.12	1.01	0.56
Control Delay	18.8	5.4	12.7	52.9	16.0
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.8	5.4	12.7	52.9	16.0
Queue Length 50th (m)	7.2	0.0	2.0	77.6	26.3
Queue Length 95th (m)	14.9	11.4	13.1	#284.2	#119.9
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	1110	1045	394	914	889
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	0.07	0.22	0.12	1.01	0.56

Intersection Summary

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

HCM 6th Signalized Intersection Summary  
3: Rockdale & Hwy 417 EB

FT2032AM Peak Hour  
6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	74	216	43	853	352	104
Future Volume (veh/h)	74	216	43	853	352	104
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	80	235	47	927	383	113
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	398	354	415	931	689	203
Arrive On Green	0.24	0.24	0.53	0.53	0.53	0.53
Sat Flow, veh/h	1688	1502	901	1772	1313	387
Grp Volume(v), veh/h	80	235	47	927	0	496
Grp Sat Flow(s),veh/h/ln	1688	1502	901	1772	0	1700
Q Serve(g_s), s	2.3	8.7	2.3	31.8	0.0	12.0
Cycle Q Clear(g_c), s	2.3	8.7	14.2	31.8	0.0	12.0
Prop In Lane	1.00	1.00	1.00			0.23
Lane Grp Cap(c), veh/h	398	354	415	931	0	893
V/C Ratio(X)	0.20	0.66	0.11	1.00	0.00	0.56
Avail Cap(c_a), veh/h	1132	1007	415	931	0	893
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.7	21.2	14.5	14.4	0.0	9.7
Incr Delay (d2), s/veh	0.3	3.0	0.2	28.5	0.0	1.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	2.5	0.3	13.2	0.0	2.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	19.1	24.2	14.7	42.9	0.0	10.8
LnGrp LOS	B	C	B	D	A	B
Approach Vol, veh/h	315			974	496	
Approach Delay, s/veh	22.9			41.6	10.8	
Approach LOS	C			D	B	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		21.1		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		33.8		10.7		14.0
Green Ext Time (p_c), s		0.0		3.8		3.6

Intersection Summary

HCM 6th Ctrl Delay	29.7
HCM 6th LOS	C

Notes

User approved pedestrian interval to be less than phase max green.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings  
4: Rockdale & Access 1

FT2032AM Peak Hour  
6175 Rockdale Dr

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	↑	↓
Lane Group	NBT	SBT
Lane Configurations	↶	↷
Traffic Volume (vph)	347	624
Future Volume (vph)	347	624
Lane Group Flow (vph)	457	678
Sign Control	Free	Free
<b>Intersection Summary</b>		
Control Type: Unsignalized		
Intersection Capacity Utilization 38.0%		ICU Level of Service A
Analysis Period (min) 15		

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	93	4	6	210	52	16
Future Vol, veh/h	93	4	6	210	52	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	101	4	7	228	57	17

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	308	66	74	0	0
Stage 1	66	-	-	-	-
Stage 2	242	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	684	998	1526	-	-
Stage 1	957	-	-	-	-
Stage 2	798	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	681	998	1526	-	-
Mov Cap-2 Maneuver	681	-	-	-	-
Stage 1	952	-	-	-	-
Stage 2	798	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	690	-	-
HCM Lane V/C Ratio	0.004	-	0.153	-	-
HCM Control Delay (s)	7.4	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection												
Int Delay, s/veh	33.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	126	0	61	0	576	177	82	410	0
Future Vol, veh/h	0	0	0	126	0	61	0	576	177	82	410	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	137	0	66	0	626	192	89	446	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1379	1442	446	1346	1346	722	446	0	0	818	0	0
Stage 1	624	624	-	722	722	-	-	-	-	-	-	-
Stage 2	755	818	-	624	624	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	122	132	612	~128	151	427	1114	-	-	810	-	-
Stage 1	473	478	-	418	431	-	-	-	-	-	-	-
Stage 2	401	390	-	473	478	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	92	113	612	~114	129	427	1114	-	-	810	-	-
Mov Cap-2 Maneuver	92	113	-	~114	129	-	-	-	-	-	-	-
Stage 1	473	408	-	418	431	-	-	-	-	-	-	-
Stage 2	339	390	-	404	408	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		253.9		0		1.7	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1114	-	-	-	150	810	-	-
HCM Lane V/C Ratio	-	-	-	-	1.355	0.11	-	-
HCM Control Delay (s)	0	-	-	0	253.9	10	0	-
HCM Lane LOS	A	-	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	12.7	0.4	-	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Intersection						
Int Delay, s/veh	5.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	59	139	660	285	90	476
Future Vol, veh/h	59	139	660	285	90	476
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	64	151	717	310	98	517

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1585	872	0	0	1027
Stage 1	872	-	-	-	-
Stage 2	713	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	119	350	-	-	676
Stage 1	409	-	-	-	-
Stage 2	486	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	95	350	-	-	676
Mov Cap-2 Maneuver	95	-	-	-	-
Stage 1	409	-	-	-	-
Stage 2	387	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	45.8	0	1.8
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	95	350	676
HCM Lane V/C Ratio	-	-	0.675	0.432	0.145
HCM Control Delay (s)	-	-	99.6	22.9	11.2
HCM Lane LOS	-	-	F	C	B
HCM 95th %tile Q(veh)	-	-	3.3	2.1	0.5



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	370	841	118	653	576
v/c Ratio	0.48	1.04	0.97	1.02	0.92
Control Delay	18.6	62.9	106.1	71.3	48.6
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.6	62.9	106.1	71.3	48.6
Queue Length 50th (m)	41.0	~131.1	19.1	~113.3	87.6
Queue Length 95th (m)	64.4	#200.3	#52.2	#180.6	#151.3
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	775	805	122	638	624
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	0.48	1.04	0.97	1.02	0.92

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

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

Queue shown is maximum after two cycles.

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FT2032PM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	340	774	109	601	377	153
Future Volume (veh/h)	340	774	109	601	377	153
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	370	841	118	653	410	166
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	789	702	112	649	438	177
Arrive On Green	0.47	0.47	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1688	1502	837	1772	1196	484
Grp Volume(v), veh/h	370	841	118	653	0	576
Grp Sat Flow(s),veh/h/ln	1688	1502	837	1772	0	1681
Q Serve(g_s), s	13.1	41.0	3.1	32.1	0.0	29.0
Cycle Q Clear(g_c), s	13.1	41.0	32.1	32.1	0.0	29.0
Prop In Lane	1.00	1.00	1.00			0.29
Lane Grp Cap(c), veh/h	789	702	112	649	0	615
V/C Ratio(X)	0.47	1.20	1.06	1.01	0.00	0.94
Avail Cap(c_a), veh/h	789	702	112	649	0	615
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.9	23.3	43.4	27.8	0.0	26.8
Incr Delay (d2), s/veh	0.6	102.6	100.8	37.0	0.0	22.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.9	30.4	5.3	17.3	0.0	12.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.5	125.9	144.2	64.8	0.0	49.1
LnGrp LOS	B	F	F	F	A	D
Approach Vol, veh/h	1211			771	576	
Approach Delay, s/veh	92.5			77.0	49.1	
Approach LOS	F			E	D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		47.7		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		43.0		31.0
Green Ext Time (p_c), s		0.0		0.0		0.5

Intersection Summary

HCM 6th Ctrl Delay	78.0
HCM 6th LOS	E

Notes

User approved pedestrian interval to be less than phase max green.  
 \* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings  
4: Rockdale & Access 1

FT2032PM Peak Hour  
6175 Rockdale Dr

	↑	↓
Lane Group	NBT	SBT
Lane Configurations	↗	↖
Traffic Volume (vph)	762	467
Future Volume (vph)	762	467
Lane Group Flow (vph)	923	508
Sign Control	Free	Free
<b>Intersection Summary</b>		
Control Type: Unsignalized		
Intersection Capacity Utilization 51.2%		ICU Level of Service A
Analysis Period (min) 15		

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	105	7	5	82	240	20
Future Vol, veh/h	105	7	5	82	240	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	8	5	89	261	22

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	371	272	283	0	-	0
Stage 1	272	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	630	767	1279	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	627	767	1279	-	-	-
Mov Cap-2 Maneuver	627	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	634	-	-
HCM Lane V/C Ratio	0.004	-	0.192	-	-
HCM Control Delay (s)	7.8	0	12	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Intersection												
Int Delay, s/veh	40.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	231	0	70	1	319	35	33	469	0
Future Vol, veh/h	0	0	0	231	0	70	1	319	35	33	469	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	251	0	76	1	347	38	36	510	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	988	969	510	950	950	366	510	0	0	385	0	0
Stage 1	582	582	-	368	368	-	-	-	-	-	-	-
Stage 2	406	387	-	582	582	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	226	254	563	~240	260	679	1055	-	-	1173	-	-
Stage 1	499	499	-	652	621	-	-	-	-	-	-	-
Stage 2	622	610	-	499	499	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	194	243	563	~232	249	679	1055	-	-	1173	-	-
Mov Cap-2 Maneuver	194	243	-	~232	249	-	-	-	-	-	-	-
Stage 1	499	478	-	651	620	-	-	-	-	-	-	-
Stage 2	552	609	-	478	478	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	156.5	0	0.5
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1055	-	-	-	274	1173	-
HCM Lane V/C Ratio	0.001	-	-	-	1.194	0.031	-
HCM Control Delay (s)	8.4	0	-	0	156.5	8.2	0
HCM Lane LOS	A	A	-	A	F	A	A
HCM 95th %tile Q(veh)	0	-	-	-	14.9	0.1	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Intersection						
Int Delay, s/veh	32.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	81	224	275	728	261	387
Future Vol, veh/h	81	224	275	728	261	387
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	88	243	299	791	284	421

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1684	695	0	0	1090
Stage 1	695	-	-	-	-
Stage 2	989	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	104	442	-	-	640
Stage 1	495	-	-	-	-
Stage 2	360	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	~ 44	442	-	-	640
Mov Cap-2 Maneuver	~ 44	-	-	-	-
Stage 1	495	-	-	-	-
Stage 2	152	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	193.2	0	6.1
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	44	442	640	-
HCM Lane V/C Ratio	-	-	2.001	0.551	0.443	-
HCM Control Delay (s)	-	-	\$ 664.7	22.7	15	0
HCM Lane LOS	-	-	F	C	C	A
HCM 95th %tile Q(veh)	-	-	9.1	3.3	2.3	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	84	259	52	1001	507
v/c Ratio	0.21	0.48	0.13	1.10	0.57
Control Delay	18.9	5.5	12.9	78.9	16.3
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	18.9	5.5	12.9	78.9	16.3
Queue Length 50th (m)	7.6	0.0	2.2	~95.2	27.1
Queue Length 95th (m)	15.6	12.0	14.3	#311.8	#124.3
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	1109	1053	386	914	888
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	0.08	0.25	0.13	1.10	0.57

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
 3: Rockdale & Hwy 417 EB

FT2037AM Peak Hour  
 6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	77	238	48	921	359	108
Future Volume (veh/h)	77	238	48	921	359	108
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	84	259	52	1001	390	117
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	427	380	389	910	671	201
Arrive On Green	0.25	0.25	0.51	0.51	0.51	0.51
Sat Flow, veh/h	1688	1502	892	1772	1307	392
Grp Volume(v), veh/h	84	259	52	1001	0	507
Grp Sat Flow(s),veh/h/ln	1688	1502	892	1772	0	1699
Q Serve(g_s), s	2.4	9.7	2.7	32.1	0.0	12.9
Cycle Q Clear(g_c), s	2.4	9.7	15.6	32.1	0.0	12.9
Prop In Lane	1.00	1.00	1.00			0.23
Lane Grp Cap(c), veh/h	427	380	389	910	0	873
V/C Ratio(X)	0.20	0.68	0.13	1.10	0.00	0.58
Avail Cap(c_a), veh/h	1107	985	389	910	0	873
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	18.4	21.1	15.9	15.2	0.0	10.5
Incr Delay (d2), s/veh	0.3	3.1	0.3	61.0	0.0	1.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.7	2.8	0.4	21.7	0.0	2.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	18.7	24.2	16.2	76.2	0.0	11.9
LnGrp LOS	B	C	B	F	A	B
Approach Vol, veh/h	343			1053	507	
Approach Delay, s/veh	22.8			73.2	11.9	
Approach LOS	C			E	B	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		22.5		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		11.7		14.9
Green Ext Time (p_c), s		0.0		4.1		3.7

Intersection Summary

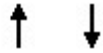
HCM 6th Ctrl Delay	47.8
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.  
 \* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings  
 4: Rockdale & Access 1

FT2037AM Peak Hour  
 6175 Rockdale Dr



Lane Group	NBT	SBT
Lane Configurations		
Traffic Volume (vph)	360	640
Future Volume (vph)	360	640
Lane Group Flow (vph)	471	696
Sign Control	Free	Free

Intersection Summary	
Control Type: Unsignalized	
Intersection Capacity Utilization 38.9%	ICU Level of Service A
Analysis Period (min) 15	

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	93	4	6	210	52	16
Future Vol, veh/h	93	4	6	210	52	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	101	4	7	228	57	17

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	308	66	74	0	0
Stage 1	66	-	-	-	-
Stage 2	242	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	684	998	1526	-	-
Stage 1	957	-	-	-	-
Stage 2	798	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	681	998	1526	-	-
Mov Cap-2 Maneuver	681	-	-	-	-
Stage 1	952	-	-	-	-
Stage 2	798	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11.2	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	690	-	-
HCM Lane V/C Ratio	0.004	-	0.153	-	-
HCM Control Delay (s)	7.4	0	11.2	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.5	-	-

Intersection												
Int Delay, s/veh	37.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	126	0	61	0	598	177	82	420	0
Future Vol, veh/h	0	0	0	126	0	61	0	598	177	82	420	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	137	0	66	0	650	192	89	457	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1414	1477	457	1381	1381	746	457	0	0	842	0	0
Stage 1	635	635	-	746	746	-	-	-	-	-	-	-
Stage 2	779	842	-	635	635	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	115	126	604	~ 121	144	413	1104	-	-	794	-	-
Stage 1	467	472	-	405	421	-	-	-	-	-	-	-
Stage 2	389	380	-	467	472	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	85	107	604	~ 107	122	413	1104	-	-	794	-	-
Mov Cap-2 Maneuver	85	107	-	~ 107	122	-	-	-	-	-	-	-
Stage 1	467	401	-	405	421	-	-	-	-	-	-	-
Stage 2	327	380	-	397	401	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	292.5	0	1.7
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1104	-	-	-	141	794	-
HCM Lane V/C Ratio	-	-	-	-	1.442	0.112	-
HCM Control Delay (s)	0	-	-	0	292.5	10.1	0
HCM Lane LOS	A	-	-	A	F	B	A
HCM 95th %tile Q(veh)	0	-	-	-	13.4	0.4	-

Notes  
 ~: Volume exceeds capacity    \$: Delay exceeds 300s    +: Computation Not Defined    \*: All major volume in platoon

Intersection						
Int Delay, s/veh	7.6					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	65	145	676	314	93	483
Future Vol, veh/h	65	145	676	314	93	483
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	8	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	71	158	735	341	101	525

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1633	906	0	0	1076
Stage 1	906	-	-	-	-
Stage 2	727	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	111	334	-	-	648
Stage 1	394	-	-	-	-
Stage 2	478	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	87	334	-	-	648
Mov Cap-2 Maneuver	87	-	-	-	-
Stage 1	394	-	-	-	-
Stage 2	373	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	58.8	0	1.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	87	334	648	-
HCM Lane V/C Ratio	-	-	0.812	0.472	0.156	-
HCM Control Delay (s)	-	-	134.1	25	11.6	0
HCM Lane LOS	-	-	F	D	B	A
HCM 95th %tile Q(veh)	-	-	4.2	2.4	0.6	-

Queues  
3: Rockdale & Hwy 417 EB

FT2037PM Peak Hour  
6175 Rockdale Dr



Lane Group	EBL	EBR	NBL	NBT	SBT
Lane Group Flow (vph)	387	929	130	685	590
v/c Ratio	0.50	1.16	1.15	1.07	0.95
Control Delay	19.0	104.8	162.1	86.2	52.4
Queue Delay	0.0	0.0	0.0	0.0	0.0
Total Delay	19.0	104.8	162.1	86.2	52.4
Queue Length 50th (m)	43.4	~164.2	~26.0	~129.3	91.1
Queue Length 95th (m)	67.9	#235.1	#59.6	#192.9	#156.6
Internal Link Dist (m)	297.6			153.3	407.6
Turn Bay Length (m)	8.0		180.0		
Base Capacity (vph)	775	802	113	638	624
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	0.50	1.16	1.15	1.07	0.95

Intersection Summary

~ Volume exceeds capacity, queue is theoretically infinite.  
Queue shown is maximum after two cycles.

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

HCM 6th Signalized Intersection Summary  
3: Rockdale & Hwy 417 EB

FT2037PM Peak Hour  
6175 Rockdale Dr



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	356	855	120	630	383	160
Future Volume (veh/h)	356	855	120	630	383	160
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00	1.00			0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1772	1772	1772	1772	1772	1772
Adj Flow Rate, veh/h	387	929	130	685	416	174
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	789	702	101	649	433	181
Arrive On Green	0.47	0.47	0.37	0.37	0.37	0.37
Sat Flow, veh/h	1688	1502	826	1772	1184	495
Grp Volume(v), veh/h	387	929	130	685	0	590
Grp Sat Flow(s),veh/h/ln	1688	1502	826	1772	0	1679
Q Serve(g_s), s	13.9	41.0	2.0	32.1	0.0	30.1
Cycle Q Clear(g_c), s	13.9	41.0	32.1	32.1	0.0	30.1
Prop In Lane	1.00	1.00	1.00			0.29
Lane Grp Cap(c), veh/h	789	702	101	649	0	614
V/C Ratio(X)	0.49	1.32	1.29	1.06	0.00	0.96
Avail Cap(c_a), veh/h	789	702	101	649	0	614
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	16.1	23.3	43.7	27.8	0.0	27.2
Incr Delay (d2), s/veh	0.7	155.3	186.7	51.1	0.0	26.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.1	40.7	7.2	19.8	0.0	14.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	16.8	178.7	230.4	78.9	0.0	54.0
LnGrp LOS	B	F	F	F	A	D
Approach Vol, veh/h	1316			815	590	
Approach Delay, s/veh	131.1			103.1	54.0	
Approach LOS	F			F	D	
Timer - Assigned Phs		2		4		6
Phs Duration (G+Y+Rc), s		40.0		47.7		40.0
Change Period (Y+Rc), s		7.9		* 6.7		7.9
Max Green Setting (Gmax), s		32.1		* 41		32.1
Max Q Clear Time (g_c+I1), s		34.1		43.0		32.1
Green Ext Time (p_c), s		0.0		0.0		0.0

Intersection Summary

HCM 6th Ctrl Delay	106.0
HCM 6th LOS	F

Notes

User approved pedestrian interval to be less than phase max green.

\* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Lanes, Volumes, Timings  
 4: Rockdale & Access 1

FT2037PM Peak Hour  
 6175 Rockdale Dr

	↑	↓
Lane Group	NBT	SBT
Lane Configurations	↶	↷
Traffic Volume (vph)	784	477
Future Volume (vph)	784	477
Lane Group Flow (vph)	947	518
Sign Control	Free	Free
<b>Intersection Summary</b>		
Control Type: Unsignalized		
Intersection Capacity Utilization 52.5%		ICU Level of Service A
Analysis Period (min) 15		

Intersection						
Int Delay, s/veh	3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		T
Traffic Vol, veh/h	105	7	5	82	240	20
Future Vol, veh/h	105	7	5	82	240	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	114	8	5	89	261	22

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	371	272	283	0	-	0
Stage 1	272	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	630	767	1279	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	627	767	1279	-	-	-
Mov Cap-2 Maneuver	627	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	634	-	-
HCM Lane V/C Ratio	0.004	-	0.192	-	-
HCM Control Delay (s)	7.8	0	12	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.7	-	-

Intersection												
Int Delay, s/veh	22.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	231	0	70	1	319	35	33	469	0
Future Vol, veh/h	0	0	0	231	0	70	1	319	35	33	469	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	231	0	70	1	319	35	33	469	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	909	891	469	874	874	337	469	0	0	354	0	0
Stage 1	535	535	-	339	339	-	-	-	-	-	-	-
Stage 2	374	356	-	535	535	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	256	282	594	270	288	705	1093	-	-	1205	-	-
Stage 1	529	524	-	676	640	-	-	-	-	-	-	-
Stage 2	647	629	-	529	524	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	224	271	594	262	277	705	1093	-	-	1205	-	-
Mov Cap-2 Maneuver	224	271	-	262	277	-	-	-	-	-	-	-
Stage 1	528	505	-	675	639	-	-	-	-	-	-	-
Stage 2	582	628	-	509	505	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	84.4	0	0.5
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1093	-	-	-	307	1205	-
HCM Lane V/C Ratio	0.001	-	-	-	0.98	0.027	-
HCM Control Delay (s)	8.3	0	-	0	84.4	8.1	0
HCM Lane LOS	A	A	-	A	F	A	A
HCM 95th %tile Q(veh)	0	-	-	-	10.3	0.1	-

Intersection												
Int Delay, s/veh	20.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	126	0	61	0	598	177	82	420	0
Future Vol, veh/h	0	0	0	126	0	61	0	598	177	82	420	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	100	100	100	100	100	100	100	100	100	100	100	100
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	126	0	61	0	598	177	82	420	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	1301	1359	420	1271	1271	687	420	0	0	775	0	0
Stage 1	584	584	-	687	687	-	-	-	-	-	-	-
Stage 2	717	775	-	584	584	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	138	149	633	145	168	447	1139	-	-	841	-	-
Stage 1	498	498	-	437	447	-	-	-	-	-	-	-
Stage 2	421	408	-	498	498	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	108	130	633	131	147	447	1139	-	-	841	-	-
Mov Cap-2 Maneuver	108	130	-	131	147	-	-	-	-	-	-	-
Stage 1	498	435	-	437	447	-	-	-	-	-	-	-
Stage 2	364	408	-	435	435	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		153.5		0		1.6	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1139	-	-	-	170	841	-	-
HCM Lane V/C Ratio	-	-	-	-	1.1	0.098	-	-
HCM Control Delay (s)	0	-	-	0	153.5	9.7	0	-
HCM Lane LOS	A	-	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	9.5	0.3	-	-

Intersection												
Int Delay, s/veh	12.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	171	0	70	1	295	35	33	438	0
Future Vol, veh/h	0	0	0	171	0	70	1	295	35	33	438	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	186	0	76	1	321	38	36	476	0

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	928	909	476	890	890	340	476	0	0	359	0	0
Stage 1	548	548	-	342	342	-	-	-	-	-	-	-
Stage 2	380	361	-	548	548	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	248	275	589	264	282	702	1086	-	-	1200	-	-
Stage 1	521	517	-	673	638	-	-	-	-	-	-	-
Stage 2	642	626	-	521	517	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	214	263	589	256	270	702	1086	-	-	1200	-	-
Mov Cap-2 Maneuver	214	263	-	256	270	-	-	-	-	-	-	-
Stage 1	520	496	-	672	637	-	-	-	-	-	-	-
Stage 2	572	625	-	500	496	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		54.6		0		0.6	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1086	-	-	-	314	1200	-	-
HCM Lane V/C Ratio	0.001	-	-	-	0.834	0.03	-	-
HCM Control Delay (s)	8.3	0	-	0	54.6	8.1	0	-
HCM Lane LOS	A	A	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	7.2	0.1	-	-

Intersection						
Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↔
Traffic Vol, veh/h	59	0	336	74	0	605
Future Vol, veh/h	59	0	336	74	0	605
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	64	0	365	80	0	658

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1063	-	0	0	-
Stage 1	405	-	-	-	-
Stage 2	658	-	-	-	-
Critical Hdwy	6.42	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-
Pot Cap-1 Maneuver	247	0	-	-	0
Stage 1	673	0	-	-	0
Stage 2	515	0	-	-	0
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	247	-	-	-	-
Mov Cap-2 Maneuver	247	-	-	-	-
Stage 1	673	-	-	-	-
Stage 2	515	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	24.6	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	247
HCM Lane V/C Ratio	-	-	0.26
HCM Control Delay (s)	-	-	24.6
HCM Lane LOS	-	-	C
HCM 95th %tile Q(veh)	-	-	1

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	33	4	6	210	52	16
Future Vol, veh/h	33	4	6	210	52	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	4	7	228	57	17

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	308	66	74	0	0
Stage 1	66	-	-	-	-
Stage 2	242	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	684	998	1526	-	-
Stage 1	957	-	-	-	-
Stage 2	798	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	681	998	1526	-	-
Mov Cap-2 Maneuver	681	-	-	-	-
Stage 1	952	-	-	-	-
Stage 2	798	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	705	-	-
HCM Lane V/C Ratio	0.004	-	0.057	-	-
HCM Control Delay (s)	7.4	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection												
Int Delay, s/veh	5.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	57	0	61	0	555	177	82	402	0
Future Vol, veh/h	0	0	0	57	0	61	0	555	177	82	402	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	62	0	66	0	603	192	89	437	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1347	1410	437	1314	1314	699	437	0	0	795	0	0
Stage 1	615	615	-	699	699	-	-	-	-	-	-	-
Stage 2	732	795	-	615	615	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	128	138	620	135	158	440	1123	-	-	826	-	-
Stage 1	479	482	-	430	442	-	-	-	-	-	-	-
Stage 2	413	399	-	479	482	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	97	118	620	120	136	440	1123	-	-	826	-	-
Mov Cap-2 Maneuver	97	118	-	120	136	-	-	-	-	-	-	-
Stage 1	479	414	-	430	442	-	-	-	-	-	-	-
Stage 2	351	399	-	411	414	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		55		0		1.7	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1123	-	-	-	-	192	826	-
HCM Lane V/C Ratio	-	-	-	-	0.668	0.108	-	-
HCM Control Delay (s)	0	-	-	0	55	9.9	0	-
HCM Lane LOS	A	-	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	4	0.4	-	-

Intersection						
Int Delay, s/veh	2.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖		↗			↖
Traffic Vol, veh/h	68	0	741	87	0	456
Future Vol, veh/h	68	0	741	87	0	456
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	0	805	95	0	496

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1349	-	0	0	-
Stage 1	853	-	-	-	-
Stage 2	496	-	-	-	-
Critical Hdwy	6.42	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-
Pot Cap-1 Maneuver	166	0	-	-	0
Stage 1	418	0	-	-	0
Stage 2	612	0	-	-	0
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	166	-	-	-	-
Mov Cap-2 Maneuver	166	-	-	-	-
Stage 1	418	-	-	-	-
Stage 2	612	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	43	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	166
HCM Lane V/C Ratio	-	-	0.445
HCM Control Delay (s)	-	-	43
HCM Lane LOS	-	-	E
HCM 95th %tile Q(veh)	-	-	2

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	36	7	5	82	240	20
Future Vol, veh/h	36	7	5	82	240	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	8	5	89	261	22

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	371	272	283	0	-	0
Stage 1	272	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	630	767	1279	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	627	767	1279	-	-	-
Mov Cap-2 Maneuver	627	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	646	-	-
HCM Lane V/C Ratio	0.004	-	0.072	-	-
HCM Control Delay (s)	7.8	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection												
Int Delay, s/veh	14.3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	171	0	70	1	306	35	33	453	0
Future Vol, veh/h	0	0	0	171	0	70	1	306	35	33	453	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	186	0	76	1	333	38	36	492	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	956	937	492	918	918	352	492	0	0	371	0	0
Stage 1	564	564	-	354	354	-	-	-	-	-	-	-
Stage 2	392	373	-	564	564	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	238	265	577	252	272	692	1071	-	-	1188	-	-
Stage 1	510	508	-	663	630	-	-	-	-	-	-	-
Stage 2	633	618	-	510	508	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	205	254	577	244	260	692	1071	-	-	1188	-	-
Mov Cap-2 Maneuver	205	254	-	244	260	-	-	-	-	-	-	-
Stage 1	509	487	-	662	629	-	-	-	-	-	-	-
Stage 2	563	617	-	489	487	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	62.2	0	0.6
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1071	-	-	-	301	1188	-
HCM Lane V/C Ratio	0.001	-	-	-	0.87	0.03	-
HCM Control Delay (s)	8.4	0	-	0	62.2	8.1	0
HCM Lane LOS	A	A	-	A	F	A	A
HCM 95th %tile Q(veh)	0	-	-	-	7.8	0.1	-

Intersection						
Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↖		↗			↖
Traffic Vol, veh/h	59	0	347	74	0	620
Future Vol, veh/h	59	0	347	74	0	620
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	64	0	377	80	0	674

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1091	-	0	0	-
Stage 1	417	-	-	-	-
Stage 2	674	-	-	-	-
Critical Hdwy	6.42	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-
Pot Cap-1 Maneuver	238	0	-	-	0
Stage 1	665	0	-	-	0
Stage 2	506	0	-	-	0
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	238	-	-	-	-
Mov Cap-2 Maneuver	238	-	-	-	-
Stage 1	665	-	-	-	-
Stage 2	506	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	25.6	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	238
HCM Lane V/C Ratio	-	-	0.269
HCM Control Delay (s)	-	-	25.6
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	1.1

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	33	4	6	210	52	16
Future Vol, veh/h	33	4	6	210	52	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	4	7	228	57	17

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	308	66	74	0	0
Stage 1	66	-	-	-	-
Stage 2	242	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	684	998	1526	-	-
Stage 1	957	-	-	-	-
Stage 2	798	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	681	998	1526	-	-
Mov Cap-2 Maneuver	681	-	-	-	-
Stage 1	952	-	-	-	-
Stage 2	798	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	705	-	-
HCM Lane V/C Ratio	0.004	-	0.057	-	-
HCM Control Delay (s)	7.4	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection												
Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	57	0	61	0	576	177	82	410	0
Future Vol, veh/h	0	0	0	57	0	61	0	576	177	82	410	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	62	0	66	0	626	192	89	446	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1379	1442	446	1346	1346	722	446	0	0	818	0	0
Stage 1	624	624	-	722	722	-	-	-	-	-	-	-
Stage 2	755	818	-	624	624	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	122	132	612	128	151	427	1114	-	-	810	-	-
Stage 1	473	478	-	418	431	-	-	-	-	-	-	-
Stage 2	401	390	-	473	478	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	92	113	612	114	129	427	1114	-	-	810	-	-
Mov Cap-2 Maneuver	92	113	-	114	129	-	-	-	-	-	-	-
Stage 1	473	408	-	418	431	-	-	-	-	-	-	-
Stage 2	339	390	-	404	408	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		60.2		0		1.7	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1114	-	-	-	184	810	-	-
HCM Lane V/C Ratio	-	-	-	-	0.697	0.11	-	-
HCM Control Delay (s)	0	-	-	0	60.2	10	0	-
HCM Lane LOS	A	-	-	A	F	A	A	-
HCM 95th %tile Q(veh)	0	-	-	-	4.3	0.4	-	-

Intersection						
Int Delay, s/veh	2.3					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↗			↑
Traffic Vol, veh/h	68	0	762	87	0	464
Future Vol, veh/h	68	0	762	87	0	464
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	0	828	95	0	504

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1380	-	0	0	-
Stage 1	876	-	-	-	-
Stage 2	504	-	-	-	-
Critical Hdwy	6.42	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-
Pot Cap-1 Maneuver	159	0	-	-	0
Stage 1	407	0	-	-	0
Stage 2	607	0	-	-	0
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	159	-	-	-	-
Mov Cap-2 Maneuver	159	-	-	-	-
Stage 1	407	-	-	-	-
Stage 2	607	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	45.9	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	159
HCM Lane V/C Ratio	-	-	0.465
HCM Control Delay (s)	-	-	45.9
HCM Lane LOS	-	-	E
HCM 95th %tile Q(veh)	-	-	2.2

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	36	7	5	82	240	20
Future Vol, veh/h	36	7	5	82	240	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	8	5	89	261	22

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	371	272	283	0	-	0
Stage 1	272	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	630	767	1279	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	627	767	1279	-	-	-
Mov Cap-2 Maneuver	627	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	646	-	-
HCM Lane V/C Ratio	0.004	-	0.072	-	-
HCM Control Delay (s)	7.8	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection												
Int Delay, s/veh	16.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	171	0	70	1	319	35	33	469	0
Future Vol, veh/h	0	0	0	171	0	70	1	319	35	33	469	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	186	0	76	1	347	38	36	510	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	988	969	510	950	950	366	510	0	0	385	0	0
Stage 1	582	582	-	368	368	-	-	-	-	-	-	-
Stage 2	406	387	-	582	582	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	226	254	563	240	260	679	1055	-	-	1173	-	-
Stage 1	499	499	-	652	621	-	-	-	-	-	-	-
Stage 2	622	610	-	499	499	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	194	243	563	232	249	679	1055	-	-	1173	-	-
Mov Cap-2 Maneuver	194	243	-	232	249	-	-	-	-	-	-	-
Stage 1	499	478	-	651	620	-	-	-	-	-	-	-
Stage 2	552	609	-	478	478	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0	72.3	0	0.5
HCM LOS	A	F		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1055	-	-	-	287	1173	-
HCM Lane V/C Ratio	0.001	-	-	-	0.913	0.031	-
HCM Control Delay (s)	8.4	0	-	0	72.3	8.2	0
HCM Lane LOS	A	A	-	A	F	A	A
HCM 95th %tile Q(veh)	0	-	-	-	8.5	0.1	-

Intersection						
Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔			↑
Traffic Vol, veh/h	59	0	360	74	0	636
Future Vol, veh/h	59	0	360	74	0	636
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	64	0	391	80	0	691

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1122	-	0	0	-
Stage 1	431	-	-	-	-
Stage 2	691	-	-	-	-
Critical Hdwy	6.42	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-
Pot Cap-1 Maneuver	228	0	-	-	0
Stage 1	655	0	-	-	0
Stage 2	497	0	-	-	0
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	228	-	-	-	-
Mov Cap-2 Maneuver	228	-	-	-	-
Stage 1	655	-	-	-	-
Stage 2	497	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	26.9	0	0
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	228
HCM Lane V/C Ratio	-	-	0.281
HCM Control Delay (s)	-	-	26.9
HCM Lane LOS	-	-	D
HCM 95th %tile Q(veh)	-	-	1.1

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T		T		T	
Traffic Vol, veh/h	33	4	6	210	52	16
Future Vol, veh/h	33	4	6	210	52	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	36	4	7	228	57	17

Major/Minor	Minor2	Major1		Major2	
Conflicting Flow All	308	66	74	0	0
Stage 1	66	-	-	-	-
Stage 2	242	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-
Pot Cap-1 Maneuver	684	998	1526	-	-
Stage 1	957	-	-	-	-
Stage 2	798	-	-	-	-
Platoon blocked, %				-	-
Mov Cap-1 Maneuver	681	998	1526	-	-
Mov Cap-2 Maneuver	681	-	-	-	-
Stage 1	952	-	-	-	-
Stage 2	798	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.4	0.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1526	-	705	-	-
HCM Lane V/C Ratio	0.004	-	0.057	-	-
HCM Control Delay (s)	7.4	0	10.4	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

Intersection												
Int Delay, s/veh	6.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	0	0	0	57	0	61	0	598	177	82	420	0
Future Vol, veh/h	0	0	0	57	0	61	0	598	177	82	420	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	62	0	66	0	650	192	89	457	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1414	1477	457	1381	1381	746	457	0	0	842	0	0
Stage 1	635	635	-	746	746	-	-	-	-	-	-	-
Stage 2	779	842	-	635	635	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	115	126	604	121	144	413	1104	-	-	794	-	-
Stage 1	467	472	-	405	421	-	-	-	-	-	-	-
Stage 2	389	380	-	467	472	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	85	107	604	107	122	413	1104	-	-	794	-	-
Mov Cap-2 Maneuver	85	107	-	107	122	-	-	-	-	-	-	-
Stage 1	467	401	-	405	421	-	-	-	-	-	-	-
Stage 2	327	380	-	397	401	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	0		69.3		0		1.7	
HCM LOS	A		F					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1	WBLn1	SBL	SBT	SBR
Capacity (veh/h)	1104	-	-	-	173	794	-	-
HCM Lane V/C Ratio	-	-	-	-	0.741	0.112	-	-
HCM Control Delay (s)	0	-	-	0	69.3	10.1	0	-
HCM Lane LOS	A	-	-	A	F	B	A	-
HCM 95th %tile Q(veh)	0	-	-	-	4.7	0.4	-	-

Intersection						
Int Delay, s/veh	2.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘		↗			↑
Traffic Vol, veh/h	68	0	784	87	0	474
Future Vol, veh/h	68	0	784	87	0	474
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	74	0	852	95	0	515

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1415	-	0	0	-
Stage 1	900	-	-	-	-
Stage 2	515	-	-	-	-
Critical Hdwy	6.42	-	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	-	-	-	-
Pot Cap-1 Maneuver	151	0	-	-	0
Stage 1	397	0	-	-	0
Stage 2	600	0	-	-	0
Platoon blocked, %		-	-	-	-
Mov Cap-1 Maneuver	151	-	-	-	-
Mov Cap-2 Maneuver	151	-	-	-	-
Stage 1	397	-	-	-	-
Stage 2	600	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	49.8	0	0
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBT
Capacity (veh/h)	-	-	151
HCM Lane V/C Ratio	-	-	0.489
HCM Control Delay (s)	-	-	49.8
HCM Lane LOS	-	-	E
HCM 95th %tile Q(veh)	-	-	2.3

Intersection						
Int Delay, s/veh	1.3					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	T			T		
Traffic Vol, veh/h	36	7	5	82	240	20
Future Vol, veh/h	36	7	5	82	240	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	39	8	5	89	261	22

Major/Minor	Minor2	Major1	Major2			
Conflicting Flow All	371	272	283	0	-	0
Stage 1	272	-	-	-	-	-
Stage 2	99	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	630	767	1279	-	-	-
Stage 1	774	-	-	-	-	-
Stage 2	925	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	627	767	1279	-	-	-
Mov Cap-2 Maneuver	627	-	-	-	-	-
Stage 1	771	-	-	-	-	-
Stage 2	925	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	11	0.4	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1279	-	646	-	-
HCM Lane V/C Ratio	0.004	-	0.072	-	-
HCM Control Delay (s)	7.8	0	11	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0	-	0.2	-	-

# Attachment 7

Signal Warrant Calculation

# Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

[GO TO Justification:](#)

What are the intersecting roadways?

Rockdale Road/Russland Road

What is the direction of the Main Road street?

North-South

When was the data collected?

2023-11-23

## Justification 1 - 4: Volume Warrants

a.- Number of lanes on the Main Road?

1

b.- Number of lanes on the Minor Road?

1

c.- How many approaches?

4

d.- What is the operating environment?

Rural

Population < 10,000

AND

Speed >= 70 km/hr

e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
7:00	0	280	33	0	0	0	17	414	0	147	0	53	
8:00	1	245	31	0	0	0	27	305	0	101	0	40	
9:00	1	204	26	2	0	0	20	212	1	54	0	33	
11:30	1	213	54	1	0	0	23	239	0	48	0	24	
12:30	2	203	52	2	0	2	22	250	1	36	0	13	
15:00	0	395	106	0	0	0	44	331	0	42	0	24	
16:00	0	537	160	0	0	0	53	386	0	41	0	41	
17:00	0	407	119	0	0	0	59	289	0	34	0	33	
<b>Total</b>	<b>5</b>	<b>2,484</b>	<b>581</b>	<b>5</b>	<b>0</b>	<b>2</b>	<b>265</b>	<b>2,426</b>	<b>2</b>	<b>503</b>	<b>0</b>	<b>261</b>	<b>0</b>

**Justification 1: Minimum Vehicle Volumes**

**Free Flow Rural Conditions**

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	11:30	12:30	15:00	16:00	17:00		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	944	750	553	603	583	942	1,218	941		
	COMPLIANCE %				100	100	100	100	100	100	100	100	100	800
1B	120	170	120	170	200	141	89	73	53	66	82	67		
	COMPLIANCE %				100	100	74	61	44	55	68	56	558	70
<b>Free Flow Signal Justification 1:</b>					Both 1A and 1B 100% Fulfilled each of 8 hours Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
													Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

**Justification 2: Delay to Cross Traffic**

**Free Flow Rural Conditions**

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	7:00	8:00	9:00	11:30	12:30	15:00	16:00	17:00		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	744	609	464	530	530	876	1,136	874		
	COMPLIANCE %				100	100	97	100	100	100	100	100	100	797
2B	50	75	50	75	147	101	56	49	38	42	41	34		
	COMPLIANCE %				100	100	100	98	76	84	82	68	708	89
<b>Free Flow Signal Justification 2:</b>					Both 2A and 2B 100% fulfilled each of 8 hours Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
													Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

**Justification 3: Combination**

**Combination Justification 1 and 2**

Justification	Justification Satisfied 80% or More	Two Justifications Satisfied 80% or More	
		YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 1	Minimum Vehicle Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
		NOT JUSTIFIED	

**Justification 4: Four Hour Volume**

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach	Required Value	Average % Compliance	Overall % Compliance
		X	Y (actual)	Y (warrant threshold)		
Justification 4	7:00	744	200	191	100 %	70 %
	15:00	876	66	149	44 %	
	16:00	1,136	82	90	91 %	
	17:00	874	67	150	45 %	

# Results Sheet

[Input Sheet](#)

[Analysis Sheet](#)

[Proposed Collision](#)

[GO TO Justification:](#)

Intersection: Rockdale Road/Russland Road

Count Date: 2023-11-23

## Summary Results

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	70 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	89 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	70 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	89 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		70 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>

# Input Data Sheet

[Analysis Sheet](#)

[Results Sheet](#)

[Proposed Collision](#)

GO TO Justification:

What are the intersecting roadways?

What is the direction of the Main Road street?

When was the data collected?

## Justification 1 - 4: Volume Warrants

- a.- Number of lanes on the Main Road?
- b.- Number of lanes on the Minor Road?
- c.- How many approaches?
- d.- What is the operating environment?  Population < 10,000 AND Speed >= 70 km/hr
- e.- What is the eight hour vehicle volume at the intersection? (Please fill in table below)

Hour Ending	Main Northbound Approach			Minor Eastbound Approach			Main Southbound Approach			Minor Westbound Approach			Pedestrians Crossing Main Road
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
8:00		237	563				215	345		63		184	
9:00		237	376				147	301		67		80	
10:00		237	376				147	301		67		80	
12:30		241	232				64	234		34		61	
13:00		249	210				55	251		35		59	
16:00		506	206				59	405		42		108	
17:00		616	243				53	447		50		98	
18:00		483	207				55	310		38		94	
<b>Total</b>	<b>0</b>	<b>2,806</b>	<b>2,413</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>795</b>	<b>2,594</b>	<b>0</b>	<b>396</b>	<b>0</b>	<b>764</b>	<b>0</b>

**Justification 1: Minimum Vehicle Volumes**

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 Lanes		2 or More Lanes		Hour Ending									
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	8:00	9:00	10:00	12:30	13:00	16:00	17:00	18:00		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
1A	480	720	600	900	1,607	1,208	1,208	866	859	1,326	1,507	1,187		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
1B	180	255	180	255	247	147	147	95	94	150	148	132		
	COMPLIANCE %				100	82	82	53	52	83	82	73	607	76
<b>Free Flow Signal Justification 1:</b>					Both 1A and 1B 100% Fulfilled each of 8 hours Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
													Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

**Justification 2: Delay to Cross Traffic**

Free Flow Rural Conditions

Justification	Guidance Approach Lanes				Percentage Warrant								Total Across	Section Percent
	1 lanes		2 or More lanes		Hour Ending									
Flow Condition	FREE FLOW	RESTR. FLOW	FREE FLOW	RESTR. FLOW	8:00	9:00	10:00	12:30	13:00	16:00	17:00	18:00		
	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>										
2A	480	720	600	900	1,360	1,061	1,061	771	765	1,176	1,359	1,055		
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100
2B	50	75	50	75	63	67	67	34	35	42	50	38		
	COMPLIANCE %				100	100	100	68	70	84	100	76	698	87
<b>Free Flow Signal Justification 2:</b>					Both 2A and 2B 100% fulfilled each of 8 hours Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
													Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>

**Justification 3: Combination**

Combination Justification 1 and 2

Justification	Justification Satisfied 80% or More	Two Justifications Satisfied 80% or More	
		YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 1	Minimum Vehicle Volume	YES <input type="checkbox"/>	NO <input checked="" type="checkbox"/>
Justification 2	Delay Cross Traffic	YES <input checked="" type="checkbox"/>	NO <input type="checkbox"/>
		NOT JUSTIFIED	

**Justification 4: Four Hour Volume**

Justification	Time Period	Total Volume of Both Approaches (Main)	Heaviest Minor Approach	Required Value	Average % Compliance	Overall % Compliance
		X	Y (actual)	Y (warrant threshold)		
Justification 4	8:00	1,360	247	80	100 %	100 %
	9:00	1,061	147	104	100 %	
	16:00	1,176	150	84	100 %	
	17:00	1,359	148	80	100 %	

Intersection: Highway 417 westbound ramp terminal/Rockdale Ro Count Date: 2024-11-14

**Summary Results**

	Justification	Compliance	Signal Justified?	
			YES	NO
1. Minimum Vehicular Volume	A Total Volume	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Volume	76 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Delay to Cross Traffic	A Main Road	100 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Crossing Road	87 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Combination	A Justificaton 1	76 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
	B Justification 2	87 %	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4. 4-Hr Volume		100 %	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Rockdale Rd @ Russland Road  
2027 Future Background

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	582	121%	92%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	111	92%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	508	106%	98%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	49	98%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Rockdale Rd @ Russland Road  
2032 Future Background

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	596	124%	92%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	111	92%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	522	109%	98%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	49	98%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Rockdale Rd @ Russland Road  
2037 Future Background

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	611	127%	92%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	111	92%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	537	112%	98%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	49	98%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Rockdale Rd @ Russland Road  
2027 Future Total

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	627	131%	131%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	183	153%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	505	105%	105%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	89	179%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Rockdale Rd @ Russland Road  
2032 Future Total

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	640	133%	133%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	183	153%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	518	108%	108%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	89	179%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2 \text{ or } (AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Rockdale Rd @ Russland Road  
2037 Future Total

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	656	137%	137%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	183	153%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	534	111%	111%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	89	179%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2 \text{ or } (AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	594	124%	112%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	135	112%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	505	105%	105%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	57	114%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	608	127%	112%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	135	112%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	518	108%	108%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	57	114%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	623	130%	112%	No
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	135	112%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	534	111%	111%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	57	114%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2 \text{ or } (AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	801	167%	128%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	154	128%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	698	145%	60%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	30	60%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	841	175%	137%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	164	137%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	731	152%	67%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	33	67%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	883	184%	146%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	175	146%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	767	160%	73%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	37	73%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Entire %	Signal
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	851	177%	143%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	172	143%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	736	153%	60%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	30	60%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Rockdale Rd@ Hwy 417 WB  
2032 Future Total

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance			Signal
		1 Lane Highway		2 or More Lanes		Sectional		Entire %	
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	890	185%	152%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	182	152%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	769	160%	67%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	33	67%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

Rockdale Rd@ Hwy 417 WB  
2037 Future Total

**Justification #7**

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance			Signal
		1 Lane Highway		2 or More Lanes		Sectional		Entire %	
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		
1. Minimum Vehicular Volume	A. Vehicle volume, all approaches (average hour)	480	720	600	900	933	194%	161%	Yes
	B. Vehicle volume, along minor streets (average hour)	120	170	120	170	193	161%		
2. Delay to Cross Traffic	A. Vehicle volumes, major street (average hour)	480	720	600	900	804	168%	73%	No
	B. Combined vehicle and pedestrian volume crossing artery from minor streets (average hour)	50	75	50	75	37	73%		

Notes

1. Refer to OTM Book 12, pg 92, Mar 2012
2. Lowest section percentage governs justification
3. Average hourly volumes estimated from peak hour volumes,  $AHV = PM/2$  or  $(AM + PM) / 4$ , including amplification factors
4. T-intersection factor corrected, applies only to 1B
5. Correction to 2B, as per MTO and City of Ottawa, for '2 or More Lanes' has been applied

# Attachment 8

Left-turn Warrant Calculation Sheets

# Rockdale Road at Russland Road

Existing															
Design Speed															
70 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	0	0	0	156	0	56	1	297	35	18	439	0	3.9%	457	333
PM	0	0	0	40	0	43	0	557	177	65	409	0	13.7%	474	734
Future Background 2027															
Design Speed															
70 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	0	0	0	156	0	56	1	304	35	18	448	0	3.9%	466	340
PM	0	0	0	40	0	43	0	569	177	65	415	0	13.5%	480	746
Future Background 2032															
Design Speed															
70 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	0	0	0	156	0	56	1	315	35	18	463	0	3.7%	481	351
PM	0	0	0	40	0	43	0	590	177	65	423	0	13.3%	488	767
Future Background 2037															
Design Speed															
70 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	0	0	0	156	0	56	1	328	35	18	479	0	3.6%	497	364
PM	0	0	0	40	0	43	0	612	177	65	433	0	13.1%	498	789
Future Total 2027															
Design Speed															
70 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	0	0	0	231	0	70	1	295	35	33	438	0	7.0%	471	331
PM	0	0	0	126	0	61	0	555	177	82	402	0	16.9%	484	732
Future Total 2032															
Design Speed															
70 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	0	0	0	231	0	70	1	306	35	33	453	0	6.8%	486	342
PM	0	0	0	126	0	61	0	576	177	82	410	0	16.7%	492	753
Future Total 2037															
Design Speed															
70 km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM	0	0	0	231	0	70	1	319	35	33	469	0	6.6%	502	355
PM	0	0	0	126	0	61	0	598	177	82	420	0	16.3%	502	775

Existing

Design Speed		Yes													%Left Turn	Volume Advancing	Volume Opposing
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
AM		0	0	0	156	0	56	1	297	35	18	439	0	73.6%	212	0	
PM		0	0	0	40	0	43	0	557	177	65	409	0	48.2%	83	0	

Future Background 2027

Design Speed		Yes													%Left Turn	Volume Advancing	Volume Opposing
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
AM		0	0	0	156	0	56	1	304	35	18	448	0	73.6%	212	0	
PM		0	0	0	40	0	43	0	569	177	65	415	0	48.2%	83	0	

Future Background 2032

Design Speed		Yes													%Left Turn	Volume Advancing	Volume Opposing
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
AM		0	0	0	156	0	56	1	315	35	18	463	0	73.6%	212	0	
PM		0	0	0	40	0	43	0	590	177	65	423	0	48.2%	83	0	

Future Background 2037

Design Speed		Yes													%Left Turn	Volume Advancing	Volume Opposing
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
AM		0	0	0	156	0	56	1	328	35	18	479	0	73.6%	212	0	
PM		0	0	0	40	0	43	0	612	177	65	433	0	48.2%	83	0	

Future Total 2027

Design Speed		Yes													%Left Turn	Volume Advancing	Volume Opposing
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
AM		0	0	0	231	0	70	1	295	35	33	438	0	76.7%	301	0	
PM		0	0	0	126	0	61	0	555	177	82	402	0	67.4%	187	0	

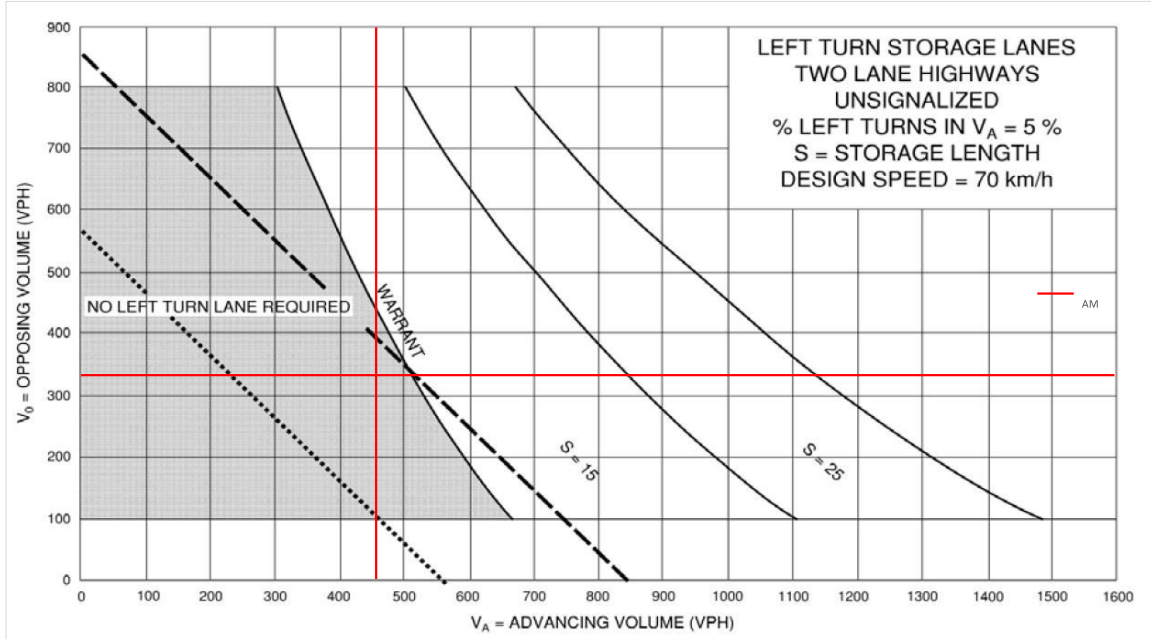
Future Total 2032

Design Speed		Yes													%Left Turn	Volume Advancing	Volume Opposing
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
AM		0	0	0	231	0	70	1	306	35	33	453	0	76.7%	301	0	
PM		0	0	0	126	0	61	0	576	177	82	410	0	67.4%	187	0	

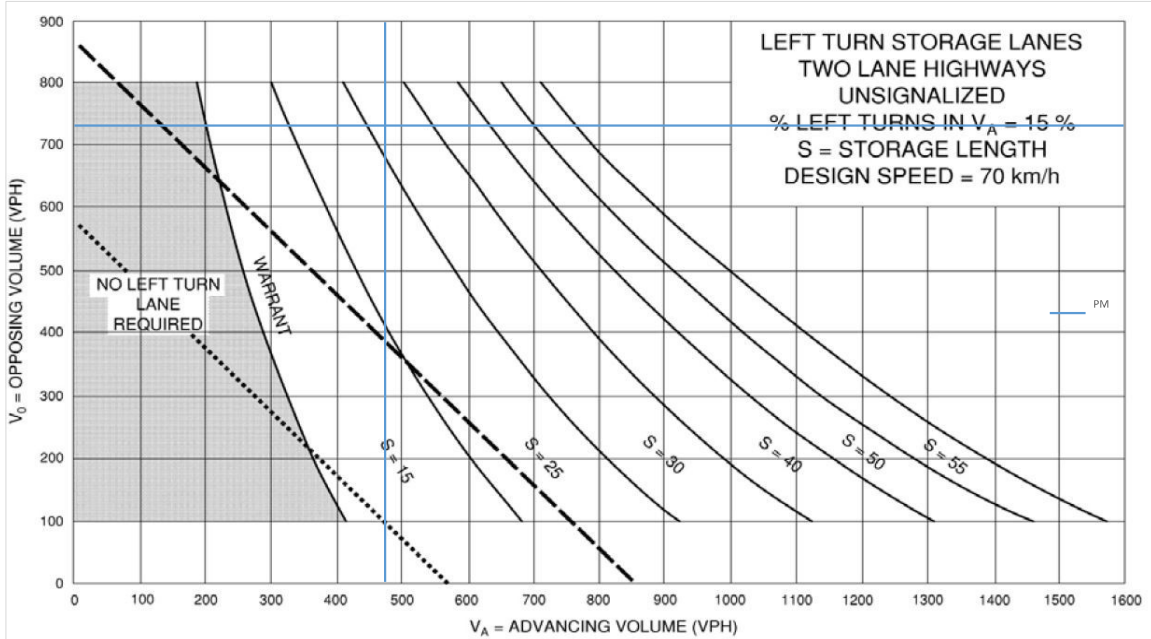
Future Total 2037

Design Speed		Yes													%Left Turn	Volume Advancing	Volume Opposing
80 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR				
AM		0	0	0	231	0	70	1	319	35	33	469	0	76.7%	301	0	
PM		0	0	0	126	0	61	0	598	177	82	420	0	67.4%	187	0	

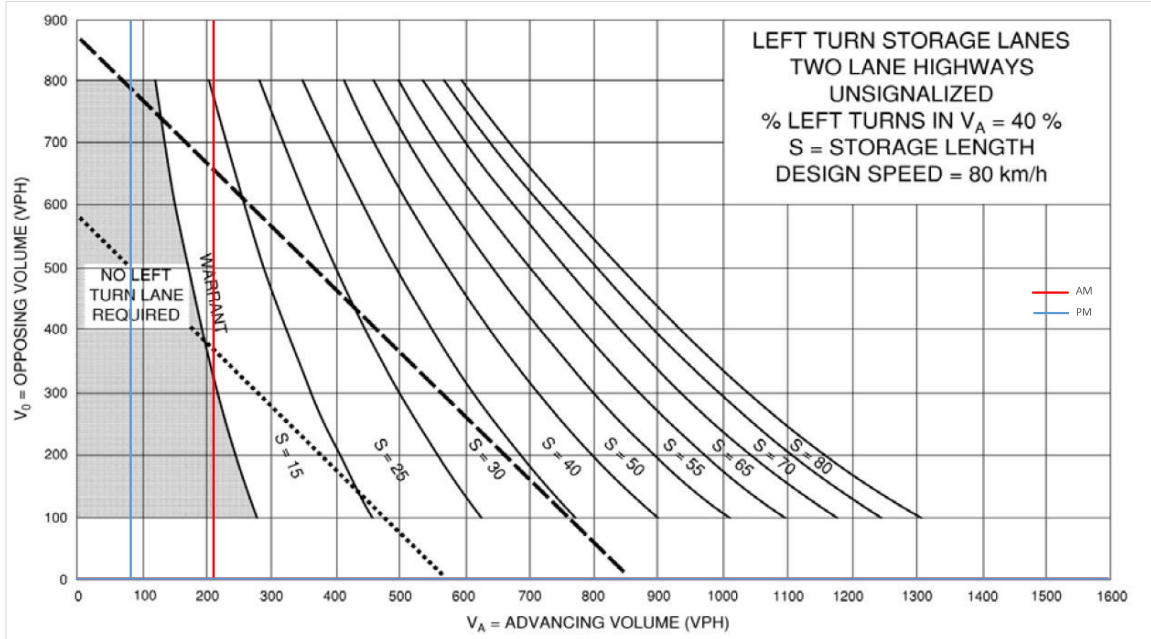
Existing - Southbound Left



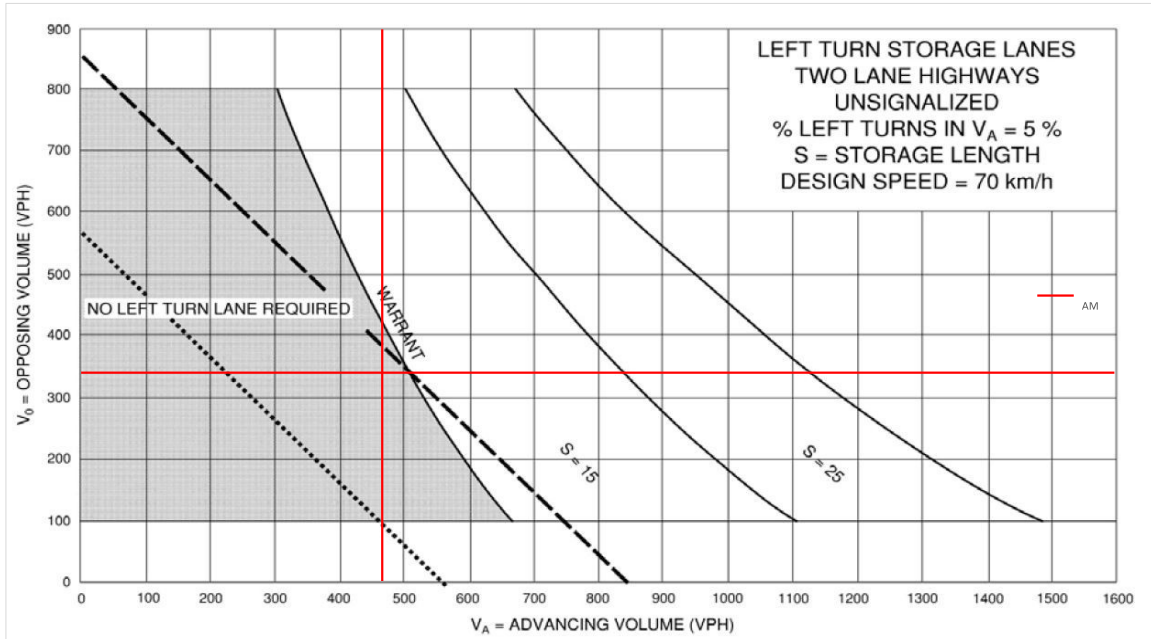
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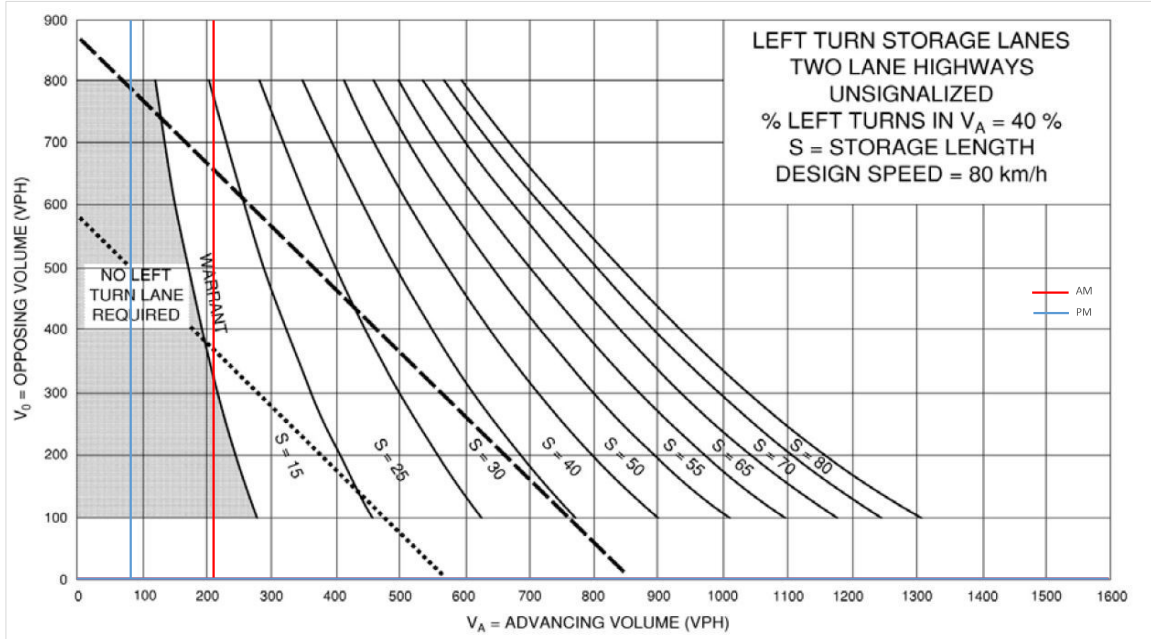
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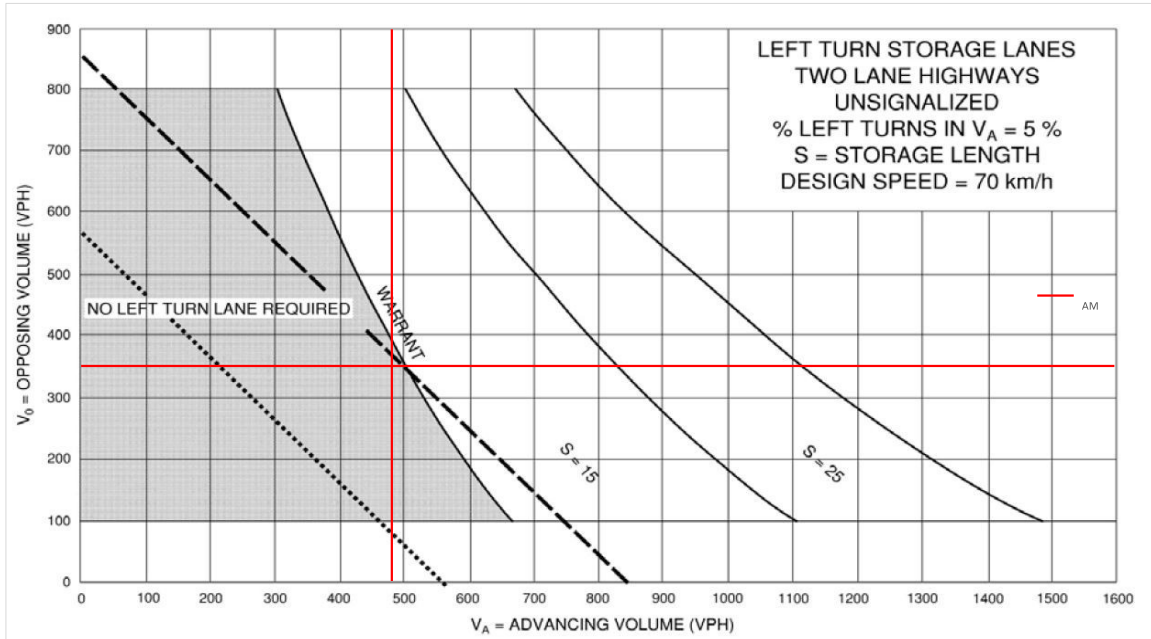
Future Background 2027 - Southbound Left



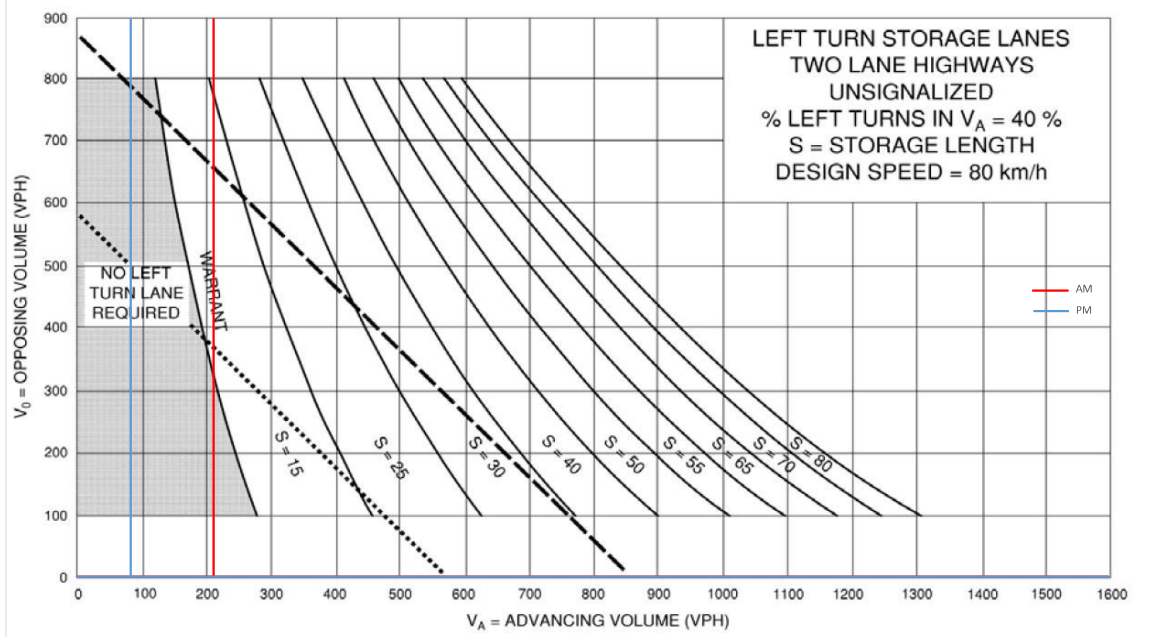
Future Background 2027 - Westbound Left



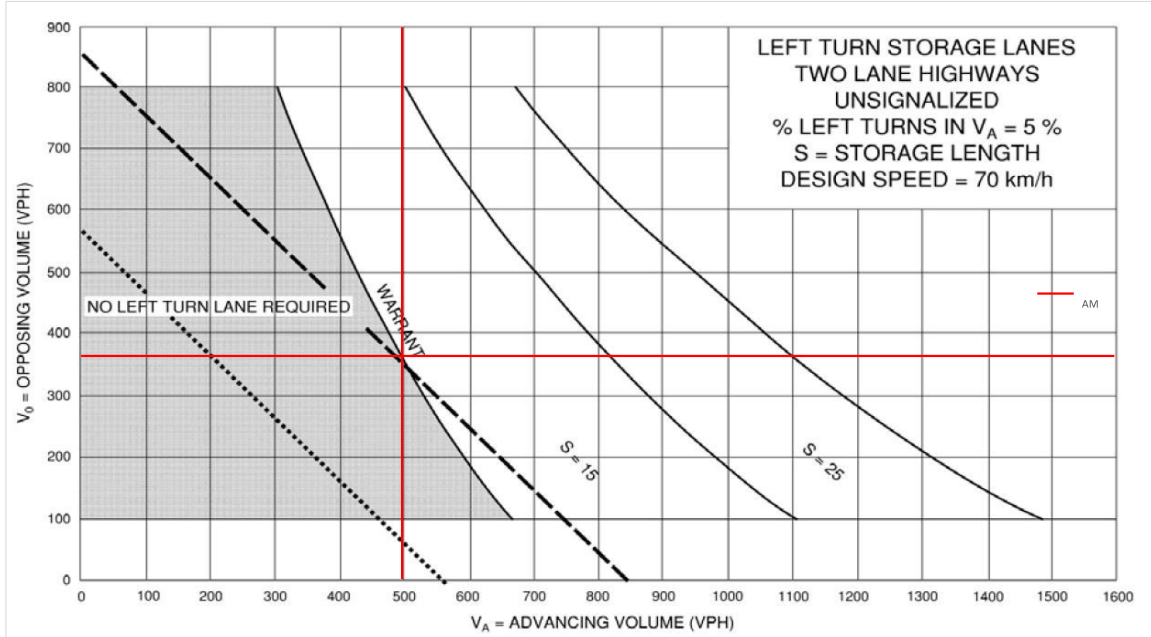
Future Background 2032 - Southbound Left

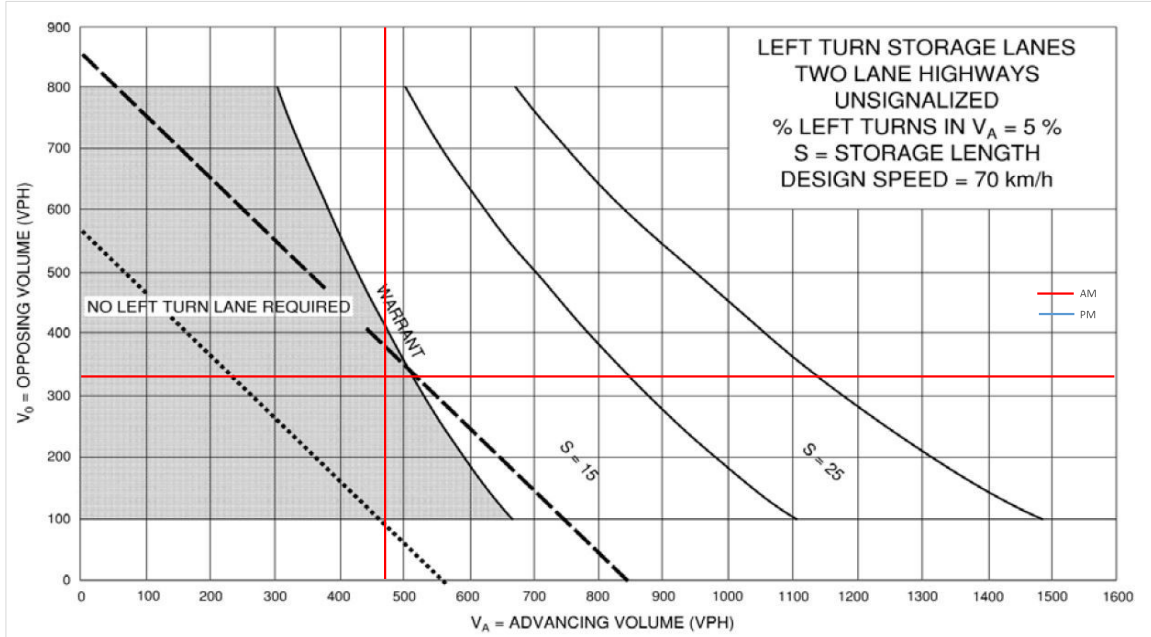
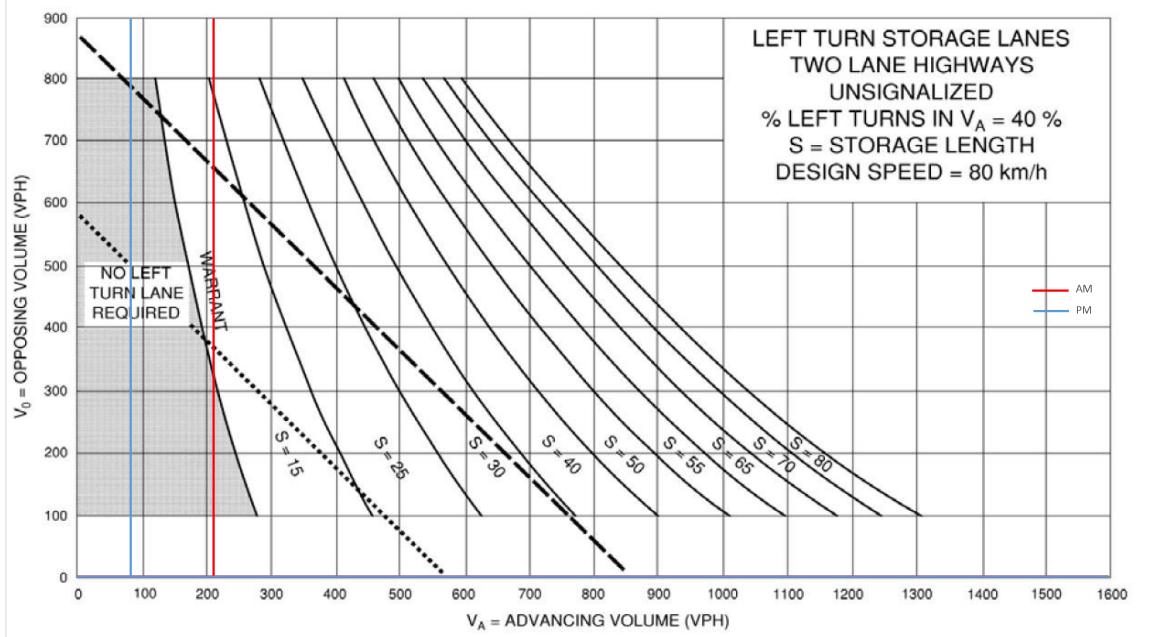


Future Background 2032 - Westbound Left

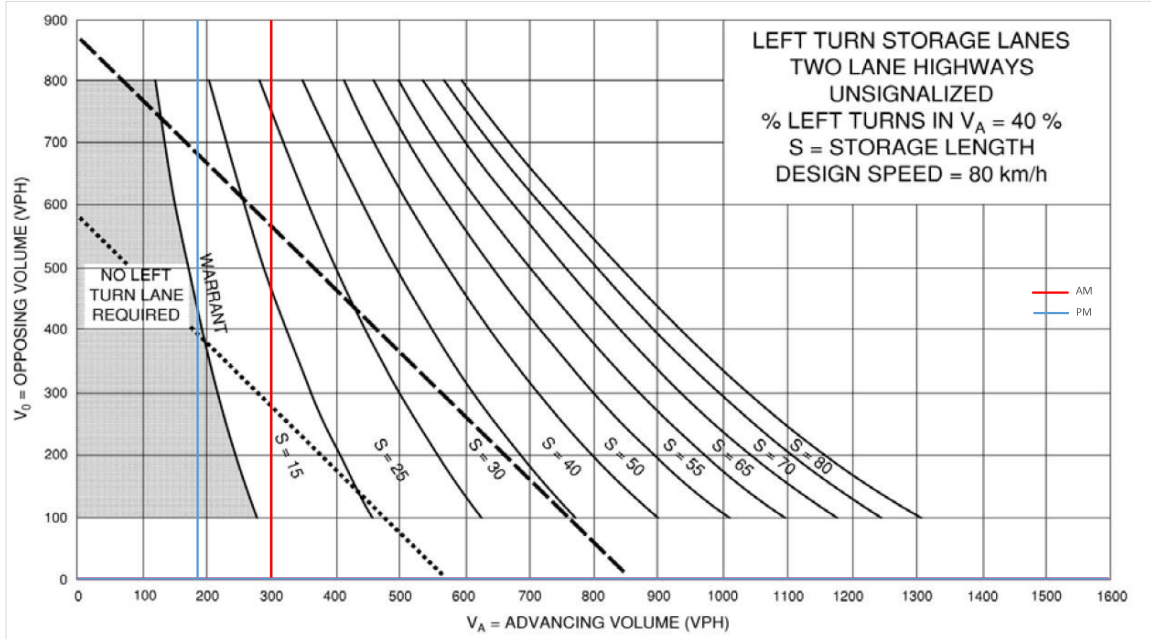


Future Background 2037 - Southbound Left

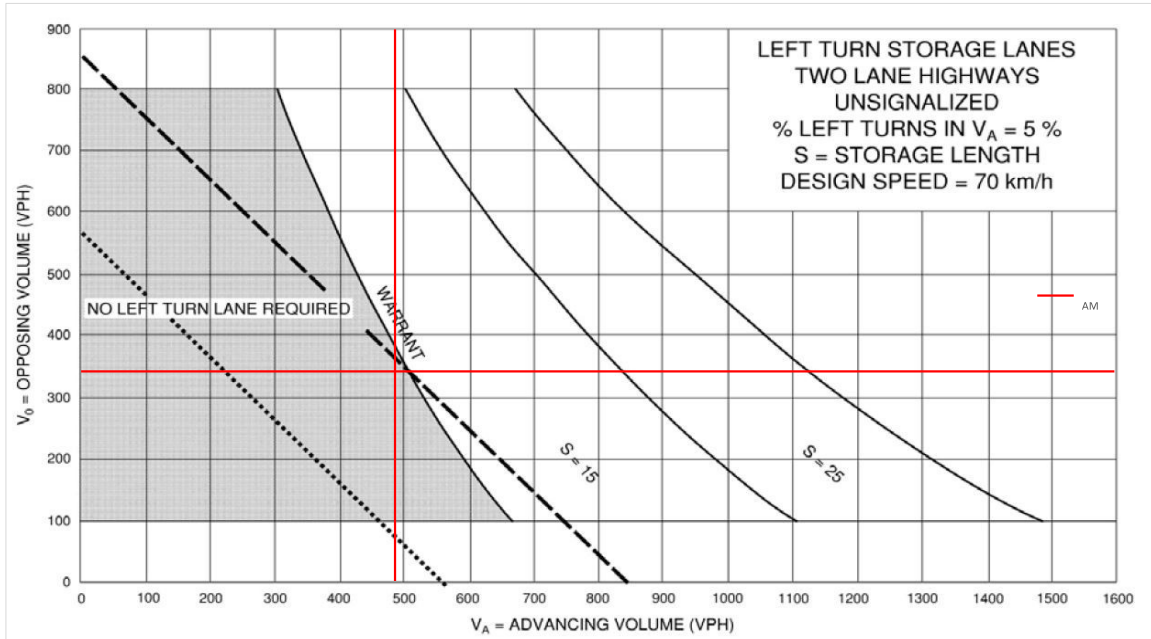




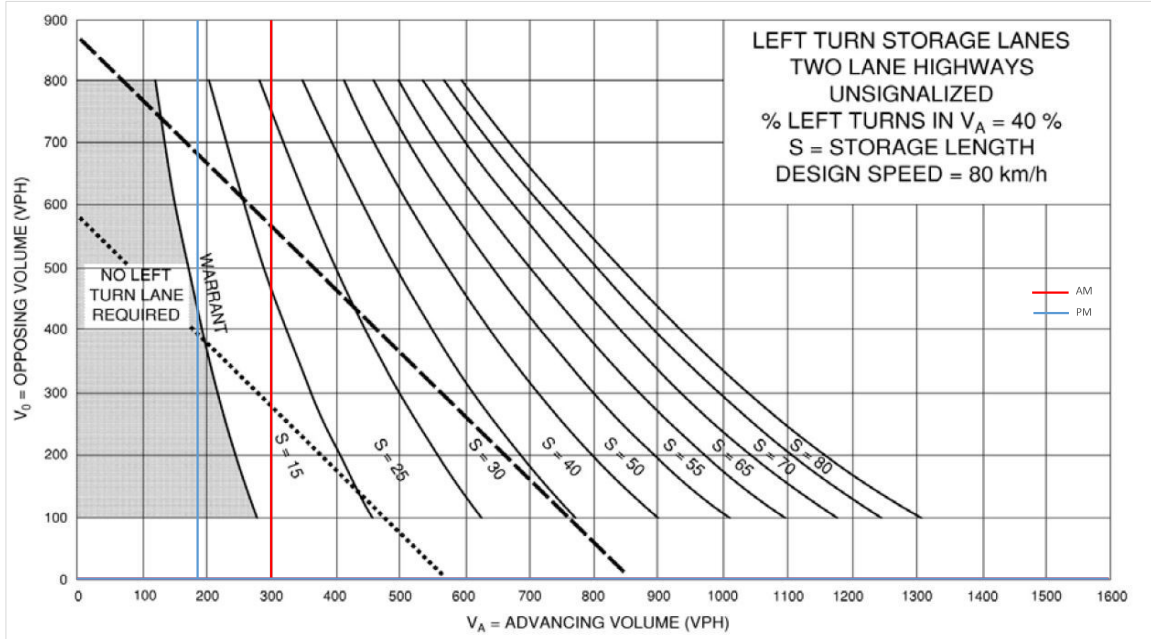
Future Total 2027 - Westbound Left



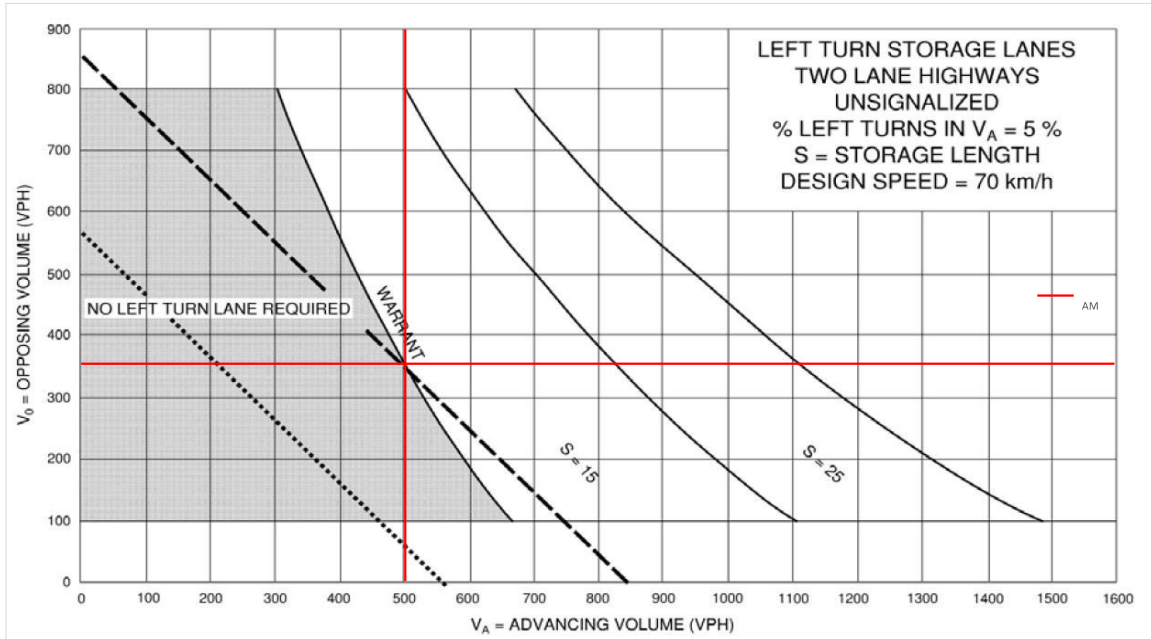
Future Total 2032 - Southbound Left

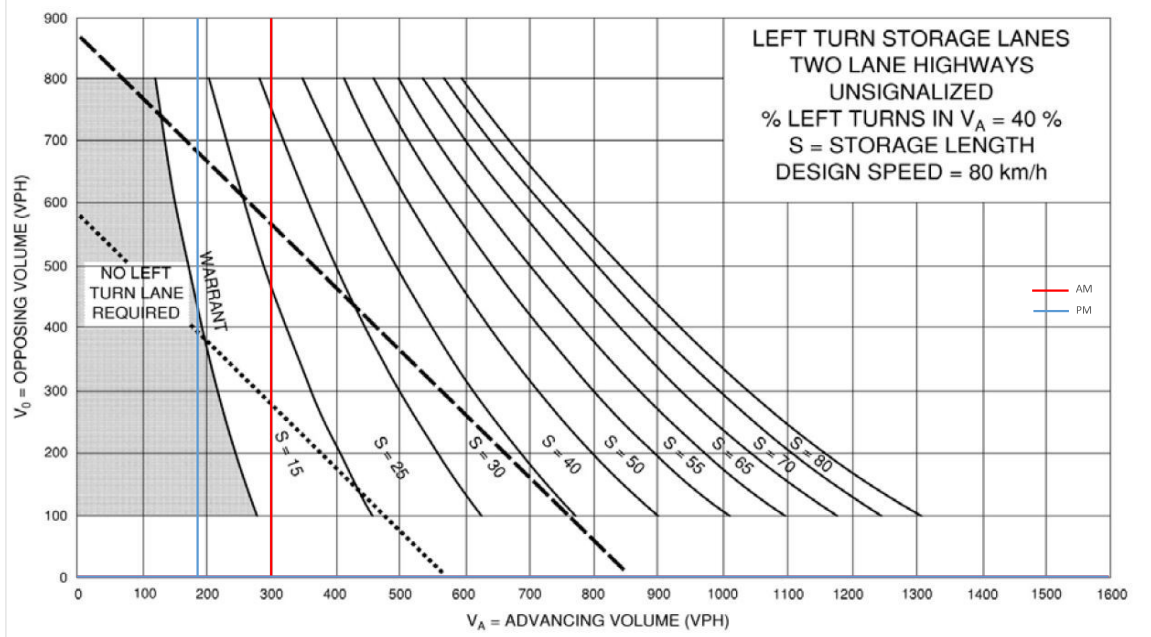


Future Total 2032 - Westbound Left



Future Total 2037 - Southbound Left





# Rockdale Road at Highway 417 Westbound Ramp Terminal

## Existing

Design Speed													Yes			
70 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM					63	0	184	0	237	563	215	345	0	38.4%	560	800
PM					50	0	98	0	616	243	53	447	0	10.6%	500	859

## Future Background 2027

Design Speed													Yes			
70 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM		0	0	0	67	0	190	0	238	597	222	347	0	39.0%	569	835
PM		0	0	0	53	0	101	0	625	258	55	451	0	10.9%	506	883

## Future Background 2032

Design Speed													Yes			
70 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM		0	0	0	74	0	199	0	240	660	233	351	0	39.9%	584	900
PM		0	0	0	59	0	106	0	641	285	57	457	0	11.1%	514	926

## Future Background 2037

Design Speed													Yes			
70 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM		0	0	0	81	0	209	0	243	728	245	355	0	40.8%	600	971
PM		0	0	0	65	0	112	0	657	314	60	464	0	11.5%	524	971

## Future Total 2027

Design Speed													Yes			
70 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM		0	0	0	67	0	205	0	270	597	238	379	0	38.6%	617	867
PM		0	0	0	53	0	134	0	644	258	88	470	0	15.8%	558	902

## Future Total 2032

Design Speed													Yes			
70 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM		0	0	0	74	0	214	0	272	660	249	383	0	39.4%	632	932
PM		0	0	0	59	0	139	0	660	285	90	476	0	15.9%	566	945

## Future Total 2037

Design Speed													Yes			
70 km/h		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
AM		0	0	0	81	0	224	0	275	728	261	387	0	40.3%	648	1003
PM		0	0	0	65	0	145	0	676	314	93	483	0	16.1%	576	990

Existing

Design Speed		EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
50	km/h																
		AM				63	0	184	0	237	563	215	345	0	25.5%	247	0
		PM				50	0	98	0	616	243	53	447	0	33.8%	148	0

Future Background 2027

Design Speed		EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
50	km/h																
		AM	0	0	0	67	0	190	0	238	597	222	347	0	26.1%	257	0
		PM	0	0	0	53	0	101	0	625	258	55	451	0	34.4%	154	0

Future Background 2032

Design Speed		EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
50	km/h																
		AM	0	0	0	74	0	199	0	240	660	233	351	0	27.1%	273	0
		PM	0	0	0	59	0	106	0	641	285	57	457	0	35.8%	165	0

Future Background 2037

Design Speed		EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
50	km/h																
		AM	0	0	0	81	0	209	0	243	728	245	355	0	27.9%	290	0
		PM	0	0	0	65	0	112	0	657	314	60	464	0	36.7%	177	0

Future Total 2027

Design Speed		EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
50	km/h																
		AM	0	0	0	67	0	205	0	270	597	238	379	0	24.6%	272	0
		PM	0	0	0	53	0	134	0	644	258	88	470	0	28.3%	187	0

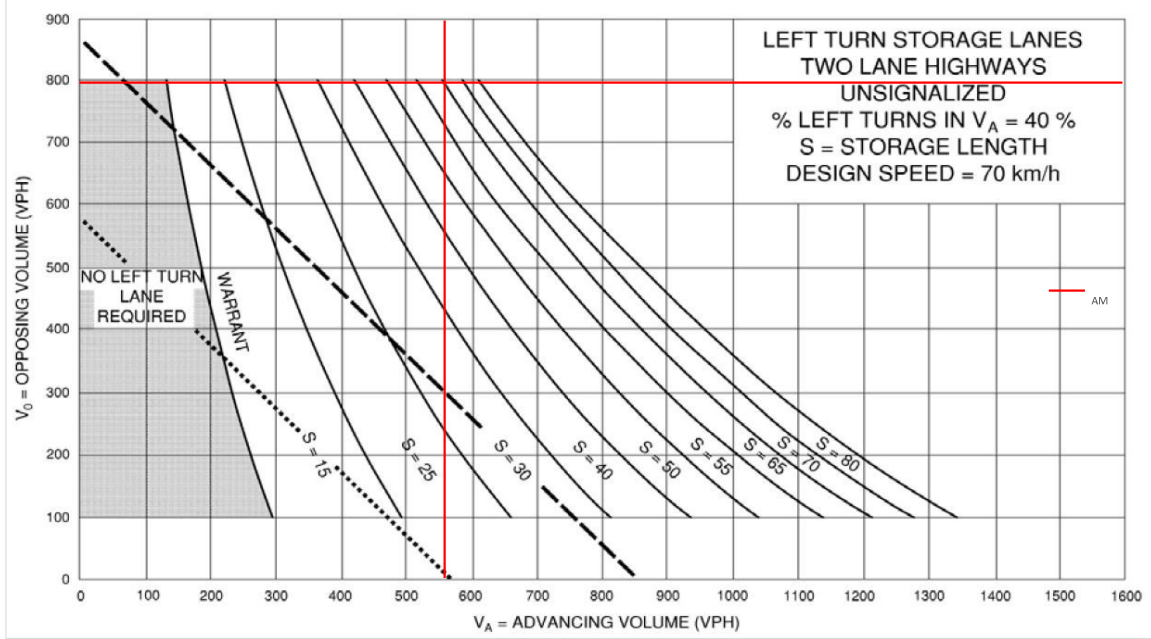
Future Total 2032

Design Speed		EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
50	km/h																
		AM	0	0	0	74	0	214	0	272	660	249	383	0	25.7%	288	0
		PM	0	0	0	59	0	139	0	660	285	90	476	0	29.8%	198	0

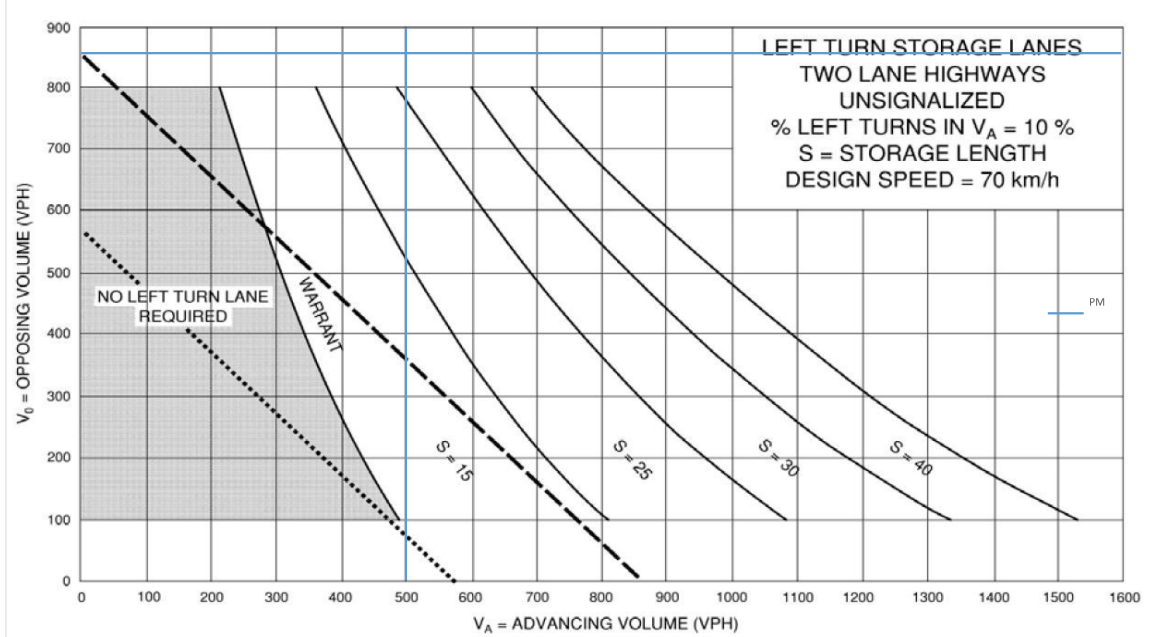
Future Total 2037

Design Speed		EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
50	km/h																
		AM	0	0	0	81	0	224	0	275	728	261	387	0	26.6%	305	0
		PM	0	0	0	65	0	145	0	676	314	93	483	0	31.0%	210	0

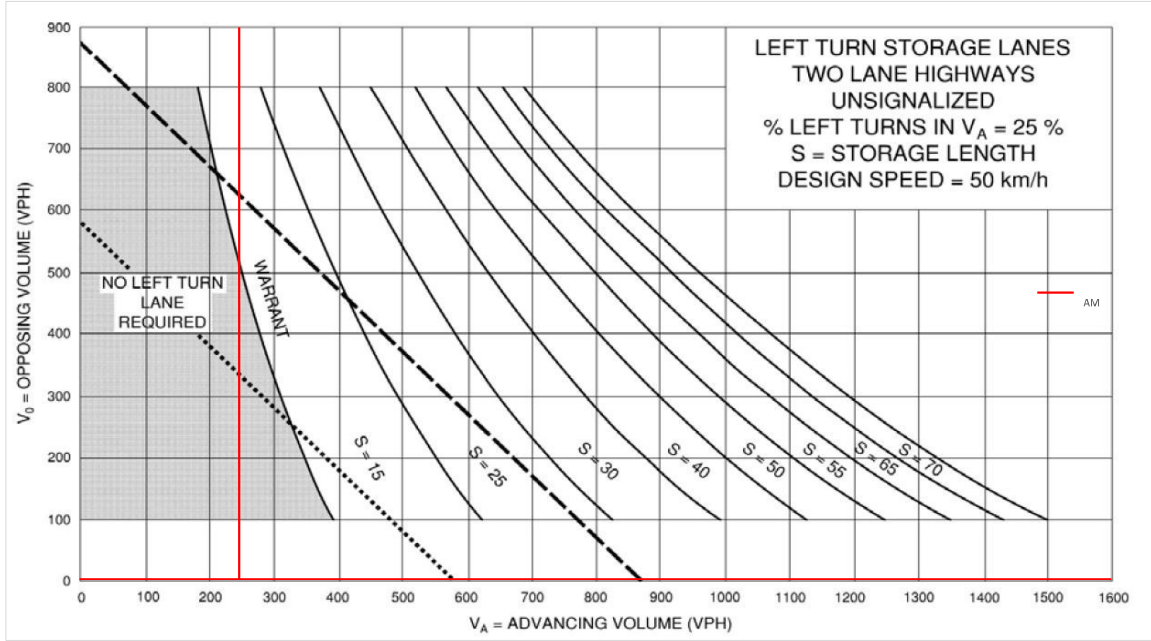
Existing - Southbound Left



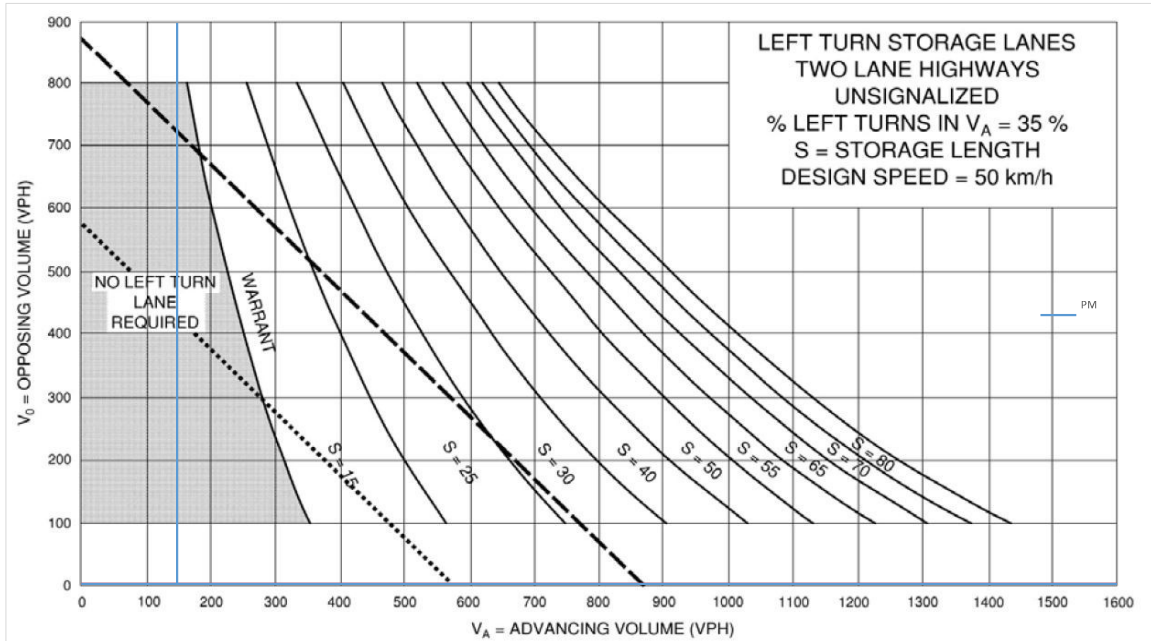
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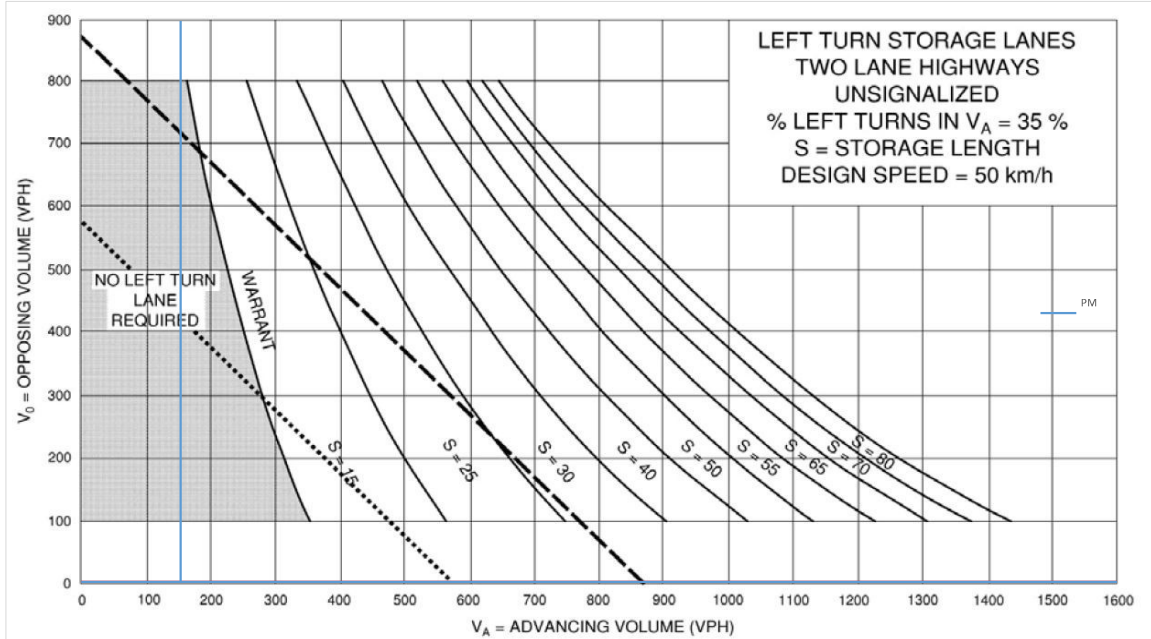
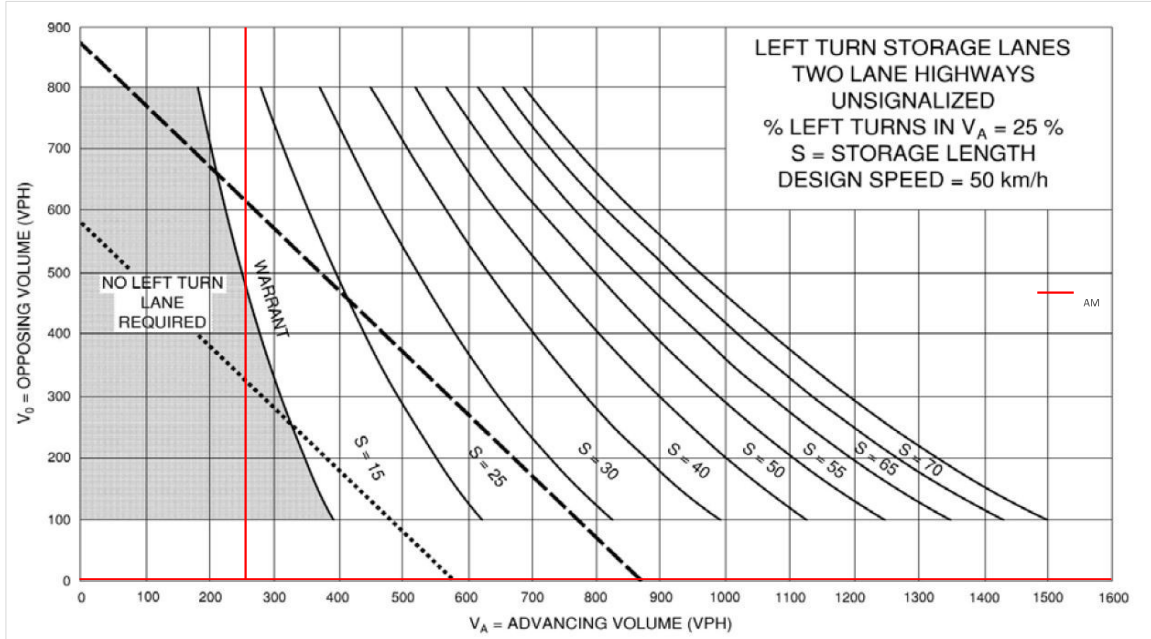


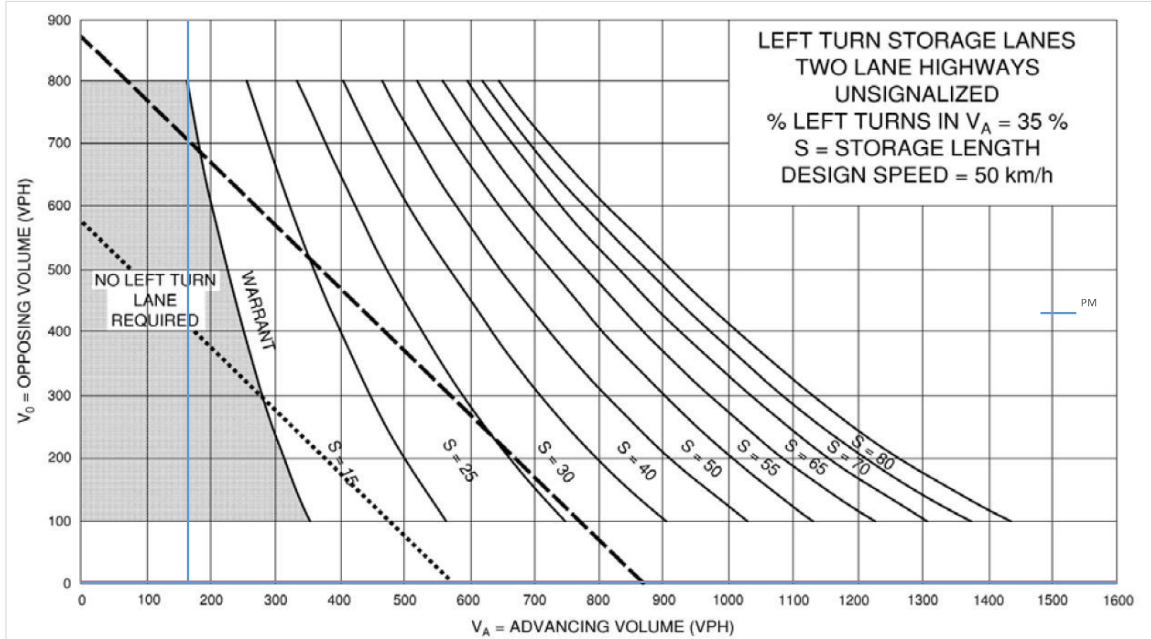
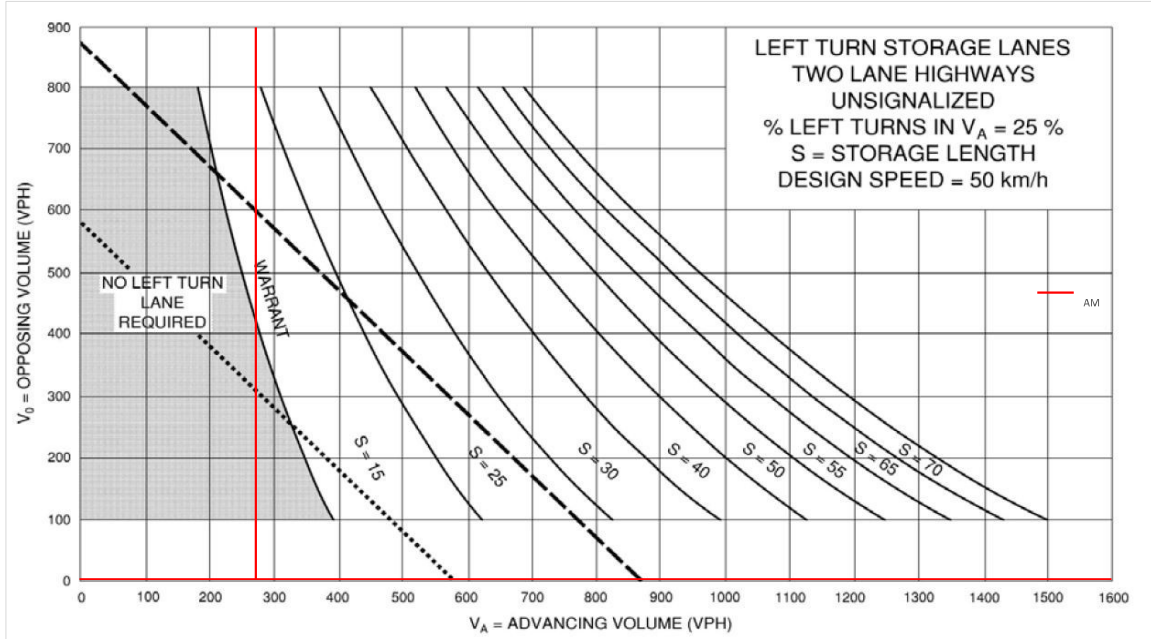
Existing - Westbound Left

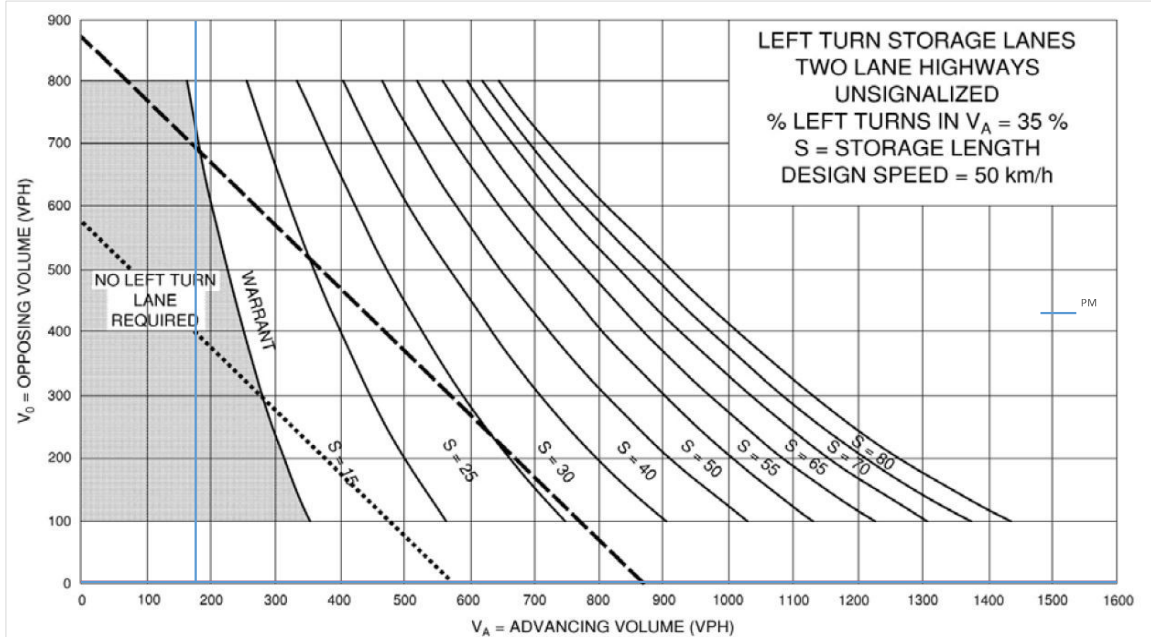
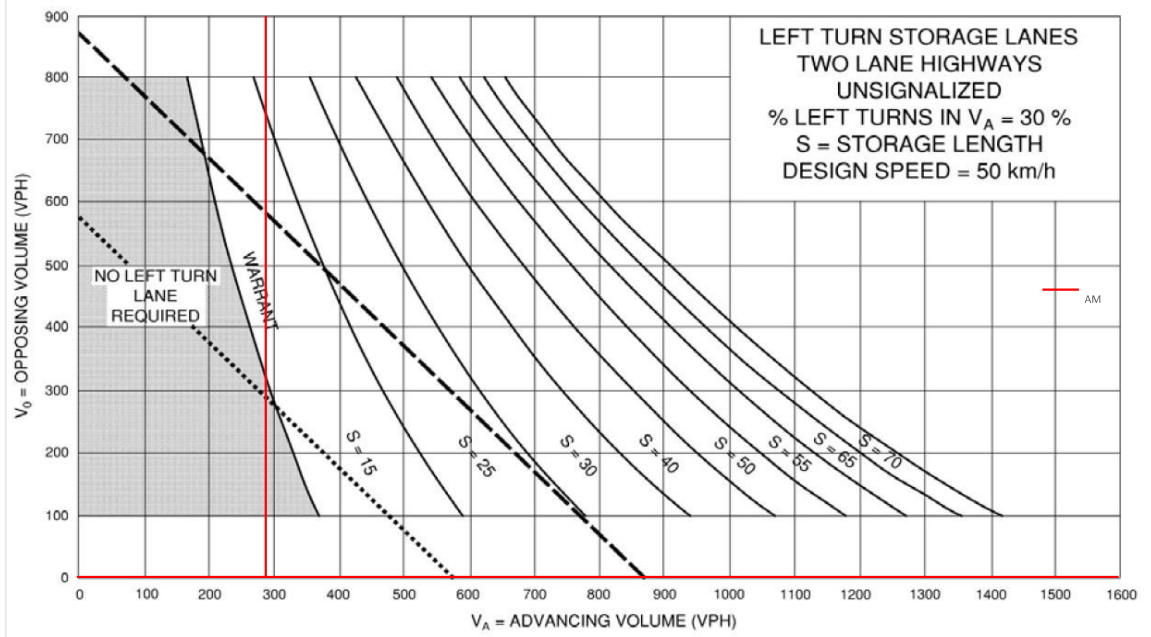


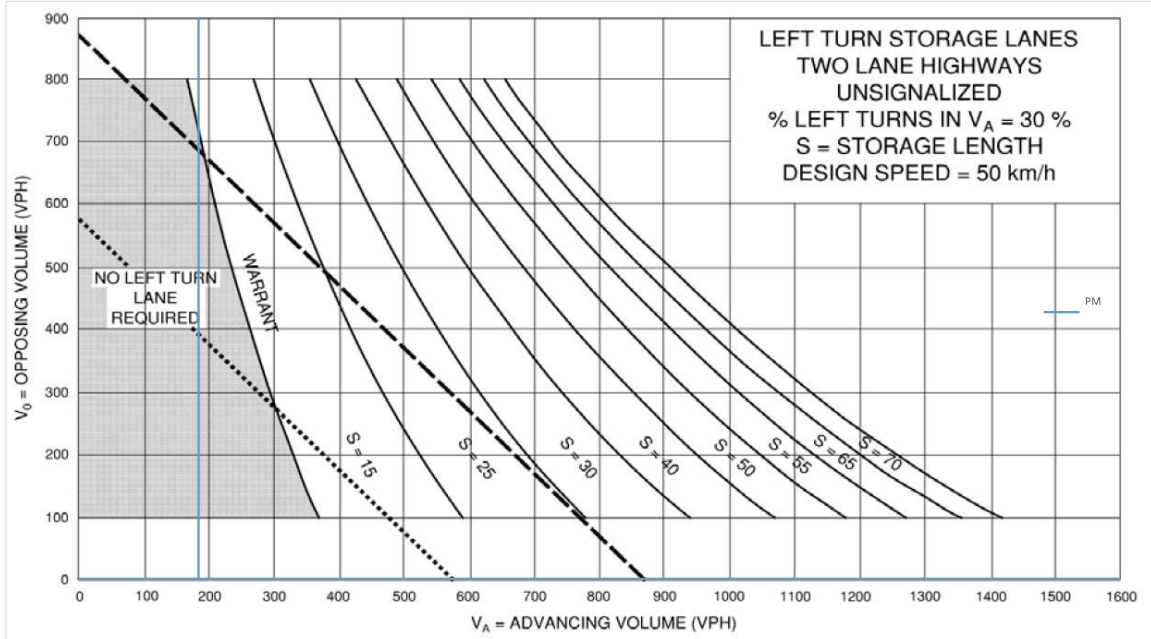
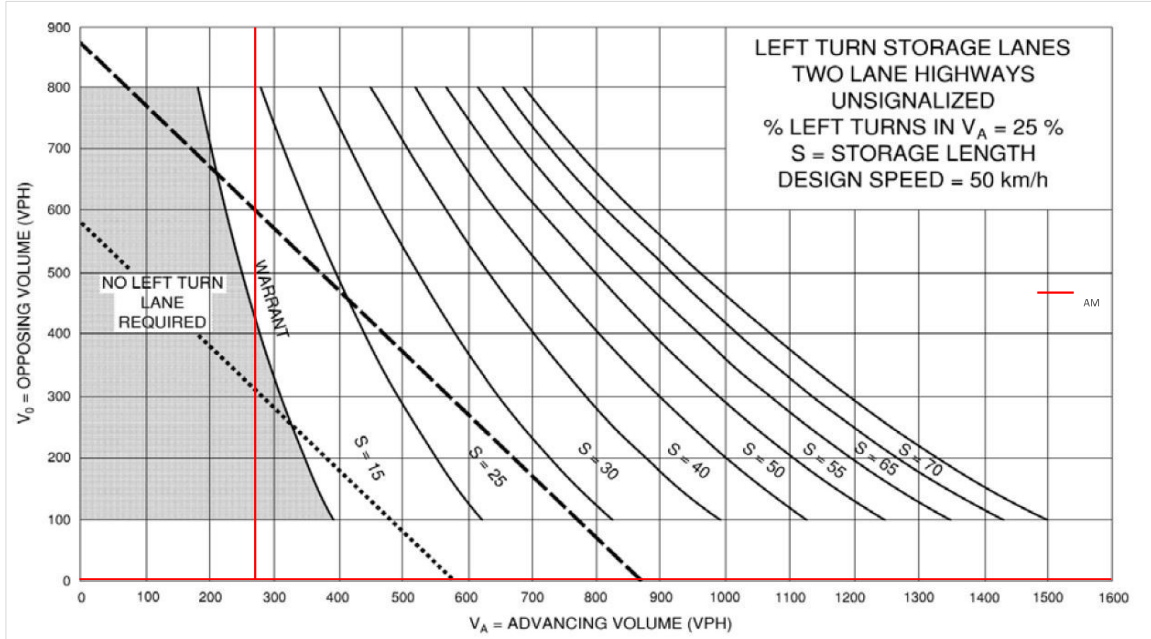
Existing - Westbound Left

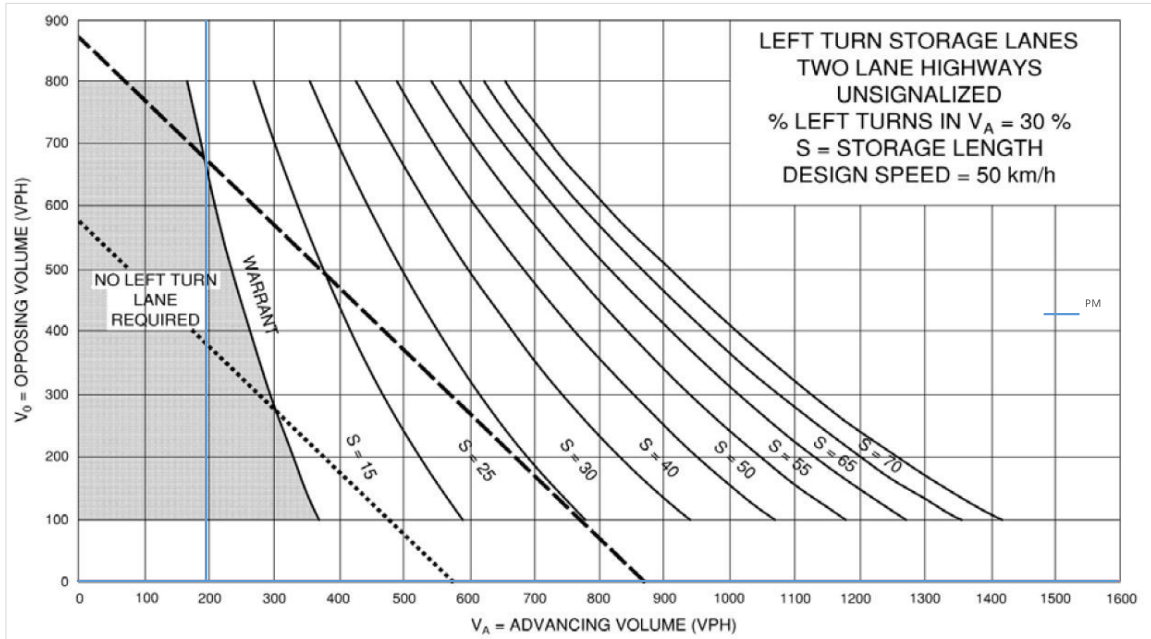
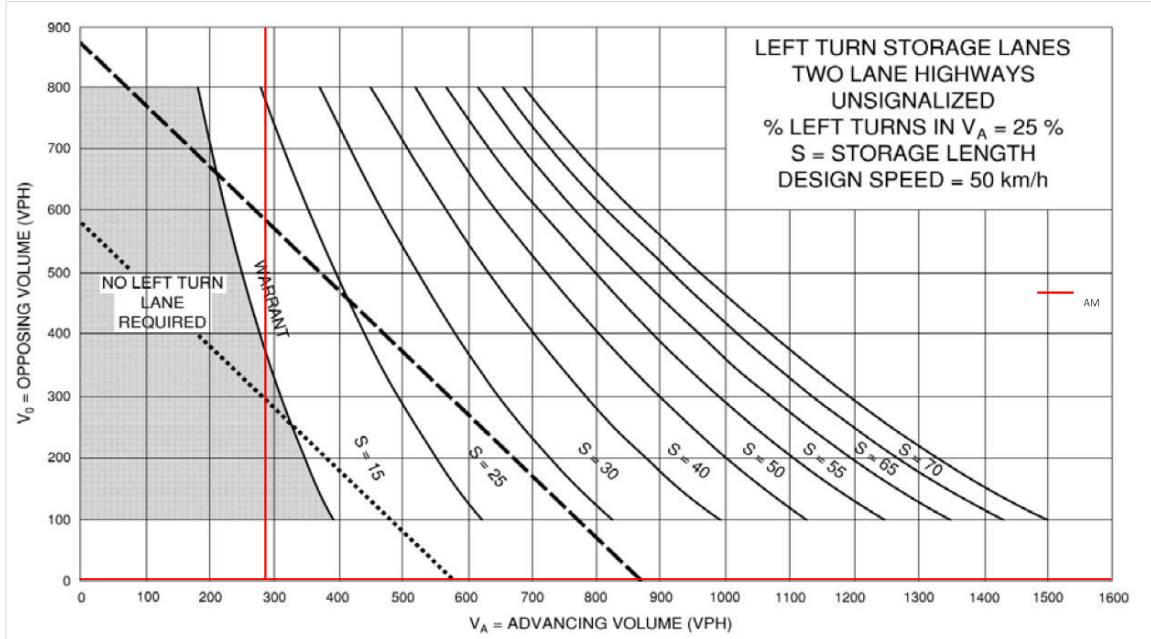


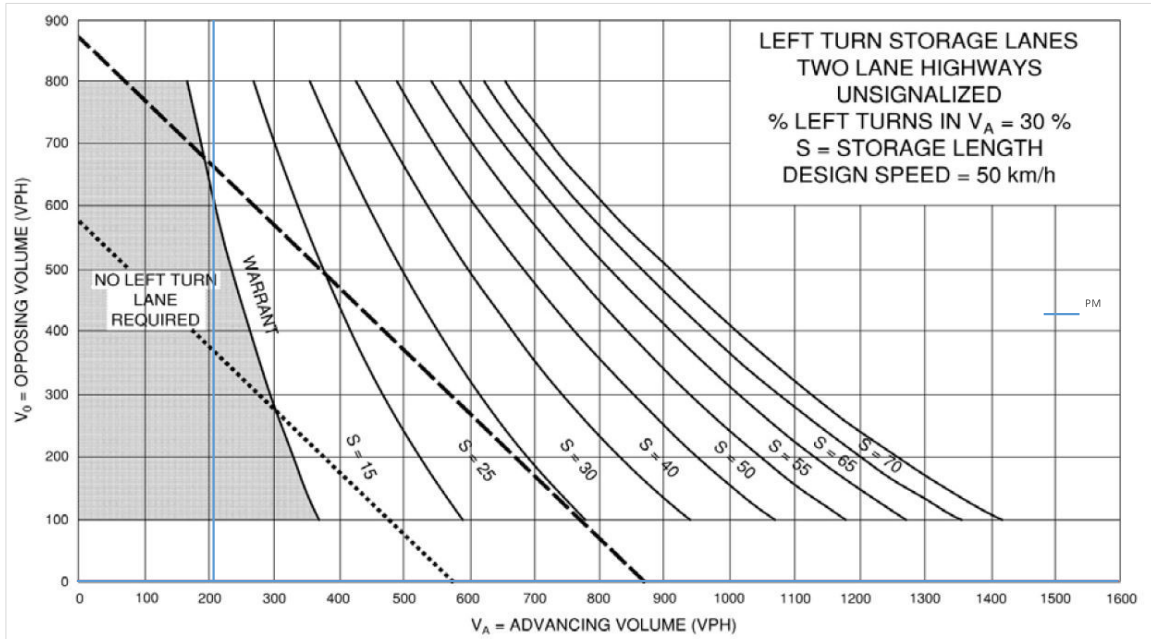
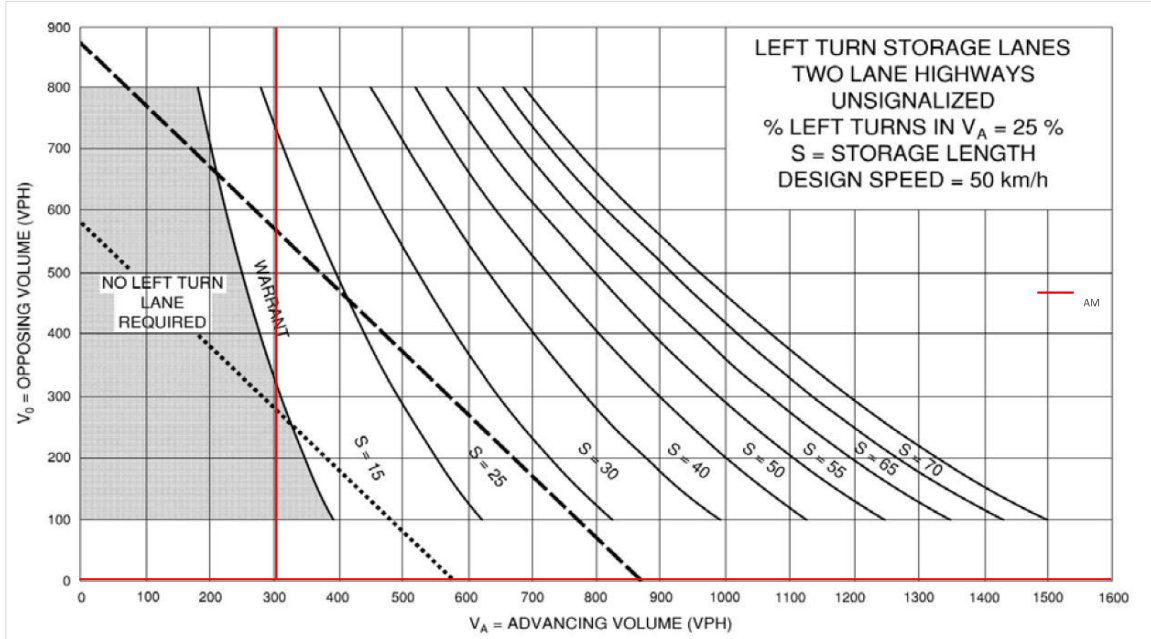












# Attachment 9

Turning Templates

# RUSSLAND ROAD

# ROCKDALE ROAD

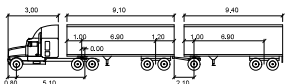
  
**Rb-19 (OTM)**  
**DO NOT ENTER SIGN**  
 600mm x 600mm

  
**Rb-12 (OTM)**  
**NO LEFT TURN SIGN**  
 600mm x 600mm

**Notes:**

**Legend:**

--- 0,50m CLEARANCE FORM OBJECTS



**ATD**

	metres	Look to Look Time	seconds
Tractor Width	: 3.00		: 6.0
Trailer Width	: 9.10	Steering Angle	: 27.5
Tractor Track	: 2.80	Articulating Angle	: 70.0
Trailer Track	: 2.80		

02	Issued for Review	EA	2026-02-04
REV	DESCRIPTION	BY	DATE
STATUS			



**CGH Transportation**  
 6 Plaza Court  
 Ottawa, ON  
 K2H 7W1  
 (343) 999-8117

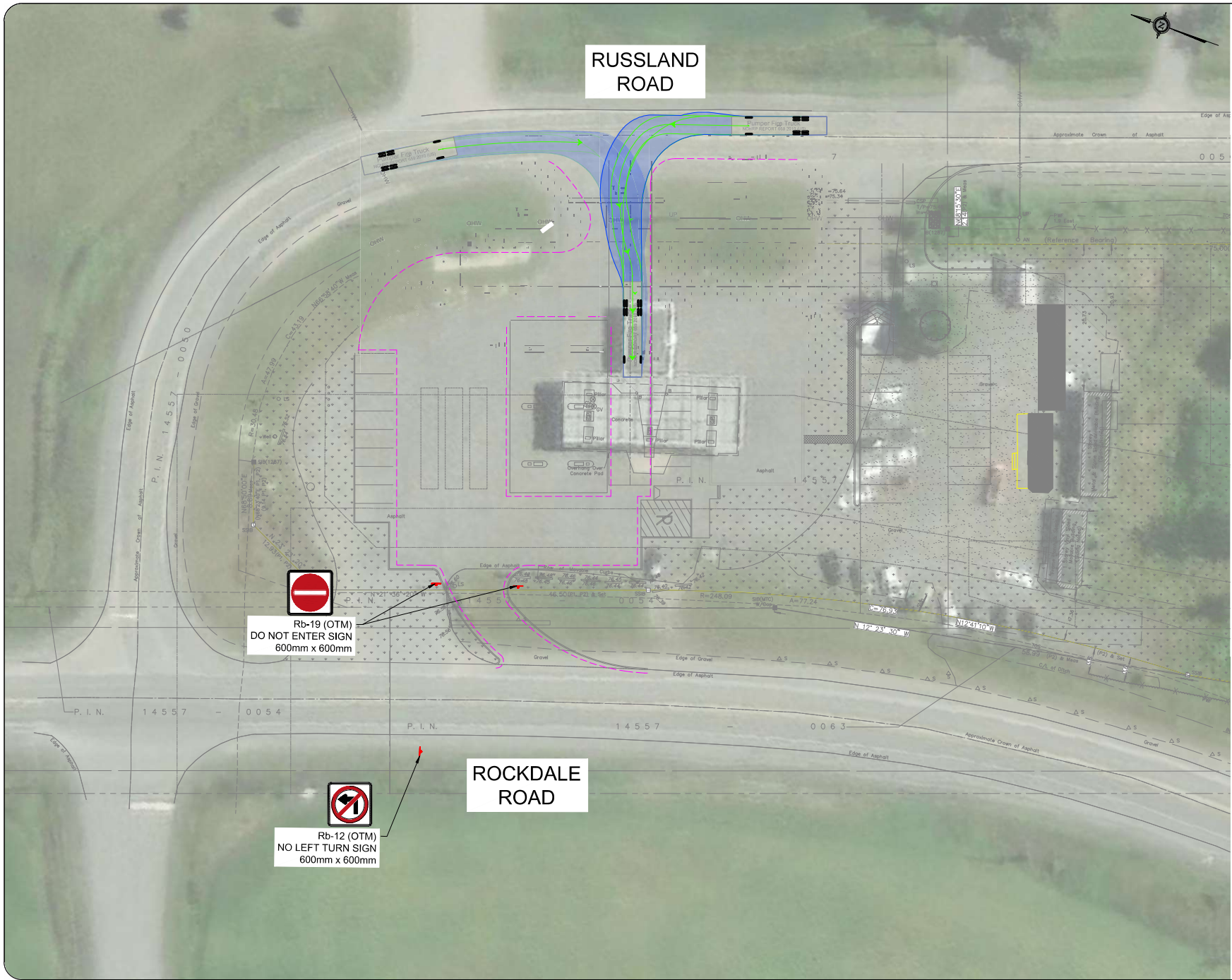
**CLIENT:**  
 6175 Rockdale Road

**ARCHITECT:**

**SITE:**  
 6175 Rockdale Road

**TITLE:**  
 Proposed Site Plan  
 Fuel Truck Site Circulation

SCALE AT A3	DATE	DRAWN	CHECKED
1:500	2026-02-04	EA	AH
PROJECT NO.	DRAWING NO.	REVISION	
2025-047	001	02	



**RUSLAND ROAD**

**ROCKDALE ROAD**

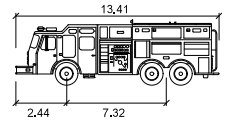
  
**Rb-19 (OTM)**  
**DO NOT ENTER SIGN**  
 600mm x 600mm

  
**Rb-12 (OTM)**  
**NO LEFT TURN SIGN**  
 600mm x 600mm

**Notes:**

**Legend:**

--- 0.50m CLEARANCE FORM OBJECTS



**Pumper Fire Truck**

	units
Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

02	Issued for Review	BB	2026-02-04
REV	DESCRIPTION	BY	DATE
STATUS			

 **CGH Transportation**  
 6 Plaza Court  
 Ottawa, ON  
 K2H 7W1  
 (343) 998-8117

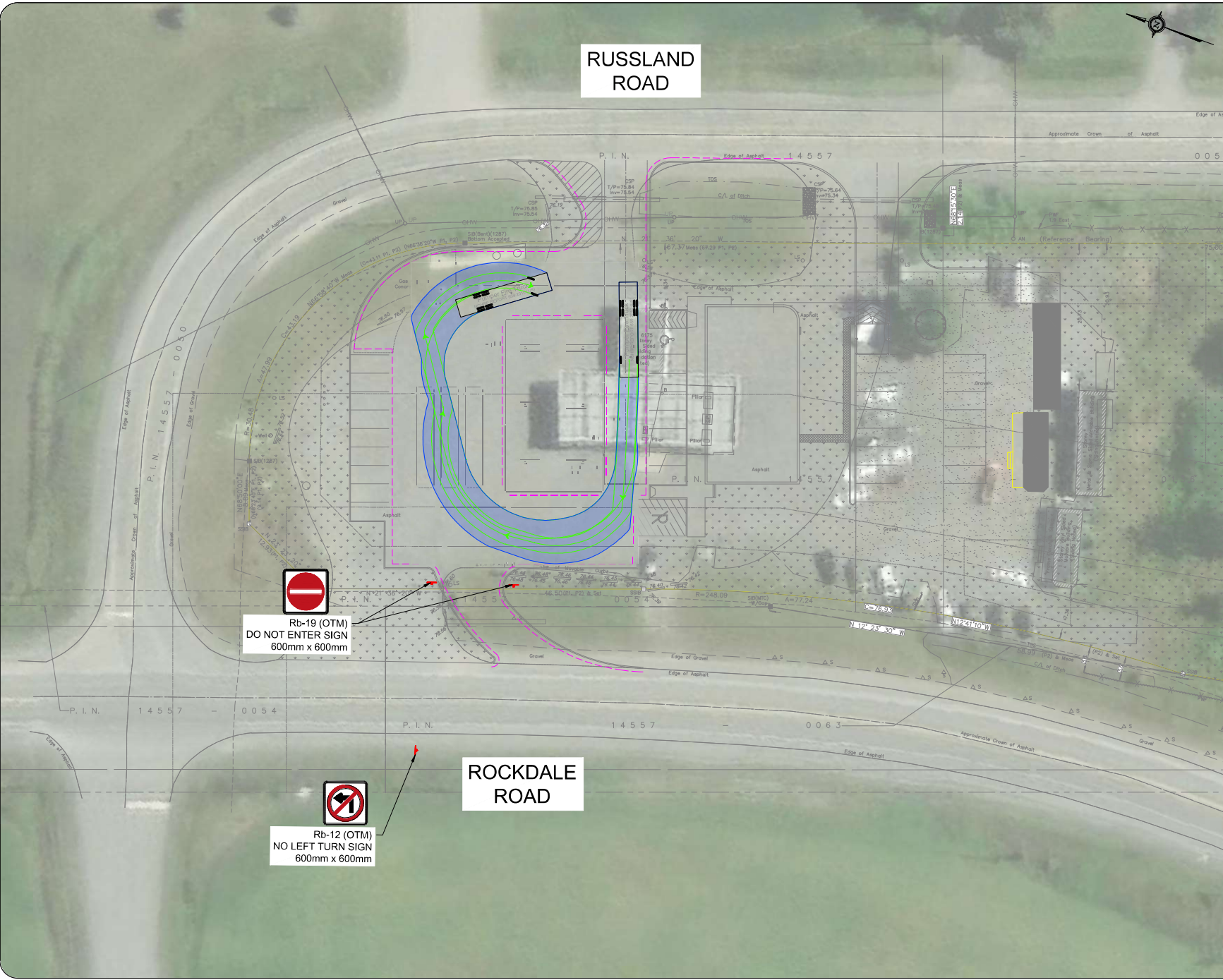
CLIENT:	6175 Rockdale Road
ARCHITECT:	

SITE: **6175 Rockdale Road**

TITLE: **Proposed Site Plan  
 Fire Truck Entrance Movement**

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2026-02-04	EA	AH
PROJECT NO:	DRAWING NO:	REVISION	
2025-047	002	02	

# RUSSLAND ROAD



Rb-19 (OTM)  
DO NOT ENTER SIGN  
600mm x 600mm



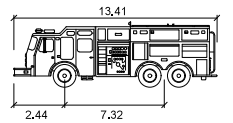
Rb-12 (OTM)  
NO LEFT TURN SIGN  
600mm x 600mm

# ROCKDALE ROAD

### Notes:

#### Legend:

--- 0.50m CLEARANCE FORM OBJECTS



### Pumper Fire Truck

	units
Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

02	Issued for Review	EA	2026-02-04
REV	DESCRIPTION	BY	DATE
STATUS			



**CGH Transportation**  
6 Plaza Court  
Ottawa, ON  
K2H 7W1  
(343) 999-8117

CLIENT:  
6175 Rockdale Road

ARCHITECT:

SITE:  
6175 Rockdale Road

TITLE:  
Proposed Site Plan  
Fire Truck Circulation

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2026-02-04	EA	AH
PROJECT NO:	DRAWING NO:	REVISION	
2025-047	003	02	

# RUSSLAND ROAD

# ROCKDALE ROAD

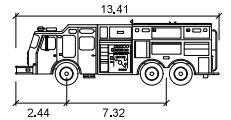
  
**Rb-19 (OTM)**  
**DO NOT ENTER SIGN**  
 600mm x 600mm

  
**Rb-12 (OTM)**  
**NO LEFT TURN SIGN**  
 600mm x 600mm

**Notes:**

**Legend:**

--- 0.50m CLEARANCE FORM OBJECTS



**Pumper Fire Truck**

	units
Width	: 2.59
Track	: 2.59
Lock to Lock Time	: 6.0
Steering Angle	: 37.8

02	Issued for Review	EA	2026-02-04
REV	DESCRIPTION	BY	DATE
STATUS			

 **CGH Transportation**  
 6 Plaza Court  
 Ottawa, ON  
 K2H 7W1  
 (343) 999-8117

CLIENT:	6175 Rockdale Road
ARCHITECT:	

SITE:	6175 Rockdale Road
TITLE:	Proposed Site Plan Fire Truck Exit Movement

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1:500	2026-02-04	EA	AH
PROJECT NO:	DRAWING NO:	REVISION	
2025-047	004	02	