



Technical Memorandum

To: Brian Hickey, MTO

Date:

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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 11th 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
Existing Convenience Store/Gas Station	ITE LUC 944	6 VFP	31	31	62	42	42	84
Proposed Convenience Store/Gas Station	ITE LUC 945	12 VFP	96	96	192	111	111	222
Net Increase			+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 11th 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
Existing	Total Trips	100%	31	31	62	100%	42	42	84
	Primary Trips	37%	11	11	22	43%	18	18	36
	Pass-by trips	63%	20	20	40	57%	24	24	48
Proposed	Total Trips	100%	96	96	192	100%	111	111	222
	Primary Trips	24%	23	23	46	25%	27	27	54
	Pass-by trips	76%	73	73	146	75%	84	84	168
Net Increase	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 11th 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
North	40%	40% Rockdale Rd (N)
South	20%	20% Rockdale Rd (S)
East	25%	15% Russland Rd (E), 10% Highway 417 (E)
West	15%	15% Highway 417 (W)
Total	100%	100%

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 6th 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 6th 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 6th 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
Rockdale Road at Russland Road	Thursday, November 23, 2023	City of Ottawa
Rockdale Road at Highway 417 Westbound Ramp Terminal	Thursday, November 14, 2024	Ministry of Transportation
Rockdale Road at Highway 417 Eastbound Ramp Terminal	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
Rockdale Road at Russland Road (unsignalized)	Westbound Left	Existing	-	-	39.6 (E)	36.2 (E)
		FB 2027	-	-	42.1 (E)	37.6 (E)
		FB 2032	-	-	(E) 46.9	(E) 40.7
		FB 2037	-	-	53.3 (F)	44.4 (E)
Rockdale Road at Highway 417 Westbound Ramp Terminal (unsignalized)	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)
Rockdale Road at Highway 417 Eastbound Ramp Terminal (signalized)	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)	-	-
		Existing	0.66 (B)	1.02 (F)	-	-
	Eastbound Right	FB 2027	0.67 (B)	1.09 (F)	-	-
		FB 2032	0.70 (B)	1.20 (F)	-	-
		FB 2037	0.71 (C)	1.32 (F)	-	-
		Existing	0.49 (A)	0.86 (D)	-	-
	Southbound Through/ Right	FB 2027	0.49 (A)	0.88 (D)	-	-
		FB 2032	0.50 (A)	0.90 (D)	-	-
		FB 2037	0.53 (A)	0.92 (E)	-	-
		Existing	0.49 (A)	0.88 (D)	-	-

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
Rockdale Road at Russland Road (<i>unsignalized</i>)	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	-	-	(E) 46.9	(E) 40.7
		FT 2032	-	-	135.2 (F)	253.9 (F)
		FB 2037	-	-	53.3 (F)	44.4 (E)
		FT 2037	-	-	156.5 (F)	292.5 (F)
Rockdale Road at Highway 417 Westbound Ramp Terminal (<i>unsignalized</i>)	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)
Rockdale Road at Highway 417 Eastbound Ramp Terminal (<i>signalized</i>)	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)	-	-
	Northbound Left	Existing	0.08 (A)	0.70 (B)	-	-
		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)	-	-
		FT 2037	0.68 (B)	1.32 (F)	-	-
	Southbound Through/ Right	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
Site Access #2 at Russland Road (unsignalized)	Eastbound Left/Right	FB 2037	0.53 (A)	0.92 (E)	-	-
		FT 2037	0.58 (A)	0.96 (E)	-	-
		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 95th 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 95th 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 95th 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
Rockdale Road at Russland Road (unsignalized)	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)
Rockdale Road at Access #1 (unsignalized)	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 95th 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) 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

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

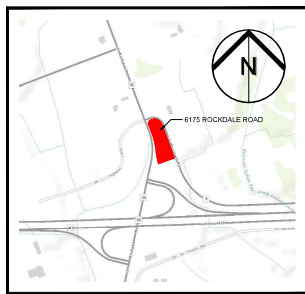


Taking pride in strengthening Ontario, its places and its people

"

Attachment 2

Site Plan



1 Location Plan
Scale = N/A

LEGAL DESCRIPTION: LOT 27 & LOT 28 PIN14557-0136

PROPERTY:

PROPERTY AREA: 915.9 sqm
FRONTAGE: 45.77 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
MAXIMUM BUILDING HEIGHT: 11 m
MAXIMUM LOT COVERAGE: 25%

PARKING REQUIREMENTS:

USE	RATE	AREA	SPACES REQUIRED	SPACES PROVIDED
FAST FOOD	10 PER 100 SQ.M	80 SQ.M	8	9
RETAIL STORE	3.4 PER 100 SQ.M	256.6 SQ.M	8.72	9
CAR DEALERSHIP	2 PER 100 SQ.M	38.16 SQ.M	1.89	2 EMPLOYEE 13 DISPLAY
ACCESSORY STORAGE TO CAR DEALERSHIP	N/A	56.49 SQ.M	0	N/A
GAS BAR	N/A	N/A	N/A	N/A
LOADING SPACE	355-999 SQ.M	336 SQ.M	0	1
TABLE 13A LAND USE (4)				
TOTAL				32 PARKING SPACES 1 LOADING SPACE

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

GENERAL NOTES FOR DRAWING A0:

A. REFER TO 1.1.1 FOR PLANT LIST.

NOTES FOR DRAWING A0:

- CANOPY ABOVE CONCRETE PAD AT GRADE.
- DEPRESSED CURB
- GRAVEL TO REMAIN, REGRADED AS REQUIRED. REFER TO CIVIL.
- ASPHALT.
- PAVED ENTRY.
- CULVERT.
- EXISTING ENTRY TO BE REMOVED.
- EXISTING WELL TO BE DECOMMISSIONED.
- EXISTING SIGN TO REMAIN.
- TYPICAL GAS PUMP STATION ON CONCRETE CURB.
- GARBAGE STORAGE.
- LOADING SPACE.
- BROW STORAGE.
- DO NOT ENTER SIGN.
- NO LEFT TURN SIGN.
- SEPTIC TANKS.
- BOLLARD.
- SEPTIC FIELD.
- UNDERGROUND GAS TANKS.
- BICYCLE RACK.
- DRAINAGE RIP RAP.
- STORM DRAIN, REFER TO CIVIL.
- MOUNTABLE CURB FOR LARGE VEHICLES.
- RESERVED.
- PROPOSED LOCATION OF NEW WELL, FOUR BOLLARDS TO BE PLACED EQUALLY AROUND.
- EXISTING EXTERIOR OF PAVEMENT, TO BE MODIFIED TO SUIT NEW LAYOUT.
- WOODEN FENCE, REFER TO LANDSCAPING PLAN FOR DETAIL.
- RESERVED.
- GAS TANK VENTS.
- RAISED CONCRETE CURB.
- APPROXIMATE CENTER LINE OF ROAD.
- PROTECTED RIGHT-OF-WAY.
- EXTENDED CURB FOR FIRE ROUTE SIGNAGE.
- MTO HIGHWAY PROPERTY LINE.
- MTO HIGHWAY PROPERTY LINE 4m STRUCTURE SETBACK.
- MTO HIGHWAY PROPERTY LINE 30m WELL SETBACK.
- GRAVEL ENTRY.
- RESERVED.
- SEMI PERMEABLE LANDSCAPING PAVERS.
- 127 x 127 x 8mm H.S.S. STEEL POST.
- 102 x 50 x 5mm H.S.S. STEEL FRAME - TYPICAL.
- 35 x 140mm PRESSURE TREATED LUMBER SPACED @ 150mm O.C. FINISHES TO MATCH EXISTING.
- GATE CONSTRUCTION.
- 762 x 762 x 6.35mm H.S.S. ALL 4 SIDES AND DIAGONAL.
- 25mm SONO TUBE TO EXTEND 150mm BELOW GRADE.
- 120mm DIA. x 200mm LONG STAINLESS STEEL SURFACE BOLT.
- GATE LATCH.
- 50 x 50 x 6mm BOLT GLUPES WELDED TO GATE FRAMES.
- LOCKING DEVICE.
- 100 x 100 x 10mm STEEL PLATE FASTENED TO PRESSURE TREATED LUMBER FACING.
- 50 x 50 x 6mm BOLT NUT.
- HEAVY DUTY CUSTOM PIVOT HINGE.
- 1/4" TAPCON FASTENER BY ENGINEER.
- FRENCHENGLERS.
- BASE PLATE WELDED TO UNDERSIDE OF POST: 250 x 250 x 12mm STEEL PLATE ON 25mm SETTING BED CW 6-12M DIA. ANCHOR BOLTS.
- BARRIER FREE PARKING SIGNAGE (BILINGUAL).
- METAL POST.
- FIRE ROUTE SIGNAGE.

LEGEND FOR DRAWING A0:

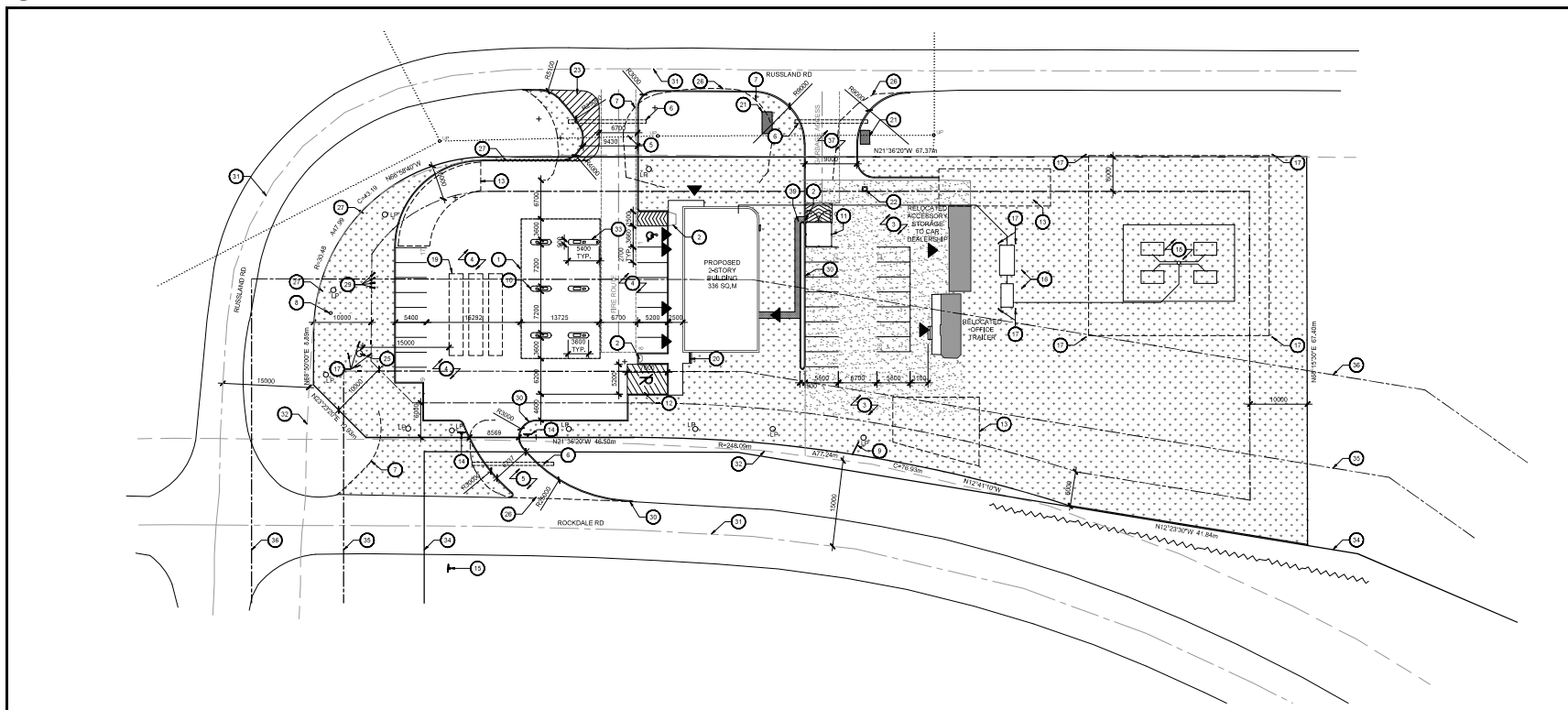
- DRAWING NOTE ANNOTATION.
- NEW DOOR
- BUILDING ENTRANCE
- UTILITY POST
- UP
- 300
- GRAVEL
- PLANTINGS
- PROPERTY LINE
- SET BACK
- OVERHEAD WIRE
- FENCE
- SANITARY



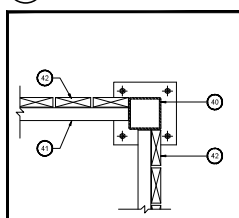
CONSTRUCTION NORTH



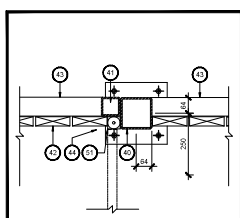
TRUE NORTH



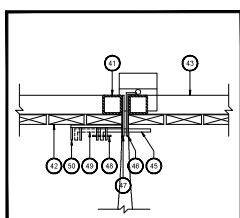
2 Site Plan
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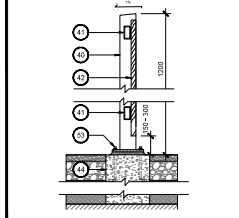
3 Enclosure Corner Detail
Scale = 1:10



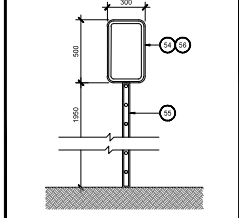
4 Enclosure Gate Hinge Detail
Scale = 1:10



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	25.09.25
2	Issued for Site Plan Control	24.06.24
1	Issued for Coordination	03.06.24
No. N°	ISSUE/REVISION EMMISSION/REVISION	DATE DATE



PROJECT NAME: 6175 Rockdale Rd

6175 Rockdale Rd. Vars ON. K0A 3H0

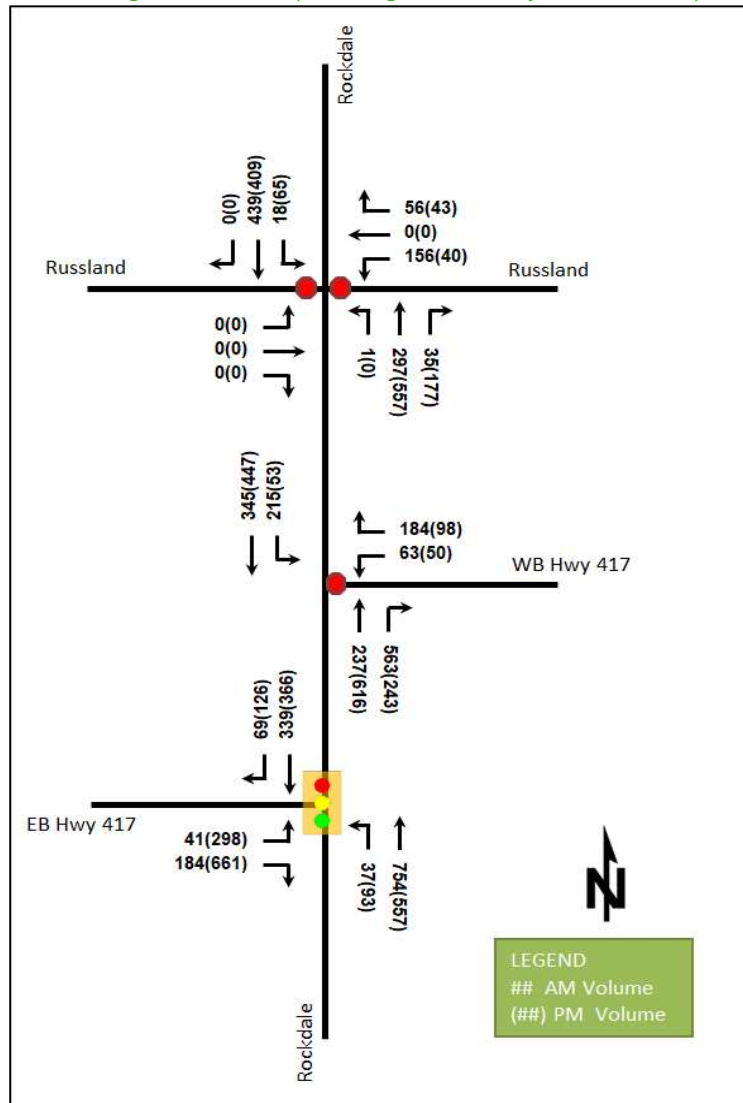
DRAWING TITLE: Site Plan
Location Plan
Site Details

JOB No: 610-24	N° DE PROJET May 2024	DATE May 2024	DATE
SCALE As Noted	ECHELLE CONÇUS PAR SG	PRINTING SCALE / ECHELLE D'IMPRESSION	IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PRINTING SCALE. SI CETTE BARRE NE MESURE PAS 25mm, AJUSTER VOTRE ECHELLE D'IMPRESSION.
DRAWN BY KS	DESIGNÉ PAR SG	CHECKED BY SG	VÉRIFIÉ PAR
ARCHITECT'S STAMP	DRAWING No. DESIGN No.	REVISION No. REVISION No.	3

Attachment 3

Existing and Forecasted Figures

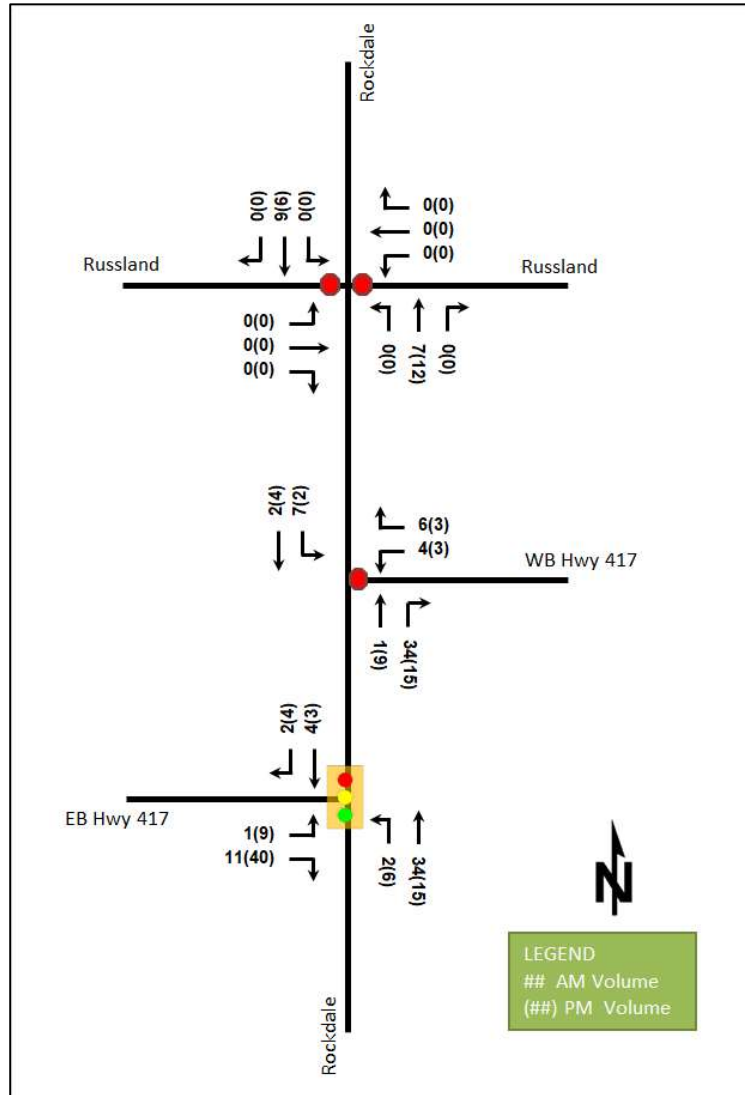
Existing Traffic Counts (Including Seasonal Adjustment Factor)



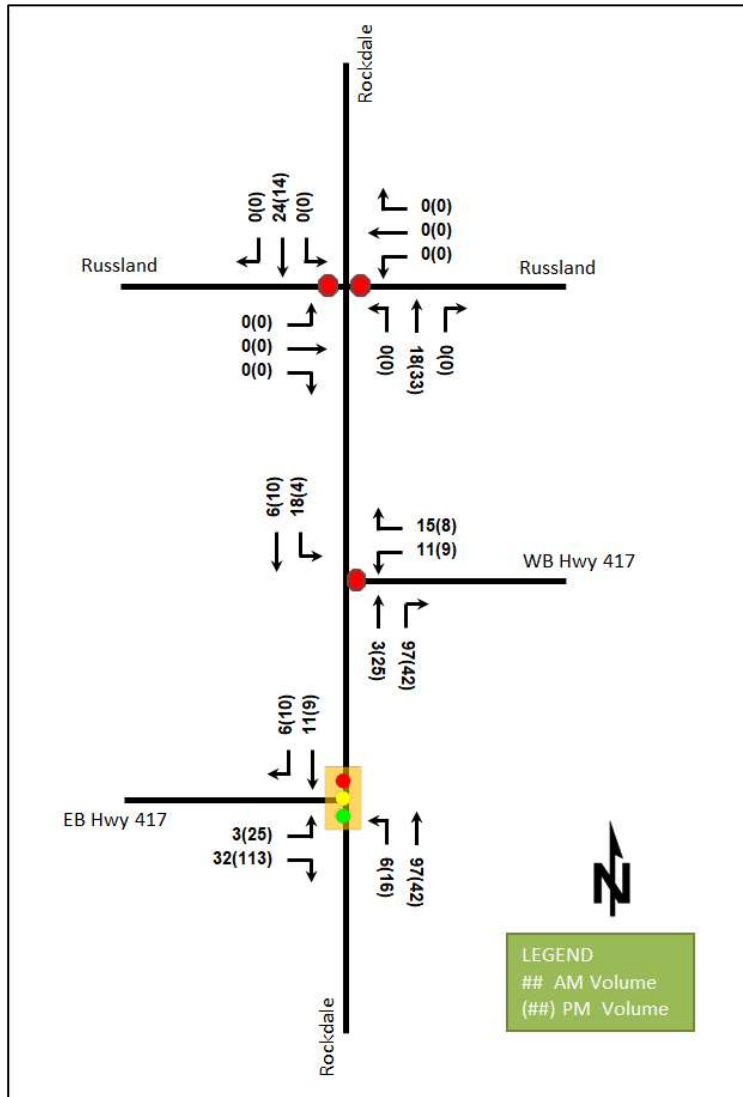
ITE Trip Generation Rates

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%	

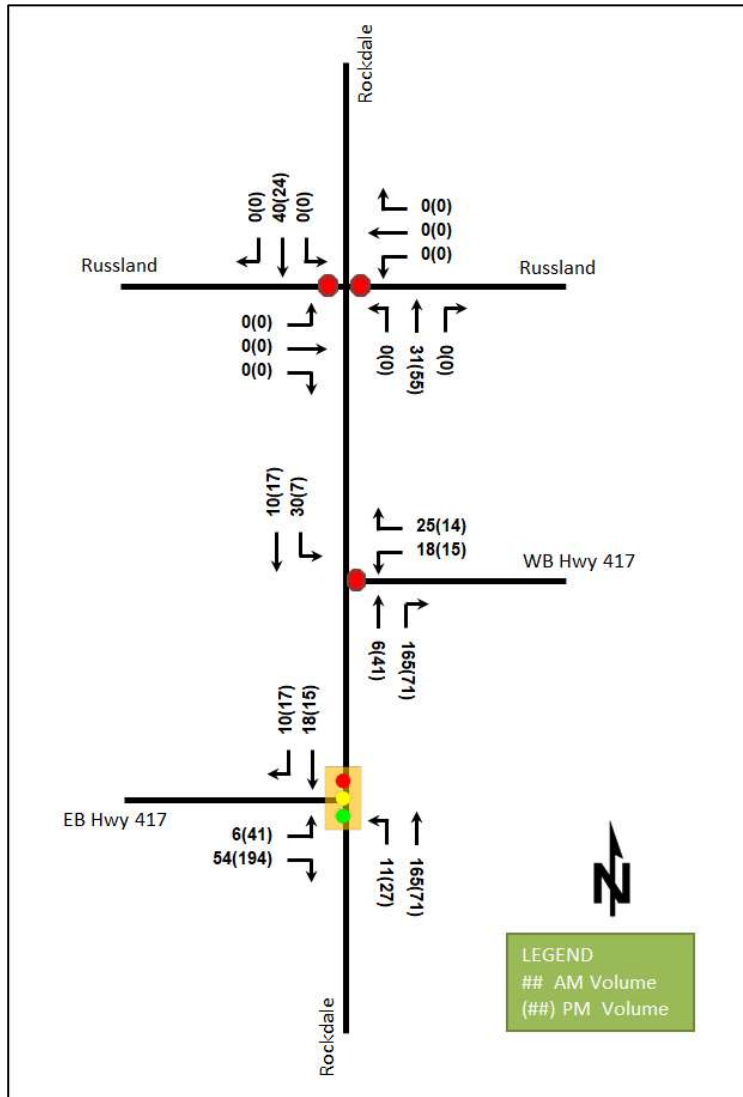
Traffic Volume Growth-2027



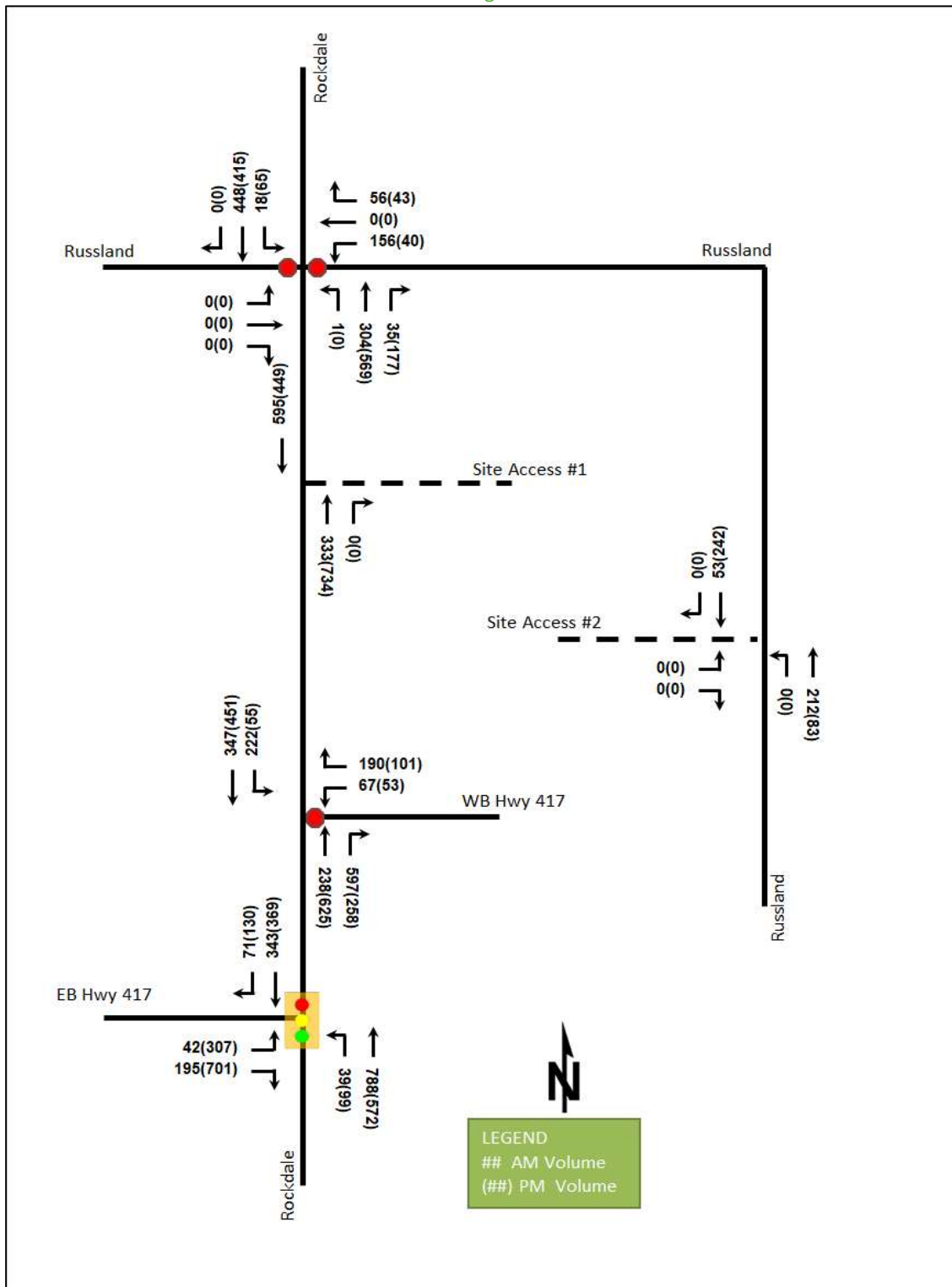
Traffic Volume Growth-2032



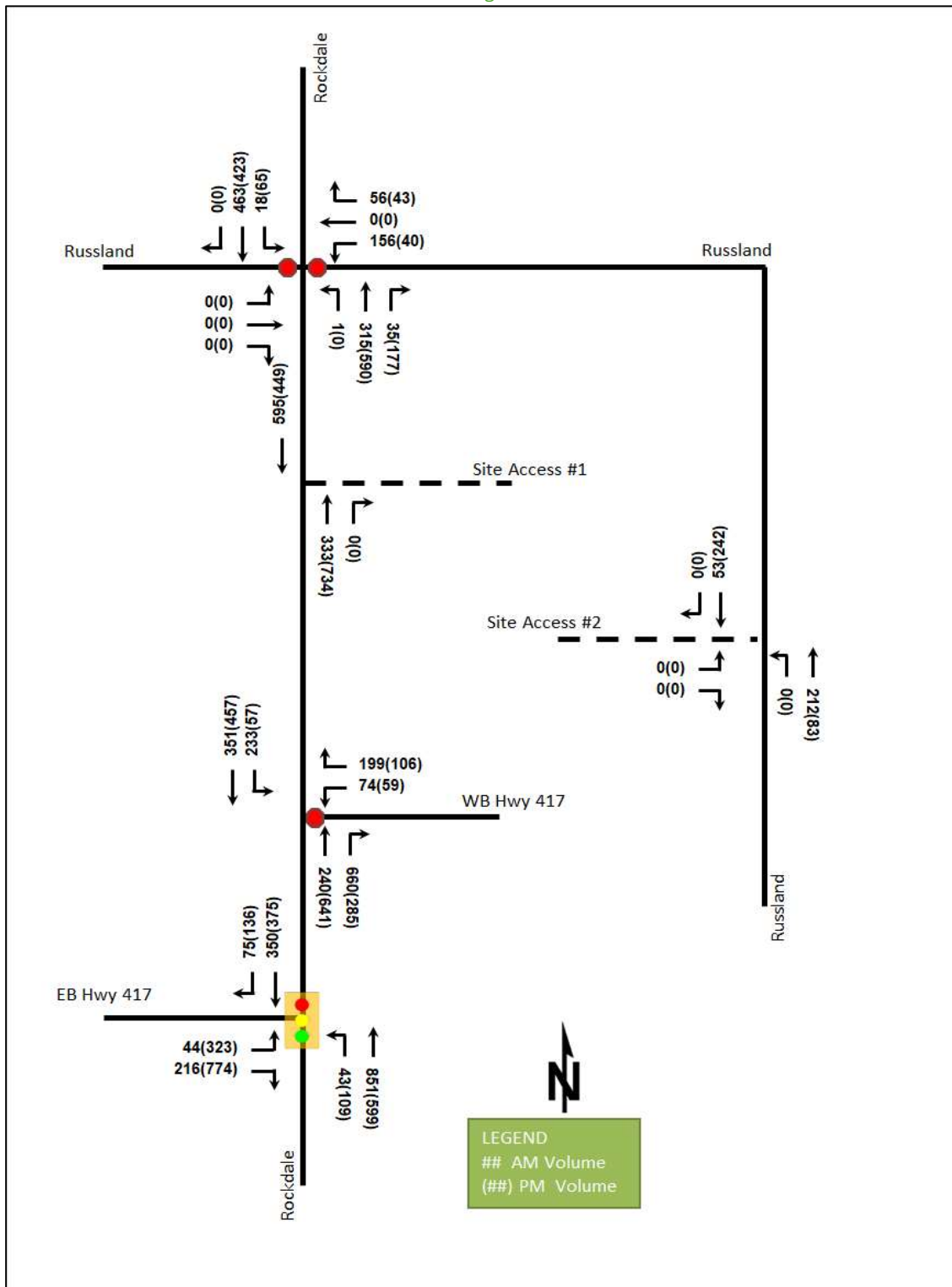
Traffic Volume Growth-2037



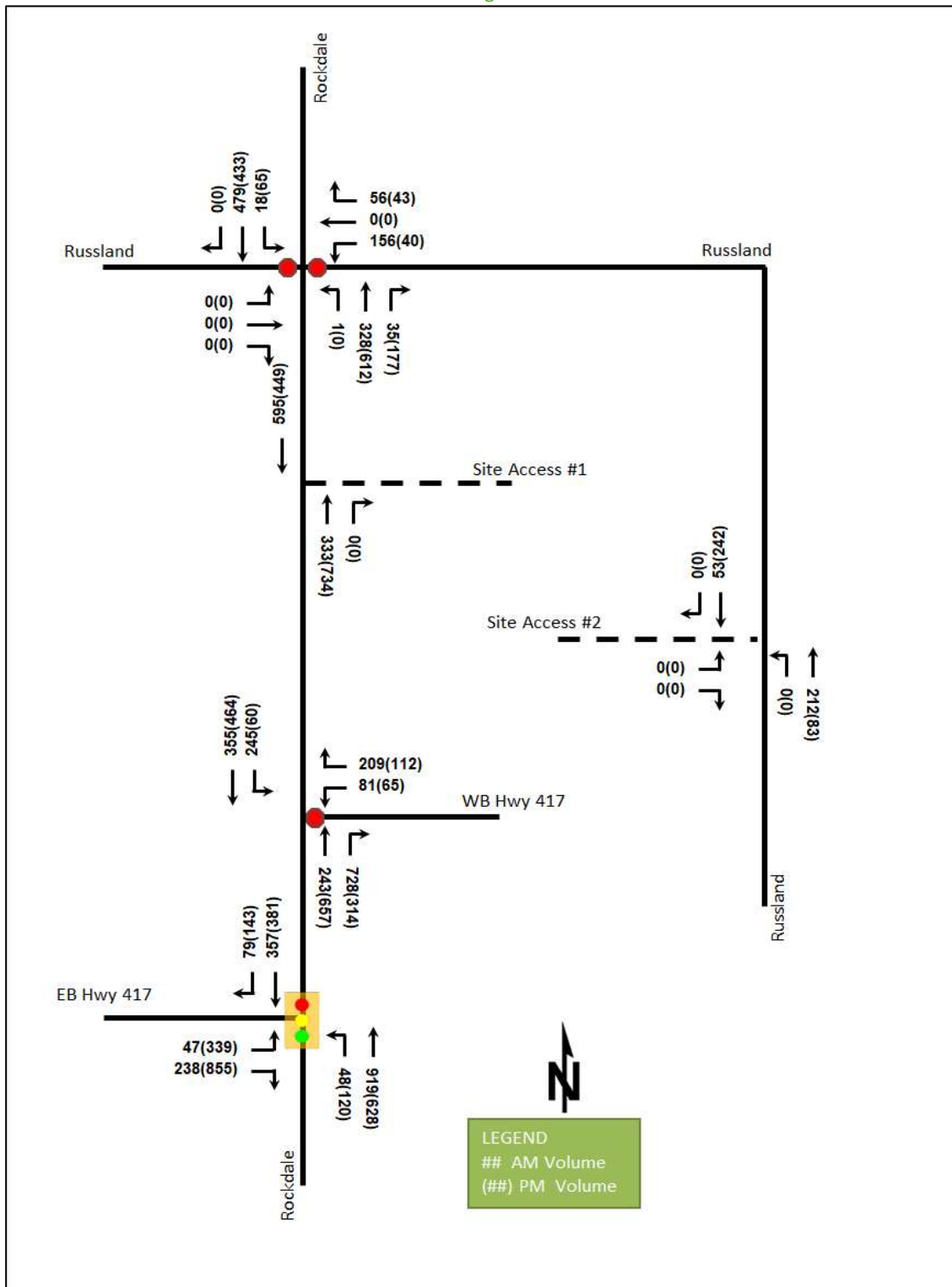
2027 Future Background Volumes



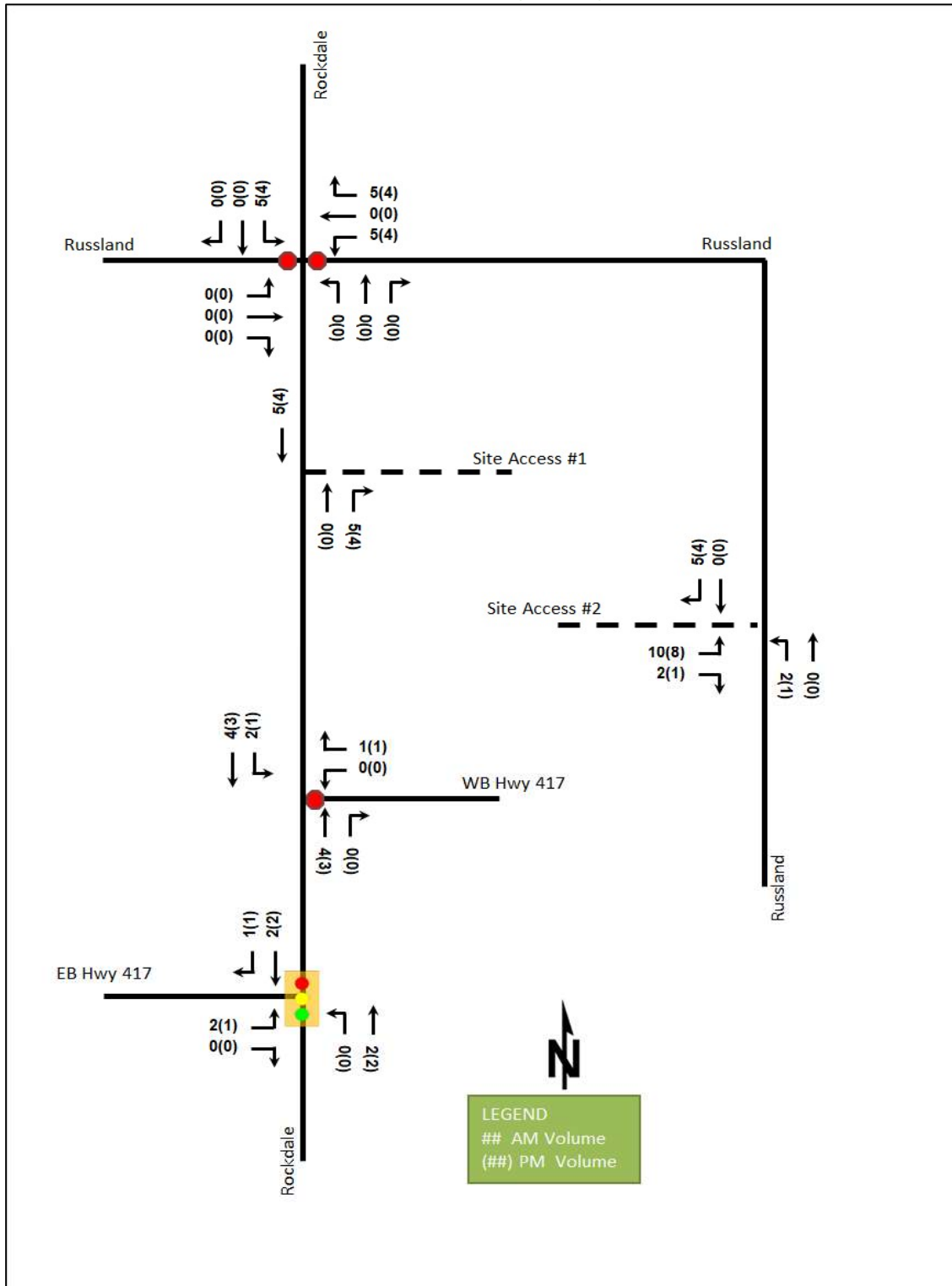
2032 Future Background Volumes



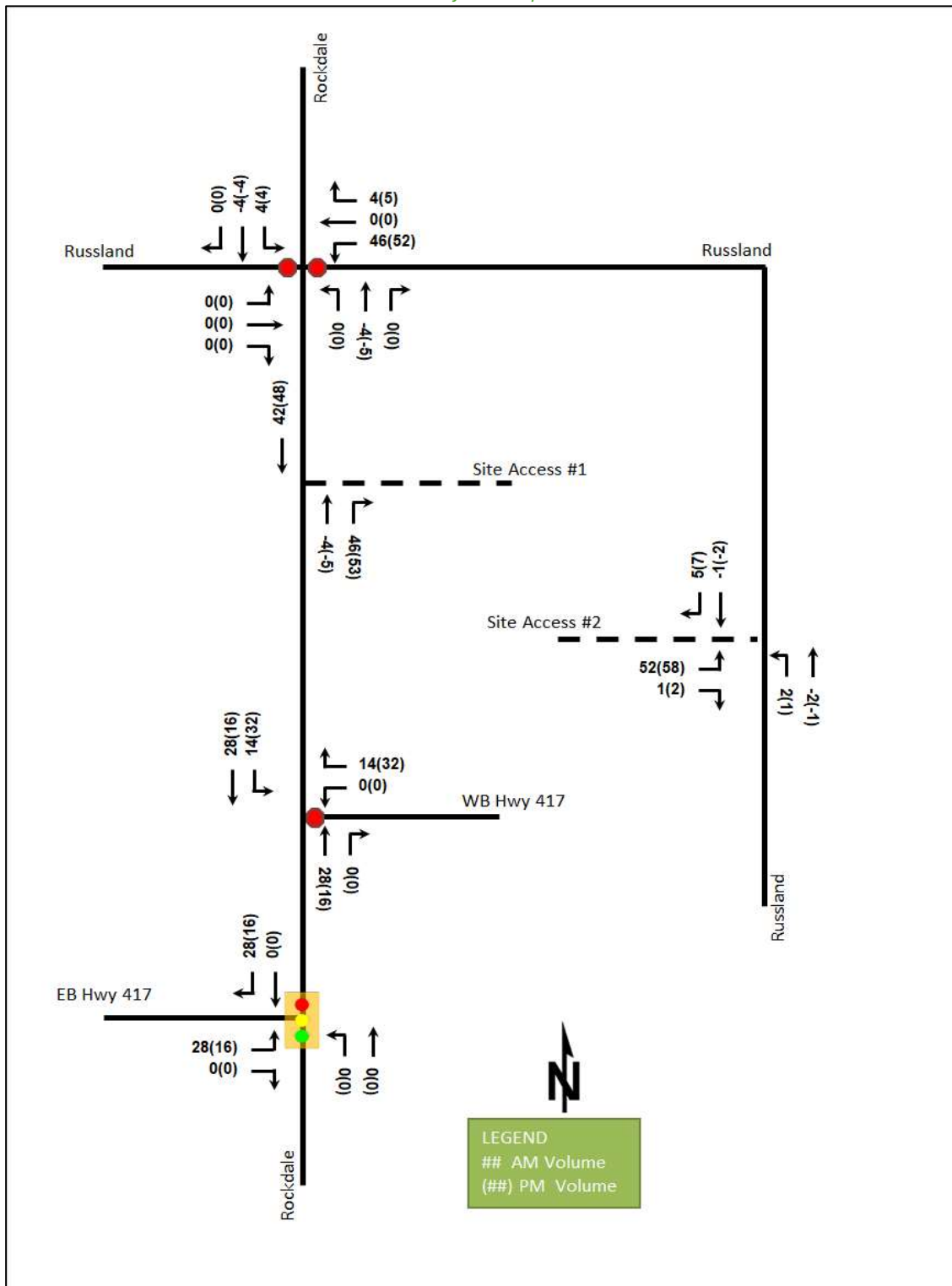
2037 Future Background Volumes



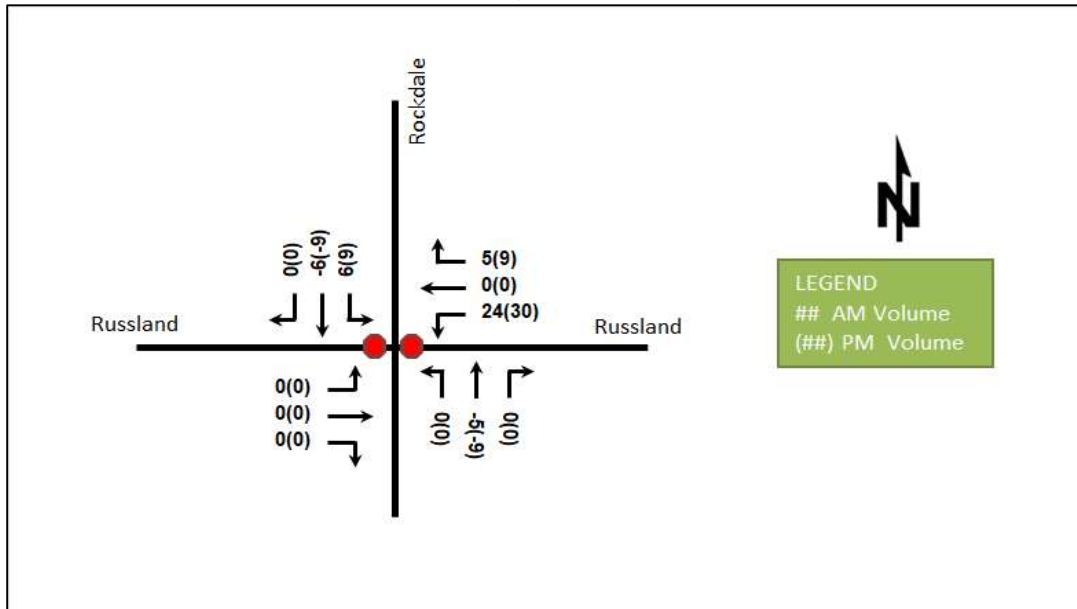
Forecasted Site-Generated Primary Auto Trip – Net Increase



Forecasted Pass-by Auto Trip – Net Increase



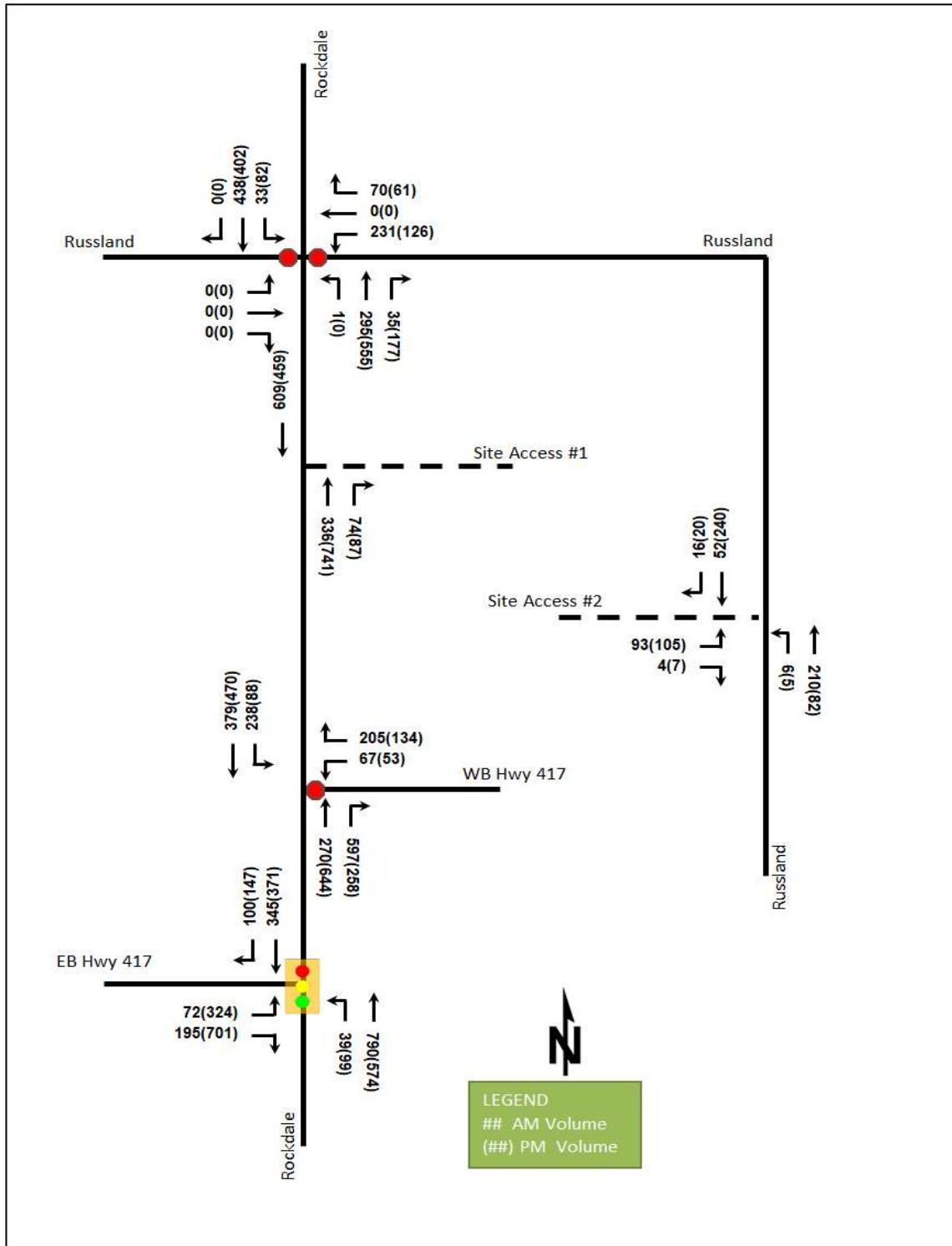
Forecasted Redistribution of Existing Traffic due to RI Restriction of Access #1



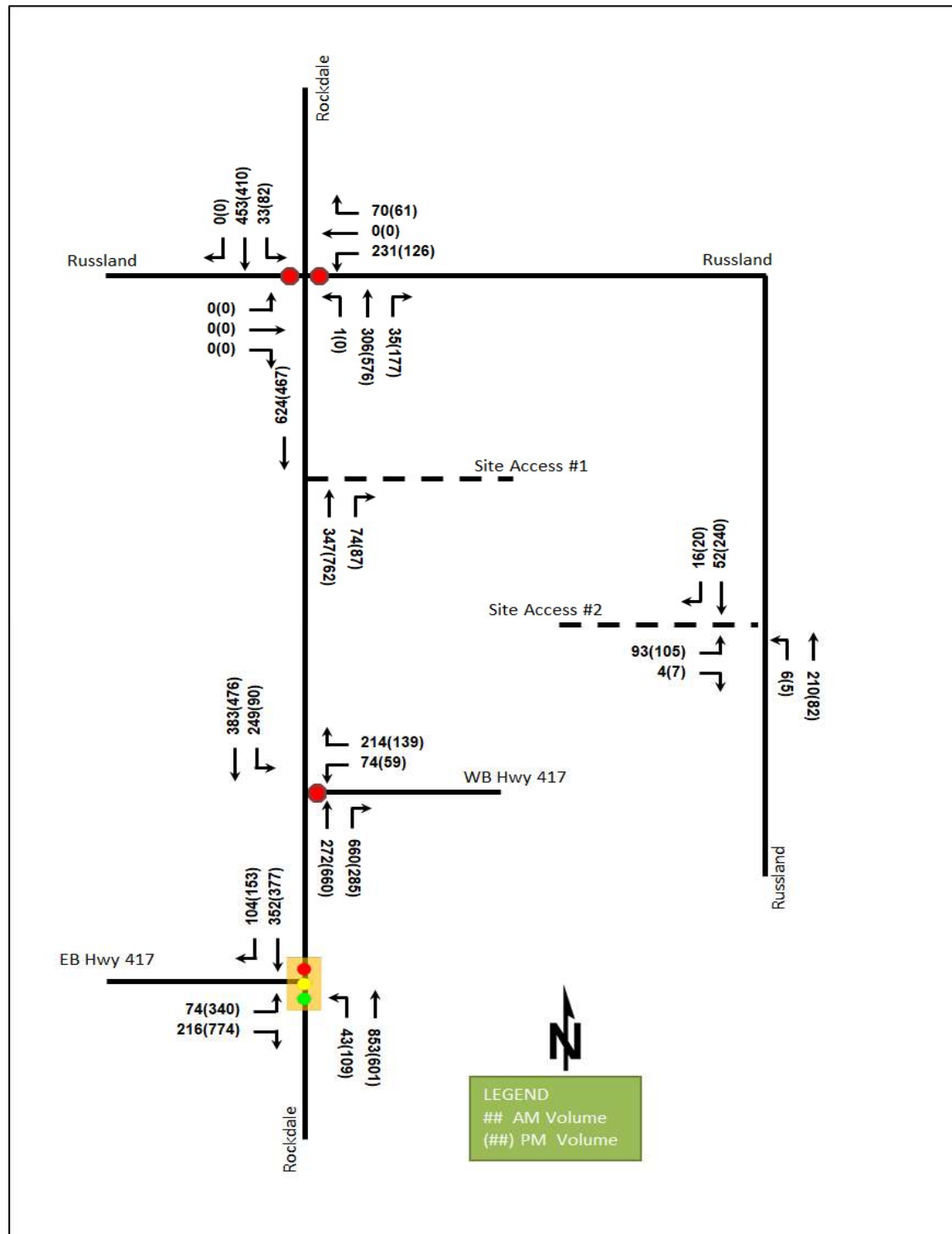
The map illustrates the intersection of Russland and Rockdale roads. Key features include:

- Legend:**
 - ## AM Volume
 - (##) PM Volume
- North Arrow:** Points towards the top of the map.
- Rockdale Road:** Runs vertically through the center of the map.
- Russland Road:** Runs horizontally across the top of the map.
- EB Hwy 417:** Runs horizontally across the bottom of the map.
- WB Hwy 417:** A short segment running horizontally to the right from Rockdale Road.
- Site Access #1:** A dashed line indicating access to the east of Rockdale Road.
- Site Access #2:** A dashed line indicating access to the east of Rockdale Road, further south than Site Access #1.
- Traffic Volumes:**
 - Rockdale Road (Northbound):** 14(18) left, 0(0) through, 75(86) right.
 - Rockdale Road (Southbound):** 69(80) through.
 - Russland Road (Eastbound):** 0(0) left, 0(0) through, 0(0) right.
 - Russland Road (Westbound):** 0(0) left, -6(-6) through, 15(17) right.
 - EB Hwy 417 (Northbound):** 42(27) left, 0(0) through, 5(5) right.
 - EB Hwy 417 (Southbound):** 41(26) left, 5(5) through, 46(31) right.
 - WB Hwy 417 (Westbound):** 22(48) left, 0(0) through, 0(0) right.
 - Site Access #1 (Eastbound):** 74(87) left, -5(-7) right.
 - Site Access #2 (Eastbound):** 16(20) left, -1(-3) right.
 - Site Access #2 (Westbound):** 93(105) left, 4(7) right.
 - Rockdale Road (Eastbound):** 3(-1) left, 6(5) right.

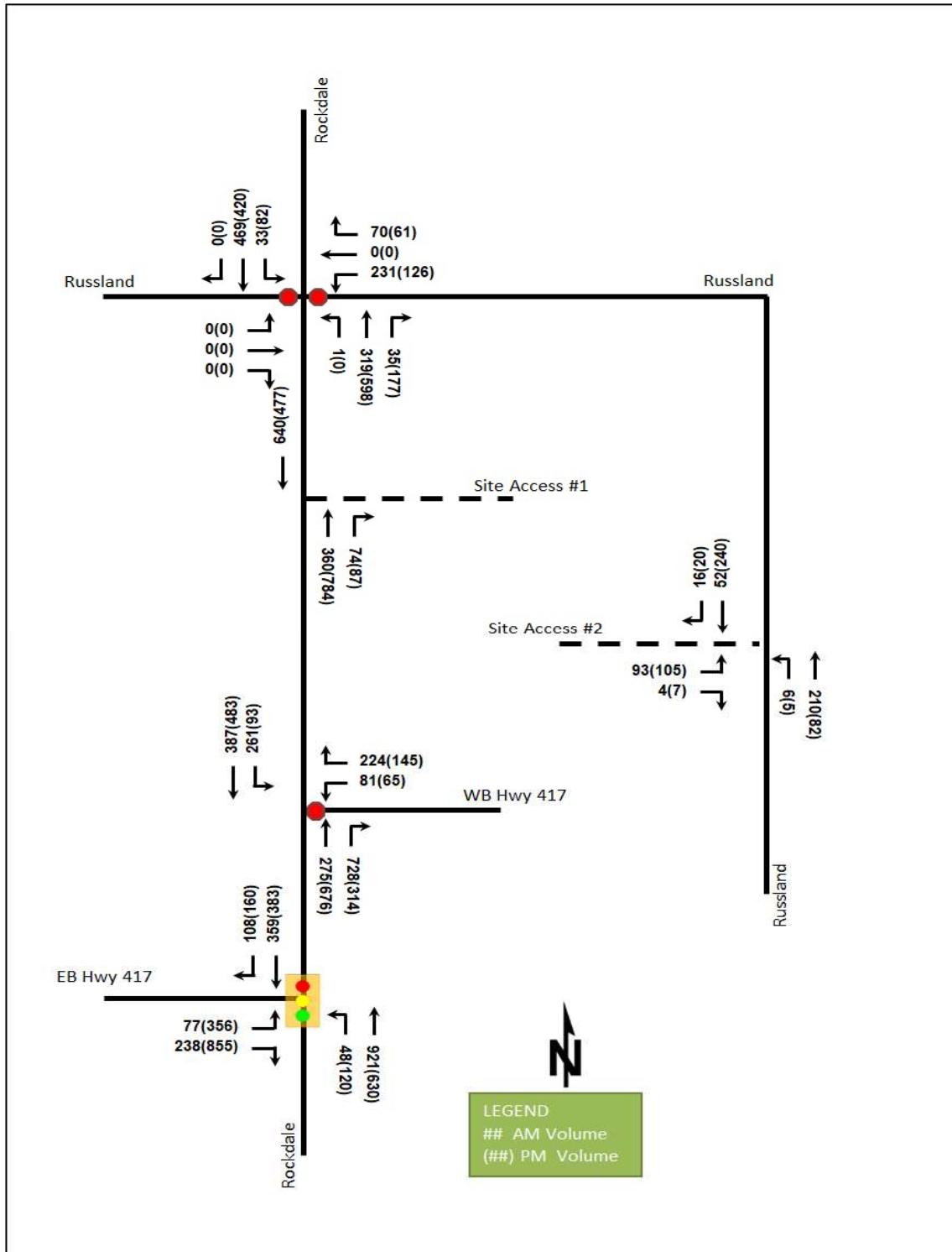
2027 Future Total Traffic Volumes



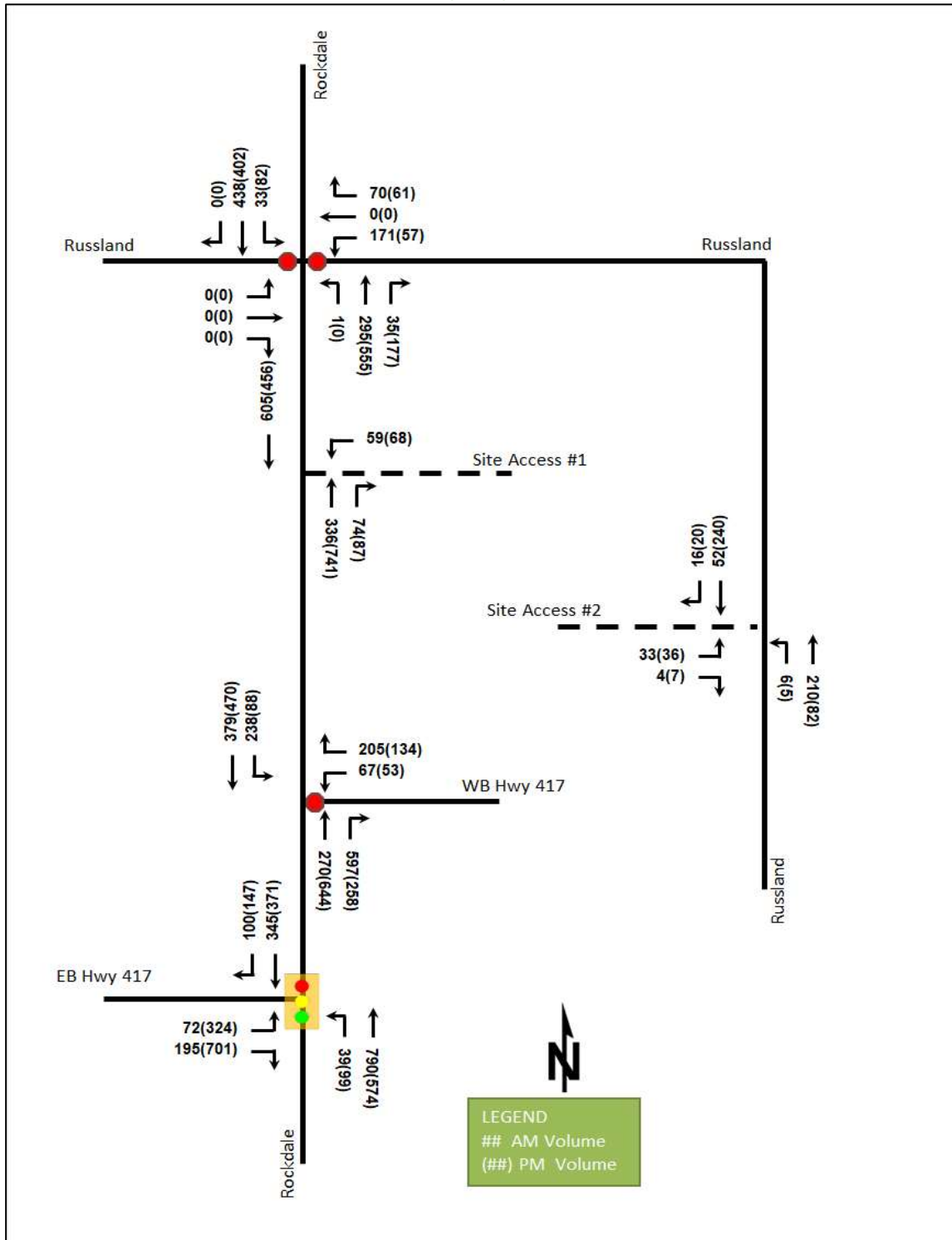
2032 Future Total Traffic Volumes



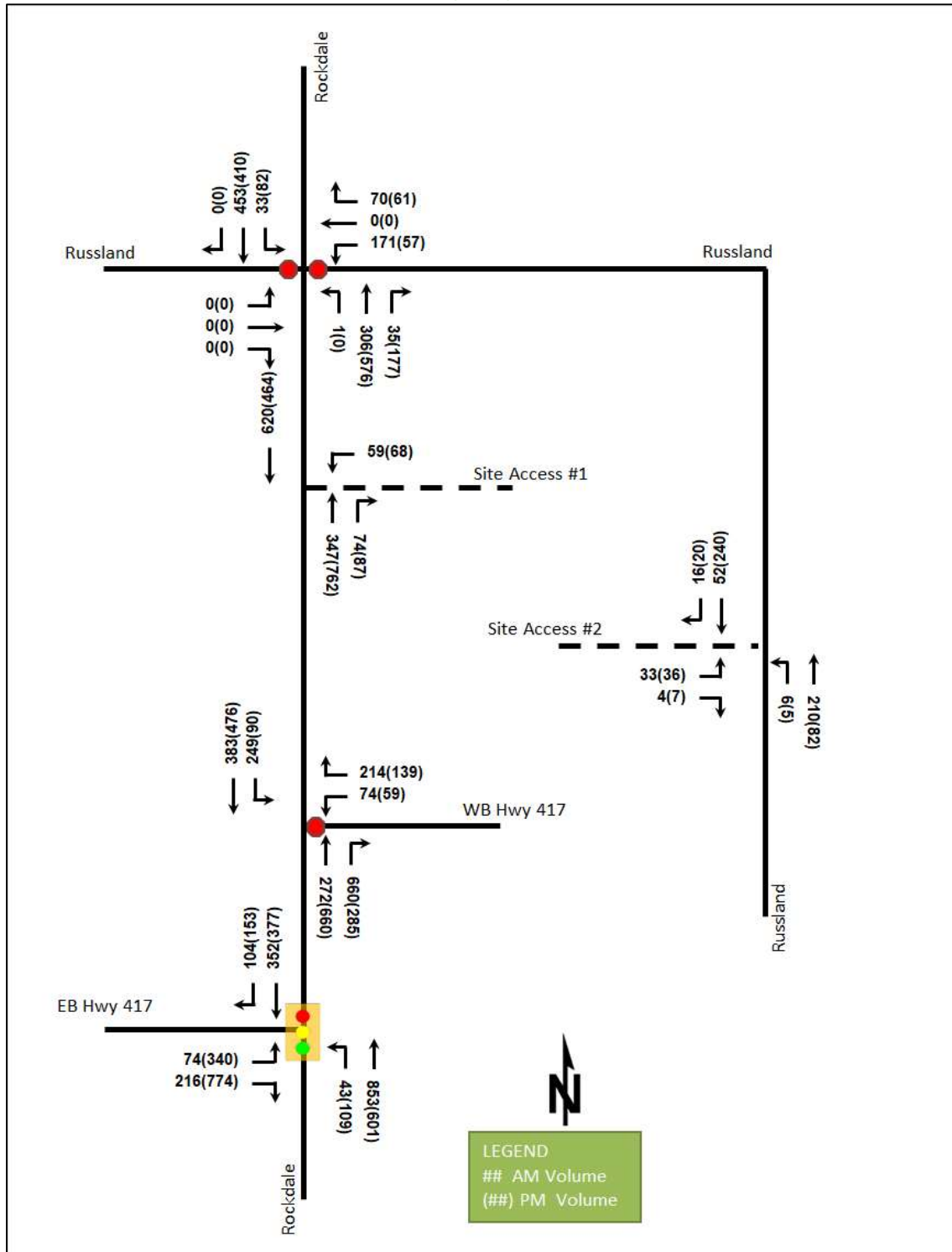
2037 Future Total Traffic Volumes



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



[illegible]

Attachment 4

Turning Movement Count Data

Turning Movement Count - Study Results

ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

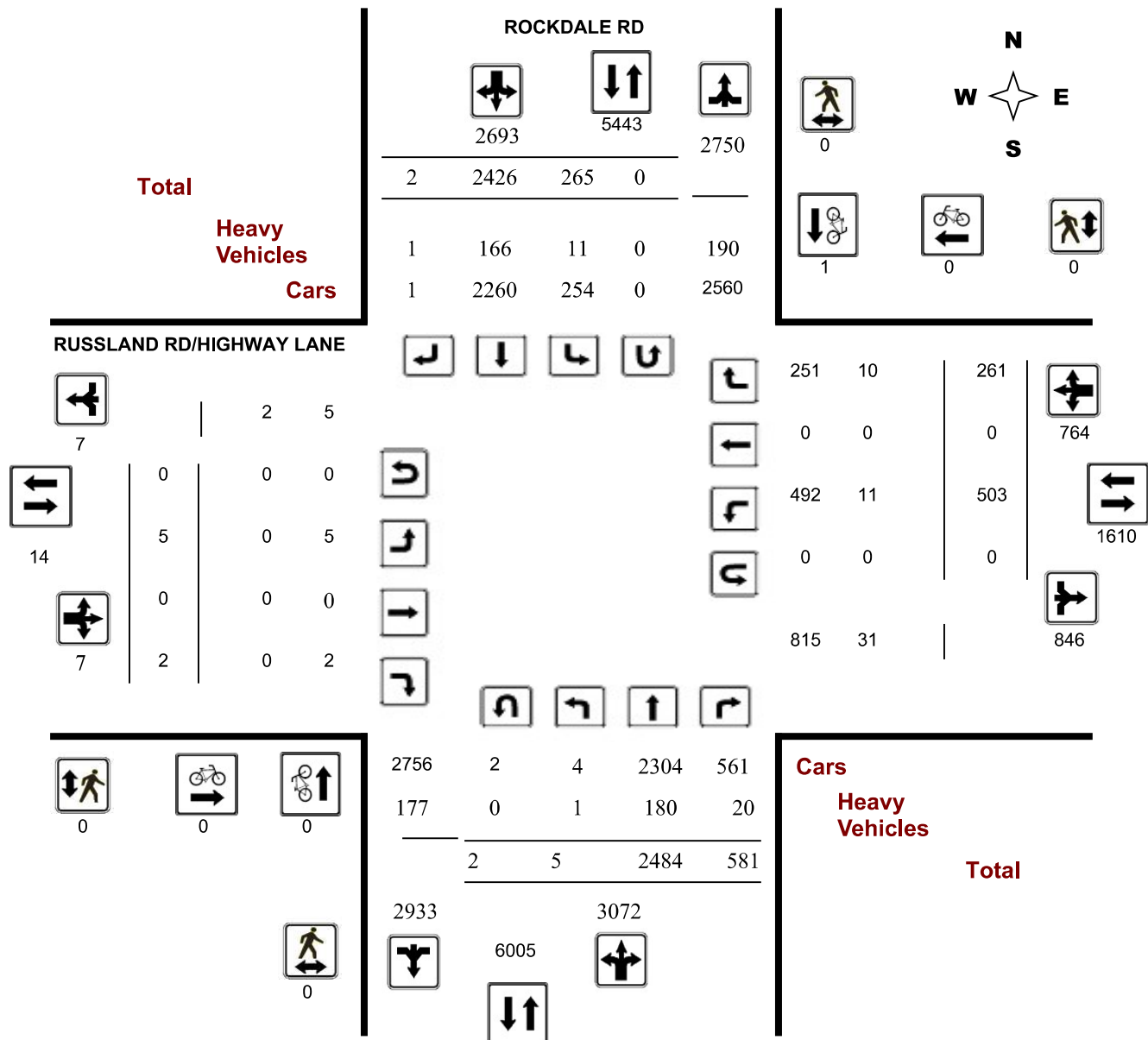
Survey Date: Thursday, November 23, 2023

WO No: 41324

Start Time: 07:00

Device: Miovision

Full Study Diagram



Turning Movement Count - Study Results

ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

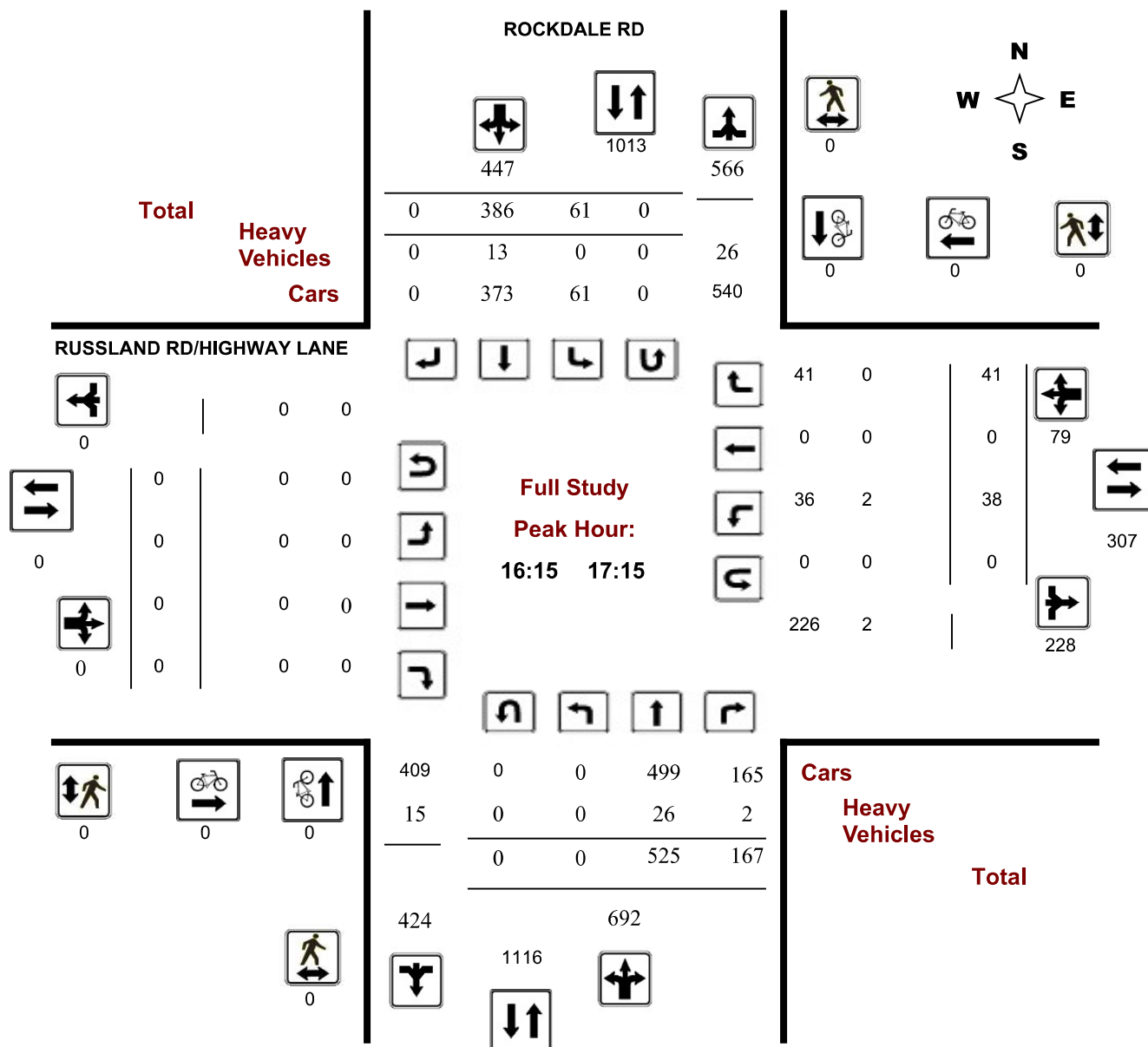
Survey Date: Thursday, November 23, 2023

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

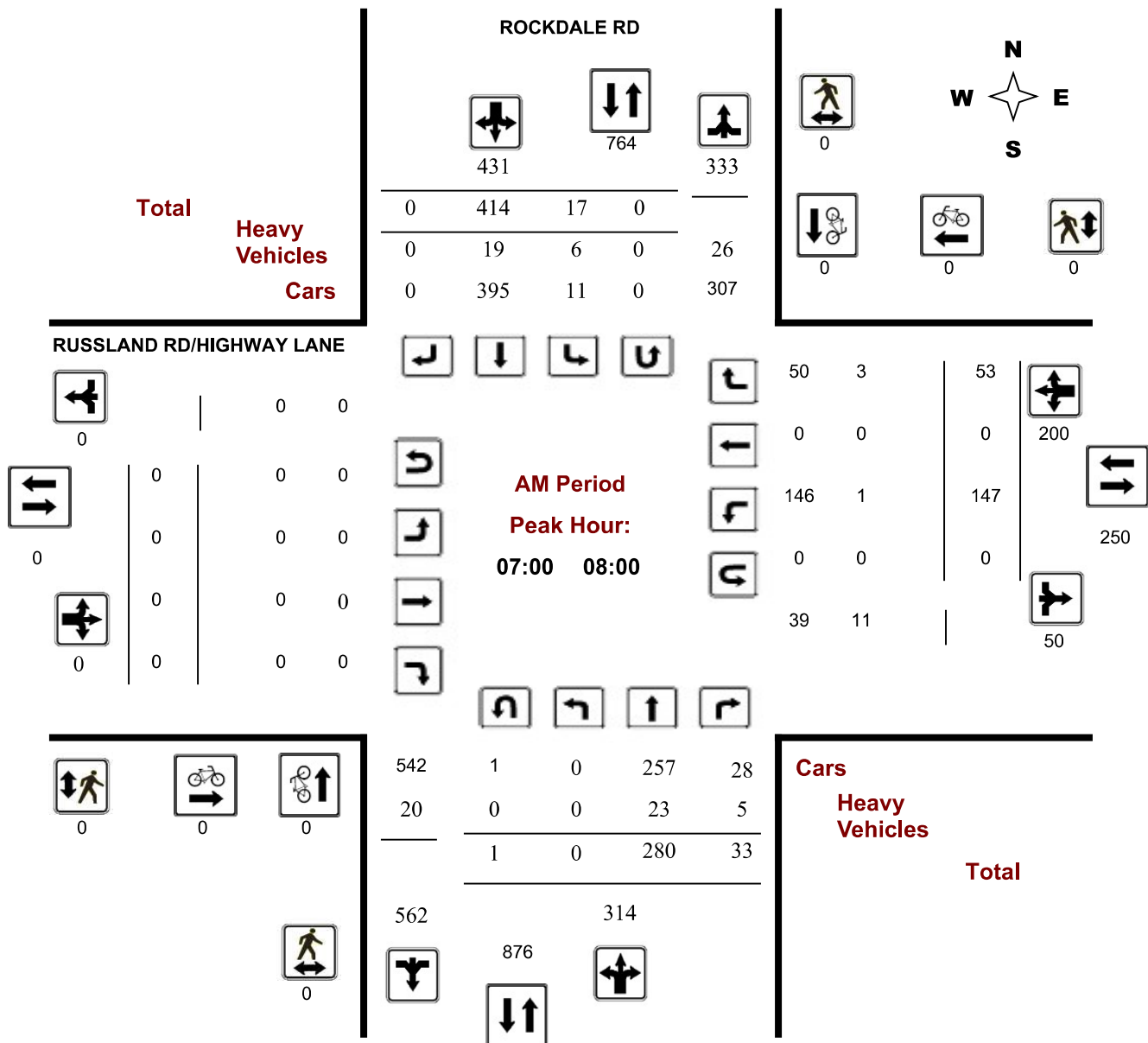
Survey Date: Thursday, November 23, 2023

WO No: 41324

Start Time: 07:00

Device: Miovision

AM Period Peak Hour Diagram



Transportation Services - Traffic Services

Turning Movement Count - Study Results

ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

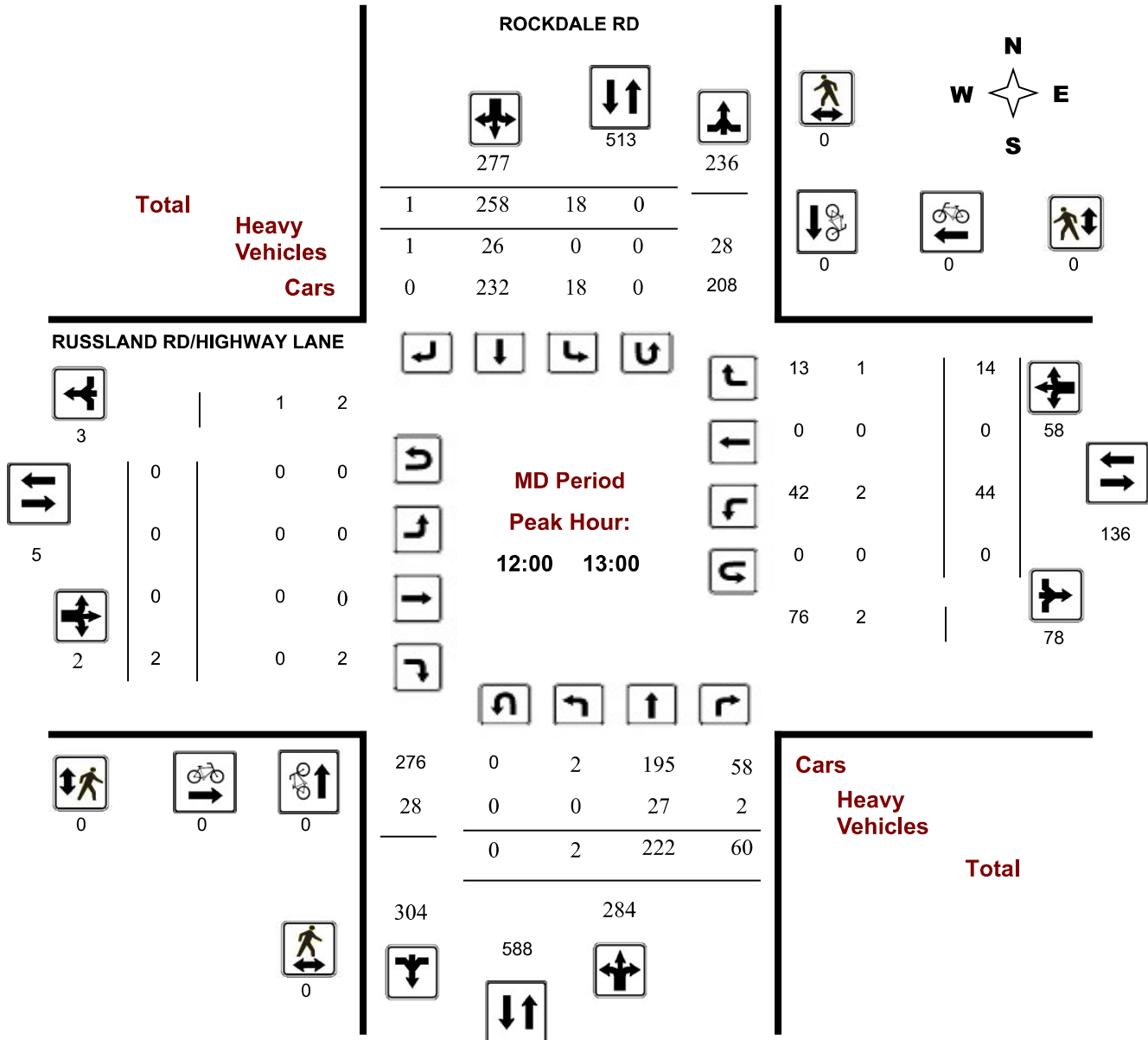
Survey Date: Thursday, November 23, 2023

WO No: 41324

Start Time: 07:00

Device: Miovision

MD Period Peak Hour Diagram



Turning Movement Count - Study Results

ROCKDALE RD @ RUSSLAND RD/HIGHWAY LANE

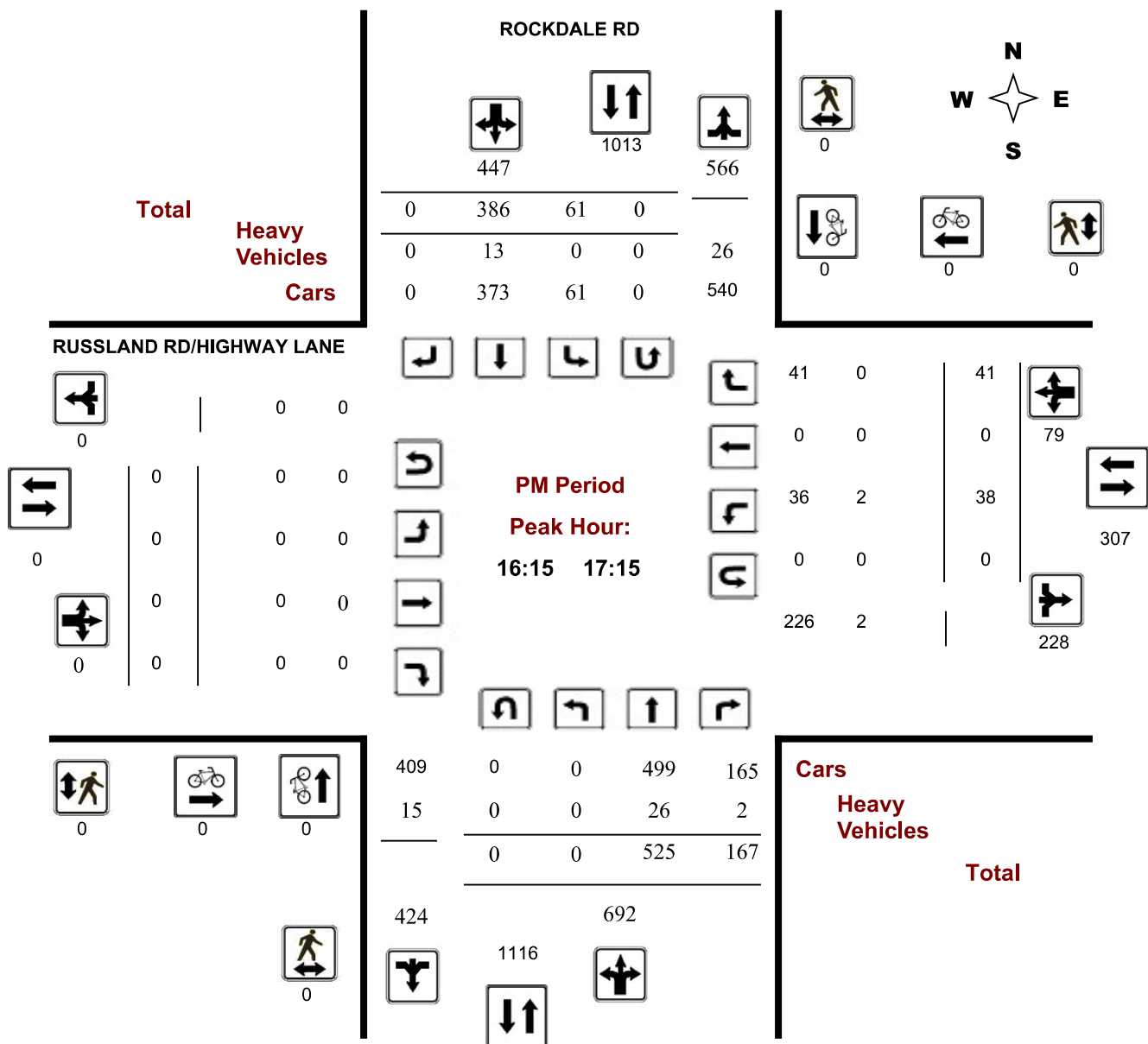
Survey Date: Thursday, November 23, 2023

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	Northbound					Southbound					Eastbound					Westbound					Grand Total
	LT	ST	RT	NB TOT		LT	ST	RT	SB TOT	STR TOT	LT	ST	RT	EB TOT		LT	ST	RT	WB TOT	STR TOT	
07:00 08:00	0	280	33	313		17	414	0	431	744	0	0	0	0		147	0	53	200	200	944
08:00 09:00	1	245	31	277		27	305	0	332	609	0	0	0	0		101	0	40	141	141	750
09:00 10:00	1	204	26	231		20	212	1	233	464	2	0	0	2		54	0	33	87	89	553
11:30 12:30	1	213	54	268		23	239	0	262	530	1	0	0	1		48	0	24	72	73	603
12:30 13:30	2	203	52	257		22	250	1	273	530	2	0	2	4		36	0	13	49	53	583
15:00 16:00	0	395	106	501		44	331	0	375	876	0	0	0	0		42	0	24	66	66	942
16:00 17:00	0	537	160	697		53	386	0	439	1136	0	0	0	0		41	0	41	82	82	1218
17:00 18:00	0	407	119	526		59	289	0	348	874	0	0	0	0		34	0	33	67	67	941
Sub Total	5	2484	581	3070		265	2426	2	2693	5763	5	0	2	7		503	0	261	764	771	6534
U Turns				2					0	2				0					0	0	2
Total	5	2484	581	3072		265	2426	2	2693	5765	5	0	2	7		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
Total:	5	2484	581	3072	265	2426	2	2693	5765	5	0	2	7	503	0	261	764	771	6,536

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			Grand Total
Time Period		Northbound	Southbound	Street Total	Eastbound	Westbound	Street 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
Total	0	0	0	0	0	0	0



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	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	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

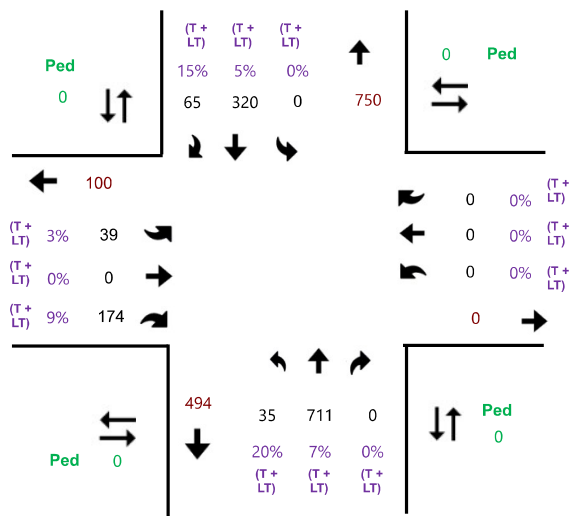
		ROCKDALE RD		RUSSLAND RD/HIGHWAY LANE		
Time Period		Northbound U-Turn Total	Southbound U-Turn Total	Eastbound U-Turn Total	Westbound U-Turn Total	Total
07:00	07:15	0	0	0	0	0
07:15	07:30	0	0	0	0	0
07:30	07:45	0	0	0	0	0
07:45	08:00	1	0	0	0	1
08:00	08:15	0	0	0	0	0
08:30	08:45	0	0	0	0	0
09:00	09:15	0	0	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

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		

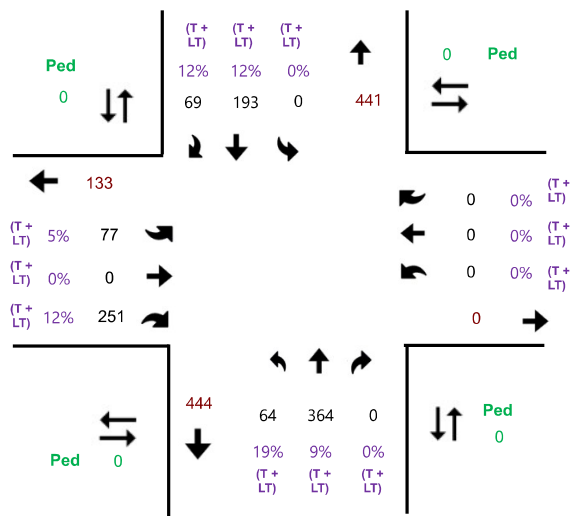
AM Period

Thu, 14 Nov, 2024 07:00 AM - 08:00 AM



MD Period

Thu, 14 Nov, 2024 12:15 PM - 01:15 PM

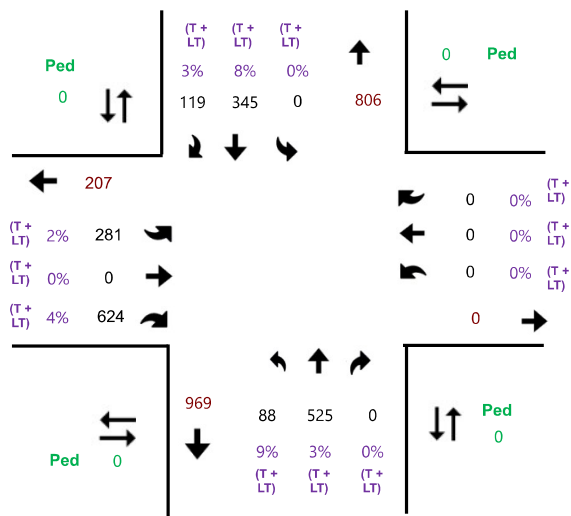


TES - Traffic Engineering System

Turning Movement Total Count and Peak Summary Report

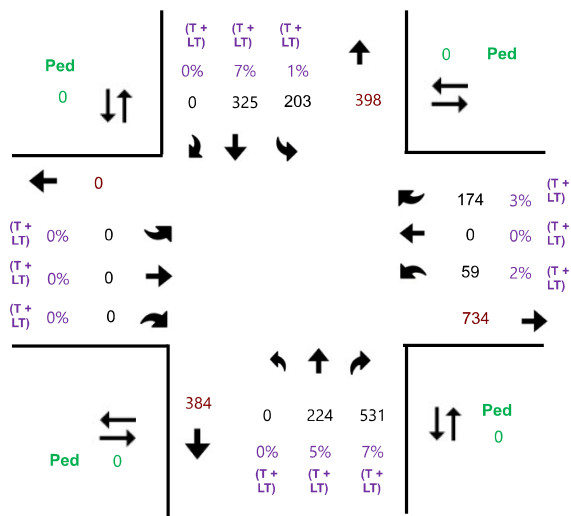
Description:	HWY 417 @ ROCKDALE RD - RAMP 51		
Region	EAST	Hwy #:	HWY 417
LHRS_Offset:	49330_0000_51T	Int. Type:	T-Intersection
Count Date:	Thursday, 14 November, 2024		

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

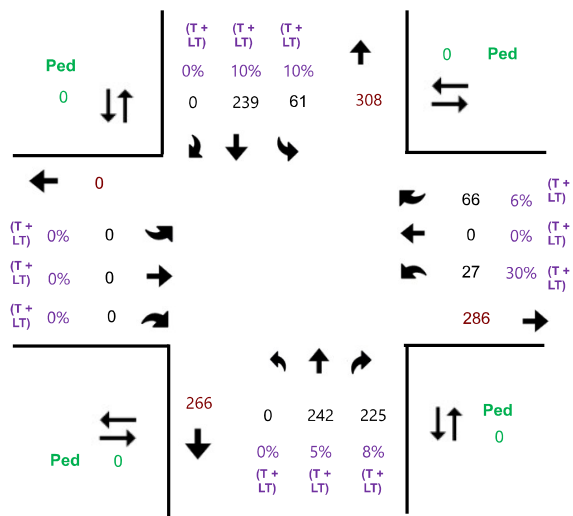


Description: HWY 417 @ ROCKDALE RD - RAMP 61
Region: EAST
LHRS_Offset: 49330_0000_61T
Count Date: Thursday, 14 November, 2024
Hwy #: HWY 417
Int. Type: T-Intersection

AM Period Thu, 14 Nov, 2024 07:00 AM - 08:00 AM



MD Period Thu, 14 Nov, 2024 12:00 PM - 01:00 PM



Description:

Region:

LHRS_Offset:

Count Date:

HWY 417 @ ROCKDALE RD - RAMP 61

EAST

49330_0000_61T

Thursday, 14 November, 2024

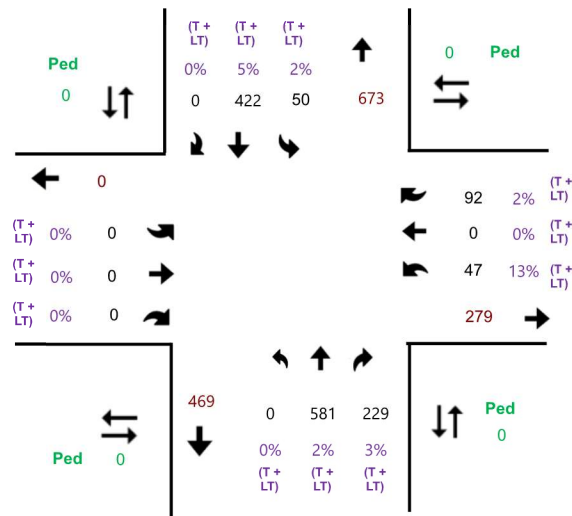
Hwy #:

Int. Type:

HWY 417

T-Intersection

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

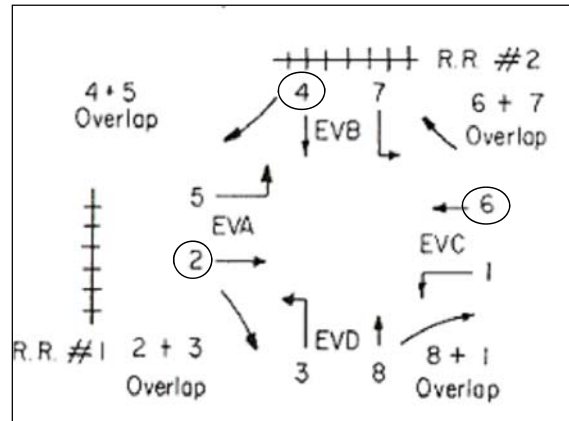
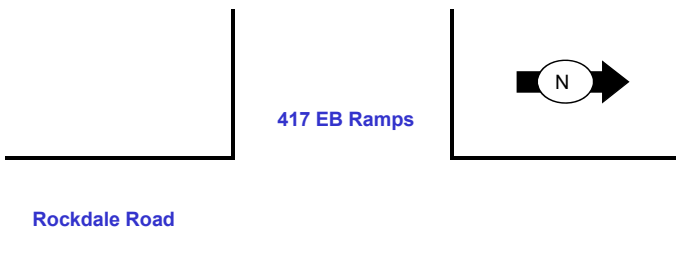
Traffic Signal # 228

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		

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

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

5.0

5.0

		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 >

		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 >

Date: 19-Jun-18

LOCATION

Hwy: 417 EB Ramps

At:

Rockdale Rd

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

< C + O + F = 1 >

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

MANUAL OFFSET

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

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

MANUAL PLAN

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

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: -

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DETECTOR ASSIGNMENTS

[illegible]

Input File Layout

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

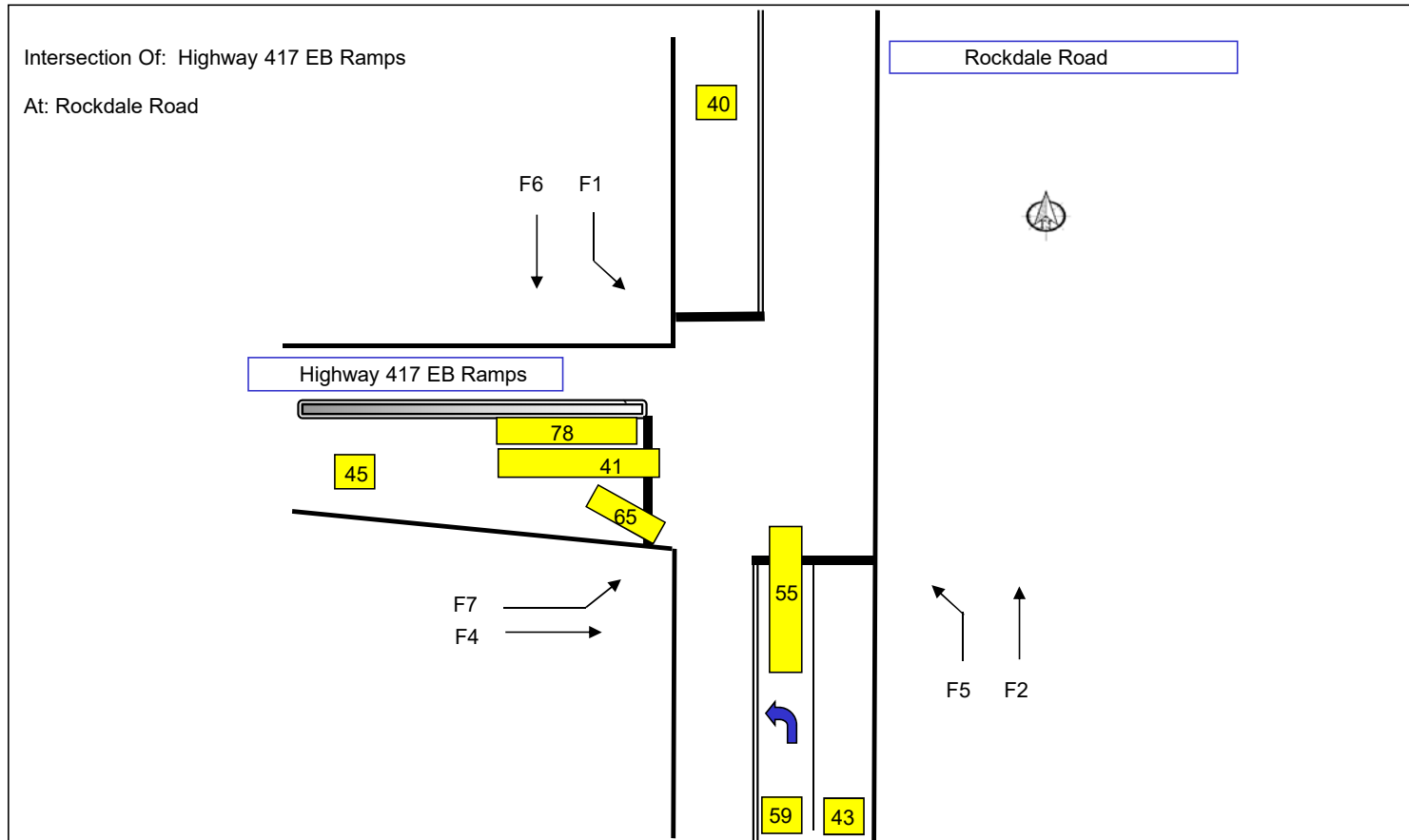
DETECTOR TYPES

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								

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: _____

		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																																

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

HOLIDAY SCHEDULES

DATE:

LOCATION:

at

Exclusive Walk	0	< F/1+0+0 >
Exclusive FDW	0	< F/1+0+0 >
All Red Clearance	0.0	< F/1+0+0 >

Exclusive Pedestrian Phase

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

	D	Row
		0
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

Dimming < C+0+E = 125 >

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

Delay Logic Times < C+0+D = 0 > (seconds)

Long Failure	0.7	< F/1+0+6 >
Short Failure	0.7	< F/1+0+7 >

Power Cycle Correction (Default = 0.5)

Time	Function	Day of Week
0:00	0	
0:00	0	
0:00	0	
0:00	0	
0:00	0	
0:00	0	
0:00	0	
0:00	0	
0:00	0	
0:00	0	
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0:00	0	
0:00	0	
0:00	0	
0:00	0	
0:00	0	

Holiday TOD Functions < C+0+7=0.2>

COLUMN 4

<C+0+E=28>

Row	Day	Year	Month	Holiday Type
0	00	00	0	
1	00	00	0	
2	00	00	0	
3	00	00	0	
4	00	00	0	
5	00	00	0	
6	00	00	0	
7	00	00	0	
8	00	00	0	
9	00	00	0	
A	00	00	0	
B	00	00	0	
C	00	00	0	
D	00	00	0	
E	00	00	0	
F	00	00	0	

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

Row	Day	Year	Month	Holiday Type
0	00	00	0	
1	00	00	0	
2	00	00	0	
3	00	00	0	
4	00	00	0	
5	00	00	0	
6	00	00	0	
7	00	00	0	
8	00	00	0	
9	00	00	0	
A	00	00	0	
B	00	00	0	
C	00	00	0	
D	00	00	0	
E	00	00	0	
F	00	00	0	

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

Time	Plan	Offset	Holiday Type
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	

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

Time	Plan	Offset	Holiday Type
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	
00:00	###	###	

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

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

- 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

COORDINATION

Column Numbers ---->		PLAN								
Plan Name ---->		1	2	3	4	5	6	7	8	9
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>

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>

0		2
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 0.3 < 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

DATE: 03-Sep-12

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

	E	Row	Time	Plan	Offset	Day of Week
0		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)

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

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	Column 1 ATTRIBUTES								Column 2 PHASE(S)								Column 3 ASSIGNMENTS							
		C1 PIN NUMBER	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
I-6 U	-->	2	41			X	X	X						X					X	X	X					X
J-6 U	-->	3	42			X	X	X										X	X	X	X					X
I-2 L	-->	4	43			X	X	X		X									X	X	X					X
J-2 L	-->	5	44			X	X	X						X					X	X	X					X
I-6 L	-->	6	45			X	X	X						X					X	X	X					X
J-6 L	-->	7	46			X	X	X										X	X	X	X					X
I-4	-->	8	47					X	X		X								X	X	X					X
J-4	-->	9	48					X	X					X					X	X	X					X
I-8	-->	A	49					X	X					X					X	X	X					X
J-8	-->	B	50					X	X									X	X	X	X					X
J-1	-->	C	55			X	X	X						X					X	X	X					X
I-1	-->	D	56			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

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

Input File

→ 1 2 3 4 5 6 7 8 9 10 11 12 13 14

"I" FILE

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

"J" FILE

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

Standard 332 Cabinet Location		Column 4	Column 5 ATTRIBUTES								Column 6 PHASE(S)								Column 7 ASSIGNMENTS							
		C1 PIN NUMBER	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
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
I-3 U	-->	4	63			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
J-7 U	-->	7	66			X	X	X										X	X	X	X					X
I-12 U	-->	8	67	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
I-13 L	-->	B	70	X														X	X	X	X					X
I-3 L	-->	C	76			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
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

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:

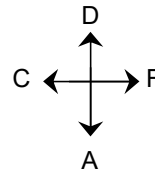
$$E/2 + 0 + 9 = \text{Not Zero}$$

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

<u>Plan Select</u>	<u>Offset Select</u>
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

Page 1 (of 8)

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

Communication Addresses

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

Manual Selection

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

Start / Revert Times

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

Exclusive Ped Phase

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

Column Numbers ---->		Phase							
Phase Names ---->		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
Max Initial					
Alternate Walk					
Alternate FDW					
Alternate Initial					
Alternate Extension					

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

Column Numbers ---->		E
Row		
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
		8
		9
		A
		B
		C
		D
		E
		F

Coordination
Transition
Minimums

<C+0+C=5>

		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>

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>

(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>

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

Assignable Inputs

<C+0+E=126>

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

Assignable Outputs

<C+0+E=127>

Column Numbers ---->		Phase							
		1	2	3	4	5	6	7	8
Row	Phase Names ---->								
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>

Column Numbers ---->		Phase							
		1	2	3	4	5	6	7	8
Row	Phase Names ---->								
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>

	9	A	B	C	D
Phase 1	0	0	0	0	0.0
Phase 2	0	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	0	0	0	0	0.0
Phase 7	0	0	0	0	0.0
Phase 8	0	0	0	0	0.0
Max Initial					
Alternate Walk					
Alternate FDW					
Alternate Initial					
Alternate Extension					

Alternate Timing

	9	A	B	C	D
Phase 1	0	0	0	0	0.0
Phase 2	0	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	0	0	0	0	0.0
Phase 7	0	0	0	0	0.0
Phase 8	0	0	0	0	0.0
Max Initial					
Alternate Walk					
Alternate FDW					
Alternate Initial					
Alternate Extension					

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)

	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 ---->						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 ---->						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
Enable Redirection				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

Dimming <C+0+E=125>

	D
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

Disable Alarms

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

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

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		

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		

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	7	8	9	A	B	C	D	E	F
	Clear	Time	Ped Call	Hold	Advance	Force Off	Vehicle Call	Permit Phases	Ped Omit	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	7	8	9	A	B	C	D	E	F
	Clear	Time	Ped Call	Hold	Advance	Force Off	Vehicle Call	Permit Phases	Ped Omit	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:

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 th)	LOS	V/C	Delay	Q (95 th)
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
	Overall	A	-	8.5	-	A	-	2.8	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	F	0.72	107.5	27.8	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
	Overall	A	-	7.6	-	A	-	3.1	-
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	F	1.02	63.2	#150.3
	NBL	A	0.08	11.6	11.4	B	0.70	57.6	#37.0
	NBT	D	0.88	19.9	#244.2	E	0.93	47.6	#162.2
	SBT/R	A	0.49	8.8	94.8	D	0.86	38.5	#135.3
	Overall	C	-	16.9	-	E	-	46.3	-

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

2027 Future Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
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
	Overall	A	-	8.9	-	A	-	2.9	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	F	0.84	139.8	33.0	F	0.44	51.9	14.3
	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
	Overall	A	-	9.2	-	A	-	3.4	-
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	F	1.09	82.8	#168.3
	NBL	A	0.09	12.0	11.8	C	0.77	67.6	#42.3
	NBT	E	0.91	24.0	#258.0	E	0.96	52.9	#168.9
	SBT/R	A	0.49	9.1	96.7	D	0.88	39.9	#137.7
	Overall	C	-	19.3	-	E	-	55.0	-

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 Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
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
	Overall	A	-	9.7	-	A	-	3.0	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	F	1.12	242.1	45.0	F	0.52	62.5	18.8
	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
	Overall	B	-	14.0	-	A	-	4.0	-
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	F	1.20	125.9	#199.9
	NBL	A	0.10	13.1	12.9	E	0.92	98.8	#49.7
	NBT	E	0.98	37.9	#283.5	E	1.00	64.1	#179.9
	SBT/R	A	0.50	9.7	99.9	D	0.90	43.0	#144.0
	Overall	C	-	27.4	-	F	-	75.0	-

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 Background Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	0.80	53.3	48.0	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
	Overall	B	-	10.7	-	A	-	3.2	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	F	1.52	420.2	59.3	F	0.63	79.3	23.3
	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
	Overall	C	-	22.4	-	A	-	4.9	-
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	F	1.32	178.7	#234.7
	NBL	A	0.12	14.5	14.1	F	1.10	155.1	#56.9
	NBT	F	1.08	68.8	#311.1	F	1.05	77.9	#191.9
	SBT/R	A	0.53	10.7	#104.5	E	0.92	46.5	#148.6
	Overall	D	-	44.7	-	F	-	101.5	-

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

2027 Future Total Intersection Operations

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
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	-	-	-	-	-	-	-	-
	Overall	A	-	3.0	-	A	-	3.0	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	1.09	116.8	96.8	F	1.30	227.5	90.8
	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
	Overall	D	-	32.1	-	D	-	30.9	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	F	1.07	234.4	41.3	F	0.57	78.6	19.5
	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
	Overall	B	-	12.8	-	A	-	4.8	-
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	F	1.09	82.8	#168.5
	NBL	A	0.10	13.5	11.9	D	0.89	92.8	#45.0
	NBT	E	0.92	26.3	#258.7	E	0.96	53.6	#169.3
	SBT/R	A	0.54	10.0	#114.7	E	0.91	45.2	#146.1
	Overall	C	-	20.6	-	E	-	57.2	-

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 th)	LOS	V/C	Delay	Q (95 th)
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	-	-	-	-	-	-	-	-
	Overall	A	-	3.0	-	A	-	3.0	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	1.14	135.2	104.3	F	1.36	253.9	95.3
	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
	Overall	E	-	36.3	-	D	-	33.7	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	F	1.44	393.7	54.0	F	0.68	99.6	24.8
	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
	Overall	C	-	19.9	-	A	-	5.9	-
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	F	1.20	125.9	#200.3
	NBL	A	0.11	14.7	13.1	F	1.06	144.2	#52.2
	NBT	E	1.00	42.9	#284.2	F	1.01	64.8	#180.6
	SBT/R	A	0.56	10.8	#119.9	E	0.94	49.1	#151.3
	Overall	C	-	29.7	-	F	-	78.0	-

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 th)	LOS	V/C	Delay	Q (95 th)
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	-	-	-	-	-	-	-	-
	Overall	A	-	3.0	-	A	-	3.0	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	1.19	156.5	111.8	F	1.44	292.5	100.5
	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
	Overall	E	-	40.9	-	E	-	37.9	-
Rockdale Road at Highway 417 Westbound Ramp Terminal <i>Unsignalized</i>	WBL	F	2.00	664.7	68.3	F	0.81	134.1	31.5
	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
	Overall	D	-	32.1	-	A	-	7.6	-
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	F	1.32	178.7	#235.1
	NBL	A	0.13	16.2	14.3	F	1.29	230.4	#59.6
	NBT	F	1.10	76.2	#311.8	F	1.06	78.9	#192.9
	SBT/R	A	0.58	11.9	#124.3	E	0.96	54.0	#156.6
	Overall	D	-	47.8	-	F	-	106.0	-

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 th)	LOS	V/C	Delay	Q (95 th)
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	0.98	84.4	77.3	F	1.10	153.5	71.3
	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
	Overall	C	-	22.2	-	C	-	20.2	-

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 th)	LOS	V/C	Delay	Q (95 th)
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	-	-	-	-	-	-	-	-
	Overall	A	-	1.4	-	A	-	2.2	-
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	-	-	-	-	-	-	-	-
	Overall	A	-	1.3	-	A	-	1.3	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	0.83	54.6	54.0	F	0.67	55.0	30.0
	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
	Overall	B	-	12.9	-	A	-	5.5	-

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- Sensitivity Analysis with Site Access #1 Outbound Left-Turn

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
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	-	-	-	-	-	-	-	-
	Overall	A	-	1.4	-	A	-	2.3	-
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	-	-	-	-	-	-	-	-
	Overall	A	-	1.3	-	A	-	1.3	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	0.87	62.2	58.5	F	0.70	60.2	32.3
	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
	Overall	B	-	14.3	-	A	-	5.8	-

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- Sensitivity Analysis with Site Access #1 Outbound Left-Turn

Intersection	Lane	AM Peak Hour				PM Peak Hour			
		LOS	V/C	Delay	Q (95 th)	LOS	V/C	Delay	Q (95 th)
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	-	-	-	-	-	-	-	-
	Overall	A	-	1.4	-	A	-	2.4	-
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	-	-	-	-	-	-	-	-
	Overall	A	-	1.3	-	A	-	1.3	-
Rockdale Road at Russland Road <i>Unsignalized</i>	EB	-	-	-	-	-	-	-	-
	WB	F	0.91	72.3	63.8	F	0.74	69.3	35.3
	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
	Overall	B	-	16.1	-	A	-	6.5	-

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

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	EBLn1WBLn1	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	-

HCM 6th TWSC
2: Rockdale & Hwy 417 WB

Existing AM Peak Hour
6175 Rockdale Dr

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	0
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	NBRWBLn1WBLn2	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(I)	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	EBLn1WBLn1	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	0
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	NBRWBLn1WBLn2	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	0		
HCM Lane LOS	-	- E C	B	A		
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	EBLn1WBLn1	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	0
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	NBRWBLn1WBLn2	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	0		
HCM Lane LOS	-	- F C	B	A		
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	EBLn1WBLn1	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	0
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	NBRWBLn1WBLn2	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	0		
HCM Lane LOS	-	- F C	B	A		
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	EBLn1WBLn1	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	0
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(I)	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+l1), 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	EBLn1WBLn1	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	0
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	NBRWBLn1WBLn2	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	0		
HCM Lane LOS	-	- F C	B	A		
HCM 95th %tile Q(veh)	-	- 2.5 1.4	0.3	-		

Queues
3: Rockdale & Hwy 417 EB

FB2032PM Peak Hour
6175 Rockdale Dr



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(I)	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	
Intersection Summary						
HCM 6th Ctrl Delay			75.0			
HCM 6th LOS			E			
Notes						

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	EBLn1WBLn1	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	0
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

Queues

3: Rockdale & Hwy 417 EB

FB2037AM Peak Hour

6175 Rockdale Dr



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(I)	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+l1), 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	EBLn1WBLn1	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	0
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	NBRWBLn1WBLn2	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	0		
HCM Lane LOS	-	- F C	B	A		
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+l1), 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	EBLn1WBLn1	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	NBRWBLn1WBLn2	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+l1), 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
Intersection Summary		
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	EBLn1WBLn1	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	0
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	NBRWBLn1WBLn2	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	0		
HCM Lane LOS	-	- F C	B	A		
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(I)	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	
Intersection Summary						
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
Intersection Summary		
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	EBLn1WBLn1	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	NBRWBLn1WBLn2	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+l1), 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

	↑	↓
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
Intersection Summary		
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	EBLn1WBLn1	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	0
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	NBRWBLn1WBLn2	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	0			
HCM Lane LOS	-	- F C B	A			
HCM 95th %tile Q(veh)	-	- 3.3 2.1 0.5	-			

Queues

3: Rockdale & Hwy 417 EB

FT2032PM Peak Hour

6175 Rockdale Dr



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(I)	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
Intersection Summary		
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	0
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	NBRWBLn1WBLn2	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

Queues

3: Rockdale & Hwy 417 EB

FT2037AM Peak Hour

6175 Rockdale Dr



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(I)	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						
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	0
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	NBRWBLn1WBLn2	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(l)	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+l1), 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
Intersection Summary		
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						
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	EBLn1WBLn1	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	EBLn1WBLn1	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						
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	EBLn1WBLn1	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						
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	EBLn1	WBLn1	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						
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	EBLn1WBLn1	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						
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						
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	EBLn1WBLn1	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						
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	
Total	5	2,484	581	5	0	2	265	2,426	2	503	0	261	0

Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: Rockdale Road/Russland Road

Count Date: 2023-11-23

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				
	☒	☐	☐	☐												
1A	480	720	600	900	944	750	553	603	583	942	1,218	941				
	COMPLIANCE %				100	100	100	100	100	100	100	100	800	100		
1B	120	170	120	170	200	141	89	73	53	66	82	67				
	COMPLIANCE %				100	100	74	61	44	55	68	56	558	70		
Free Flow					Both 1A and 1B 100% Fulfilled each of 8 hours								Yes ☐		No ☒	
Signal Justification 1:					Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes ☐		No ☒	

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		
	☒	☐	☐	☐	7:00	8:00	9:00	11:30	12:30	15:00	16:00	17:00		
2A	480	720	600	900	744	609	464	530	530	876	1,136	874		
	COMPLIANCE %				100	100	97	100	100	100	100	100	797	100
2B	50	75	50	75	147	101	56	49	38	42	41	34		
	COMPLIANCE %				100	100	100	98	76	84	82	68	708	89
Free Flow					Both 2A and 2B 100% fulfilled each of 8 hours								Yes ☐	No ☒
Signal Justification 2:					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes ☒	No ☐

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicle Volume	YES ☐	NO ☒	YES ☐	NO ☒
Justification 2	Delay Cross Traffic	YES ☒	NO ☐		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 %	

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	%	☐	☒
	B Crossing Volume	70	%		
2. Delay to Cross Traffic	A Main Road	100	%	☐	☒
	B Crossing Road	89	%		
3. Combination	A Justificaton 1	70	%	☐	☒
	B Justification 2	89	%		
4. 4-Hr Volume		70	%	☐	☒

Input Data Sheet

[Analysis Sheet](#)[Results Sheet](#)[Proposed Collision](#)[GO TO Justification:](#)

What are the intersecting roadways?

Highway 417 westbound ramp terminal/Rockdale Road

What is the direction of the Main Road street?

North-South

When was the data collected?

2024-11-14

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?

3

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	
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	
Total	0	2,806	2,413	0	0	0	795	2,594	0	396	0	764	0

Analysis Sheet

Input Sheet

Results Sheet

Proposed Collision

GO TO Justification:

Intersection: Highway 417 westbound ramp terminal/Rockdale Road

Count Date: 2024-11-14

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		
1A	☒	☐	☐	☐	8:00	9:00	10:00	12:30	13:00	16:00	17:00	18:00		
	480	720	600	900	1,607	1,208	1,208	866	859	1,326	1,507	1,187	800	100
1B	COMPLIANCE %				100	100	100	100	100	100	100	100		
	180	255	180	255	247	147	147	95	94	150	148	132		
COMPLIANCE %					100	82	82	53	52	83	82	73	607	76
Free Flow Signal Justification 1:					Both 1A and 1B 100% Fulfilled each of 8 hours Lesser of 1A or 1B at least 80% fulfilled each of 8 hours								Yes ☐ Yes ☐	No ☒ No ☒

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		
2A	☒	☐	☐	☐	8:00	9:00	10:00	12:30	13:00	16:00	17:00	18:00		
	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
Free Flow														
Signal Justification 2:					Both 2A and 2B 100% fulfilled each of 8 hours								Yes ☐	No ☒
					Lesser of 2A or 2B at least 80% fulfilled each of 8 hours								Yes ☒	No ☐

Justification 3: Combination

Combination Justification 1 and 2

Justification Satisfied 80% or More				Two Justifications Satisfied 80% or More	
Justification 1	Minimum Vehicle Volume	YES ☐	NO ☒	YES ☐	NO ☒
Justification 2	Delay Cross Traffic	YES ☒	NO ☐		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	%	☐	☒
	B Crossing Volume	76	%		
2. Delay to Cross Traffic	A Main Road	100	%	☐	☒
	B Crossing Road	87	%		
3. Combination	A Justificaton 1	76	%	☐	☒
	B Justification 2	87	%		
4. 4-Hr Volume		100	%	☒	☐

Rockdale Rd @ Russland Road
2027 Future Background

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Signal	
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		Entire %
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		Signal	
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		Entire %
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		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		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		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, $AHV = PM/2$ 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, $AHV = PM/2$ 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		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		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

Rockdale Rd@ Hwy 417 WB
2027 Future Background

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		Signal	
		1 Lane Highway		2 or More Lanes		Sectional			
		Free Flow	Restr. Flow	Free Flow	Restr. Flow	Numerical	%		Entire %
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

Rockdale Rd@ Hwy 417 WB
2032 Future Background

Justification #7

Justification	Description	Minimum Requirement		Minimum Requirement		Compliance		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		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		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	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

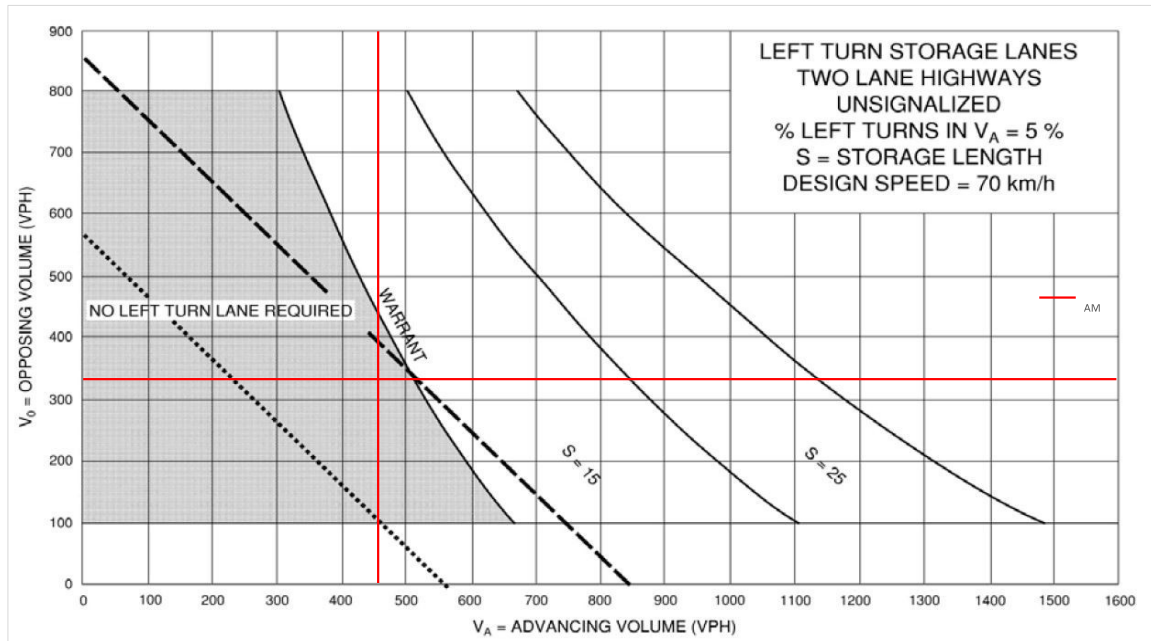
Left-turn Warrant Calculation Sheets

Rockdale Road at Russland Road

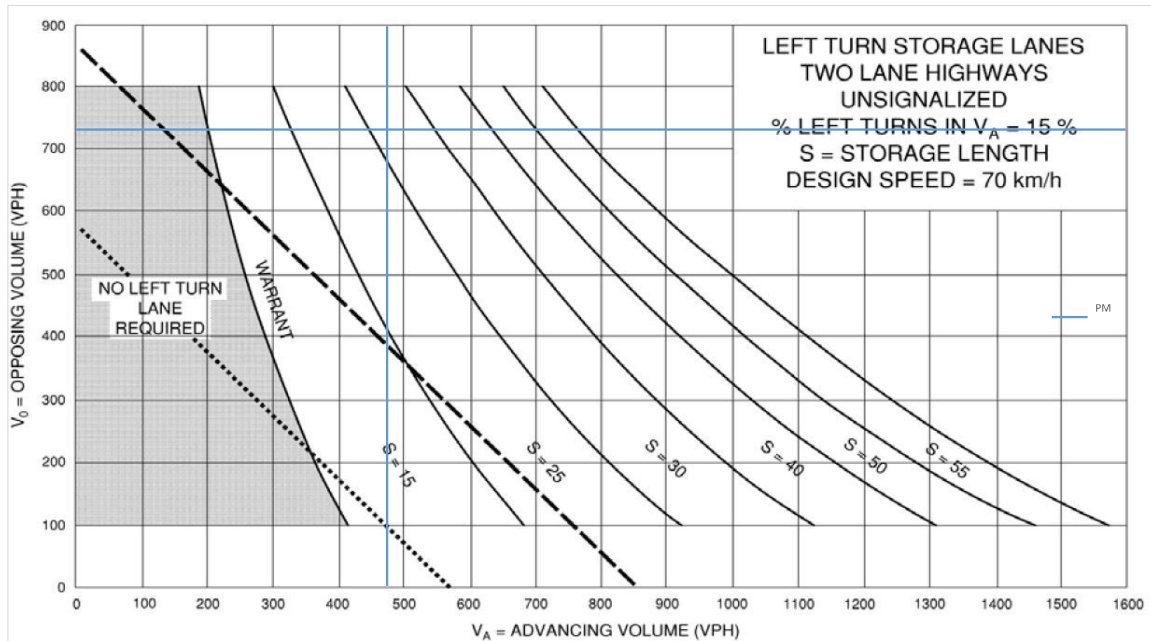
Existing																
Design Speed																
70	km/h	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
	AM	0	0	0	156	0	56	1	297	35	18	439	0	3.9%	457	333
	PM	0	0	0	40	0	43	0	557	177	65	409	0	13.7%	474	734
Future Background 2027																
Design 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	EBL	EBT	EBR	Yes	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing		
80 km/h				WBL														
				WBR													NBL	NBT
AM	0	0	0	0	156	0	56	1	297	35	18	439	0	73.6%	212	0		
PM	0	0	0	0	40	0	43	0	557	177	65	409	0	48.2%	83	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		
80 km/h				WBL														
				WBR													NBL	NBT
AM	0	0	0	0	156	0	56	1	304	35	18	448	0	73.6%	212	0		
PM	0	0	0	0	40	0	43	0	569	177	65	415	0	48.2%	83	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		
80 km/h				WBL														
				WBR													NBL	NBT
AM	0	0	0	0	156	0	56	1	315	35	18	463	0	73.6%	212	0		
PM	0	0	0	0	40	0	43	0	590	177	65	423	0	48.2%	83	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		
80 km/h				WBL														
				WBR													NBL	NBT
AM	0	0	0	0	156	0	56	1	328	35	18	479	0	73.6%	212	0		
PM	0	0	0	0	40	0	43	0	612	177	65	433	0	48.2%	83	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		
80 km/h				WBL														
				WBR													NBL	NBT
AM	0	0	0	0	231	0	70	1	295	35	33	438	0	76.7%	301	0		
PM	0	0	0	0	126	0	61	0	555	177	82	402	0	67.4%	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		
80 km/h				WBL														
				WBR													NBL	NBT
AM	0	0	0	0	231	0	70	1	306	35	33	453	0	76.7%	301	0		
PM	0	0	0	0	126	0	61	0	576	177	82	410	0	67.4%	187	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		
80 km/h				WBL														
				WBR													NBL	NBT
AM	0	0	0	0	231	0	70	1	319	35	33	469	0	76.7%	301	0		
PM	0	0	0	0	126	0	61	0	598	177	82	420	0	67.4%	187	0		

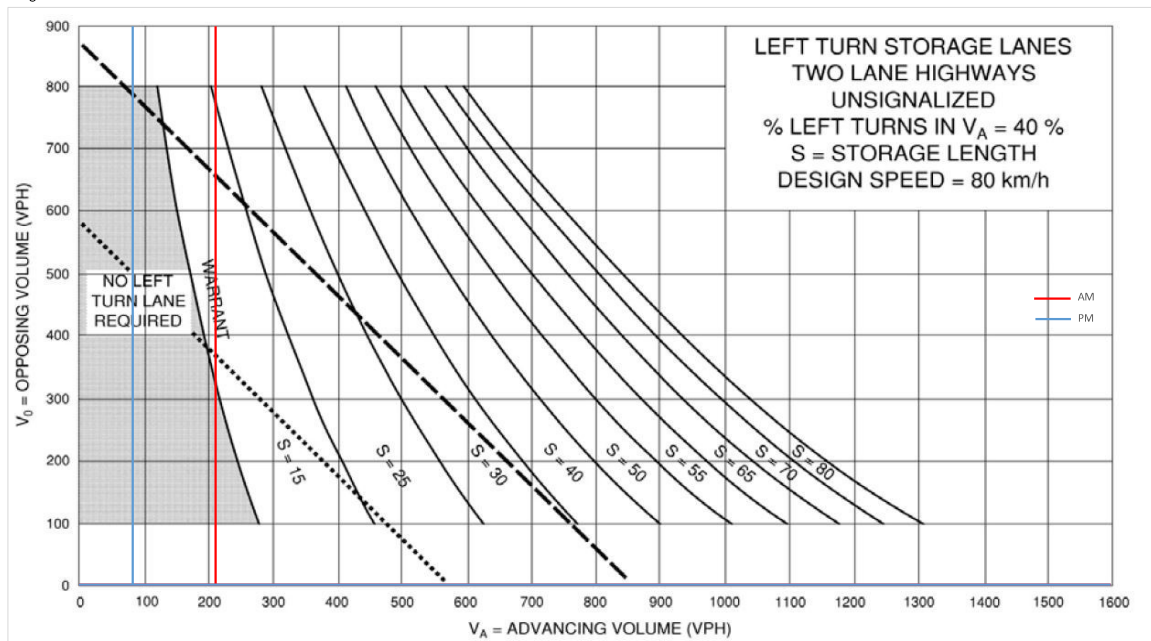
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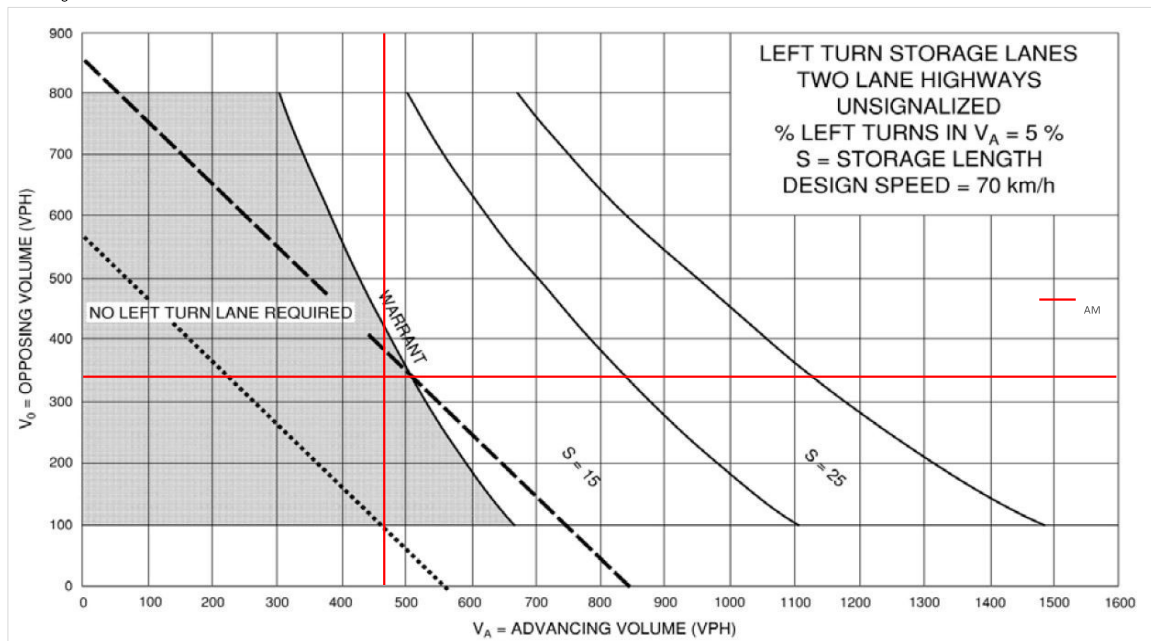
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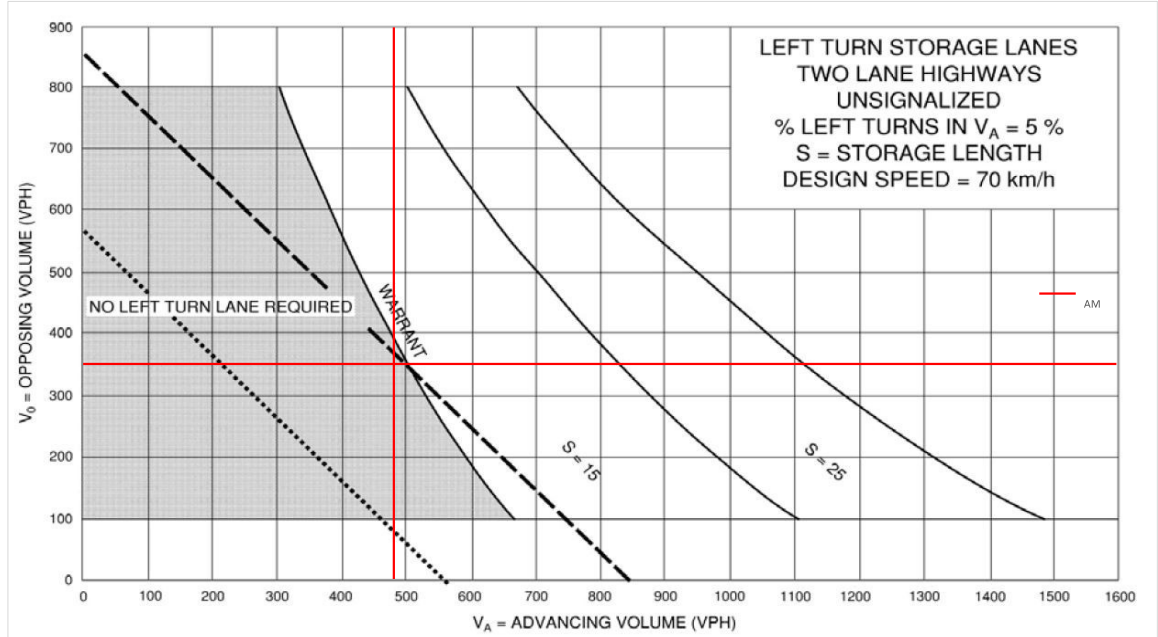
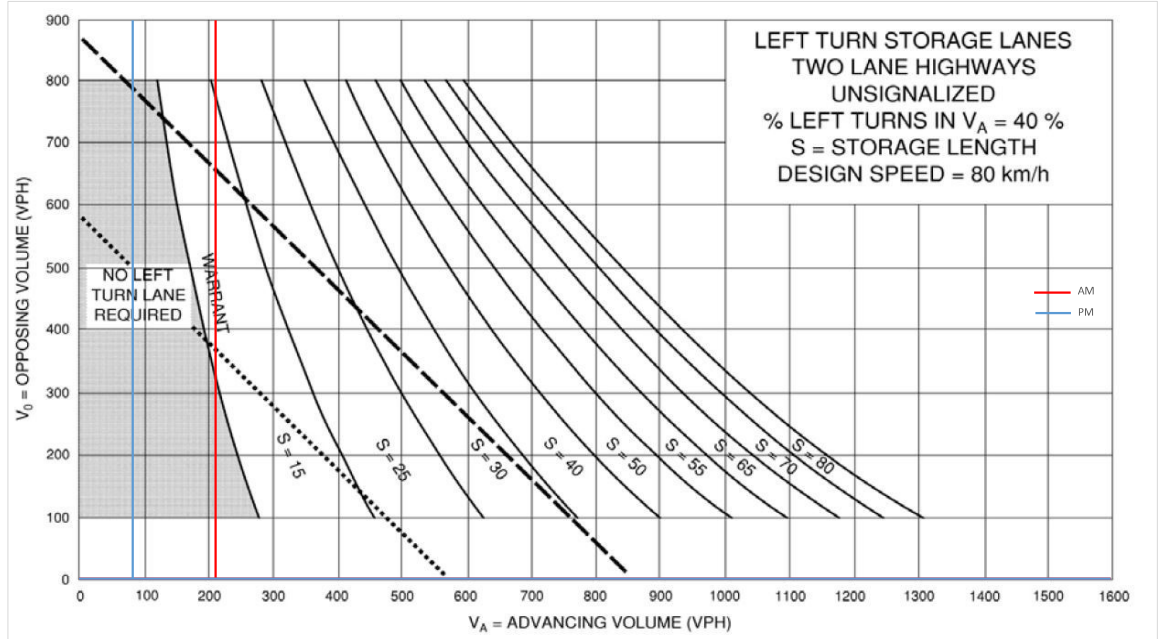


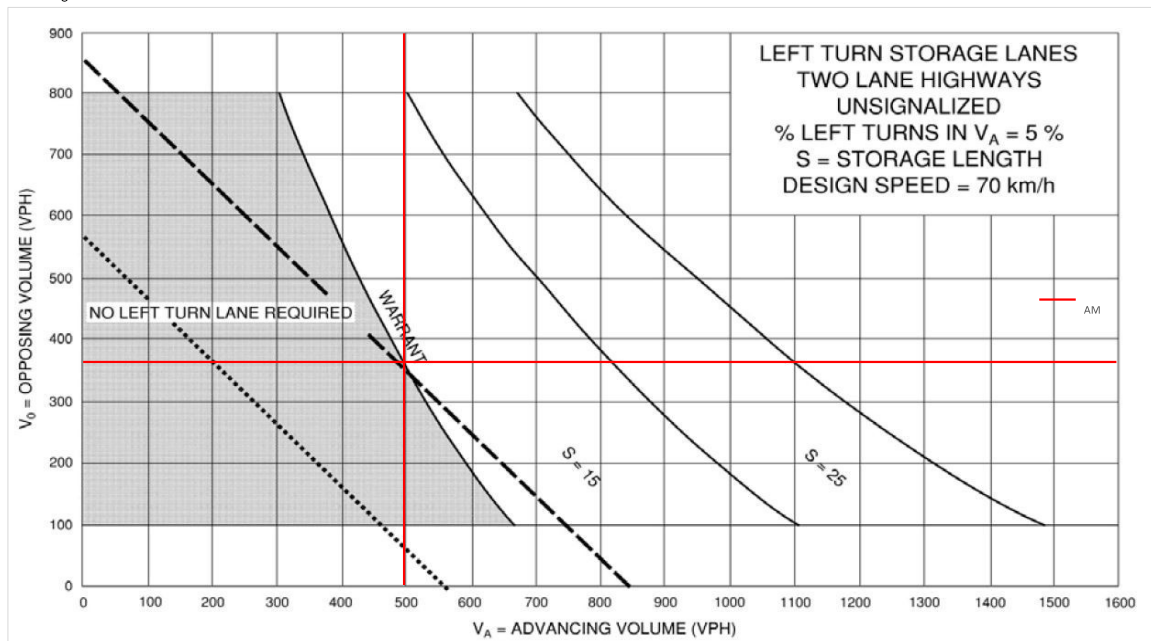
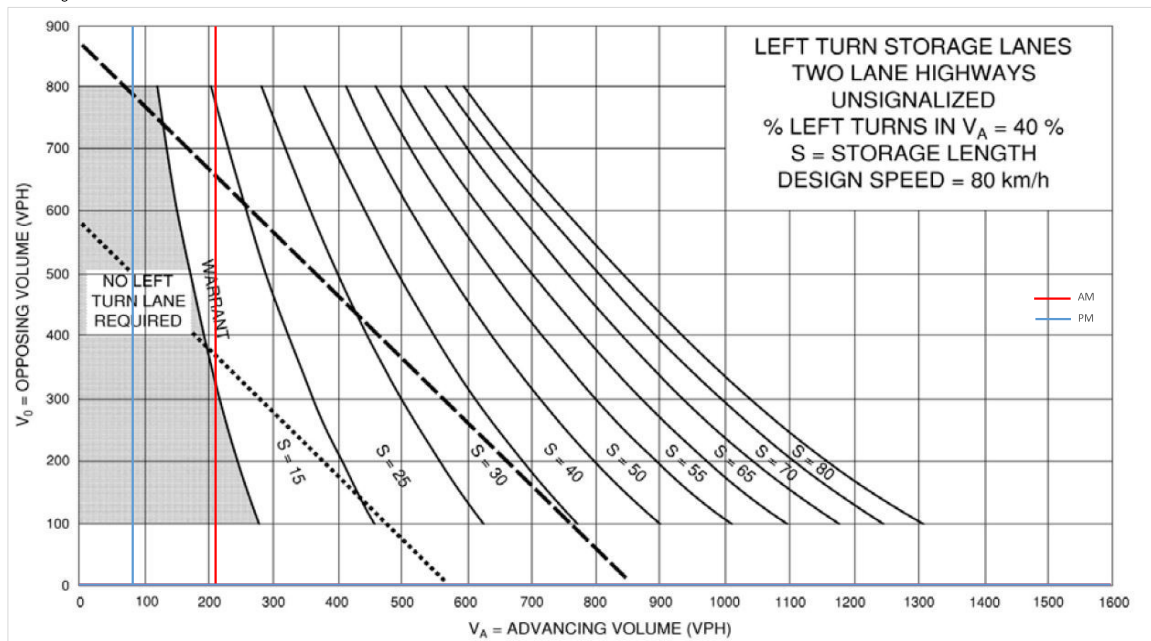
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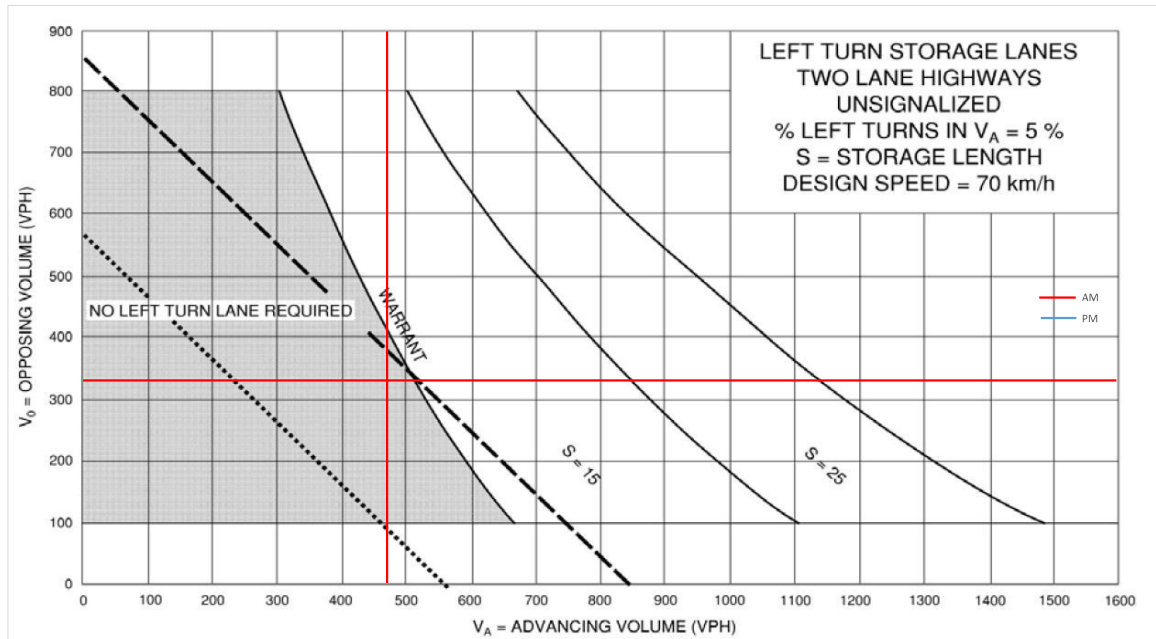
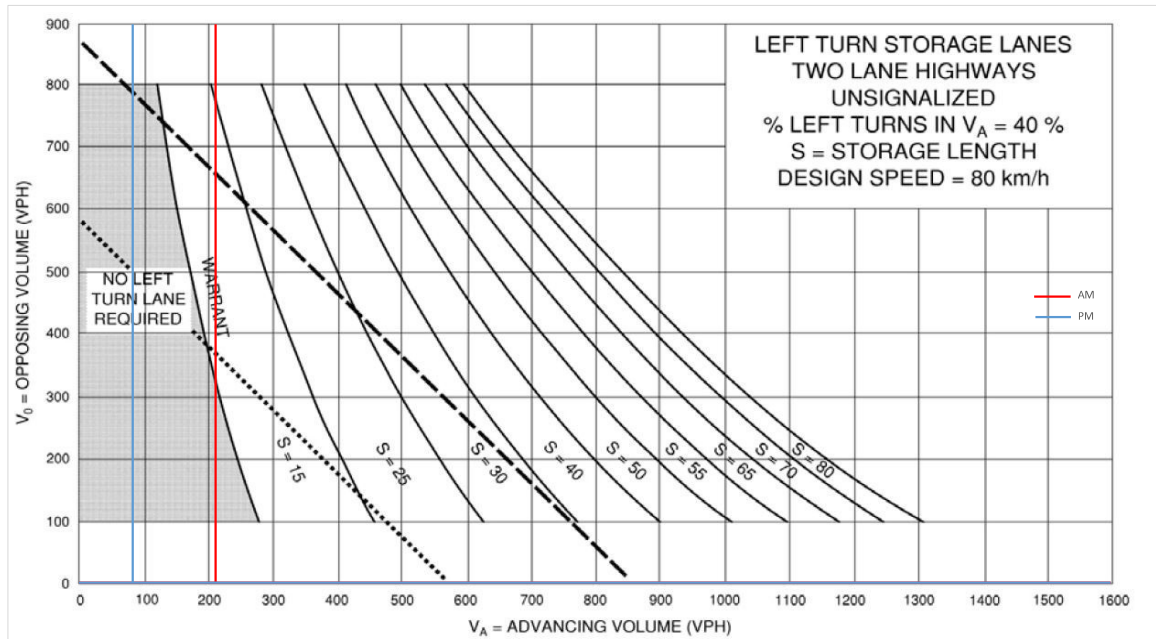


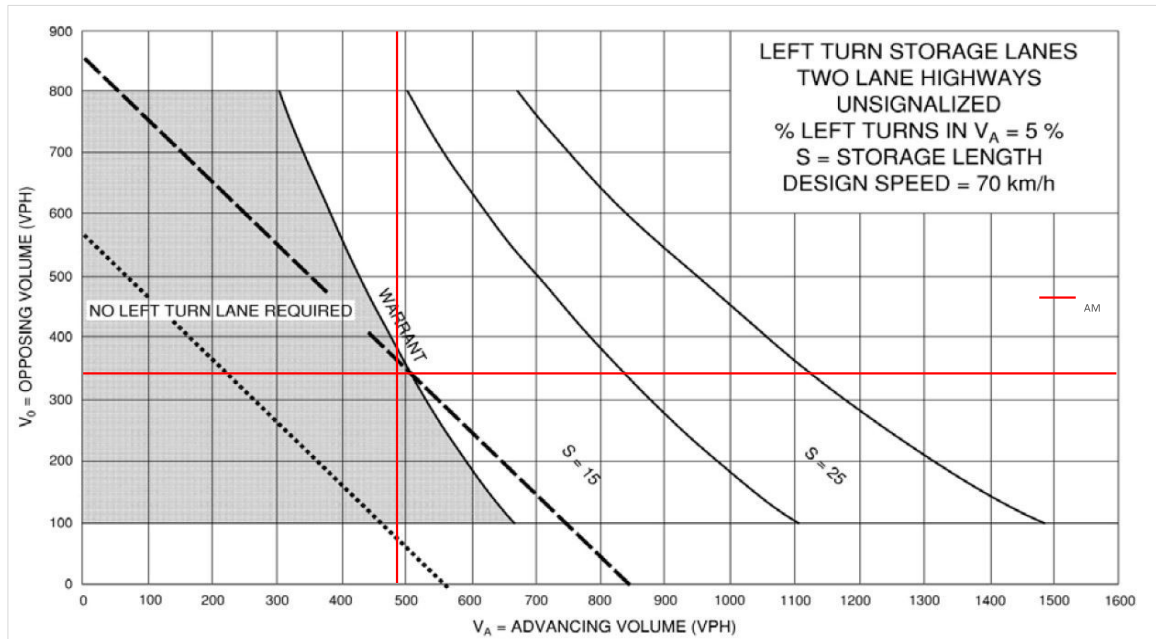
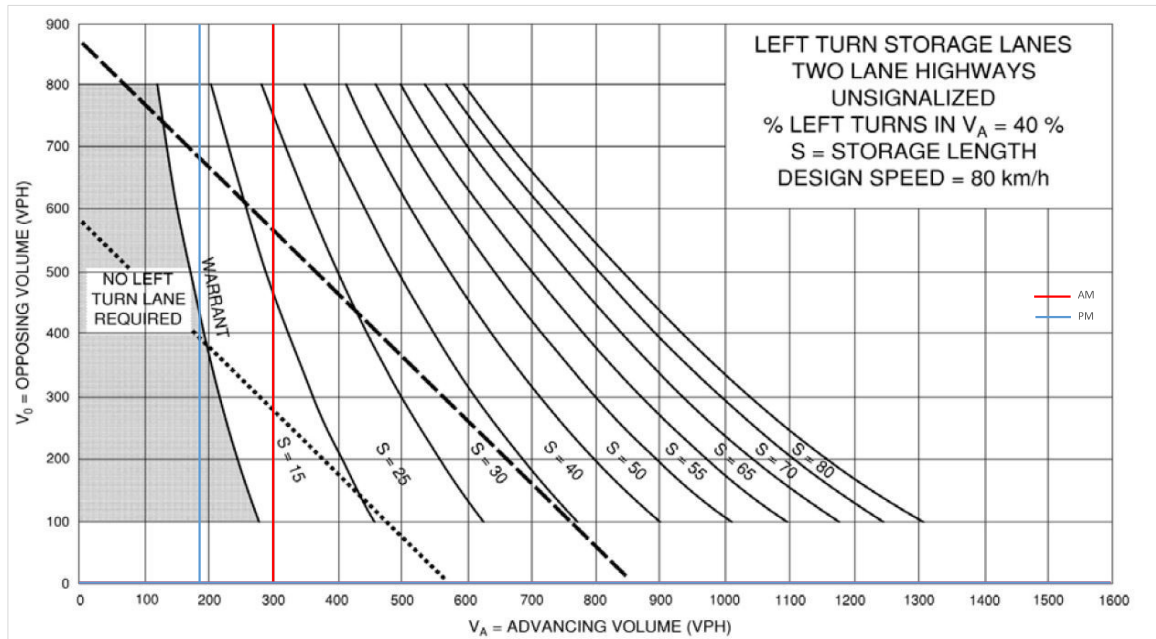
Future Background 2027 - Southbound Left

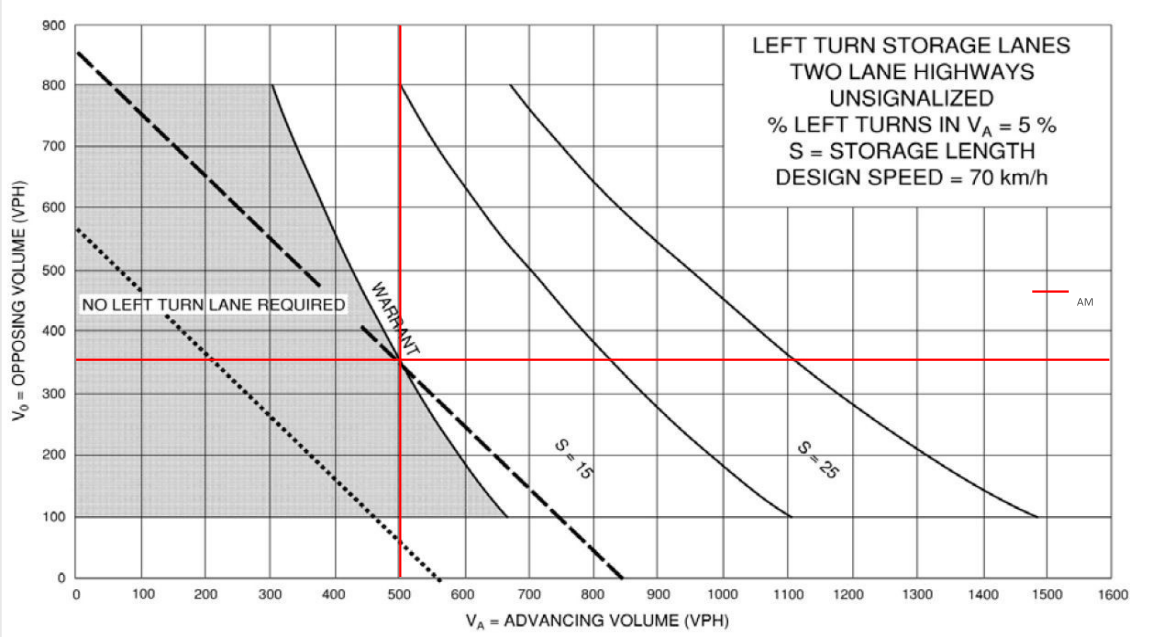
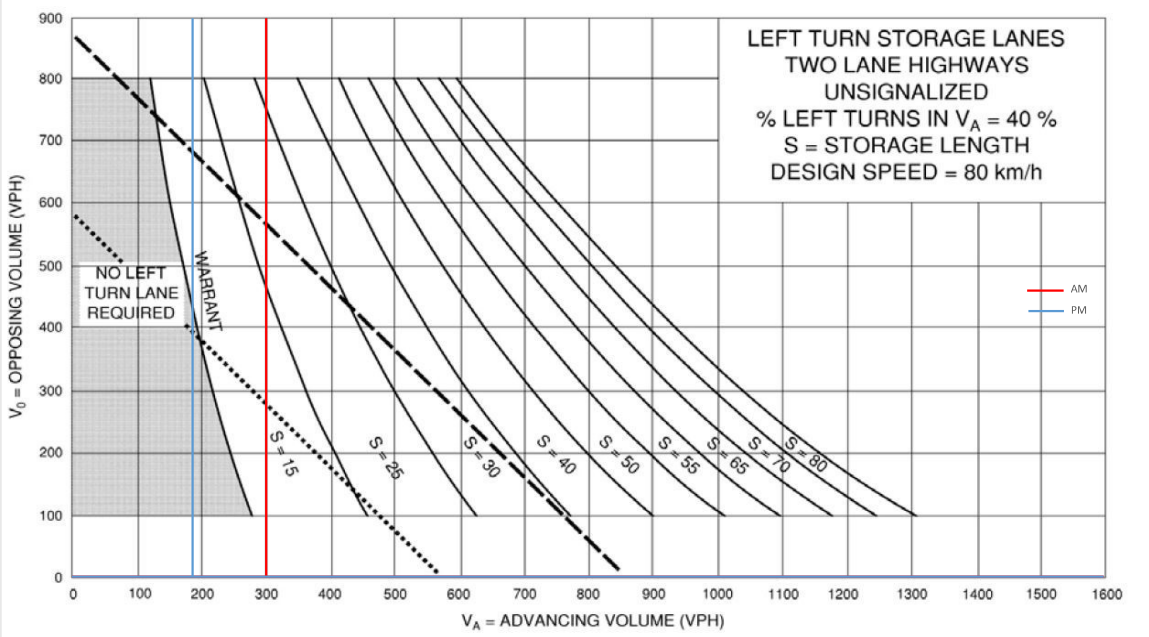


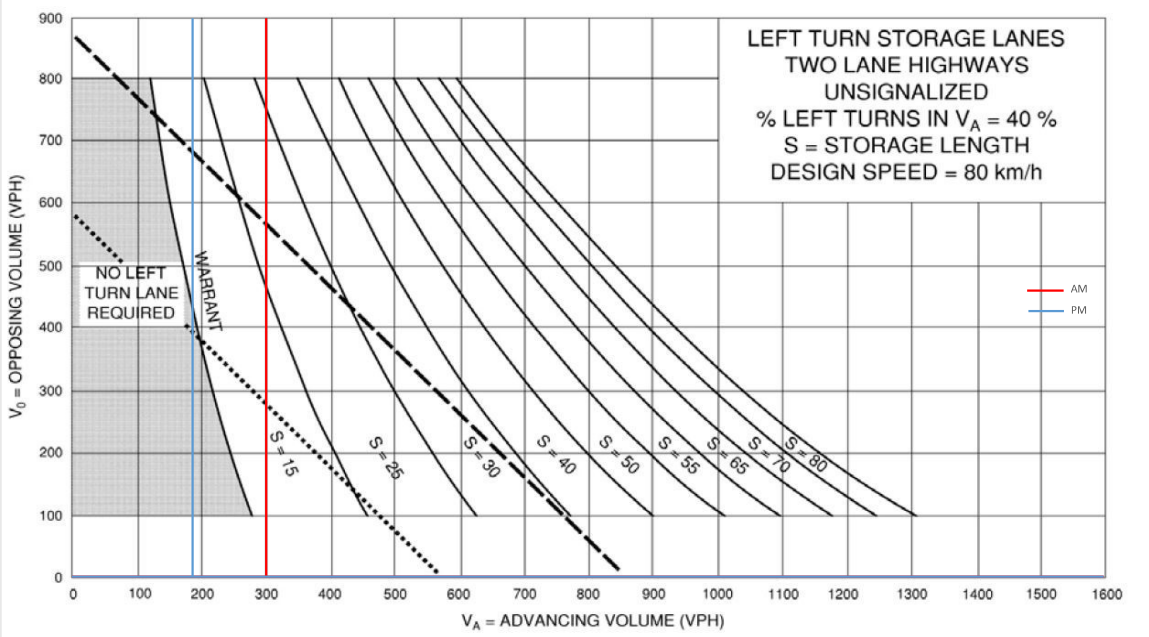












Rockdale Road at Highway 417 Westbound Ramp Terminal

Existing

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

Future Background 2027

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

Future Background 2032

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

Future Background 2037

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

Future Total 2027

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

Future Total 2032

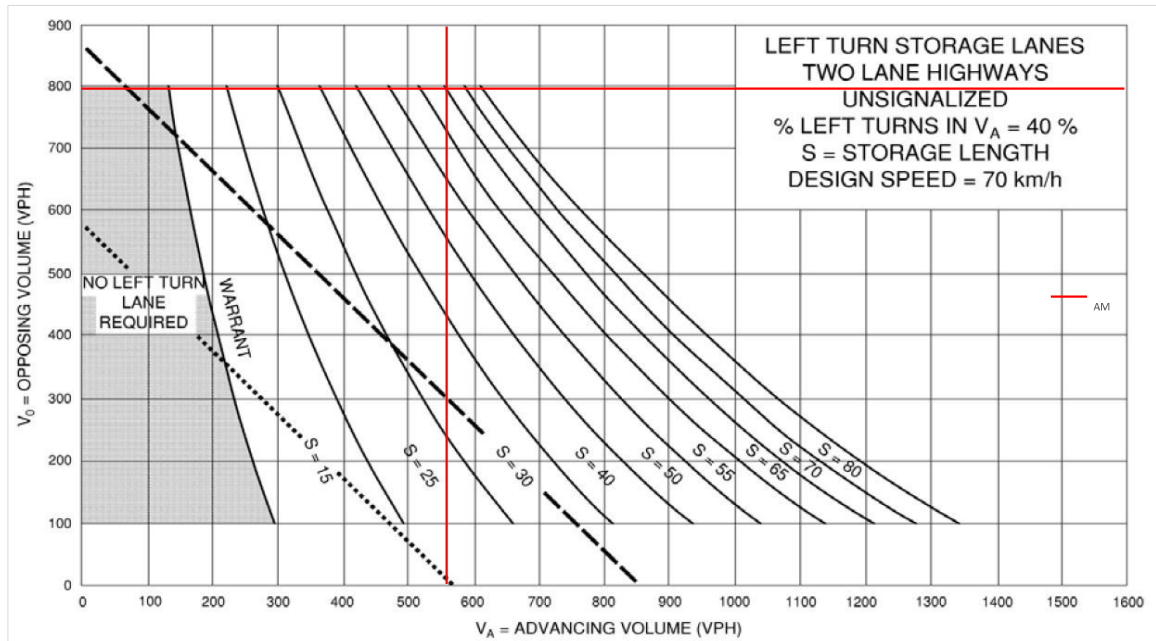
Design Speed	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
70 km/h															
AM		0	0	0	74	0	214	0	272	660	249	383	0	39.4%	632
PM		0	0	0	59	0	139	0	660	285	90	476	0	15.9%	932

Future Total 2037

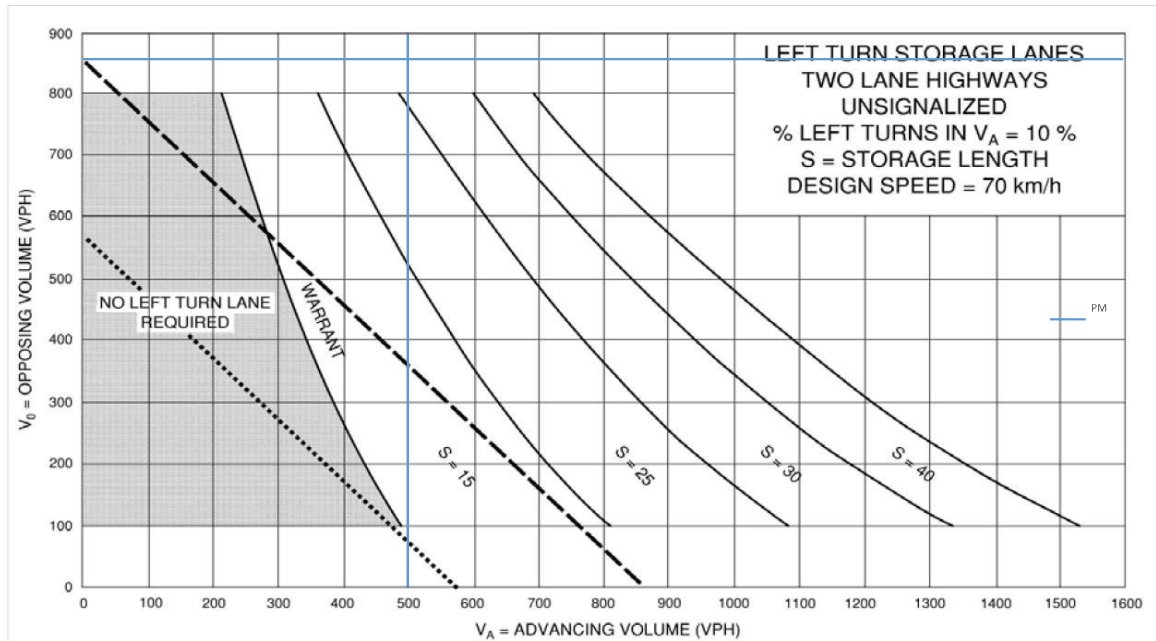
Design Speed	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	Yes SBL	SBT	SBR	%Left Turn	Volume Advancing	Volume Opposing
70 km/h															
AM		0	0	0	81	0	224	0	275	728	261	387	0	40.3%	648
PM		0	0	0	65	0	145	0	676	314	93	483	0	16.1%	1003

Existing																	
Design Speed					Yes												
50	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	25.5%	247	0	
		PM			50	0	98	0	616	243	53	447	0	33.8%	148	0	
Future Background 2027																	
Design Speed					Yes												
50	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	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					Yes												
50	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	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					Yes												
50	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	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					Yes												
50	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	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					Yes												
50	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	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					Yes												
50	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	26.6%	305	0
		PM	0	0	0	65	0	145	0	676	314	93	483	0	31.0%	210	0

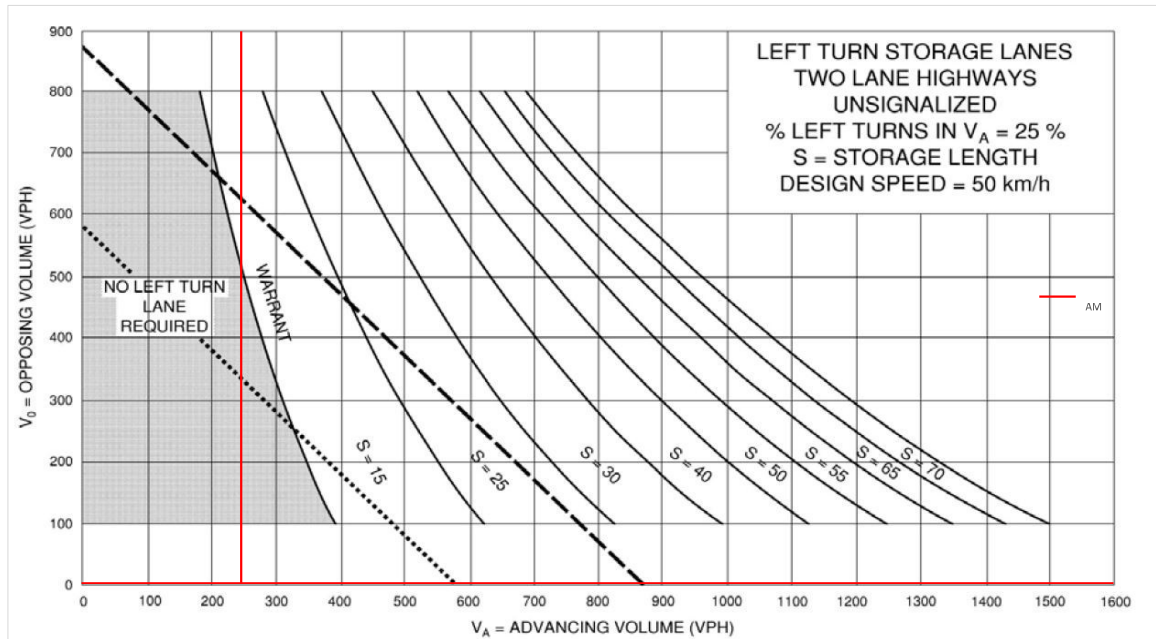
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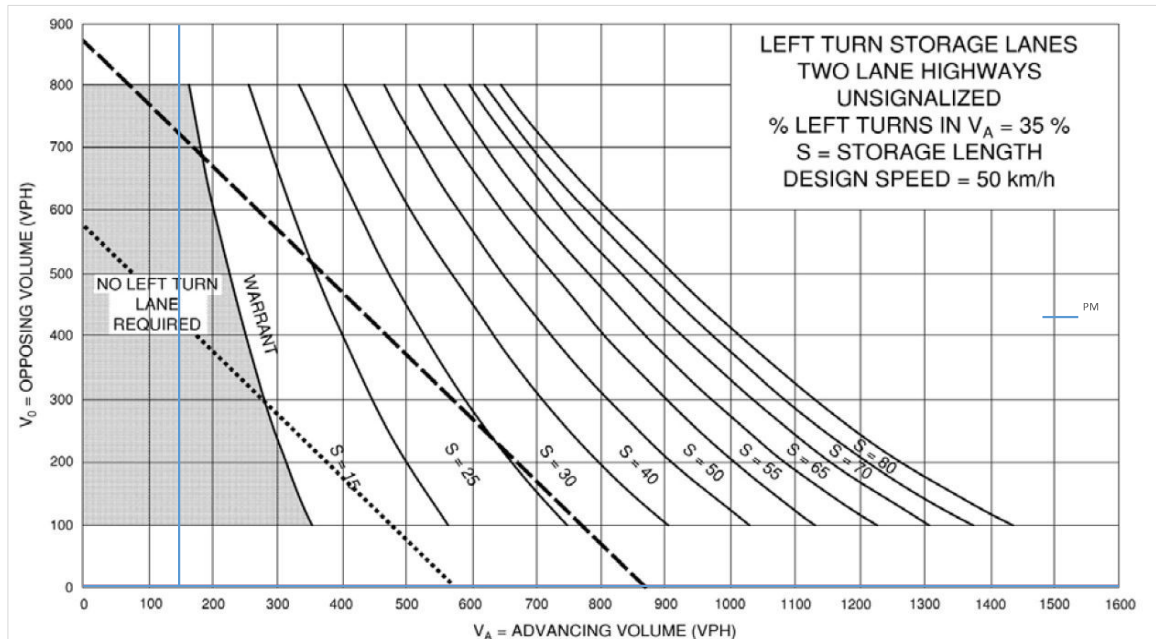
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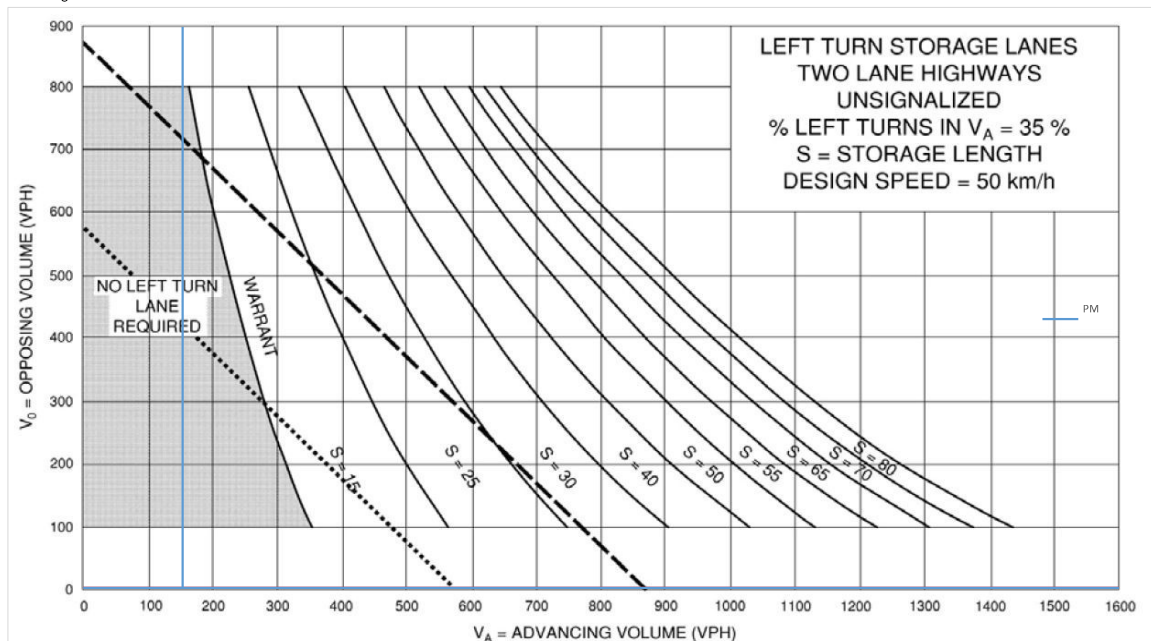
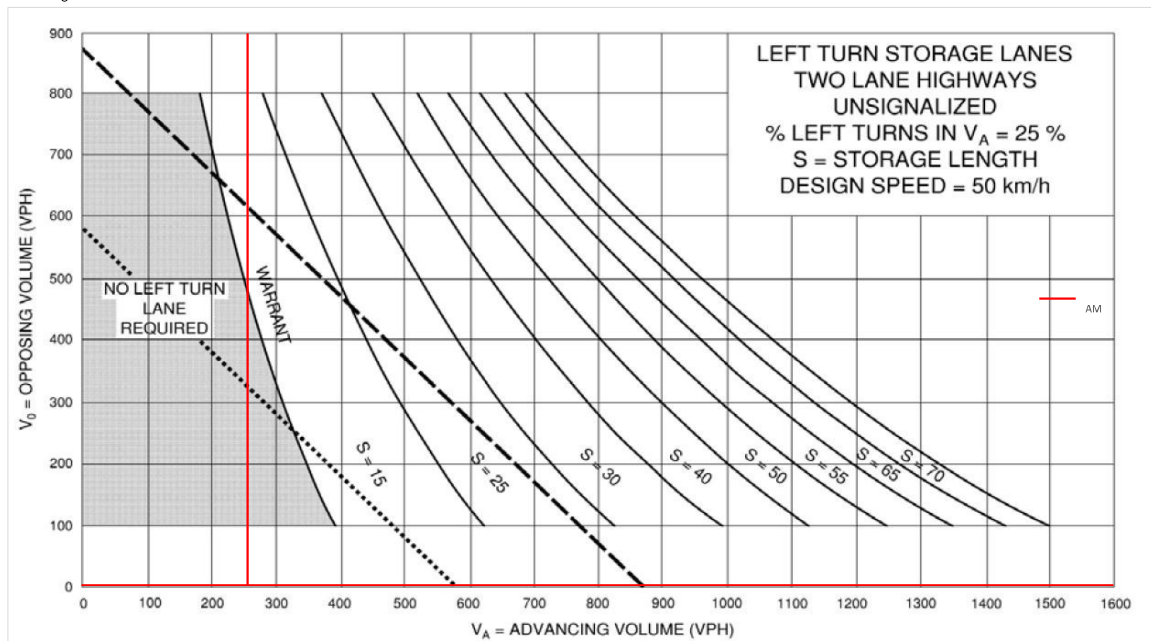


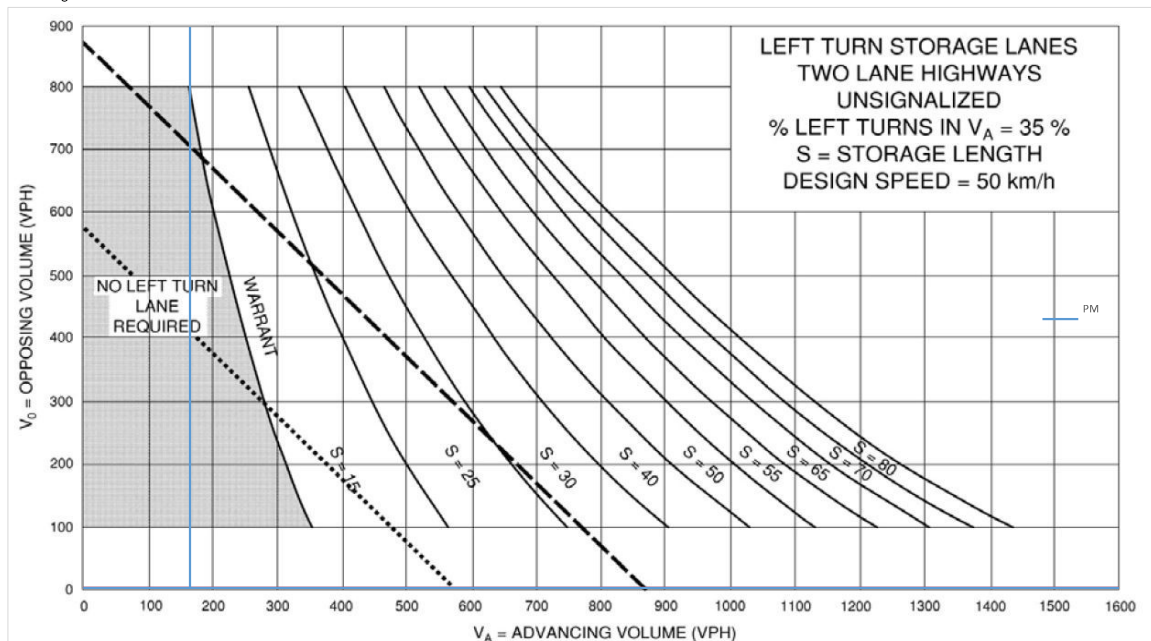
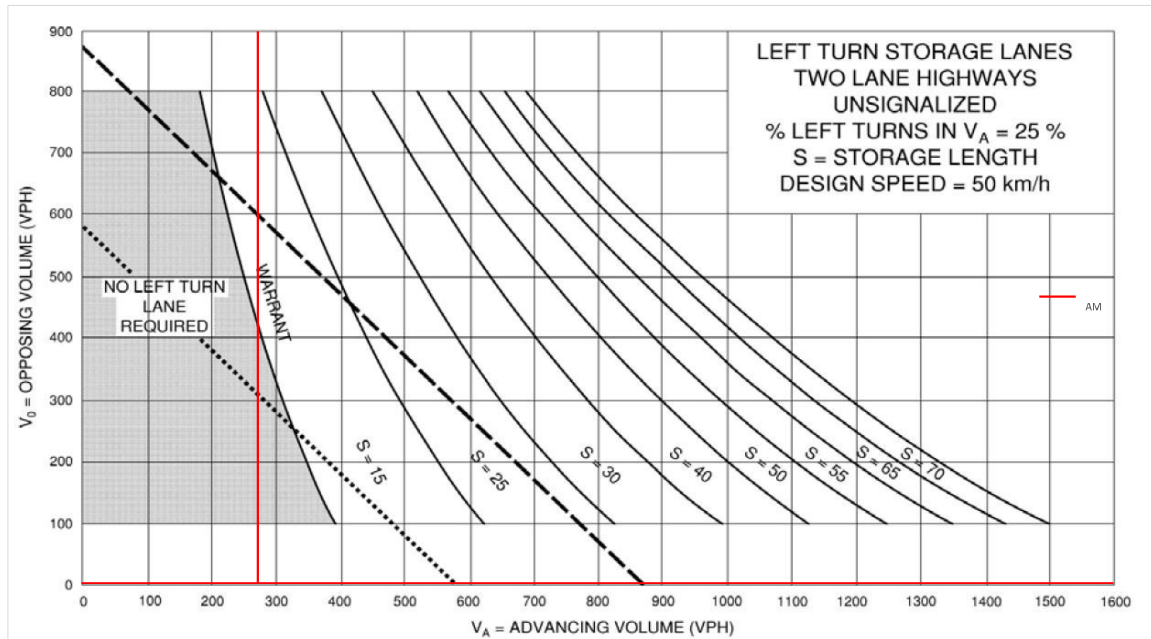
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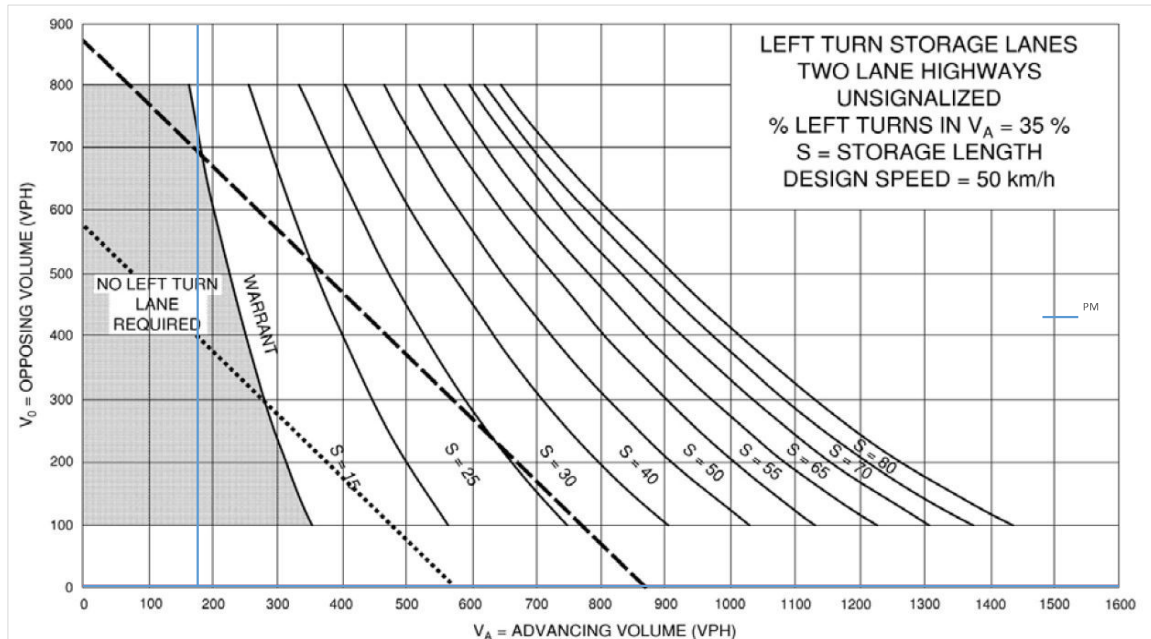
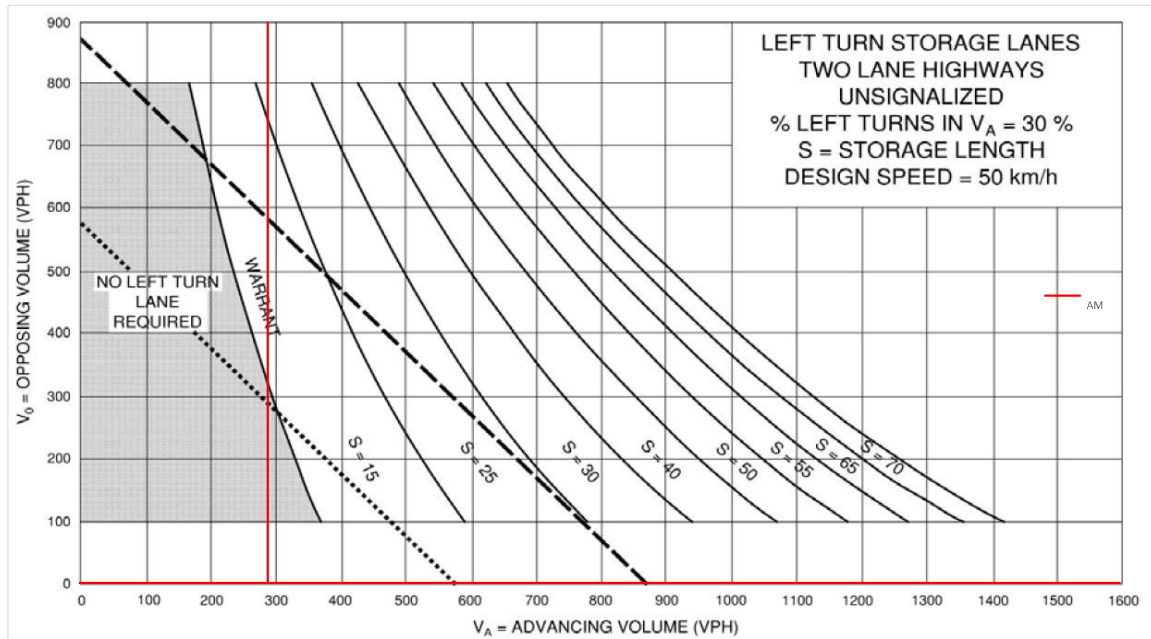


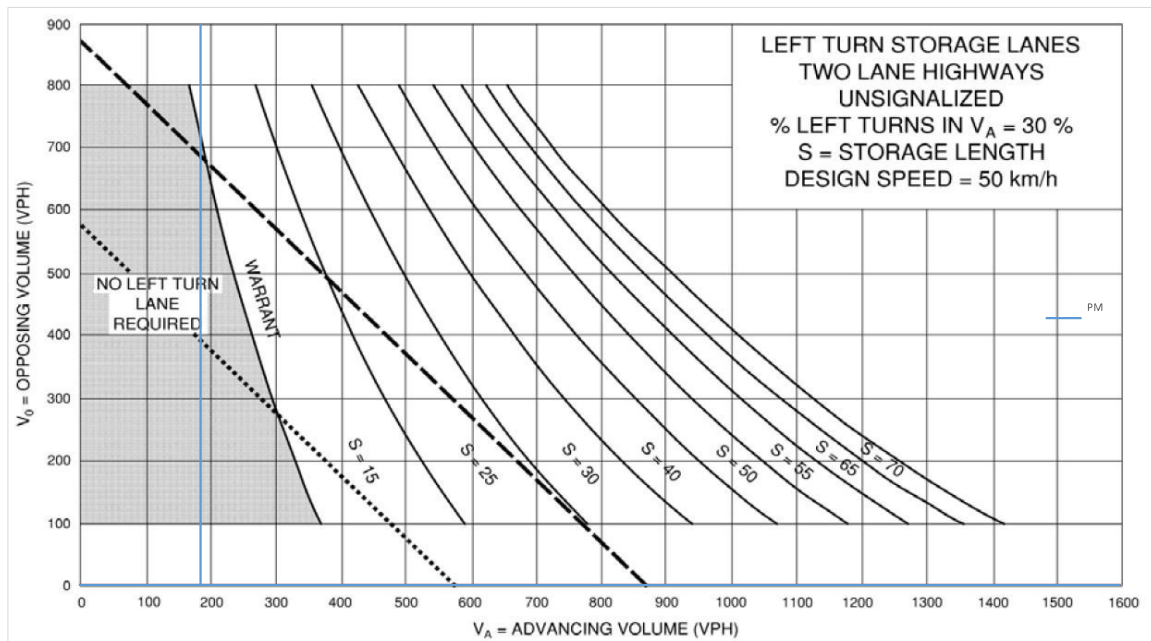
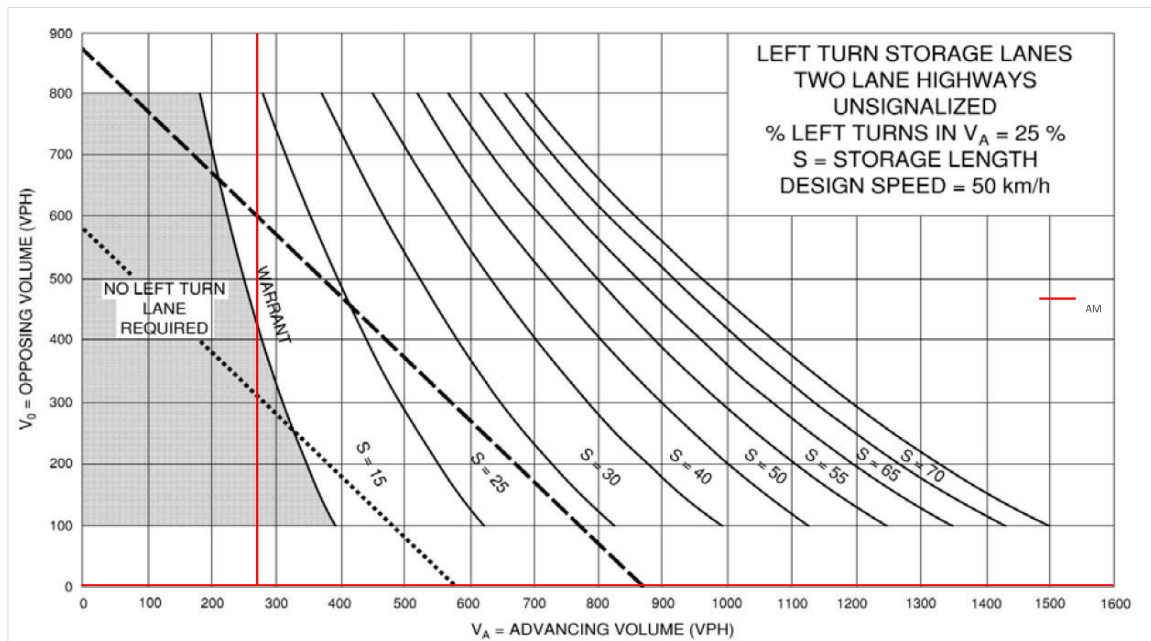
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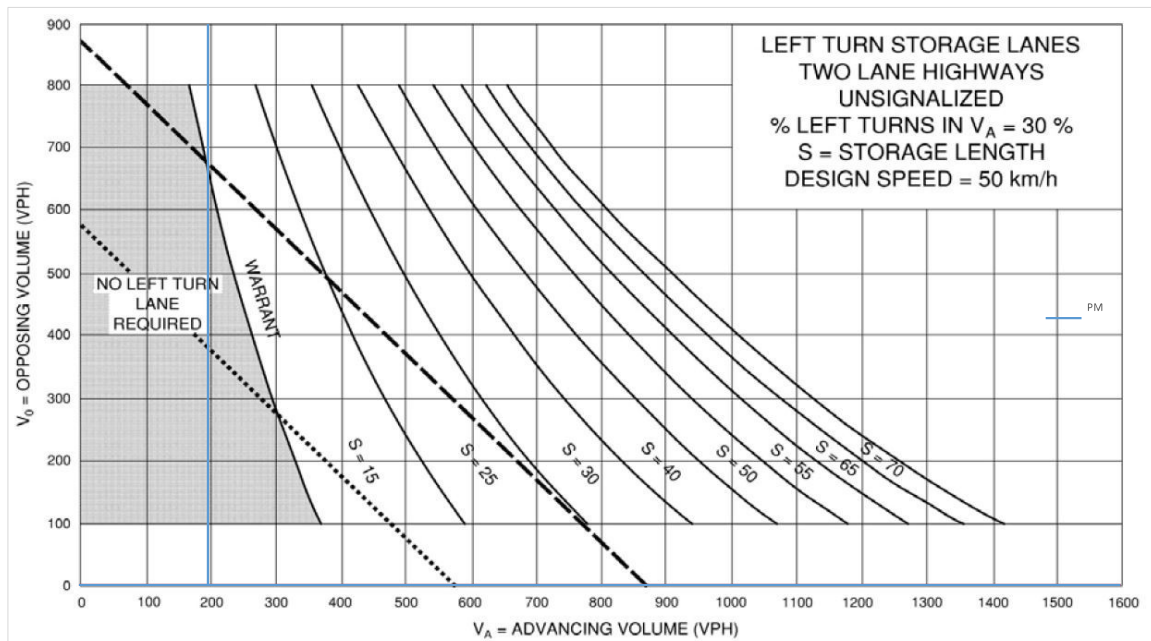
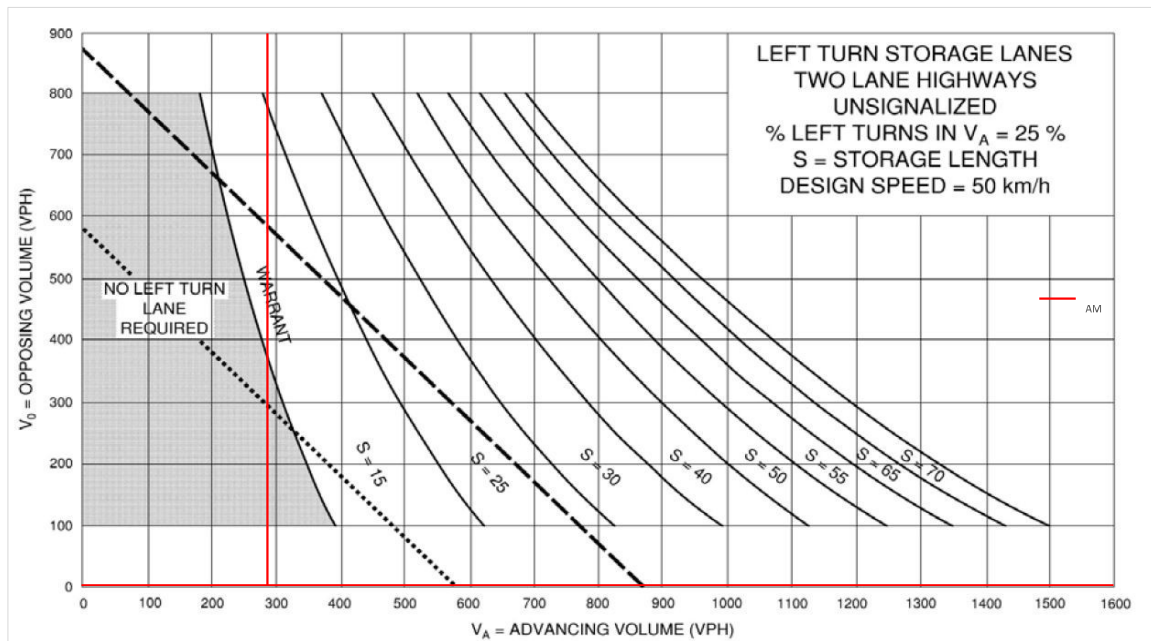


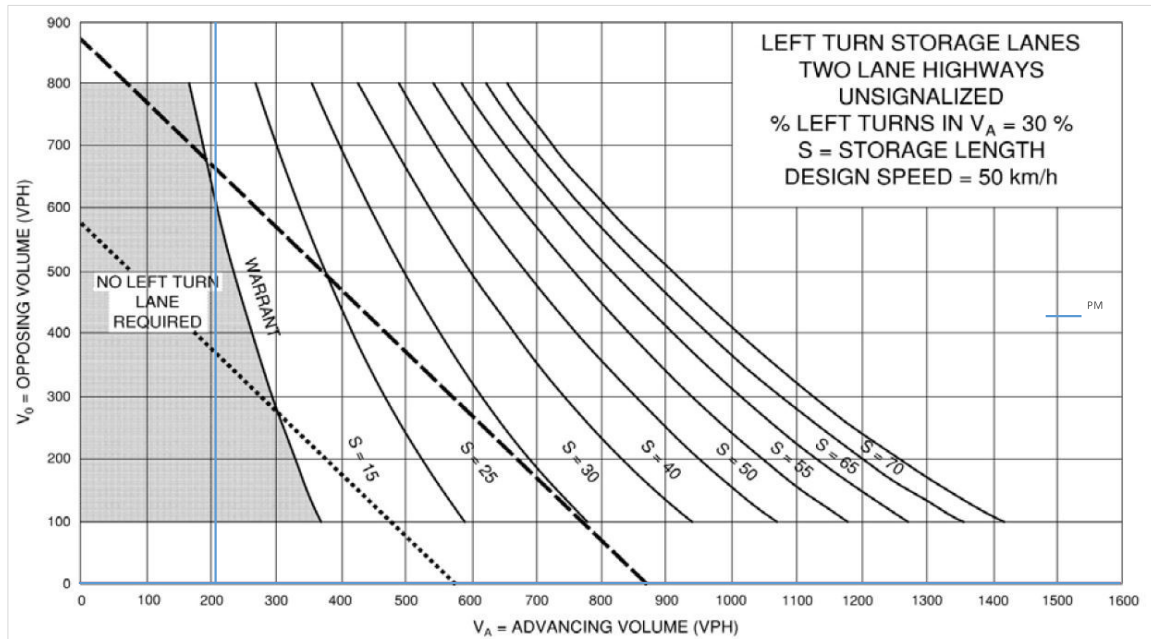
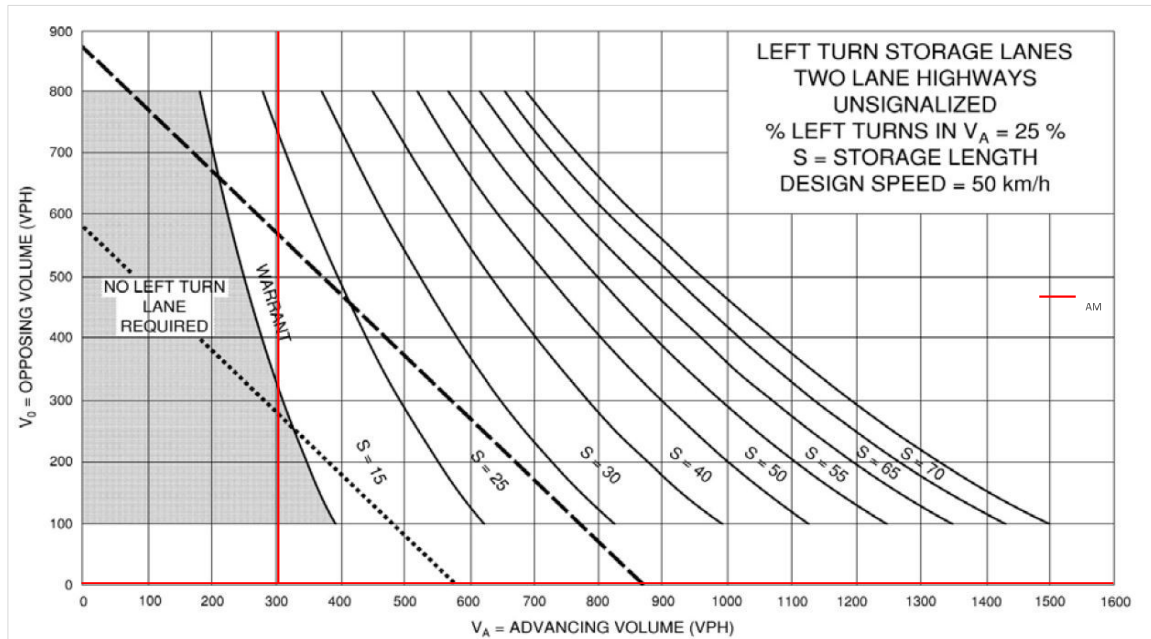






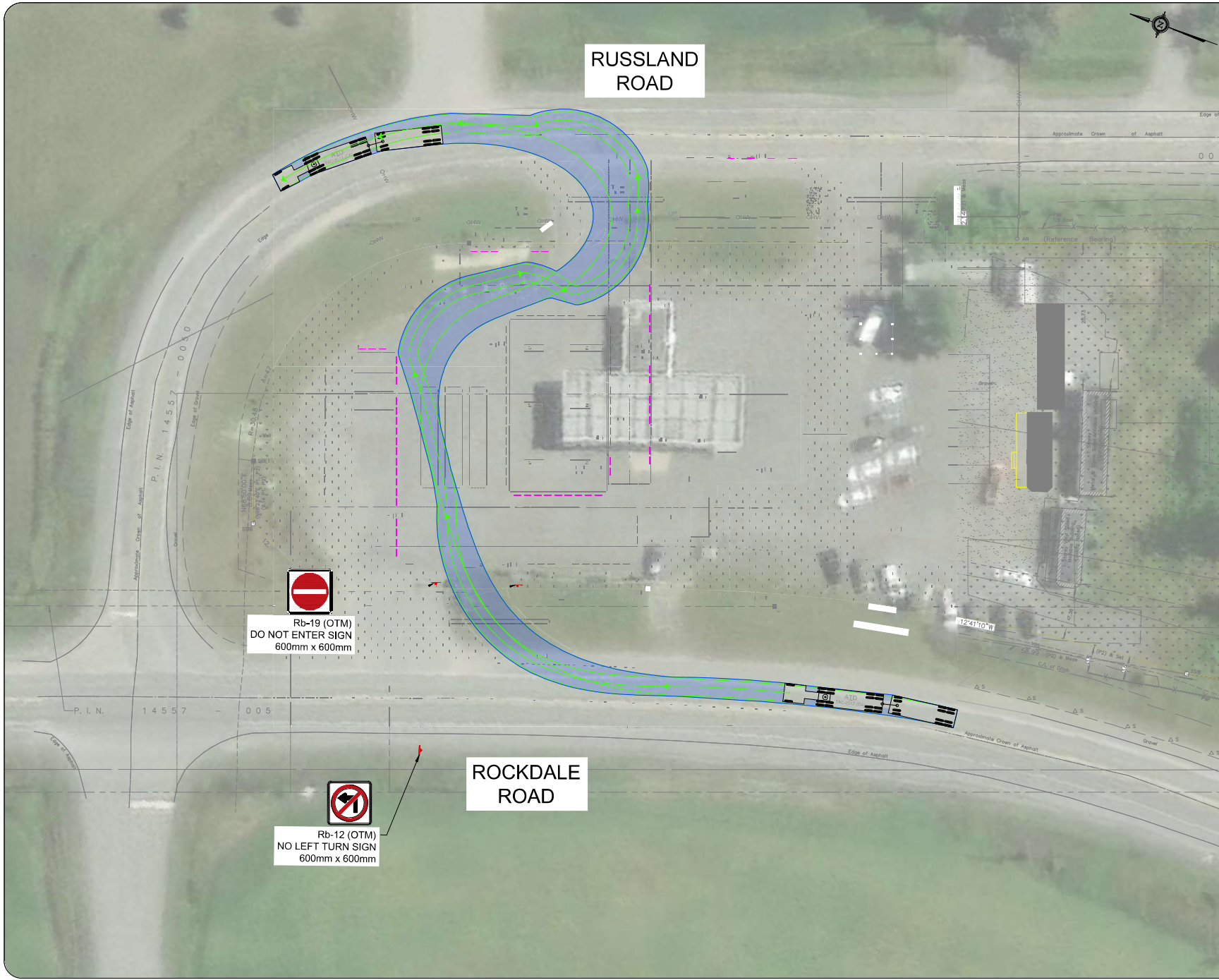






Attachment 9

Turning Templates



Notes:

Legend:
0.50m CLEARANCE FORM OBJECTS

Tractor Width	2.80	Look to Lock Time	6.0
Trailer Width	2.80	Steering Angle	27.3
Tractor Track	2.80	Articulating Angle	70.0

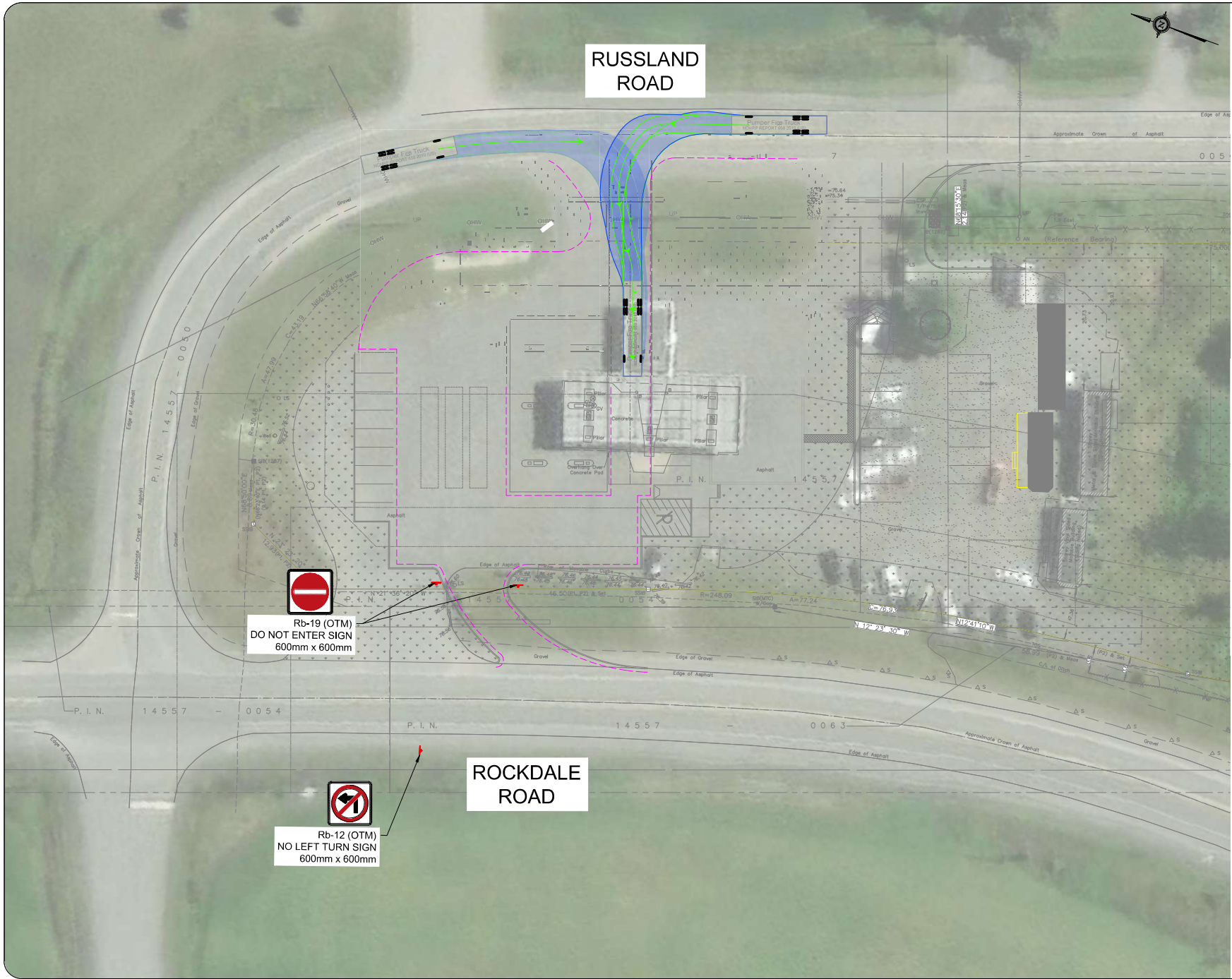
02	Issued for Review	EA	2026-02-04
REV	DESCRIPTION	BY	DATE
STATUS			

CGH Transportation
6 Plaza Court
Ottawa, ON
K2H 7W1
(343) 999-9117

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	



Notes:

Legend:

0.50m CLEARANCE FORM OBJECTS

13.41
2.44 7.32

Pumper Fire Truck

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) 999-9117

CLIENT:

6175 Rockdale Road

ARCHITECT:

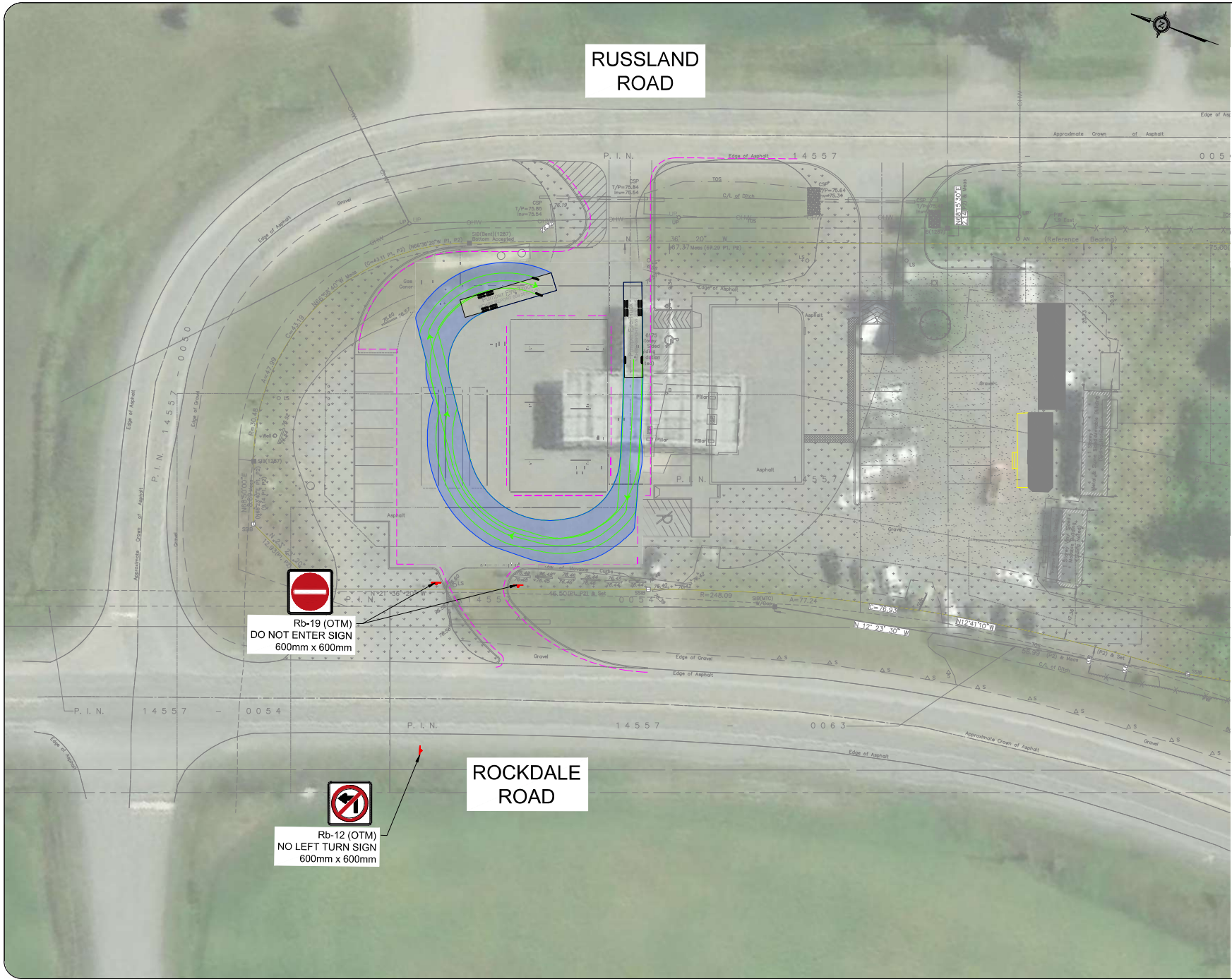
SITE:

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	



Notes:

Legend:

0.50m CLEARANCE FORM OBJECTS

13.41

2.44 7.32

Pumper Fire Truck

Width

Track

Lock to Lock Time

Steering Angle

meters

: 2.59

: 2.59

: 6.0

: 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) 999-9117

CLIENT:

6175 Rockdale Road

ARCHITECT:

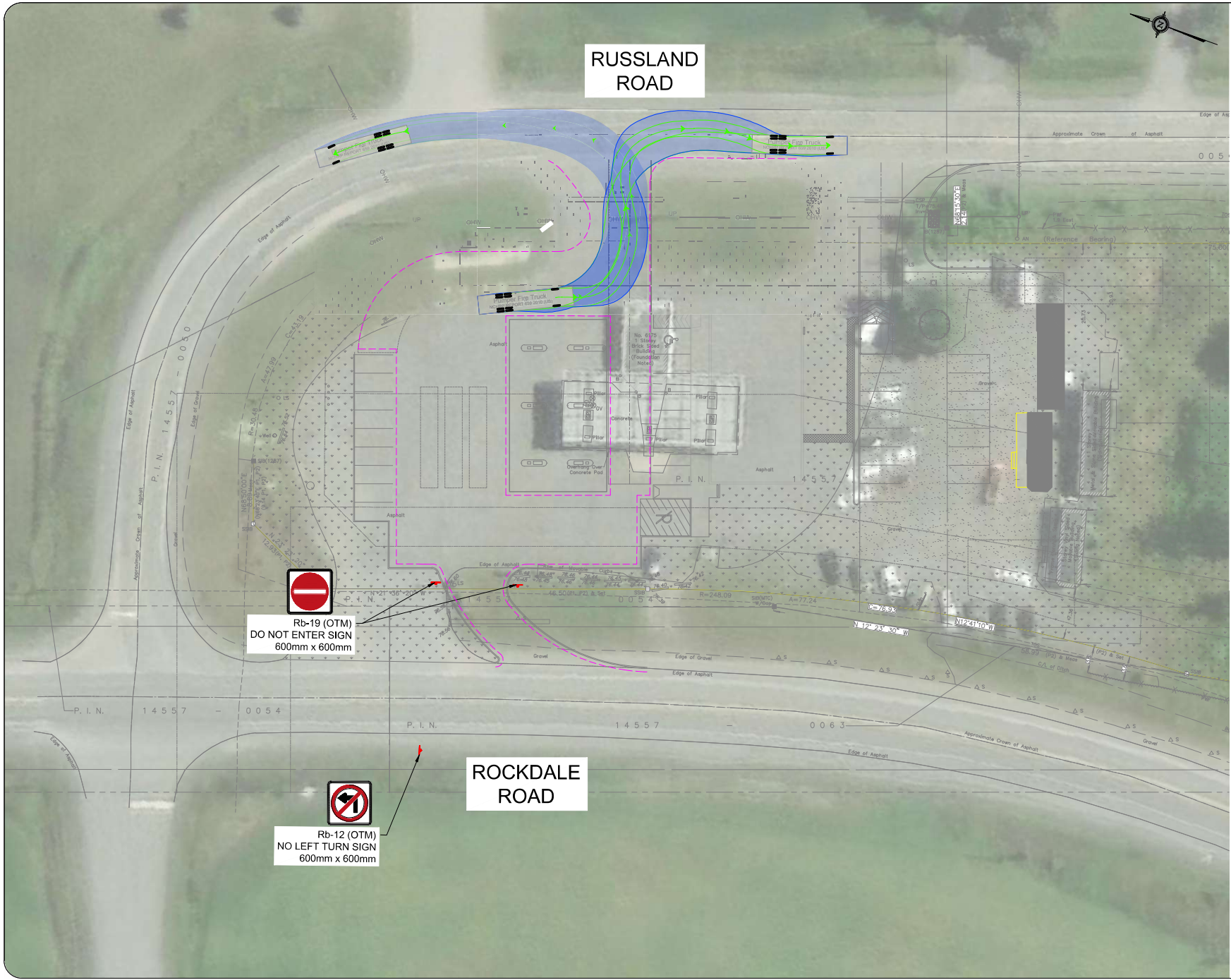
SITE:

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	



Notes:

Legend:

0.50m CLEARANCE FORM OBJECTS

Pumper Fire Truck

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) 999-9117

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	