

**TRAFFIC ANALYSIS FOR
CENTER STREET AT RAILROAD AVENUE
FOR CITY OF DEER PARK, TEXAS**



JUNE 2017



June 5, 2017

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I. INTRODUCTION AND SUMMARY

Midtown Engineers, LLC was retained to analyze the intersection of Center Street at Railroad Avenue, located in the City of Deer Park, Harris County, Texas (Key Map 538F). The study location is shown in **Exhibit 1**. Illegal left turn movements from Railroad Avenue onto Center Street created damage to the Gateway Improvements on Center Street.

The study was comprised of the following tasks:

- Analysis of existing conditions based on collected traffic counts and lane geometry
- Develop alternatives to eliminate the illegal left turn movements at the intersection of Center Street and Railroad Avenue

II. EXISTING CONDITIONS

This section outlines the characteristics of the approach roadways, the intersection of the roadways, and the current land use of the study area.

A. Center Street

Center Street runs in the north-south direction through the City of Deer Park. It begins at State Highway 225 Frontage Road and terminates just south of Fairmont Parkway. It is comprised of a four-lane section with left turn lane pockets within the study area. Center Street turns into a private industrial street, with gated entry, just north of SH 225 Westbound Frontage Road. The land use along it is commercial. Street lighting is present along Center Street. The posted speed limit on Center Street, within the study intersection, is 40 MPH.

B. Railroad Avenue

Railroad Avenue runs in the east-west direction. It begins at Deerwood Glen Drive and terminates at Center Street. It has two westbound lanes and one eastbound lane. The land use along Railroad Avenue is composed of general industrial, office professional and general commercial. The posted speed limit on Railroad Avenue is 40 MPH.

C. State Highway 225 Frontage Road

State Highway (SH) 225 Frontage Road, runs parallel to SH 225, in the east-west direction with three lanes in each direction within the study area. SH 225 is continuous through the study area. The posted speed limit on SH 225 Frontage Roads is 50 MPH.

D. Robin Street

Robin Street runs in the north-south direction. It begins at Railroad Avenue and terminates within an industrial area, just north of SH 225 Westbound Frontage Road. The land use along Robin Street is industrial.

E. Intersection Characteristics

Center Street and Railroad Avenue is a T-intersection, where Railroad Avenue T's into Center Street. Eastbound left turn movements from Railroad Avenue to Center Street is prohibited, with "NO LEFT TURN" signs at the intersection. Northbound left turn movements from Center Street to Railroad Avenue is allowed.

During a field visit in the afternoon, there were school buses traveling north on Center Street and turning left onto Railroad Avenue. Upon reviewing the Deer Park Independent School District's (ISD) Route List, see **Appendix D**, Railroad Avenue was not on the list. Midtown Engineers contacted the Deer Park ISD Department of Transportation to verify. A representative from the department said there are school buses traveling north on Center Street and turning left onto Railroad Avenue during the school days.

F. Land Use

The study intersection is located in the City of Deer Park in Harris County, Texas. According to Houston-Galveston Area Council (H-GAC), the properties surrounding the study intersection are composed of mostly commercial and residential. An existing condition diagram of this intersection is shown in **Exhibit 2**. **Appendix B** contains photographs of each approach of the study intersection.

III. TRAFFIC DATA

The traffic data collected for this intersection includes the AM and PM peak hour vehicle turning movement counts (TMC).

A. Traffic Volumes

The AM and PM peak hour vehicle turning movement counts were recorded at the study intersection on Thursday, April 22, 2017 from 6:00 to 8:00 A.M. and 4:00 to 6:00 P.M. The complete traffic data can be found in **Appendix C**. A summary of the data is presented in **Table 1**. The peak-hour turning movement counts are shown in **Exhibit 3**.

Table 1: Vehicle Volume Summary

Time Period	Traffic Volumes (vph)			
	Northbound	Southbound	Eastbound	Westbound
Center Street at Railroad Avenue				
6:00 – 7:00 AM	810	333	103	N/A
7:00 – 8:00AM	673	604	133	N/A
4:00 – 5:00 PM	650	661	176	N/A
5:00 – 6:00 PM	506	862	163	N/A
Center Street at SH 225 Eastbound Frontage Road				
6:00 – 7:00 AM	776	222	214	20
7:00 – 8:00AM	623	397	334	21
4:00 – 5:00 PM	618	439	471	116
5:00 – 6:00 PM	506	656	487	93
Center Street at SH 225 Westbound Frontage Road				
6:00 – 7:00 AM	505	13	0	294
7:00 – 8:00AM	433	6	2	472
4:00 – 5:00 PM	403	191	2	579
5:00 – 6:00 PM	289	223	2	1087
Robin Street at SH 225 Eastbound Frontage Road				
6:00 – 7:00 AM	108	7	321	0
7:00 – 8:00AM	125	19	392	0
4:00 – 5:00 PM	230	14	342	0
5:00 – 6:00 PM	192	35	406	0
Robin Street at SH 225 Westbound Frontage Road				
6:00 – 7:00 AM	141	0	11	590
7:00 – 8:00AM	120	0	4	508
4:00 – 5:00 PM	36	1	3	716
5:00 – 6:00 PM	24	1	13	963

IV. TRAFFIC OPERATIONS ANALYSIS

A. Existing Condition

Capacity analysis for the existing conditions was conducted using the methodologies defined in the Highway Capacity Manual (HCM 2010). The software program, Synchro Version 9.1, was used to conduct the analysis. The traffic operations for each movement, at signalized and unsignalized intersections, were reported in terms of Level of Service (LOS) and the corresponding control delays. The LOS criteria as defined in HCM for signalized and unsignalized intersections are detailed below.

i. Level of Service

The LOS is assigned based on the intersection delay; **Table 2** lists the different levels according to the Highway Capacity Manual (HCM) 2000. Most major urban areas within the United States, LOS A-D is considered an acceptable LOS, while LOS E is considered marginal and LOS F is considered unacceptable. For intersections operating at LOS D or below, reasonable efforts have been made to maintain the existing LOS.

The LOS at unsignalized intersections is determined by the average delay a vehicle experiences on each intersection approach. Therefore, a different LOS is reported for each approach.

The LOS at signalized intersections is determined by the average vehicle delay. Values can be reported for the intersection as a whole or each individual movement.

Table 2: LOS Criteria for Signalized and Unsignalized Intersections

	Signalized Intersections	Unsignalized Intersections
A	< 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

Source: Highway Capacity Manual 2000 (Chapter 16 and 17)

The results of the capacity analysis for 2017 existing conditions are indicated in **Table 3**. It can be seen from the results table that all intersections operate at an acceptable LOS B or better during the AM and PM peak hour.

Since HCM methodology does not provide intersection-wide delay for Stop-Controlled operation, (Center Street at Railroad Avenue), the LOS of the intersection approaches and individual movements were analyzed. The results of the LOS for the unsignalized intersection of Center Street at Railroad Avenue is summarized in **Table 3**.

Table 3: Existing LOS and Delay (seconds/vehicle)*

	AM PEAK HOUR		PM PEAK HOUR	
STOP CONTROLLED INTERSECTION	Northbound Left Turn	Eastbound Right Turn	Northbound Left Turn	Eastbound Right Turn
1 - Center Street at Railroad Avenue	A (2.9)	B (10.7)	A (2.4)	B (11.3)
SIGNALIZED INTERSECTION				
2 - SH 225 EB FR at Center Street	B (12.0)		B (14.5)	
3 - SH 225 WB FR at Center Street	B (12.7)		B (17.6)	
4 - SH 225 EB FR at Robin Street	B (13.6)		B (15.3)	
5 - SH 225 WB FR at Robin Street	B (15.3)		B (18.9)	

*signal timing based on Synchro's default values

The existing LOS for all five intersections are at LOS B or better. When this report was prepared, the signal timing plans for SH 225 Frontage Road (eastbound and westbound) at Center Street and Robin Street, was requested but was not available. Therefore, the analysis was based on the optimized pre-time created by Synchro.

V. ALTERNATIVES

Four alternatives were developed to help eliminate the illegal left turn movements at Center Street and Railroad Avenue. The details for each alternative is listed below.

Alternative 1: Close the median on Center Street at Railroad Avenue

Alternative 1 proposed to close the median at Center Street. The existing northbound left turns, from Center Street onto Railroad Avenue, will be prohibited. Traffic will be rerouted through Intersection 2, 3, 4 and 5 to return to Railroad Avenue. The rerouted traffic was analyzed in Synchro and the results are summarized below in **Table 4**.

Table 4: Alternative 1: LOS and Delay (seconds/vehicle)*

	AM PEAK HOUR		PM PEAK HOUR	
STOP CONTROLLED INTERSECTION	Northbound Left Turn	Eastbound Right Turn	Northbound Left Turn	Eastbound Right Turn
1 - Center Street at Railroad Avenue	N/A	B (10.7)	N/A	B (11.3)
SIGNALIZED INTERSECTION				
2 - SH 225 EB FR at Center Street	B (11.9)		B (14.5)	
3 - SH 225 WB FR at Center Street	B (12.6)		B (17.4)	
4 - SH 225 EB FR at Robin Street	B (12.8)		D (50.3)	
5 - SH 225 WB FR at Robin Street	B (14.7)		B (19.2)	

When compared to existing AM and PM LOS and delay, Alternative 1's AM LOS remain the same at LOS B, with minor changes to the delay. In the PM peak hour, all intersections but intersection 4, remain the same LOS B. Intersection 4 LOS changed from LOS B (existing) to D (Alternative 1). This is due to the over capacity of the shared left turn and through movement.

Alternative 1 will also impact the existing school bus routes, which travel north on Center Street and turn left onto Railroad Avenue, during the non-peak hours.

Alternative 2: Convert Railroad Avenue into a one-way street (westbound)

Alternative 2 proposed to convert Railroad Avenue into a one-way street, westbound only, starting at the intersection of Robin Street and Railroad Avenue and ending at Center Street. The existing Railroad Avenue eastbound right turn traffic onto Center Street will be rerouted through intersection 5, where vehicles will turn left onto Robin Street, then right onto SH 225 Eastbound Frontage Road, and then right onto Center Street at intersection 2. The rerouted traffic was analyzed in Synchro and the results are summarized below in **Table 5**.

Table 5: Alternative 2: LOS and Delay (seconds/vehicle)*

	AM PEAK HOUR		PM PEAK HOUR	
STOP CONTROLLED INTERSECTION	Northbound Left Turn	Eastbound Right Turn	Northbound Left Turn	Eastbound Right Turn
1 - Center Street at Railroad Avenue	A (3.1)	N/A	A (2.7)	N/A
SIGNALIZED INTERSECTION				
2 - SH 225 EB FR at Center Street	B (11.4)		B (15.5)	
3 - SH 225 WB FR at Center Street	B (12.7)		B (17.6)	
4 - SH 225 EB FR at Robin Street	B (11.1)		B (12.9)	
5 - SH 225 WB FR at Robin Street	B (15.3)		B (18.9)	

When compared to the existing AM and PM LOS and delay, Alternative 2's LOS remain the same at LOS B, with minor changes to the delay. Intersection 4, the AM and PM overall intersection delay improved with the rerouted vehicles. This is because the existing northbound right turn has very low delay, and the rerouted vehicles actually make a right turn on red. In Synchro, the overall intersection delay is a weighted average of all movements at the intersection. Therefore, increasing the volume to a movement with low delay does increase the weight for that movement and result in a decreased overall intersection delay.

Alternative 3: Add a right-turn only diverter on Railroad Avenue at Center Street

Alternative 3 proposed a right-turn diverter, similar to the example shown in **Figure 1**. The diverter is proposed to be positioned at the approach to an intersection that orients vehicles to making a right-turn movement only. Also, with Alternative 3, it is proposed to replace the existing "No Left" (R3-2) turn signs with "Right Turn Only" (R3-5R) signs. Alternative 3 will not alter the existing traffic flow, therefore the existing LOS and delay shown in **Table 3** apply.



Source: https://www.phoenix.gov/streetssite/Documents/d_039263.pdf

Figure 1: Right Turn Diverter

Alternative 4: Add a non-traversable directional median on Center Street

Alternative 4 proposed adding a directional non-traversable median, with a left turn bay, for the northbound left turn movement on Center Street. See example shown in **Figure 2**. Alternative 4 will not alter the existing traffic flow, therefore the existing LOS and delay shown in **Table 3** apply. This separator would prevent the eastbound left turn movement from Railroad Avenue, where the access becomes right-in/right-out only with just two conflict points.

This Alternative will require additional pavement on Center Street. The pavement would need to widen to 66-feet, from its existing 64-feet, with five 11-foot lanes (two southbound and three northbound) and 11-foot median/left turn lane.

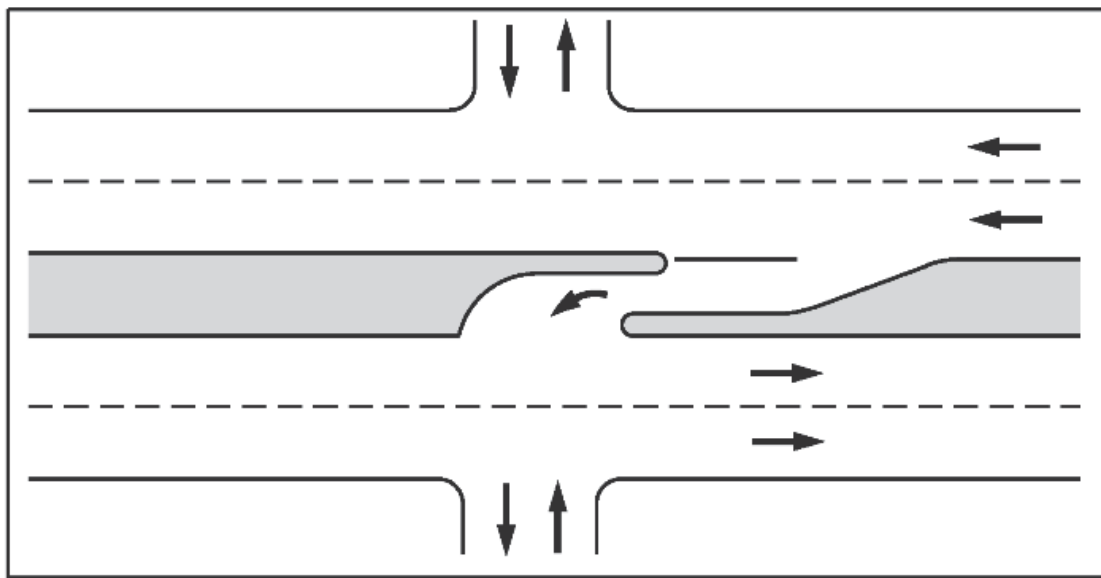


Figure 2: Left-Turn Ingress from One Direction

Source: http://onlinemanuals.txdot.gov/txdotmanuals/rdw/urban_streets.htm

VI. CONCLUSION AND RECOMMENDATIONS

The four alternatives presented above would help to eliminate the illegal eastbound left turn movement from Railroad Avenue onto Center Street. Alternative 1 proposed the closing of the median on Center Street, which will eliminate northbound access from Center Street to Railroad Avenue. This alternative will provide the most permanent solution to the illegal left turn, it will alter the traffic flow for a period of time until drivers adapt to the closure and find alternative routes. The traffic operation analysis in Synchro shows this alternative will have the same LOS as the existing for most of the intersections, except for the SH 225 Eastbound Frontage Road at Robin Street intersection, where the LOS is reduced from a B to D.

Alternative 2 proposed converting Railroad Avenue from a two-way to a one-way (westbound) roadway. This alternative will reroute all existing eastbound movement on Railroad Avenue to the intersection of Railroad Avenue and Robin Street and SH 225 Eastbound Frontage Road. Similarly to Alternative 1, it will alter the traffic flow for a period of time until drivers adapt to the closure and find alternative routes. The traffic operation analysis in Synchro shows this alternative will have the same LOS as the existing condition.

Alternative 3 proposed adding a right-turn diverter on Railroad Avenue to force all vehicles to make a right turn. This alternative will replace the existing no left turn signs with right turn only signs. This alternative will not alter the existing traffic flow.

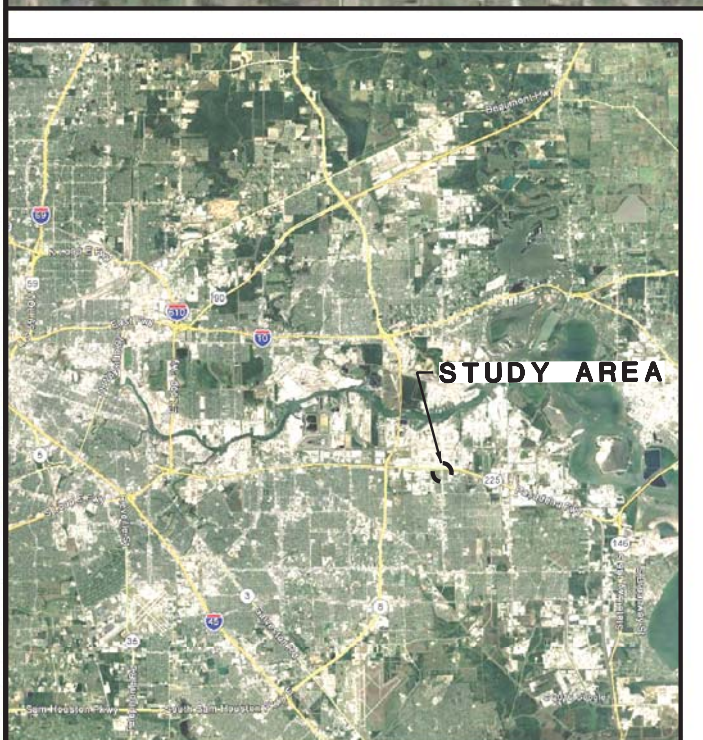
Alternative 4 proposed a directional median with a left turn lane on Center Street to manage the illegal left turn movements on Railroad Avenue. This alternative will not alter the existing traffic flow, but will require additional pavement.

In summary, Alternative 3 is recommended, as it provides an immediate viable solution with minimum cost and no impact to existing traffic flow. Alternative 4 could supplement Alternative 3 at a later date with appropriate funding.

In addition to the recommended Alternatives listed above, the City should consider installing large streetscapes, such as bollards, in the median on Center Street within the study area. The large streetscapes will further prevent large vehicles from jumping the curb to make the illegal left turn.

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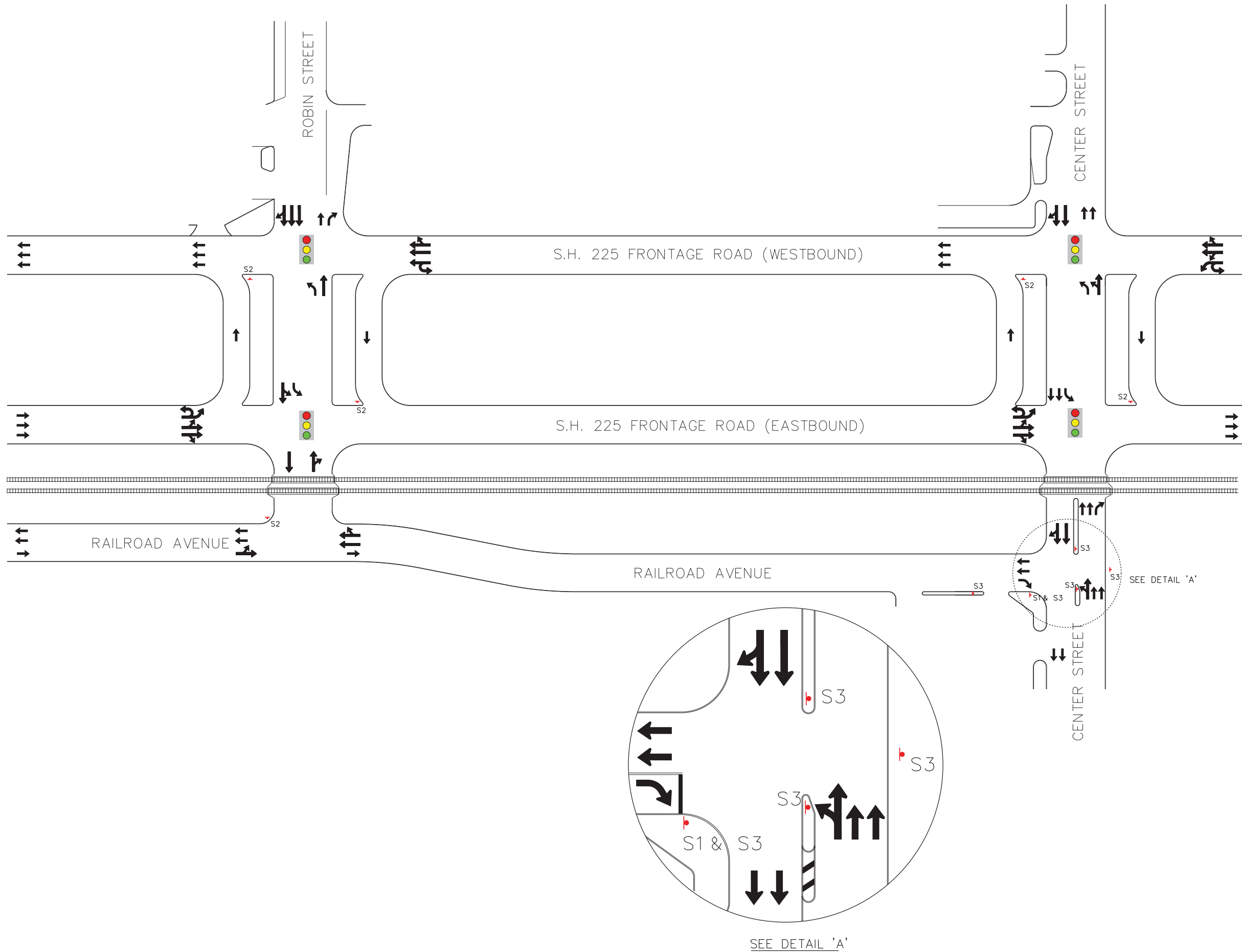
**Appendix A:
Exhibit 1 through Exhibit 3**



TRAFFIC ANALYSIS FOR
 CENTER ST. AT W. RAILROAD AVE.

EXHIBIT 1:
 SITE LOCATION MAP

DATE:	6/2/2017	SCALE:	N.T.S.
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LEGEND



DIRECTION OF TRAFFIC

SPEED LIMITS:
CENTER STREET = 40 M.P.H.
RAILROAD AVENUE = 40 M.P.H.
SH 225 FRONTAGE ROAD = 50 M.P.H.

5225 KATY FREEWAY, SUITE 400 HOUSTON, TX 77007
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TBPE NO. F-8934

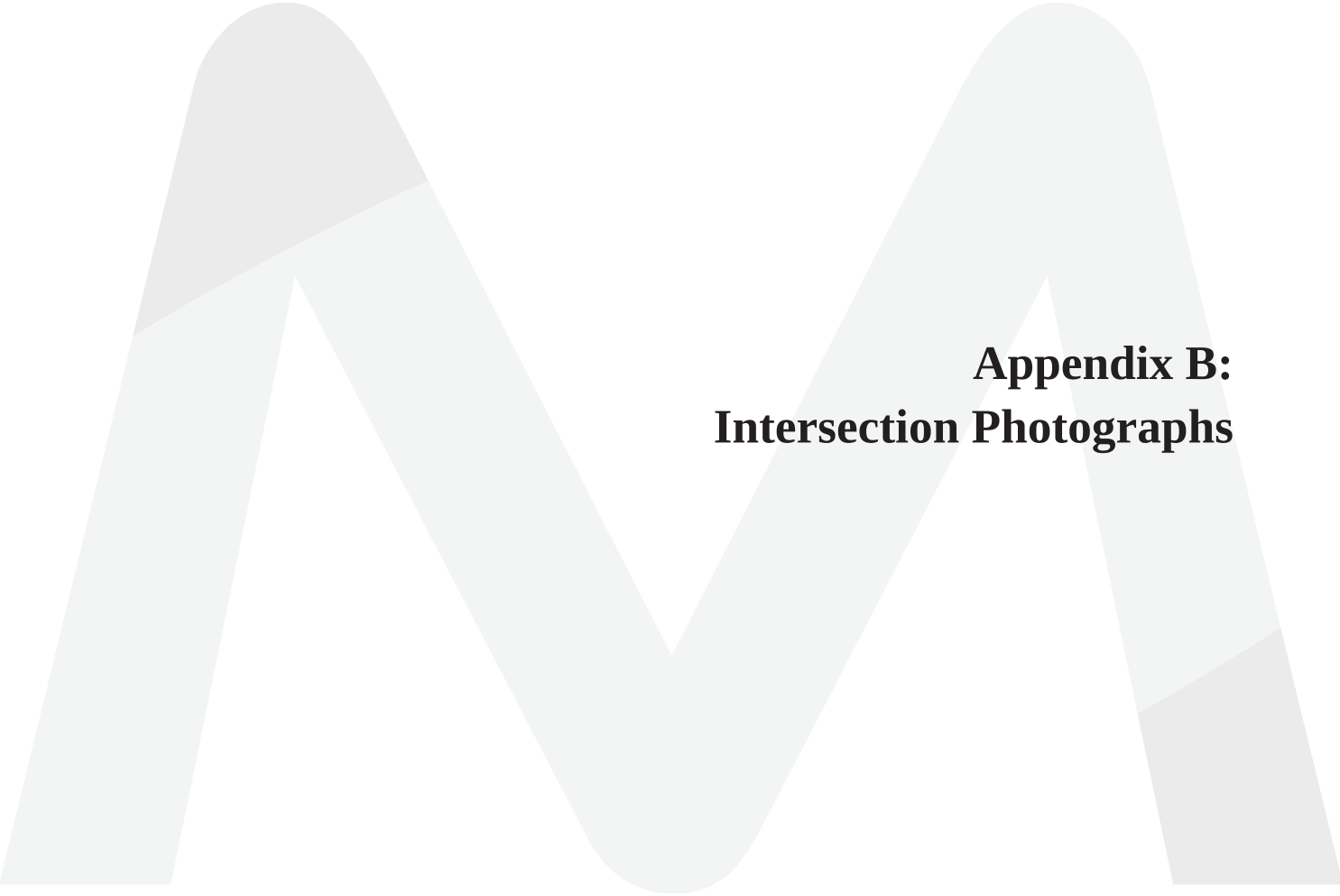
EXHIBIT 2:
EXISTING CONDITIONS



LEGEND:
XXX (YYY): AM (PM) PEAK HOUR TRAFFIC VOLUMES

Midtown Engineers, LLC
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(713) 862-8848 WWW.MIDTOWNGENGINEERS.COM
TBPE NO. F-8934

EXHIBIT 3:
PEAK HOUR VOLUMES

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Appendix B: Intersection Photographs



Image 1: Looking north on Center Street*



Image 2: Looking south on Center Street*

*Source – GoogleMap, Image Capture: February 2017.

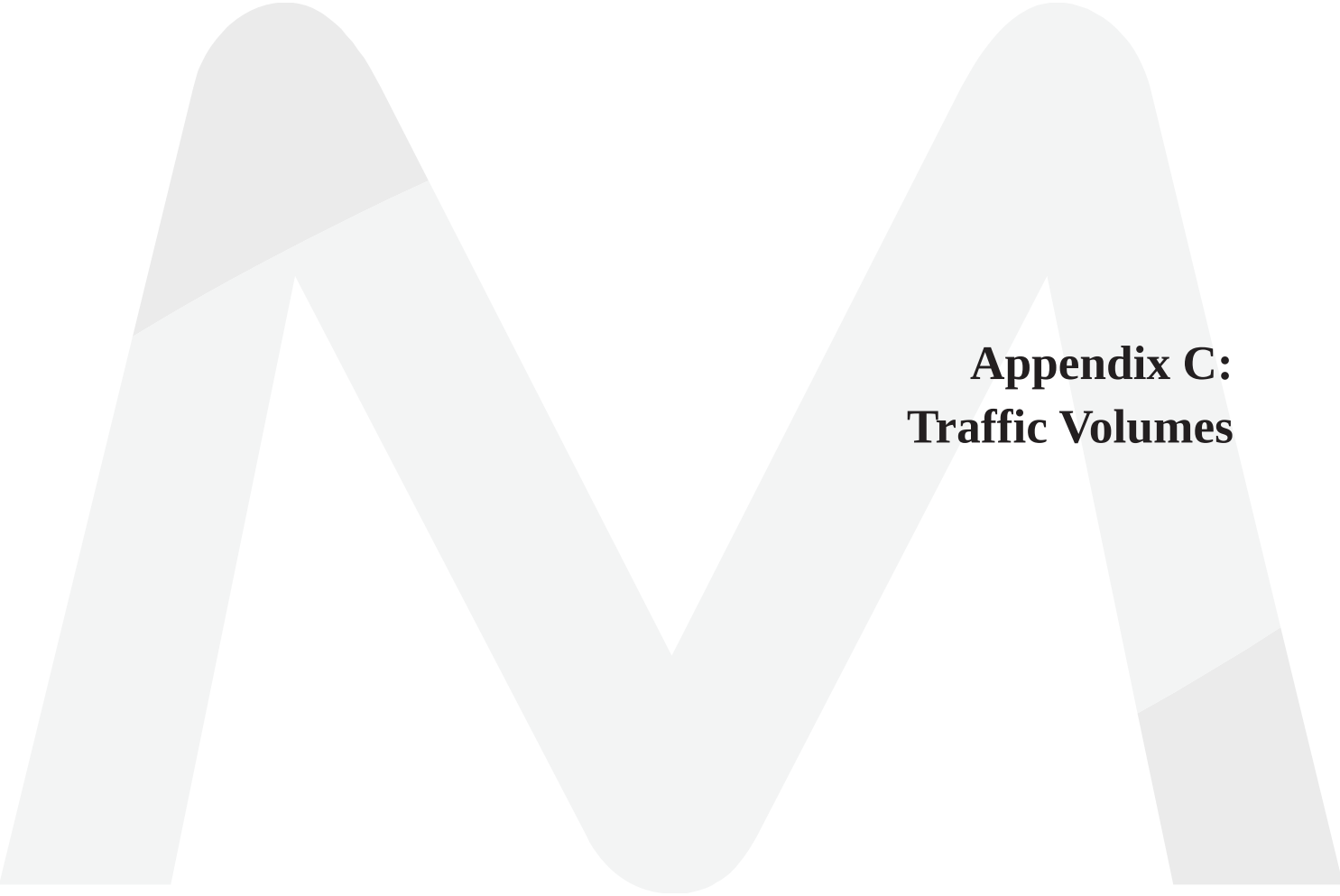


Image 3: Looking east on Railroad Avenue*



Image 4: Looking west on Railroad Avenue*

*Source – GoogleMap, Image Capture: February 2017.

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Appendix C: Traffic Volumes

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 1 - Center St at Railroad St
Site Code: 1
Start Date: 04/20/2017
Page No: 1

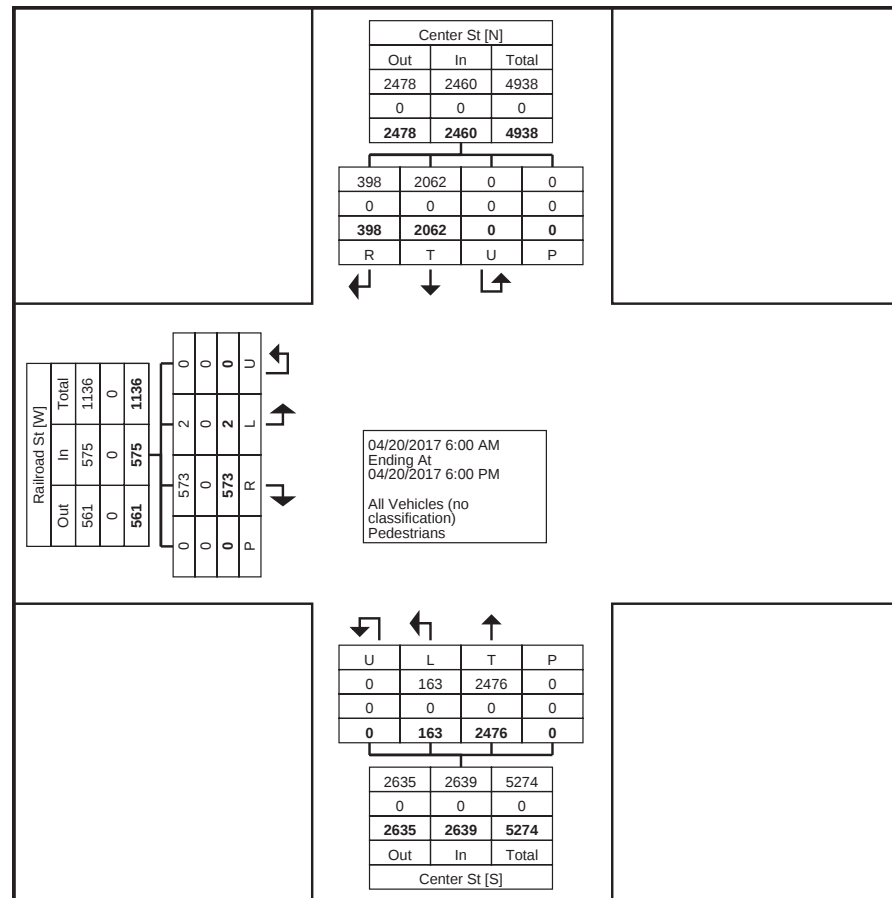
Turning Movement Data

[illegible]



Midtown
5215 Sycamore Ave
Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 1 - Center St at Railroad St
Site Code: 1
Start Date: 04/20/2017
Page No: 2



Turning Movement Data Plot

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 1 - Center St at Railroad St
Site Code: 1
Start Date: 04/20/2017
Page No: 3

Turning Movement Peak Hour Data (7:00 AM)

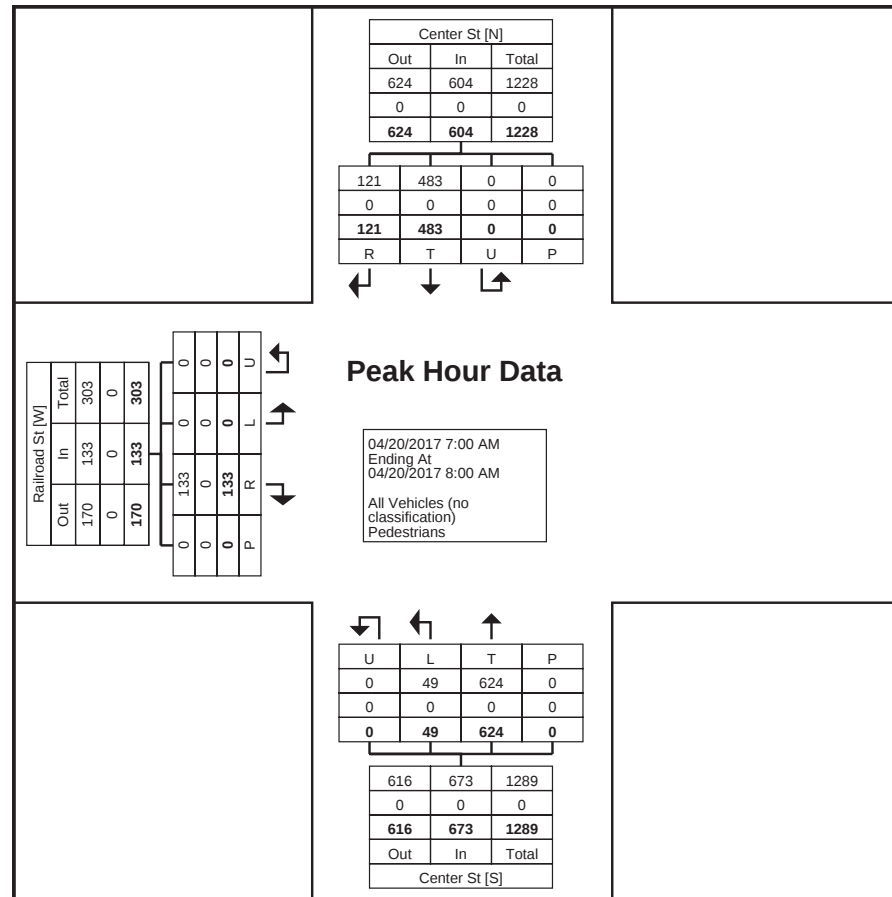
[illegible]



Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 1 - Center St at Railroad St
Site Code: 1
Start Date: 04/20/2017
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 1 - Center St at Railroad St
Site Code: 1
Start Date: 04/20/2017
Page No: 5

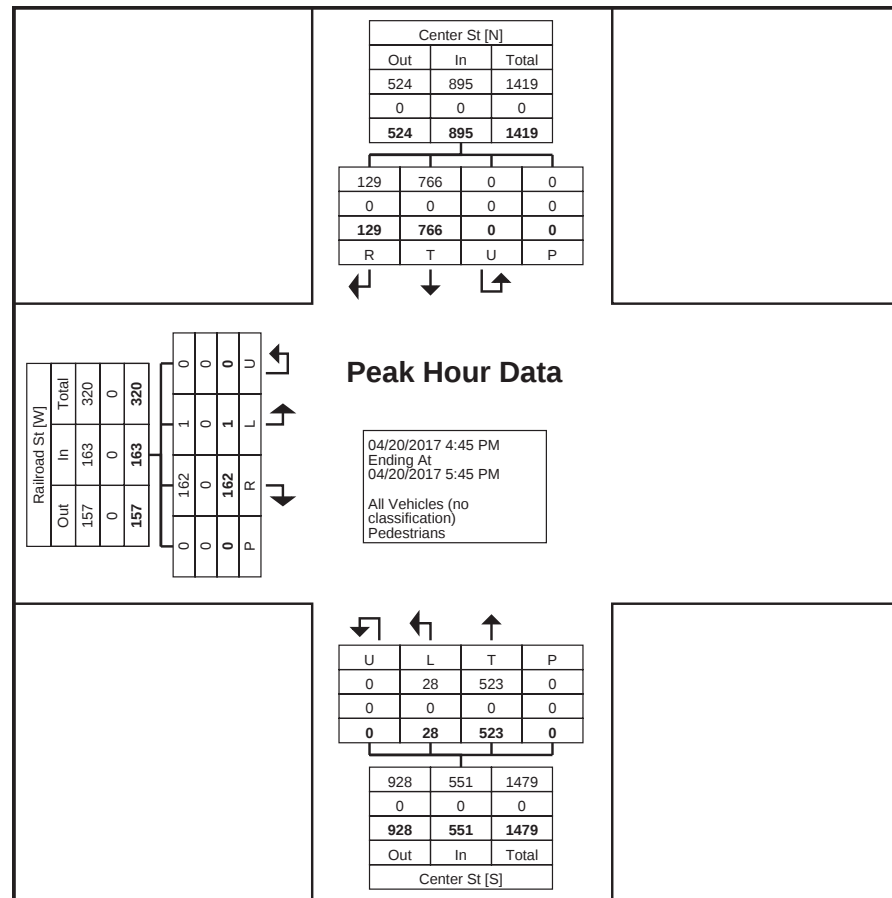
Turning Movement Peak Hour Data (4:45 PM)

[illegible]



Midtown
5215 Sycamore Ave
Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 1 - Center St at Railroad St
Site Code: 1
Start Date: 04/20/2017
Page No: 6



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

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
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Count Name: 2 - Center St at SH 225 EBFR
Site Code: 2
Start Date: 04/20/2017
Page No: 1

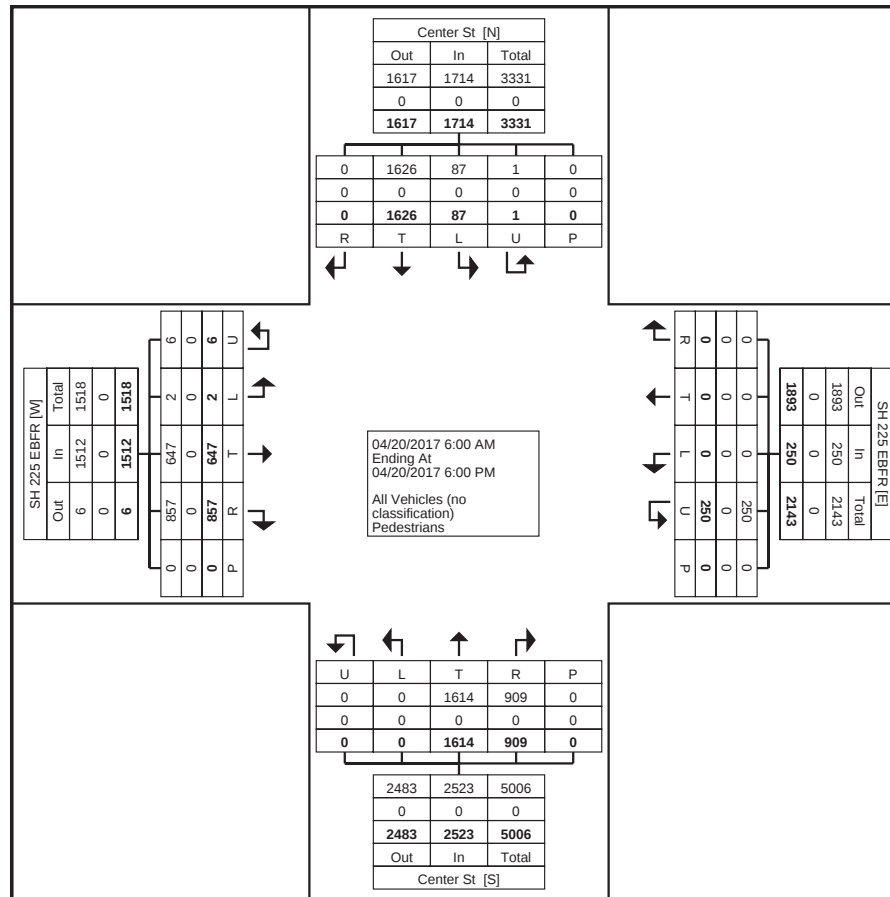
Turning Movement Data

Start Time	Center St Southbound						SH 225 EBFR Westbound						Center St Northbound						SH 225 EBFR Eastbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
6:00 AM	0	42	0	0	0	42	0	0	0	5	0	5	0	125	66	0	0	191	0	18	20	0	0	38	276
6:15 AM	0	47	0	0	0	47	0	0	0	6	0	6	0	133	68	0	0	201	1	32	18	0	0	51	305
6:30 AM	1	59	0	0	0	60	0	0	0	5	0	5	0	125	78	0	0	203	0	28	35	0	0	63	331
6:45 AM	0	73	0	0	0	73	0	0	0	4	0	4	0	122	59	0	0	181	0	26	36	0	0	62	320
Hourly Total	1	221	0	0	0	222	0	0	0	20	0	20	0	505	271	0	0	776	1	104	109	0	0	214	1232
7:00 AM	1	73	0	0	0	74	0	0	0	5	0	5	0	110	45	0	0	155	0	17	42	1	0	60	294
7:15 AM	0	108	0	0	0	108	0	0	0	5	0	5	0	121	39	0	0	160	0	31	45	1	0	77	350
7:30 AM	2	101	0	0	0	103	0	0	0	7	0	7	0	95	53	0	0	148	0	27	60	0	0	87	345
7:45 AM	1	111	0	0	0	112	0	0	0	4	0	4	0	108	52	0	0	160	0	43	69	0	0	112	388
Hourly Total	4	393	0	0	0	397	0	0	0	21	0	21	0	434	189	0	0	623	0	118	216	2	0	336	1377
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	7	87	0	0	0	94	0	0	0	21	0	21	0	115	60	0	0	175	0	72	74	1	0	147	437
4:15 PM	8	80	0	0	0	88	0	0	0	40	0	40	0	97	58	0	0	155	0	42	53	1	0	96	379
4:30 PM	15	103	0	0	0	118	0	0	0	30	0	30	0	98	58	0	0	156	0	55	63	0	0	118	422
4:45 PM	9	130	0	0	0	139	0	0	0	25	0	25	0	79	53	0	0	132	1	56	55	0	0	112	408
Hourly Total	39	400	0	0	0	439	0	0	0	116	0	116	0	389	229	0	0	618	1	225	245	2	0	473	1646
5:00 PM	13	169	0	0	0	182	0	0	0	36	0	36	0	79	73	0	0	152	0	72	91	2	0	165	535
5:15 PM	14	136	0	1	0	151	0	0	0	25	0	25	0	77	50	0	0	127	0	47	61	0	0	108	411
5:30 PM	5	188	0	0	0	193	0	0	0	20	0	20	0	62	52	0	0	114	0	55	68	0	0	123	450
5:45 PM	11	119	0	0	0	130	0	0	0	12	0	12	0	68	45	0	0	113	0	26	67	0	0	93	348
Hourly Total	43	612	0	1	0	656	0	0	0	93	0	93	0	286	220	0	0	506	0	200	287	2	0	489	1744
Grand Total	87	1626	0	1	0	1714	0	0	0	250	0	250	0	1614	909	0	0	2523	2	647	857	6	0	1512	5999
Approach %	5.1	94.9	0.0	0.1	-	-	0.0	0.0	0.0	100.0	-	-	0.0	64.0	36.0	0.0	-	-	0.1	42.8	56.7	0.4	-	-	-
Total %	1.5	27.1	0.0	0.0	-	28.6	0.0	0.0	0.0	4.2	-	4.2	0.0	26.9	15.2	0.0	-	42.1	0.0	10.8	14.3	0.1	-	25.2	-
All Vehicles (no classification)	87	1626	0	1	-	1714	0	0	0	250	-	250	0	1614	909	0	-	2523	2	647	857	6	-	1512	5999
% All Vehicles (no classification)	100.0	100.0	-	100.0	-	100.0	-	-	-	100.0	-	100.0	-	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

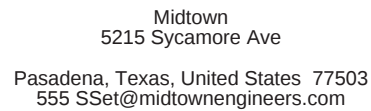


Midtown
5215 Sycamore Ave
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Count Name: 2 - Center St at SH 225 EBFR
Site Code: 2
Start Date: 04/20/2017
Page No: 2



Turning Movement Data Plot



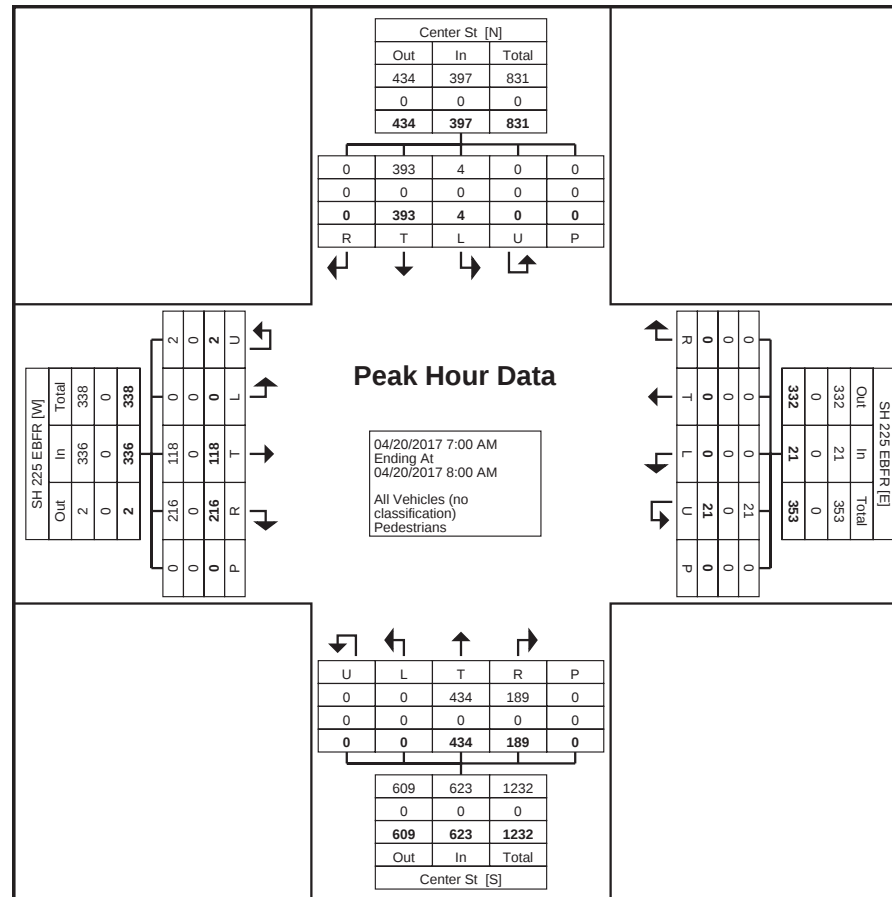
Turning Movement Peak Hour Data (7:00 AM)

Start Time	Center St Southbound						SH 225 EBFR Westbound						Center St Northbound						SH 225 EBFR Eastbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
7:00 AM	1	73	0	0	0	74	0	0	0	5	0	5	0	110	45	0	0	155	0	17	42	1	0	60	294
7:15 AM	0	108	0	0	0	108	0	0	0	5	0	5	0	121	39	0	0	160	0	31	45	1	0	77	350
7:30 AM	2	101	0	0	0	103	0	0	0	7	0	7	0	95	53	0	0	148	0	27	60	0	0	87	345
7:45 AM	1	111	0	0	0	112	0	0	0	4	0	4	0	108	52	0	0	160	0	43	69	0	0	112	388
Total	4	393	0	0	0	397	0	0	0	21	0	21	0	434	189	0	0	623	0	118	216	2	0	336	1377
Approach %	1.0	99.0	0.0	0.0	-	-	0.0	0.0	0.0	100.0	-	-	0.0	69.7	30.3	0.0	-	-	0.0	35.1	64.3	0.6	-	-	-
Total %	0.3	28.5	0.0	0.0	-	28.8	0.0	0.0	0.0	1.5	-	1.5	0.0	31.5	13.7	0.0	-	45.2	0.0	8.6	15.7	0.1	-	24.4	-
PHF	0.500	0.885	0.000	0.000	-	0.886	0.000	0.000	0.000	0.750	-	0.750	0.000	0.897	0.892	0.000	-	0.973	0.000	0.686	0.783	0.500	-	0.750	0.887
All Vehicles (no classification)	4	393	0	0	-	397	0	0	0	21	-	21	0	434	189	0	-	623	0	118	216	2	-	336	1377
% All Vehicles (no classification)	100.0	100.0	-	-	-	100.0	-	-	-	100.0	-	100.0	-	100.0	100.0	-	-	100.0	-	100.0	100.0	100.0	-	100.0	100.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Midtown
5215 Sycamore Ave
Pasadena, Texas, United States 77503
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Count Name: 2 - Center St at SH 225 EBFR
Site Code: 2
Start Date: 04/20/2017
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
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Count Name: 2 - Center St at SH 225 EBFR
Site Code: 2
Start Date: 04/20/2017
Page No: 5

Turning Movement Peak Hour Data (4:45 PM)

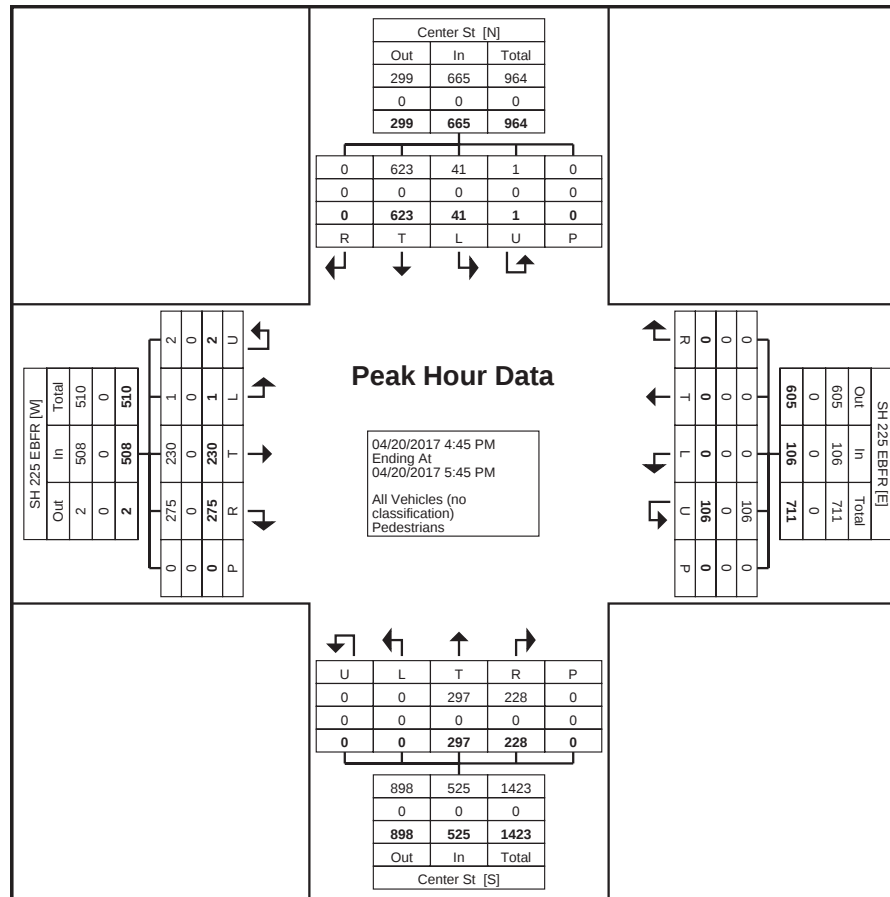
Start Time	Center St Southbound						SH 225 EBFR Westbound						Center St Northbound						SH 225 EBFR Eastbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
4:45 PM	9	130	0	0	0	139	0	0	0	25	0	25	0	79	53	0	0	132	1	56	55	0	0	112	408
5:00 PM	13	169	0	0	0	182	0	0	0	36	0	36	0	79	73	0	0	152	0	72	91	2	0	165	535
5:15 PM	14	136	0	1	0	151	0	0	0	25	0	25	0	77	50	0	0	127	0	47	61	0	0	108	411
5:30 PM	5	188	0	0	0	193	0	0	0	20	0	20	0	62	52	0	0	114	0	55	68	0	0	123	450
Total	41	623	0	1	0	665	0	0	0	106	0	106	0	297	228	0	0	525	1	230	275	2	0	508	1804
Approach %	6.2	93.7	0.0	0.2	-	-	0.0	0.0	0.0	100.0	-	-	0.0	56.6	43.4	0.0	-	-	0.2	45.3	54.1	0.4	-	-	-
Total %	2.3	34.5	0.0	0.1	-	36.9	0.0	0.0	0.0	5.9	-	5.9	0.0	16.5	12.6	0.0	-	29.1	0.1	12.7	15.2	0.1	-	28.2	-
PHF	0.732	0.828	0.000	0.250	-	0.861	0.000	0.000	0.000	0.736	-	0.736	0.000	0.940	0.781	0.000	-	0.863	0.250	0.799	0.755	0.250	-	0.770	0.843
All Vehicles (no classification)	41	623	0	1	-	665	0	0	0	106	-	106	0	297	228	0	-	525	1	230	275	2	-	508	1804
% All Vehicles (no classification)	100.0	100.0	-	100.0	-	100.0	-	-	-	100.0	-	100.0	-	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



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Count Name: 2 - Center St at SH 225 EBFR
Site Code: 2
Start Date: 04/20/2017
Page No: 6



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

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Pasadena, Texas, United States 77503
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Count Name: 3 - Center St at SH 225 WBFR
Site Code: 3
Start Date: 04/20/2017
Page No: 1

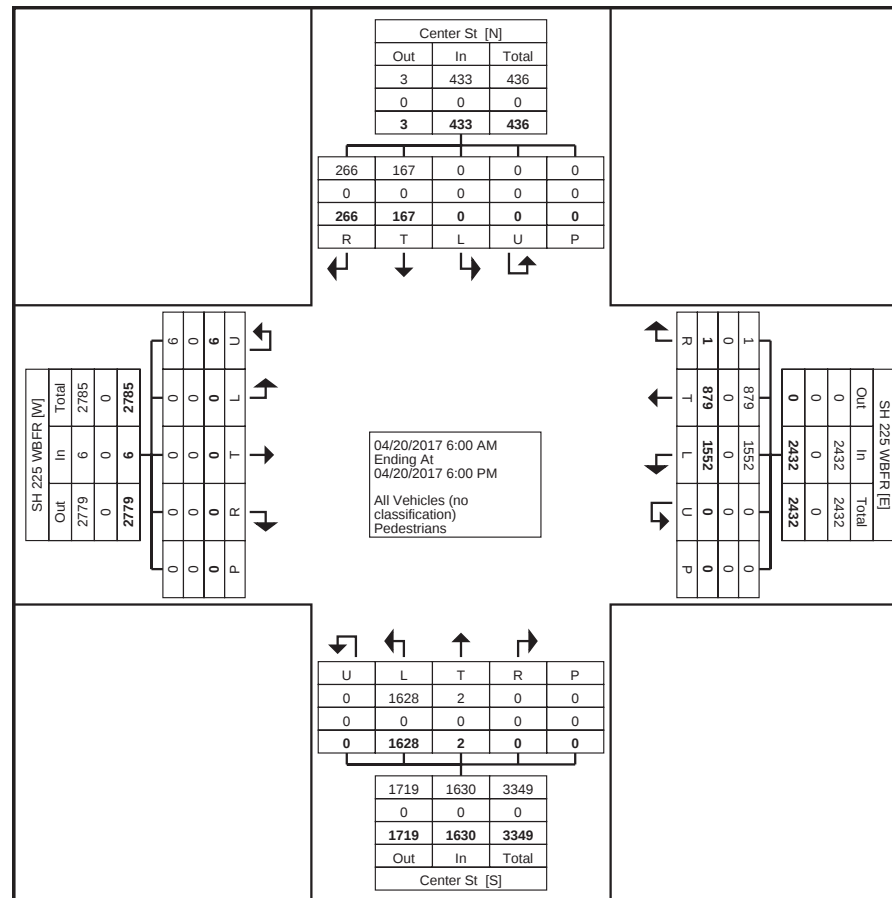
Turning Movement Data

Start Time	Center St Southbound						SH 225 WBFR Westbound						Center St Northbound						SH 225 WBFR Eastbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
6:00 AM	0	1	7	0	0	8	39	25	0	0	0	64	129	0	0	0	0	129	0	0	0	0	0	0	201
6:15 AM	0	1	2	0	0	3	46	20	0	0	0	66	128	0	0	0	0	128	0	0	0	0	0	0	197
6:30 AM	0	1	1	0	0	2	62	14	0	0	0	76	123	1	0	0	0	124	0	0	0	0	0	0	202
6:45 AM	0	0	0	0	0	0	71	17	0	0	0	88	124	0	0	0	0	124	0	0	0	0	0	0	212
Hourly Total	0	3	10	0	0	13	218	76	0	0	0	294	504	1	0	0	0	505	0	0	0	0	0	0	812
7:00 AM	0	2	1	0	0	3	83	21	0	0	0	104	108	0	0	0	0	108	0	0	0	1	0	1	216
7:15 AM	0	0	0	0	0	0	96	6	0	0	0	102	120	0	0	0	0	120	0	0	0	1	0	1	223
7:30 AM	0	2	0	0	0	2	105	29	0	0	0	134	98	1	0	0	0	99	0	0	0	0	0	0	235
7:45 AM	0	1	0	0	0	1	113	19	0	0	0	132	106	0	0	0	0	106	0	0	0	0	0	0	239
Hourly Total	0	5	1	0	0	6	397	75	0	0	0	472	432	1	0	0	0	433	0	0	0	2	0	2	913
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	13	31	0	0	44	78	22	1	0	0	101	117	0	0	0	0	117	0	0	0	1	0	1	263
4:15 PM	0	12	29	0	0	41	82	52	0	0	0	134	98	0	0	0	0	98	0	0	0	1	0	1	274
4:30 PM	0	32	41	0	0	73	97	66	0	0	0	163	99	0	0	0	0	99	0	0	0	0	0	0	335
4:45 PM	0	17	16	0	0	33	112	69	0	0	0	181	89	0	0	0	0	89	0	0	0	0	0	0	303
Hourly Total	0	74	117	0	0	191	369	209	1	0	0	579	403	0	0	0	0	403	0	0	0	2	0	2	1175
5:00 PM	0	30	37	0	0	67	145	79	0	0	0	224	82	0	0	0	0	82	0	0	0	2	0	2	375
5:15 PM	0	20	28	0	0	48	143	215	0	0	0	358	77	0	0	0	0	77	0	0	0	0	0	0	483
5:30 PM	0	20	43	0	0	63	170	154	0	0	0	324	62	0	0	0	0	62	0	0	0	0	0	0	449
5:45 PM	0	15	30	0	0	45	110	71	0	0	0	181	68	0	0	0	0	68	0	0	0	0	0	0	294
Hourly Total	0	85	138	0	0	223	568	519	0	0	0	1087	289	0	0	0	0	289	0	0	0	2	0	2	1601
Grand Total	0	167	266	0	0	433	1552	879	1	0	0	2432	1628	2	0	0	0	1630	0	0	0	6	0	6	4501
Approach %	0.0	38.6	61.4	0.0	-	-	63.8	36.1	0.0	0.0	-	-	99.9	0.1	0.0	0.0	-	-	0.0	0.0	0.0	100.0	-	-	-
Total %	0.0	3.7	5.9	0.0	-	9.6	34.5	19.5	0.0	0.0	-	54.0	36.2	0.0	0.0	0.0	-	36.2	0.0	0.0	0.0	0.1	-	0.1	-
All Vehicles (no classification)	0	167	266	0	-	433	1552	879	1	0	-	2432	1628	2	0	0	-	1630	0	0	0	6	-	6	4501
% All Vehicles (no classification)	-	100.0	100.0	-	-	100.0	100.0	100.0	100.0	-	-	100.0	100.0	100.0	-	-	-	100.0	-	-	-	100.0	-	-	100.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

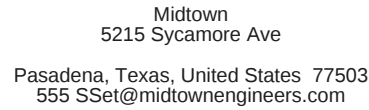
Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 3 - Center St at SH 225 WBFR
Site Code: 3
Start Date: 04/20/2017
Page No: 2



Turning Movement Data Plot



Count Name: 3 - Center St at SH 225 WBFR
Site Code: 3
Start Date: 04/20/2017
Page No: 3

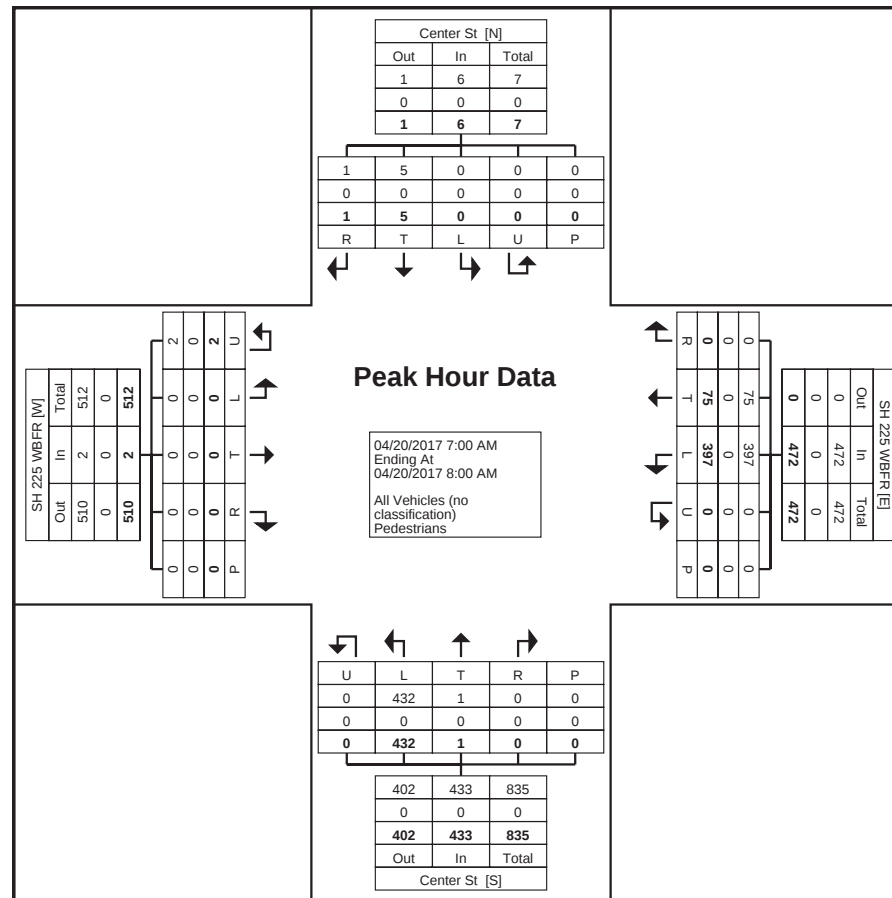
Turning Movement Peak Hour Data (7:00 AM)

[illegible]

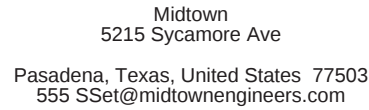
Midtown
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Count Name: 3 - Center St at SH 225 WBFR
Site Code: 3
Start Date: 04/20/2017
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)



Count Name: 3 - Center St at SH 225 WBFR
Site Code: 3
Start Date: 04/20/2017
Page No: 5

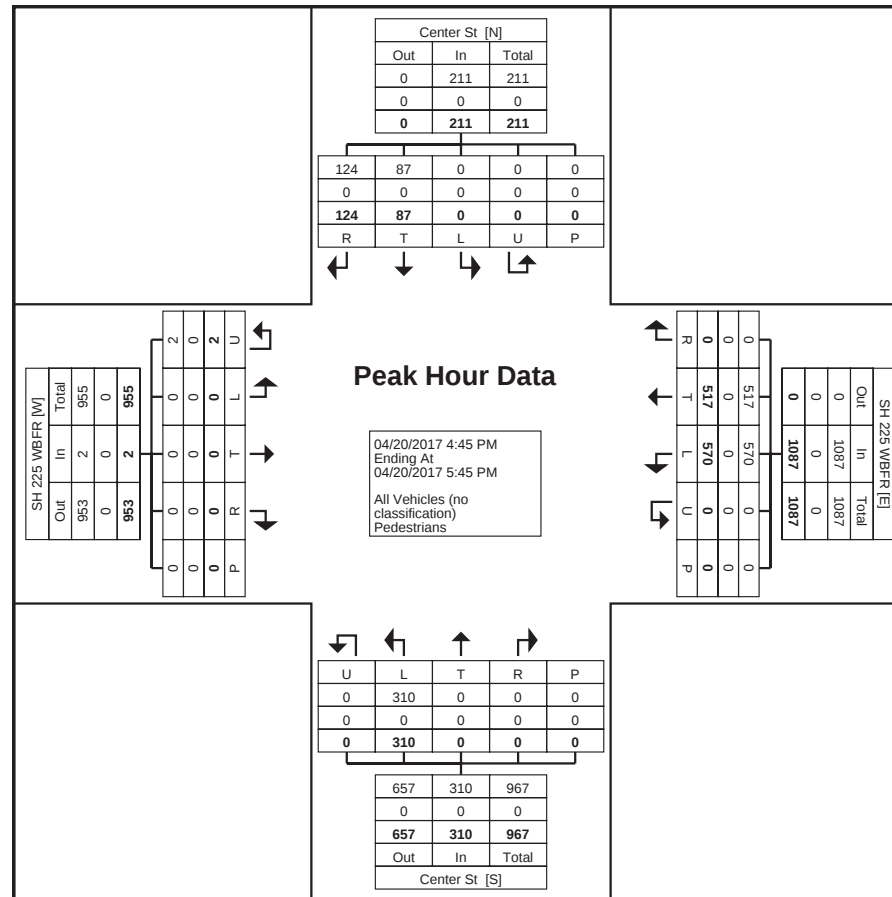
Turning Movement Peak Hour Data (4:45 PM)

[illegible]



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Pasadena, Texas, United States 77503
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Count Name: 3 - Center St at SH 225 WBFR
Site Code: 3
Start Date: 04/20/2017
Page No: 6



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

Midtown
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Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 4 - Contractor Rd at SH 225 EBFR
Site Code: 4
Start Date: 04/20/2017
Page No: 1

Turning Movement Data

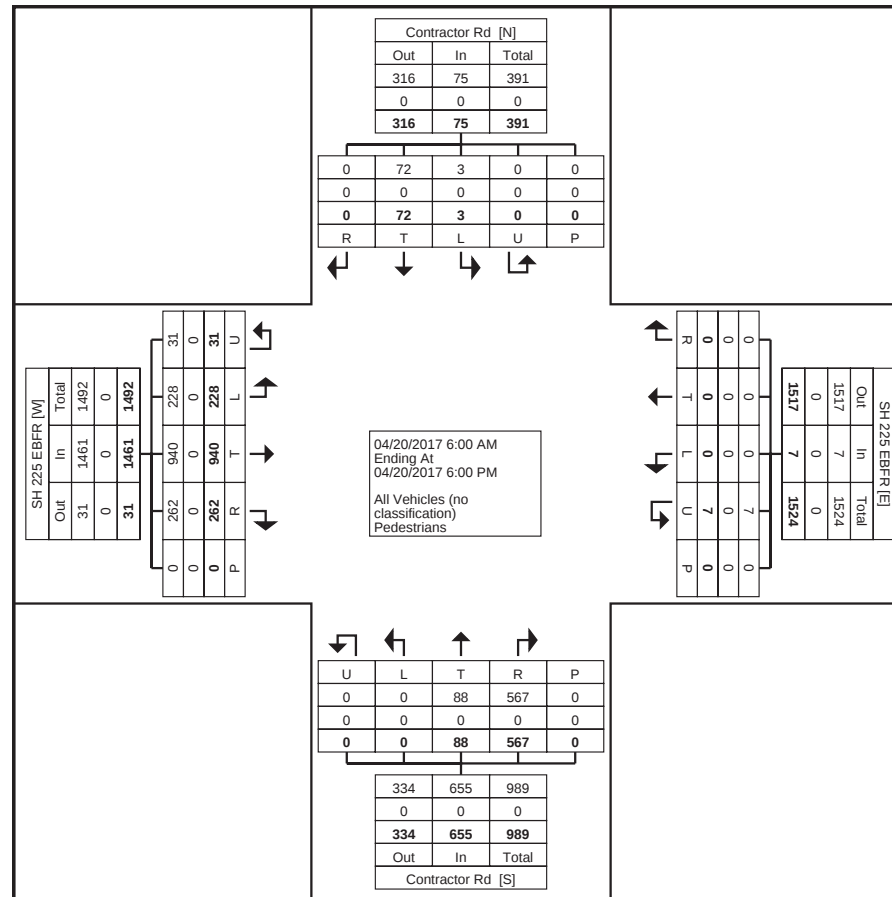
Start Time	Contractor Rd Southbound						SH 225 EBFR Westbound						Contractor Rd Northbound						SH 225 EBFR Eastbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
6:00 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	6	17	0	0	23	20	20	12	2	0	54	79
6:15 AM	0	3	0	0	0	3	0	0	0	0	0	0	0	4	27	0	0	31	33	26	11	5	0	75	109
6:30 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	5	25	0	0	30	36	40	19	1	0	96	128
6:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	4	20	0	0	24	30	40	23	3	0	96	120
Hourly Total	0	7	0	0	0	7	0	0	0	0	0	0	0	19	89	0	0	108	119	126	65	11	0	321	436
7:00 AM	0	5	0	0	0	5	0	0	0	0	0	0	0	5	15	0	0	20	34	41	11	2	0	88	113
7:15 AM	0	2	0	0	0	2	0	0	0	0	0	0	0	4	26	0	0	30	27	53	13	0	0	93	125
7:30 AM	0	6	0	0	0	6	0	0	0	0	0	0	0	9	26	0	0	35	18	64	16	1	0	99	140
7:45 AM	0	6	0	0	0	6	0	0	0	1	0	1	0	5	35	0	0	40	15	77	19	1	0	112	159
Hourly Total	0	19	0	0	0	19	0	0	0	1	0	1	0	23	102	0	0	125	94	235	59	4	0	392	537
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	2	0	0	0	2	0	0	0	2	0	2	0	6	63	0	0	69	1	77	14	0	0	92	165
4:15 PM	1	4	0	0	0	5	0	0	0	2	0	2	0	6	37	0	0	43	3	63	17	0	0	83	133
4:30 PM	1	4	0	0	0	5	0	0	0	0	0	0	0	8	50	0	0	58	2	67	16	0	0	85	148
4:45 PM	0	2	0	0	0	2	0	0	0	0	0	0	0	7	53	0	0	60	3	61	15	3	0	82	144
Hourly Total	2	12	0	0	0	14	0	0	0	4	0	4	0	27	203	0	0	230	9	268	62	3	0	342	590
5:00 PM	0	7	0	0	0	7	0	0	0	1	0	1	0	6	68	0	0	74	2	98	21	6	0	127	209
5:15 PM	1	8	0	0	0	9	0	0	0	0	0	0	0	3	34	0	0	37	3	65	21	5	0	94	140
5:30 PM	0	11	0	0	0	11	0	0	0	1	0	1	0	6	54	0	0	60	0	71	18	0	0	89	161
5:45 PM	0	8	0	0	0	8	0	0	0	0	0	0	0	4	17	0	0	21	1	77	16	2	0	96	125
Hourly Total	1	34	0	0	0	35	0	0	0	2	0	2	0	19	173	0	0	192	6	311	76	13	0	406	635
Grand Total	3	72	0	0	0	75	0	0	0	7	0	7	0	88	567	0	0	655	228	940	262	31	0	1461	2198
Approach %	4.0	96.0	0.0	0.0	-	-	0.0	0.0	0.0	100.0	-	-	0.0	13.4	86.6	0.0	-	-	15.6	64.3	17.9	2.1	-	-	-
Total %	0.1	3.3	0.0	0.0	-	3.4	0.0	0.0	0.0	0.3	-	0.3	0.0	4.0	25.8	0.0	-	29.8	10.4	42.8	11.9	1.4	-	66.5	-
All Vehicles (no classification)	3	72	0	0	-	75	0	0	0	7	-	7	0	88	567	0	-	655	228	940	262	31	-	1461	2198
% All Vehicles (no classification)	100.0	100.0	-	-	-	100.0	-	-	-	100.0	-	100.0	-	100.0	100.0	-	-	100.0	100.0	100.0	100.0	100.0	-	100.0	100.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



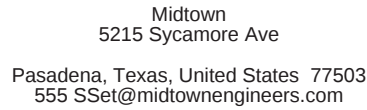
Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 4 - Contractor Rd at SH 225 EBFR
Site Code: 4
Start Date: 04/20/2017
Page No: 2



Turning Movement Data Plot



Count Name: 4 - Contractor Rd at SH 225 EBFR
Site Code: 4
Start Date: 04/20/2017
Page No: 3

Turning Movement Peak Hour Data (7:00 AM)

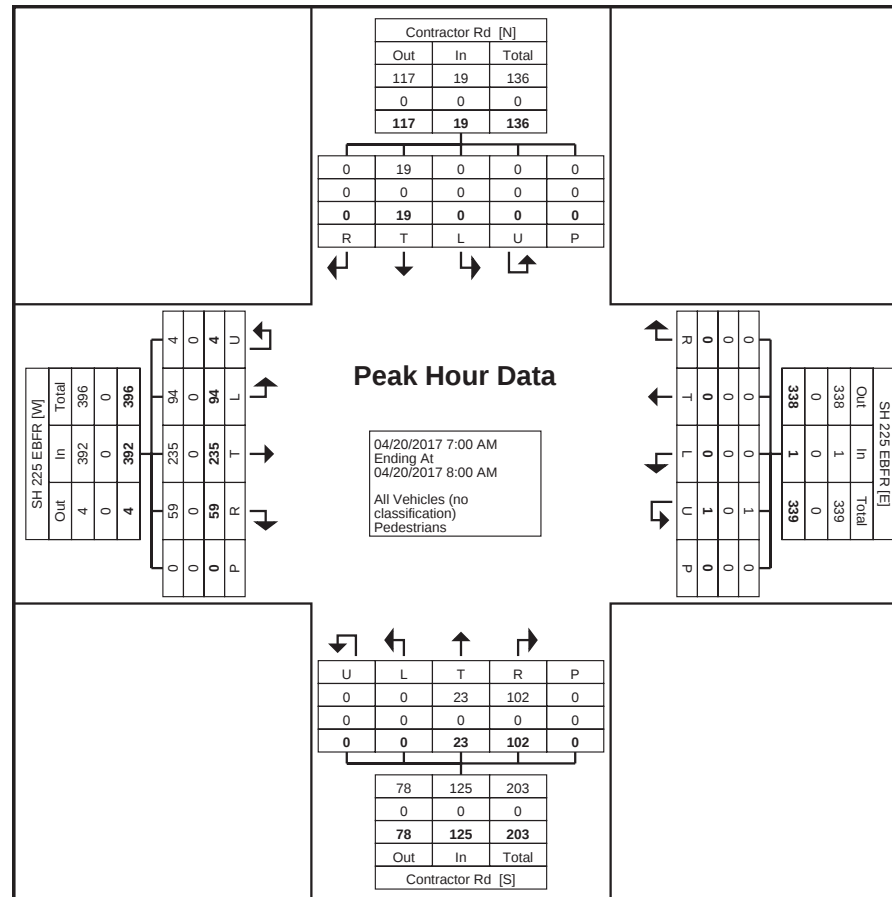
[illegible]



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Count Name: 4 - Contractor Rd at SH 225 EBFR
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Start Date: 04/20/2017
Page No: 4



Turning Movement Peak Hour Data Plot (7:00 AM)

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Count Name: 4 - Contractor Rd at SH 225 EBR
Site Code: 4
Start Date: 04/20/2017
Page No: 5

Turning Movement Peak Hour Data (4:45 PM)

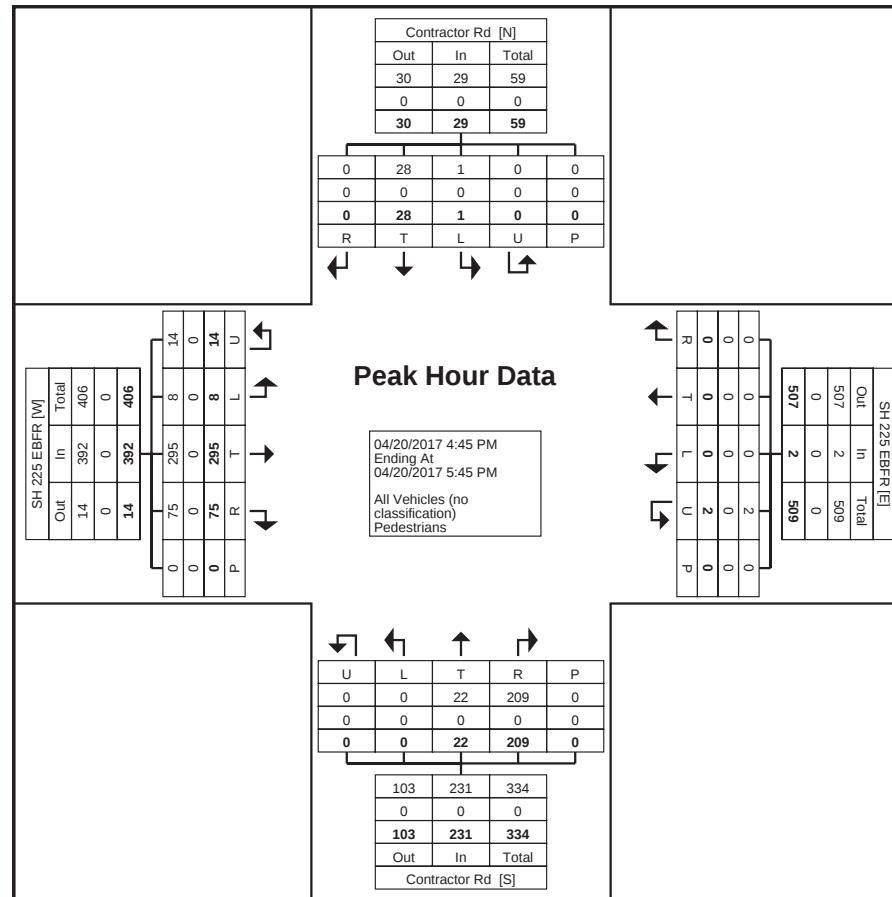
[illegible]



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Count Name: 4 - Contractor Rd at SH 225 EBFR
Site Code: 4
Start Date: 04/20/2017
Page No: 6



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

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
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Count Name: 5 - Contractor Rd at SH 225
WBFR
Site Code: 5
Start Date: 04/20/2017
Page No: 1

Turning Movement Data

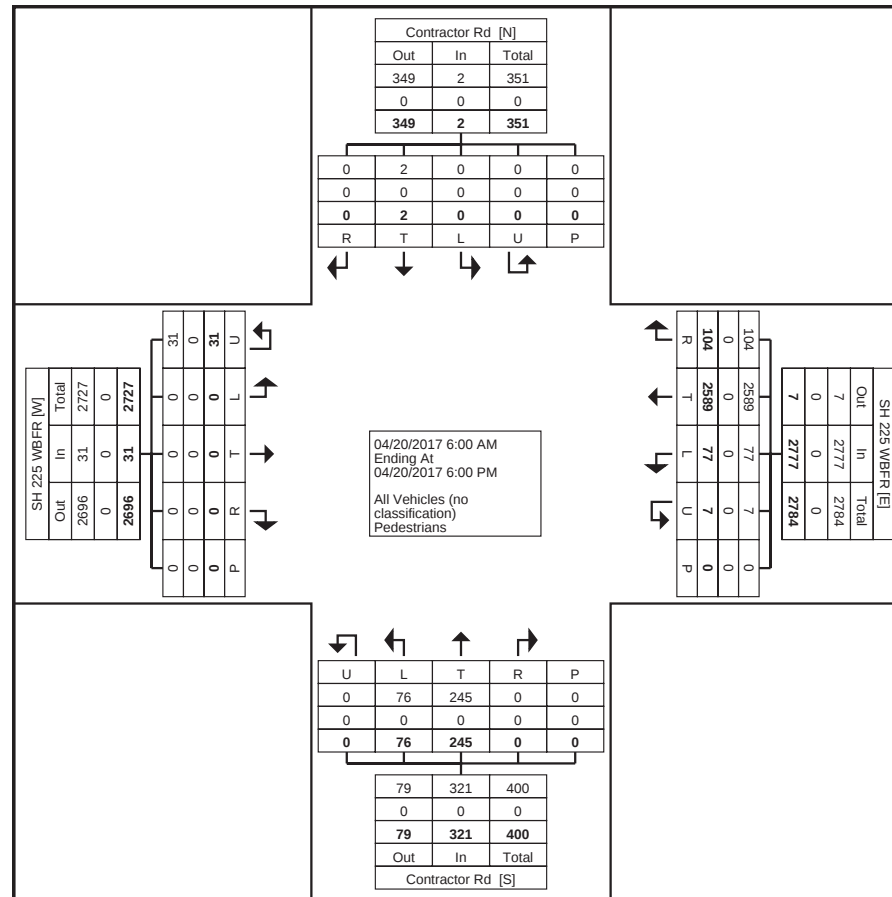
Start Time	Contractor Rd Southbound						SH 225 WBFR Westbound						Contractor Rd Northbound						SH 225 WBFR Eastbound						Int. Total
	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	Left	Thru	Right	U-Turn	Peds	App. Total	
6:00 AM	0	0	0	0	0	0	2	132	20	0	0	154	6	21	0	0	0	27	0	0	0	2	0	2	183
6:15 AM	0	0	0	0	0	0	3	137	15	0	0	155	6	33	0	0	0	39	0	0	0	5	0	5	199
6:30 AM	0	0	0	0	0	0	1	130	11	0	0	142	4	38	0	0	0	42	0	0	0	1	0	1	185
6:45 AM	0	0	0	0	0	0	4	119	16	0	0	139	2	31	0	0	0	33	0	0	0	3	0	3	175
Hourly Total	0	0	0	0	0	0	10	518	62	0	0	590	18	123	0	0	0	141	0	0	0	11	0	11	742
7:00 AM	0	0	0	0	0	0	5	103	14	0	0	122	4	37	0	0	0	41	0	0	0	2	0	2	165
7:15 AM	0	0	0	0	0	0	2	126	5	0	0	133	3	28	0	0	0	31	0	0	0	0	0	0	164
7:30 AM	0	0	0	0	0	0	6	122	4	0	0	132	6	20	0	0	0	26	0	0	0	1	0	1	159
7:45 AM	0	0	0	0	0	0	7	111	2	1	0	121	4	18	0	0	0	22	0	0	0	1	0	1	144
Hourly Total	0	0	0	0	0	0	20	462	25	1	0	508	17	103	0	0	0	120	0	0	0	4	0	4	632
*** BREAK ***	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4:00 PM	0	0	0	0	0	0	2	165	0	2	0	169	4	1	0	0	0	5	0	0	0	0	0	0	174
4:15 PM	0	1	0	0	0	1	4	177	2	2	0	185	8	2	0	0	0	10	0	0	0	0	0	0	196
4:30 PM	0	0	0	0	0	0	5	193	3	0	0	201	7	3	0	0	0	10	0	0	0	0	0	0	211
4:45 PM	0	0	0	0	0	0	2	157	2	0	0	161	5	6	0	0	0	11	0	0	0	3	0	3	175
Hourly Total	0	1	0	0	0	1	13	692	7	4	0	716	24	12	0	0	0	36	0	0	0	3	0	3	756
5:00 PM	0	0	0	0	0	0	7	199	5	1	0	212	6	2	0	0	0	8	0	0	0	6	0	6	226
5:15 PM	0	1	0	0	0	1	8	303	3	0	0	314	2	4	0	0	0	6	0	0	0	5	0	5	326
5:30 PM	0	0	0	0	0	0	11	247	2	1	0	261	5	1	0	0	0	6	0	0	0	0	0	0	267
5:45 PM	0	0	0	0	0	0	8	168	0	0	0	176	4	0	0	0	0	4	0	0	0	2	0	2	182
Hourly Total	0	1	0	0	0	1	34	917	10	2	0	963	17	7	0	0	0	24	0	0	0	13	0	13	1001
Grand Total	0	2	0	0	0	2	77	2589	104	7	0	2777	76	245	0	0	0	321	0	0	0	31	0	31	3131
Approach %	0.0	100.0	0.0	0.0	-	-	2.8	93.2	3.7	0.3	-	-	23.7	76.3	0.0	0.0	-	-	0.0	0.0	0.0	100.0	-	-	-
Total %	0.0	0.1	0.0	0.0	-	0.1	2.5	82.7	3.3	0.2	-	88.7	2.4	7.8	0.0	0.0	-	10.3	0.0	0.0	0.0	1.0	-	1.0	-
All Vehicles (no classification)	0	2	0	0	-	2	77	2589	104	7	-	2777	76	245	0	0	-	321	0	0	0	31	-	31	3131
% All Vehicles (no classification)	-	100.0	-	-	-	100.0	100.0	100.0	100.0	100.0	-	100.0	100.0	100.0	-	-	-	100.0	-	-	-	100.0	-	100.0	100.0
Pedestrians	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	-	0	-	-	-	-	0	-	-	-
% Pedestrians	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-



Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 5 - Contractor Rd at SH 225
WBFR
Site Code: 5
Start Date: 04/20/2017
Page No: 2



Turning Movement Data Plot

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 5 - Contractor Rd at SH 225
WBFR
Site Code: 5
Start Date: 04/20/2017
Page No: 3

Turning Movement Peak Hour Data (6:00 AM)

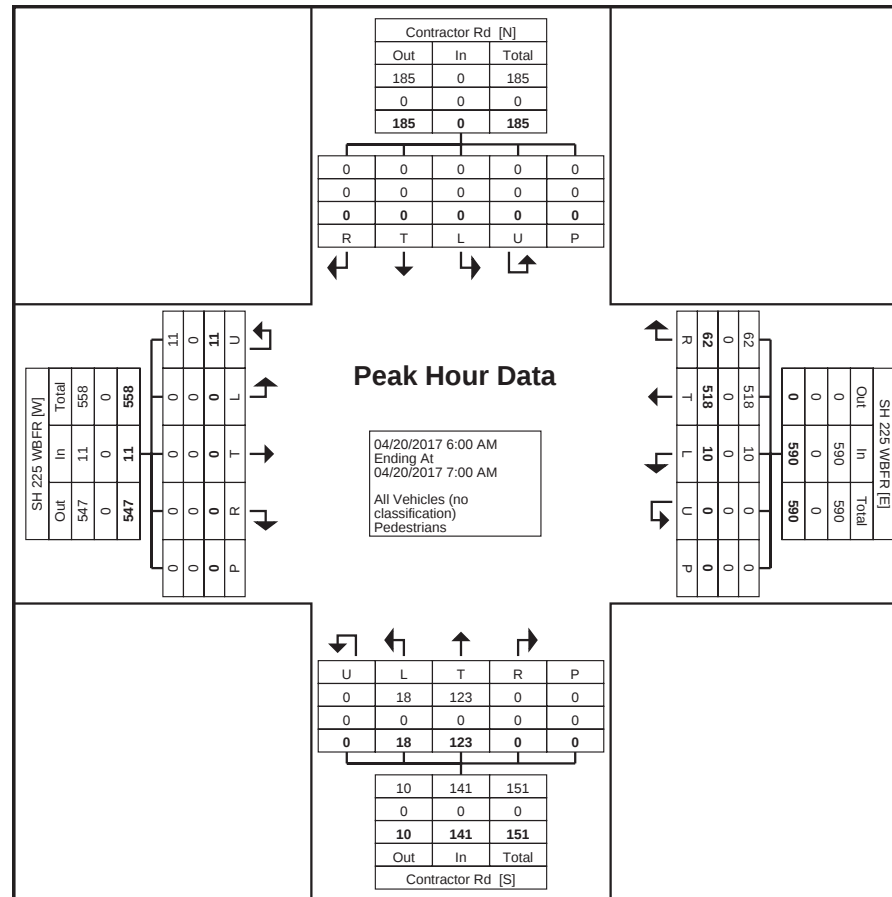
[illegible]



Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 5 - Contractor Rd at SH 225
WBFR
Site Code: 5
Start Date: 04/20/2017
Page No: 4



Turning Movement Peak Hour Data Plot (6:00 AM)

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
555 SSet@midtownengineers.com

Count Name: 5 - Contractor Rd at SH 225
WBFR
Site Code: 5
Start Date: 04/20/2017
Page No: 5

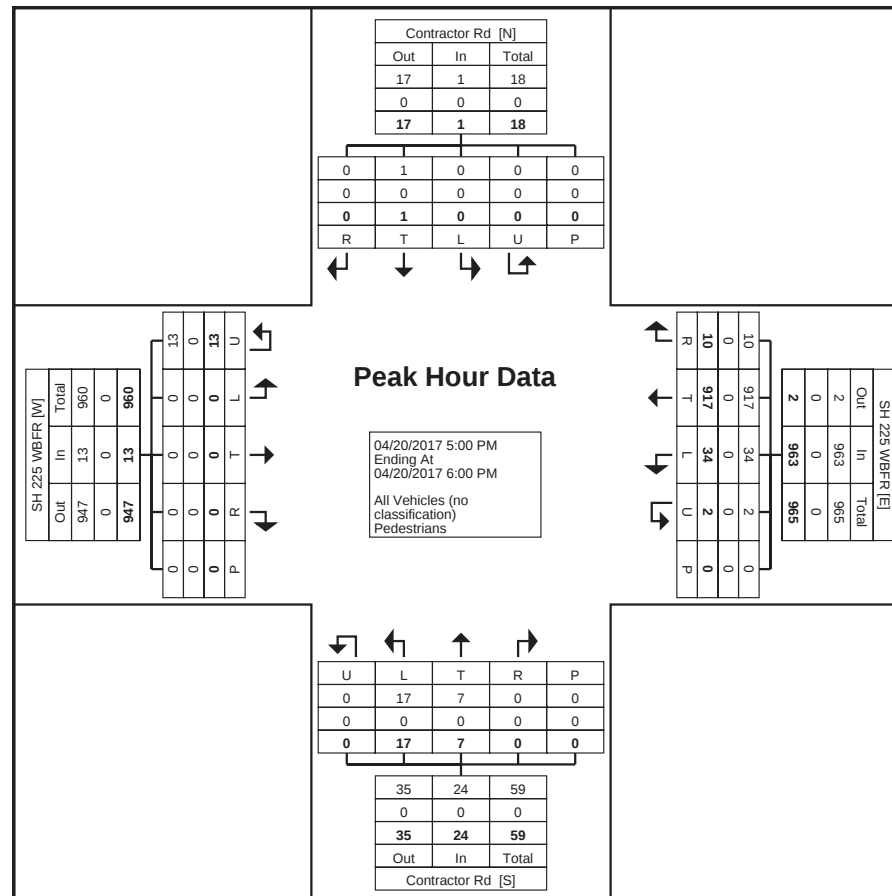
Turning Movement Peak Hour Data (5:00 PM)

[illegible]

Midtown
5215 Sycamore Ave

Pasadena, Texas, United States 77503
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Count Name: 5 - Contractor Rd at SH 225
WBFR
Site Code: 5
Start Date: 04/20/2017
Page No: 6



Turning Movement Peak Hour Data Plot (5:00 PM)

A large, light gray, stylized letter 'M' that serves as a background watermark for the page.

Appendix D:
Deer Park Independent School District Bus Route List

District Streets	Block	Zone	City	Zip	Elem	Elem Bus	JH	JH Bus	North	NC Bus	South	SC Bus	Biling Elem.	Biling JH	DAEP	SJE DL Bus
Preston Rd (residential)	131-730	AA	Pas	77503	PWE/DWE	25/PWE 8/DWE	DWJH	41	NC	41	SC	30	25/PWE 8/DWE	97	73	48
Preston Rd/Trailer Park	128-130	AA	Pas	77503	PWE/DWE	25/PWE 8/DWE	DWJH	41	NC	41	SC	55	25/PWE 8/DWE	97	73	48
Preston Rd/Vista Del Sol	701	AA	Pas	77503	PWE/DWE	25(-K-1) 54(2-3) 8(4-5)	DWJH	0	NC	69	SC	96	25(-K-1) 54(2-3) 8(4-5)	0	73	48
Prine Ln	3901-4002	DL	DP	77536	DE	96	BJH	15	NC	23	SC	10	6	55	25	66
Rafam Dr	No Addresses	FD	Pas	77505	FE	95	FJH	95	NC	66	SC	95	56	55	38a/86p	49
Rainbow Bend Dr	7603-7715	FI	Pas	77505	DE	18	FJH	52	NC	31	SC	49	56	55	38a/86p	49
Rainfall Dr	4202-4239	FI	Pas	77505	DE	18	FJH	52	NC	31	SC	49	56	55	38a/86p	49
Rainforest Trail Dr	7300-7842	FI	Pas	77505	DE	18	FJH	18	NC	31	SC	49	56	55	38a/86p	49
Raintree Ct	4302-4323	FI	Pas	77505	DE	18	FJH	18	NC	31	SC	49	56	55	38a/86p	49
Ranier Dr	1502-1718	DI	DP	77536	DPE	0	DPJH	96	NC	8	SC	10	6	97	25	66
Ravena Cr	3701-3725	FD	Pas	77505	FE	95	FJH	95	NC	75	SC	29	56	55	38a/86p	49
Ray Dr	6302-6631	FD	Pas	77505	FE	95	FJH	95	NC	66	SC	95	56	55	38a/86p	49
Reata Dr, East	2202-2318	DE	DP	77536	DPE	0	DPJH	96	NC	8	SC	0	6	97	25	66
Reata Dr, East	2709-2906	DI	DP	77536	DPE	0	DPJH	96	NC	8	SC	10	6	97	25	66
Reata Dr, West	2201-2318	DE	DP	77536	DPE	0	DPJH	96	NC	8	SC	0	75	97	25	66
Red Bluff Rd	4100-5140	EI	Pas	77503	PWE/DWE	56	DWJH	76	NC	24	SC	76	56	76	41	66
Red Bluff Rd	5202	EI	Pas	77503	PWE/DWE	45/PWE 41/DWE	DWJH	76	NC	24	SC	76	45/PWE 41/DWE	76	38a/86p	66
Red Bluff Rd (Palace Inn)	5321	EJ	Pas	77503	DE	12	FJH	49	NC	70	SC	6	76/PWE 39/DWE	55	38a/86p	49
Red Bluff Rd / Cedar Bluff Apts.	5930	FB	Pas	77505	DE	69	FJH	69	NC	46	SC	6	56	55	38a/86p	49
Red Bluff Rd on Red Bluff (houses)	5742-5826	FB	Pas	77505	DE	69	FJH	69	NC	46	SC	6	56	55	38a/86p	49
Red Coral Dr	6801-7143	FE	Pas	77505	FE	0	FJH	0	NC	75	SC	29	56	55	38a/86p	49
Redwood Falls Dr	6701-7132	FE	Pas	77505	FE	0	FJH	0	NC	75	SC	29	56	55	38a/86p	49
Regency Dr	201-4033	EA	DP	77536	DE	0	BJH	15	NC	18	SC	10	59	55	25	66
Rena Jane Ln	3701-3840	AB	Pas	77503	PWE/DWE	0	DWJH	0	NC	50	SC	15	0	0	73	48
Reta Dr	301-435	BF	DP	77536	SJE	0	DPJH	0	NC	0	SC	0	75	97	0	0
Rhodes	3801-3934	FD	Pas	77505	FE	95	FJH	95	NC	66	SC	95	56	55	38a/86p	49
River Oaks Dr	3801-3934	FD	Pas	77505	FE	95	FJH	95	NC	66	SC	95	56	55	38a/86p	49
River Park Ln	No Addresses	FI	Pas	77505	DE	18	FJH	52	NC	45	SC	49	56	55	38a/86p	49
River Ranch Dr	4201-4320	FE	Pas	77505	FE	0	FJH	0	NC	75	SC	29	56	55	38a/86p	66
Robin St	201-334	BA	DP	77536	SJE	15	DPJH	0	NC	0	SC	54	75	97	0	15
Rockfield Dr	6501-6635	FE	Pas	77505	FE	0	FJH	0	NC	75	SC	29	56	55	38a/86p	49
Roosevelt Dr	1401-1534	DH	DP	77536	DPE	0	DPJH	96	NC	8	SC	0	6	97	25	10
Royal Dornoch	4701-4822	FF	Pas	77505	FE	0	FJH	0	NC	45	SC	52	56	55	38a/86p	49

Appendix E:
SYNCHRO Analysis Report

HCM Unsignalized Intersection Capacity Analysis

1: Center Street & Railroad Avenue

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	133	49	624	483	121
Future Volume (Veh/h)	0	133	49	624	483	121
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	145	53	678	525	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					191	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	923	328	657			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	819	195	540			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	95			
cM capacity (veh/h)	282	775	976			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	145	189	271	271	350	307
Volume Left	0	53	0	0	0	0
Volume Right	145	0	0	0	0	132
cSH	775	976	1700	1700	1700	1700
Volume to Capacity	0.19	0.05	0.16	0.16	0.21	0.18
Queue Length 95th (ft)	17	4	0	0	0	0
Control Delay (s)	10.7	2.9	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	10.7	0.7			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			1.4			
Intersection Capacity Utilization		36.9%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
3: Center Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8	
Lane Configurations														
Traffic Volume (vph)	0	118	216	0	0	0	0	434	189	4	393	0		
Future Volume (vph)	0	118	216	0	0	0	0	434	189	4	393	0		
Satd. Flow (prot)	1695	3061	0	0	0	0	0	3539	1583	1770	3539	0		
Flt Permitted										0.950				
Satd. Flow (perm)	1695	3061	0	0	0	0	0	3539	1583	1770	3539	0		
Satd. Flow (RTOR)		235							205					
Lane Group Flow (vph)	0	363	0	0	0	0	0	472	205	4	427	0		
Turn Type	Perm	NA						NA	Perm	Prot	NA			
Protected Phases		4						2		1	6		8	
Permitted Phases	4								2					
Total Split (s)	22.5	22.5						23.0	23.0	9.5	32.5		22.5	
Total Lost Time (s)	4.5	4.5						4.5	4.5	4.5	4.5			
Act Effct Green (s)		12.8						31.3	31.3	5.5	33.2			
Actuated g/C Ratio		0.23						0.57	0.57	0.10	0.60			
v/c Ratio		0.41						0.23	0.21	0.02	0.20			
Control Delay		17.3						8.1	2.8	14.0	15.2			
Queue Delay		0.0						0.0	0.0	0.0	0.8			
Total Delay		17.3						8.1	2.8	14.0	16.0			
LOS		B						A	A	B	B			
Approach Delay		17.3						6.5			16.0			
Approach LOS		B						A			B			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 12.0

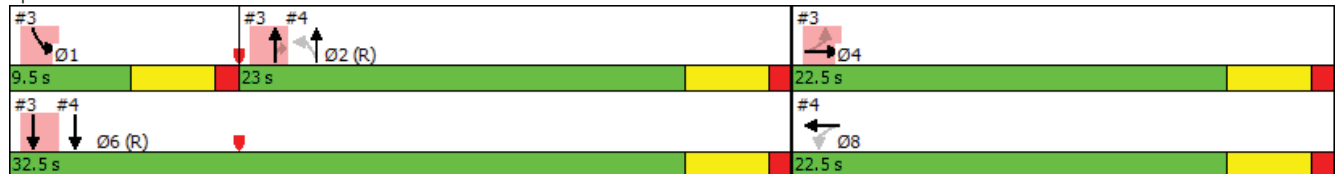
Intersection LOS: B

Intersection Capacity Utilization 45.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Center Street & SH225 FR EB



Lanes, Volumes, Timings
4: Center Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations														
Traffic Volume (vph)	0	0	0	397	75	0	432	1	0	0	5	1		
Future Volume (vph)	0	0	0	397	75	0	432	1	0	0	5	1		
Satd. Flow (prot)	0	0	0	1610	3272	0	1681	1686	0	0	3451	0		
Flt Permitted				0.950	0.965		0.754	0.723						
Satd. Flow (perm)	0	0	0	1610	3272	0	1334	1279	0	0	3451	0		
Satd. Flow (RTOR)											1			
Lane Group Flow (vph)	0	0	0	216	298	0	235	236	0	0	6	0		
Turn Type				Perm	NA		Perm	NA			NA			
Protected Phases					8			2			6		1	4
Permitted Phases				8			2							
Total Split (s)				22.5	22.5		23.0	23.0			32.5		9.5	22.5
Total Lost Time (s)				4.5	4.5		4.5	4.5			4.5			
Act Effct Green (s)				12.8	12.8		31.3	31.3			33.2			
Actuated g/C Ratio				0.23	0.23		0.57	0.57			0.60			
v/c Ratio				0.58	0.39		0.31	0.32			0.00			
Control Delay				24.2	18.4		3.4	4.0			5.7			
Queue Delay				0.0	0.0		0.2	0.2			0.0			
Total Delay				24.2	18.4		3.6	4.2			5.7			
LOS				C	B		A	A			A			
Approach Delay					20.8			3.9			5.7			
Approach LOS					C			A			A			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 12.7

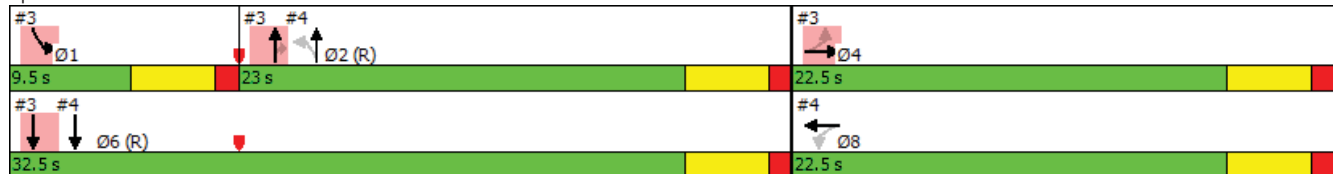
Intersection LOS: B

Intersection Capacity Utilization 45.5%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Center Street & SH225 FR WB



Lanes, Volumes, Timings
5: Robin Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø5	Ø8
Lane Configurations														
Traffic Volume (vph)	94	235	59	0	0	0	0	23	102	0	19	0		
Future Volume (vph)	94	235	59	0	0	0	0	23	102	0	19	0		
Satd. Flow (prot)	1610	3285	0	0	0	0	0	1658	0	1770	1770	0		
Flt Permitted	0.950	0.998												
Satd. Flow (perm)	1610	3285	0	0	0	0	0	1658	0	1770	1770	0		
Satd. Flow (RTOR)		53						111						
Lane Group Flow (vph)	92	329	0	0	0	0	0	136	0	0	21	0		
Turn Type	Perm	NA						NA		Prot	NA			
Protected Phases		4						2		1	6		5	8
Permitted Phases	4													
Total Split (s)	22.5	22.5						23.0		9.5	23.0		9.5	22.5
Total Lost Time (s)	4.5	4.5						4.5		4.5	4.5			
Act Effct Green (s)	12.5	12.5						33.5			31.2			
Actuated g/C Ratio	0.23	0.23						0.61			0.57			
v/c Ratio	0.25	0.42						0.13			0.02			
Control Delay	18.1	16.1						4.5			14.1			
Queue Delay	0.0	0.0						0.0			0.0			
Total Delay	18.1	16.1						4.5			14.1			
LOS	B	B						A			B			
Approach Delay		16.6						4.5			14.1			
Approach LOS		B						A			B			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 13.6

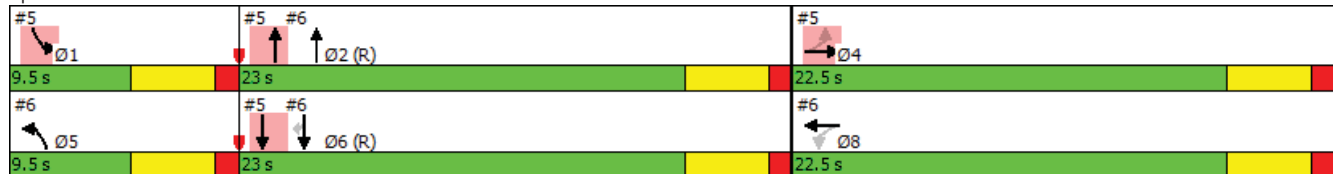
Intersection LOS: B

Intersection Capacity Utilization 41.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Robin Street & SH225 FR EB



Lanes, Volumes, Timings
6: Robin Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Group														
Lane Configurations					↕↕↕		↕	↕			↕↕	↕		
Traffic Volume (vph)	0	0	0	10	518	62	18	123	0	0	0	0		
Future Volume (vph)	0	0	0	10	518	62	18	123	0	0	0	0		
Satd. Flow (prot)	0	0	0	0	4999	0	1770	1863	0	0	3390	1695		
Flt Permitted					0.999		0.950							
Satd. Flow (perm)	0	0	0	0	4999	0	1770	1863	0	0	3390	1695		
Satd. Flow (RTOR)					39									
Lane Group Flow (vph)	0	0	0	0	641	0	20	134	0	0	0	0		
Turn Type				Perm	NA		Prot	NA				Perm		
Protected Phases					8		5	2			6		1	4
Permitted Phases				8								6		
Total Split (s)				22.5	22.5		9.5	23.0			23.0	23.0	9.5	22.5
Total Lost Time (s)					4.5		4.5	4.5			4.5	4.5		
Act Effct Green (s)					12.5		6.1	33.5						
Actuated g/C Ratio					0.23		0.11	0.61						
v/c Ratio					0.55		0.10	0.12						
Control Delay					16.0		16.9	11.6						
Queue Delay					0.0		0.0	0.0						
Total Delay					16.0		16.9	11.6						
LOS					B		B	B						
Approach Delay					16.0			12.3						
Approach LOS					B			B						

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 15.3

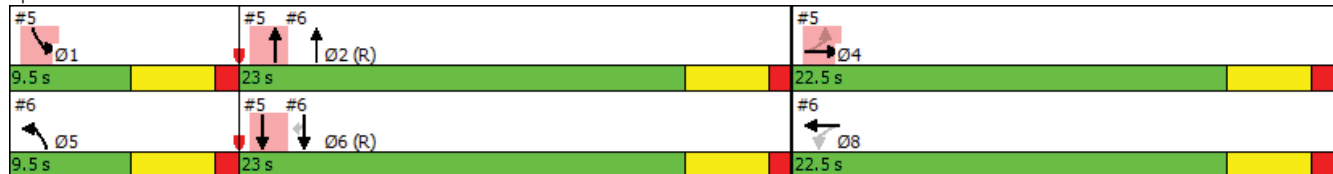
Intersection LOS: B

Intersection Capacity Utilization 41.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Robin Street & SH225 FR WB



HCM Unsignalized Intersection Capacity Analysis

1: Center Street & Railroad Avenue

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	162	28	523	766	129
Future Volume (Veh/h)	0	162	28	523	766	129
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	176	30	568	833	140
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					191	
pX, platoon unblocked	0.89	0.89	0.89			
vC, conflicting volume	1152	486	973			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	919	169	717			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	77	96			
cM capacity (veh/h)	231	751	781			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	176	144	227	227	555	418
Volume Left	0	30	0	0	0	0
Volume Right	176	0	0	0	0	140
cSH	751	781	1700	1700	1700	1700
Volume to Capacity	0.23	0.04	0.13	0.13	0.33	0.25
Queue Length 95th (ft)	23	3	0	0	0	0
Control Delay (s)	11.3	2.4	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	11.3	0.6			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay			1.3			
Intersection Capacity Utilization		42.0%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
3: Center Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8
Lane Configurations													
Traffic Volume (vph)	1	230	275	0	0	0	0	297	228	41	623	0	
Future Volume (vph)	1	230	275	0	0	0	0	297	228	41	623	0	
Satd. Flow (prot)	1610	3112	0	0	0	0	0	3539	1583	1770	3539	0	
Flt Permitted	0.950									0.950			
Satd. Flow (perm)	1610	3112	0	0	0	0	0	3539	1583	1770	3539	0	
Satd. Flow (RTOR)		179							248				
Lane Group Flow (vph)	1	549	0	0	0	0	0	323	248	45	677	0	
Turn Type	Perm	NA						NA	Perm	Prot	NA		
Protected Phases		4						2		1	6		8
Permitted Phases	4								2				
Total Split (s)	26.0	26.0						24.0	24.0	10.0	34.0		26.0
Total Lost Time (s)	4.5	4.5						4.5	4.5	4.5	4.5		
Act Effct Green (s)	19.9	19.9						27.1	27.1	5.6	31.1		
Actuated g/C Ratio	0.33	0.33						0.45	0.45	0.09	0.52		
v/c Ratio	0.00	0.48						0.20	0.29	0.27	0.37		
Control Delay	12.0	11.6						12.3	3.6	19.6	18.4		
Queue Delay	0.0	0.0						0.0	0.0	0.0	3.2		
Total Delay	12.0	11.6						12.3	3.6	19.6	21.6		
LOS	B	B						B	A	B	C		
Approach Delay		11.6						8.5			21.5		
Approach LOS		B						A			C		

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 14.5

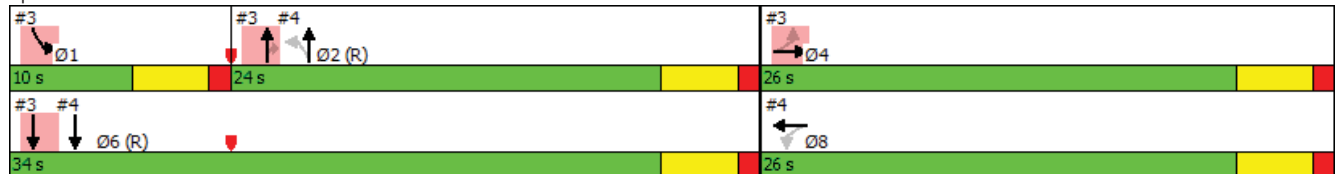
Intersection LOS: B

Intersection Capacity Utilization 61.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Center Street & SH225 FR EB



Lanes, Volumes, Timings
4: Center Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations														
Traffic Volume (vph)	0	0	0	570	517	0	310	0	0	0	87	124		
Future Volume (vph)	0	0	0	570	517	0	310	0	0	0	87	124		
Satd. Flow (prot)	0	0	0	1610	3339	0	1681	1681	0	0	3228	0		
Flt Permitted				0.950	0.985		0.608	0.608						
Satd. Flow (perm)	0	0	0	1610	3339	0	1076	1076	0	0	3228	0		
Satd. Flow (RTOR)											135			
Lane Group Flow (vph)	0	0	0	384	798	0	168	169	0	0	230	0		
Turn Type				Perm	NA		Perm	NA			NA			
Protected Phases					8			2			6		1	4
Permitted Phases				8			2							
Total Split (s)				26.0	26.0		24.0	24.0			34.0		10.0	26.0
Total Lost Time (s)				4.5	4.5		4.5	4.5			4.5			
Act Effct Green (s)				19.9	19.9		27.1	27.1			31.1			
Actuated g/C Ratio				0.33	0.33		0.45	0.45			0.52			
v/c Ratio				0.72	0.72		0.35	0.35			0.13			
Control Delay				26.0	21.6		5.6	5.6			3.9			
Queue Delay				0.9	0.3		0.2	0.2			0.0			
Total Delay				26.9	21.9		5.8	5.9			3.9			
LOS				C	C		A	A			A			
Approach Delay					23.6			5.8			3.9			
Approach LOS					C			A			A			

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 17.6

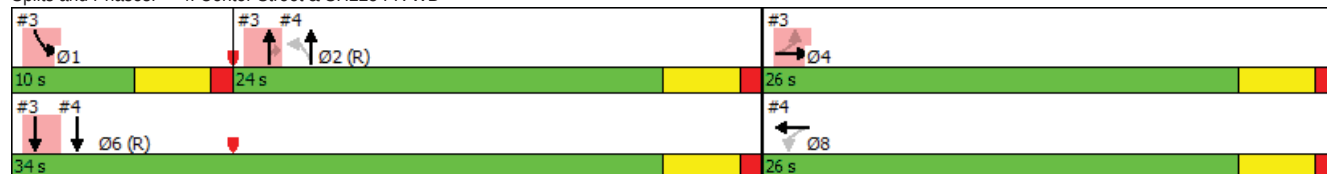
Intersection LOS: B

Intersection Capacity Utilization 61.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Center Street & SH225 FR WB



Lanes, Volumes, Timings
5: Robin Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø5	Ø8
Lane Configurations														
Traffic Volume (vph)	8	295	75	0	0	0	0	22	209	1	28	0		
Future Volume (vph)	8	295	75	0	0	0	0	22	209	1	28	0		
Satd. Flow (prot)	1610	3288	0	0	0	0	0	1635	0	1681	1770	0		
Flt Permitted	0.950									0.950				
Satd. Flow (perm)	1610	3288	0	0	0	0	0	1635	0	1681	1770	0		
Satd. Flow (RTOR)		57						227						
Lane Group Flow (vph)	8	404	0	0	0	0	0	251	0	1	30	0		
Turn Type	Perm	NA						NA		Prot	NA			
Protected Phases		4						2		1	6		5	8
Permitted Phases	4													
Total Split (s)	22.5	22.5						23.0		9.5	23.0		9.5	22.5
Total Lost Time (s)	4.5	4.5						4.5		4.5	4.5			
Act Effct Green (s)	16.8	16.8						27.3		5.2	1.0			
Actuated g/C Ratio	0.31	0.31						0.50		0.09	0.02			
v/c Ratio	0.02	0.39						0.27		0.01	0.94			
Control Delay	12.7	13.7						3.5		15.0	137.9			
Queue Delay	0.0	0.0						0.0		0.0	0.0			
Total Delay	12.7	13.7						3.5		15.0	137.9			
LOS	B	B						A		B	F			
Approach Delay		13.7						3.5			133.9			
Approach LOS		B						A			F			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 15.3

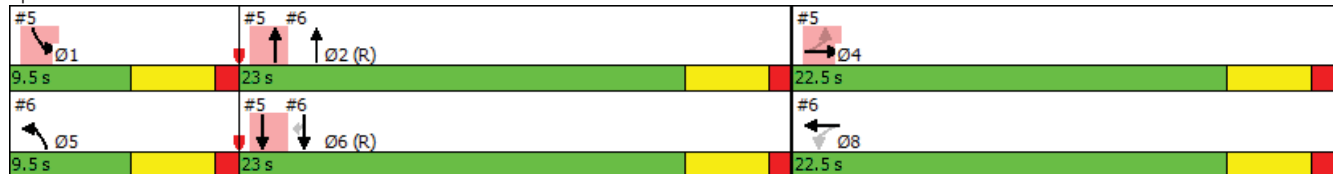
Intersection LOS: B

Intersection Capacity Utilization 38.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Robin Street & SH225 FR EB



Lanes, Volumes, Timings
6: Robin Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations					  						  			
Traffic Volume (vph)	0	0	0	34	917	10	17	7	0	0	1	0		
Future Volume (vph)	0	0	0	34	917	10	17	7	0	0	1	0		
Satd. Flow (prot)	0	0	0	0	5065	0	1770	1863	0	0	3390	1695		
Flt Permitted					0.998		0.950							
Satd. Flow (perm)	0	0	0	0	5065	0	1770	1863	0	0	3390	1695		
Satd. Flow (RTOR)					3									
Lane Group Flow (vph)	0	0	0	0	1045	0	18	8	0	0	1	0		
Turn Type				Perm	NA		Prot	NA			NA	Perm		
Protected Phases					8		5	2			6		1	4
Permitted Phases				8								6		
Total Split (s)				22.5	22.5		9.5	23.0			23.0	23.0	9.5	22.5
Total Lost Time (s)					4.5		4.5	4.5			4.5	4.5		
Act Effct Green (s)					16.8		5.2	27.3			27.3			
Actuated g/C Ratio					0.31		0.09	0.50			0.50			
v/c Ratio					0.67		0.11	0.01			0.00			
Control Delay					18.9		25.4	11.0			10.0			
Queue Delay					0.0		0.0	0.0			0.0			
Total Delay					18.9		25.4	11.0			10.0			
LOS					B		C	B			A			
Approach Delay					18.9			20.9			10.0			
Approach LOS					B			C			A			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 18.9

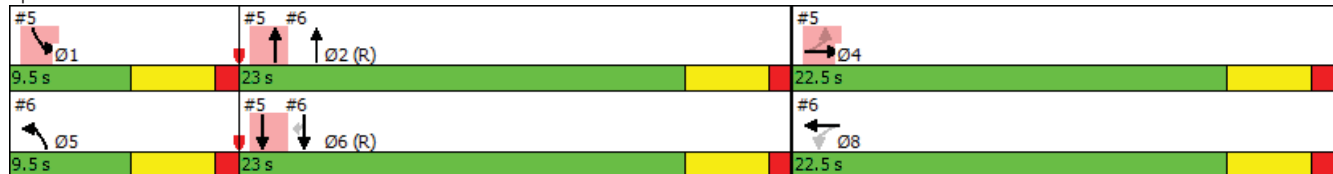
Intersection LOS: B

Intersection Capacity Utilization 38.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Robin Street & SH225 FR WB



HCM Unsignalized Intersection Capacity Analysis

1: Center Street & Railroad Avenue

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	133	0	673	483	121
Future Volume (Veh/h)	0	133	0	673	483	121
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	145	0	732	525	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					191	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	835	328	657			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	725	193	538			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	81	100			
cM capacity (veh/h)	343	777	977			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	145	244	244	244	350	307
Volume Left	0	0	0	0	0	0
Volume Right	145	0	0	0	0	132
cSH	777	1700	1700	1700	1700	1700
Volume to Capacity	0.19	0.14	0.14	0.14	0.21	0.18
Queue Length 95th (ft)	17	0	0	0	0	0
Control Delay (s)	10.7	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	10.7	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay		1.0				
Intersection Capacity Utilization		32.1%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
2: Center Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8
Lane Configurations													
Traffic Volume (vph)	0	118	216	0	0	0	0	483	189	4	393	0	
Future Volume (vph)	0	118	216	0	0	0	0	483	189	4	393	0	
Satd. Flow (prot)	1695	3061	0	0	0	0	0	3539	1583	1770	3539	0	
Flt Permitted										0.950			
Satd. Flow (perm)	1695	3061	0	0	0	0	0	3539	1583	1770	3539	0	
Satd. Flow (RTOR)		235							205				
Lane Group Flow (vph)	0	363	0	0	0	0	0	525	205	4	427	0	
Turn Type	Perm	NA						NA	Perm	Prot	NA		
Protected Phases		4						2		1	6		8
Permitted Phases	4								2				
Total Split (s)	22.5	22.5						23.0	23.0	9.5	32.5		22.5
Total Lost Time (s)	4.5	4.5						4.5	4.5	4.5	4.5		
Act Effct Green (s)		13.1						31.0	31.0	5.5	32.9		
Actuated g/C Ratio		0.24						0.56	0.56	0.10	0.60		
v/c Ratio		0.40						0.26	0.21	0.02	0.20		
Control Delay		16.6						8.5	2.8	14.5	15.5		
Queue Delay		0.0						0.0	0.0	0.0	0.8		
Total Delay		16.6						8.5	2.8	14.5	16.3		
LOS		B						A	A	B	B		
Approach Delay		16.6						6.9			16.3		
Approach LOS		B						A			B		

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 11.9

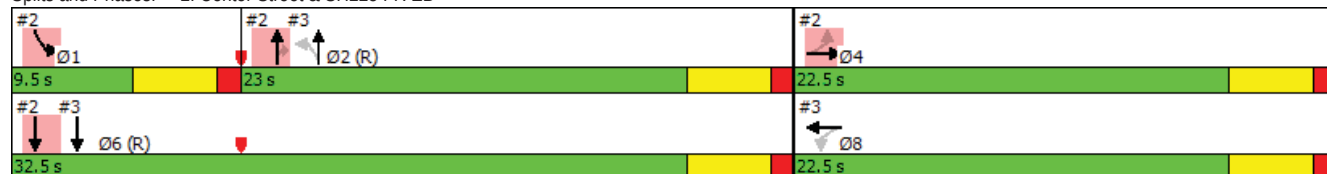
Intersection LOS: B

Intersection Capacity Utilization 46.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 2: Center Street & SH225 FR EB



Lanes, Volumes, Timings
3: Center Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Group														
Lane Configurations				↰	↰↰		↰	↰			↰↰			
Traffic Volume (vph)	0	0	0	397	75	0	481	1	0	0	5	1		
Future Volume (vph)	0	0	0	397	75	0	481	1	0	0	5	1		
Satd. Flow (prot)	0	0	0	1610	3272	0	1681	1686	0	0	3451	0		
Flt Permitted				0.950	0.965		0.754	0.723						
Satd. Flow (perm)	0	0	0	1610	3272	0	1334	1279	0	0	3451	0		
Satd. Flow (RTOR)											1			
Lane Group Flow (vph)	0	0	0	216	298	0	261	263	0	0	6	0		
Turn Type				Perm	NA		Perm	NA			NA			
Protected Phases					8			2			6		1	4
Permitted Phases				8			2							
Total Split (s)				22.5	22.5		23.0	23.0			32.5		9.5	22.5
Total Lost Time (s)				4.5	4.5		4.5	4.5			4.5			
Act Effct Green (s)				13.1	13.1		31.0	31.0			32.9			
Actuated g/C Ratio				0.24	0.24		0.56	0.56			0.60			
v/c Ratio				0.56	0.38		0.35	0.37			0.00			
Control Delay				23.3	18.0		4.5	5.4			5.8			
Queue Delay				0.0	0.0		0.2	0.2			0.0			
Total Delay				23.3	18.0		4.7	5.6			5.8			
LOS				C	B		A	A			A			
Approach Delay					20.2			5.1			5.8			
Approach LOS					C			A			A			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.56

Intersection Signal Delay: 12.6

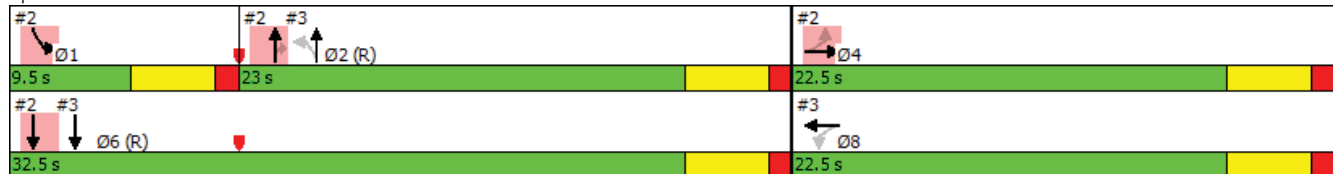
Intersection LOS: B

Intersection Capacity Utilization 46.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Center Street & SH225 FR WB



Lanes, Volumes, Timings
4: Robin Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø5	Ø8
Lane Configurations														
Traffic Volume (vph)	94	235	59	0	0	0	0	23	102	0	68	0		
Future Volume (vph)	94	235	59	0	0	0	0	23	102	0	68	0		
Satd. Flow (prot)	1610	3285	0	0	0	0	0	1658	0	1770	1770	0		
Flt Permitted	0.950	0.998												
Satd. Flow (perm)	1610	3285	0	0	0	0	0	1658	0	1770	1770	0		
Satd. Flow (RTOR)		53						111						
Lane Group Flow (vph)	92	329	0	0	0	0	0	136	0	0	74	0		
Turn Type	Perm	NA						NA		Prot	NA			
Protected Phases		4						2		1	6		5	8
Permitted Phases	4													
Total Split (s)	22.5	22.5						23.0		9.5	23.0		9.5	22.5
Total Lost Time (s)	4.5	4.5						4.5		4.5	4.5			
Act Effct Green (s)	14.0	14.0						32.0			30.1			
Actuated g/C Ratio	0.25	0.25						0.58			0.55			
v/c Ratio	0.22	0.38						0.13			0.08			
Control Delay	16.3	14.6						3.6			17.5			
Queue Delay	0.0	0.0						0.0			0.0			
Total Delay	16.3	14.6						3.6			17.5			
LOS	B	B						A			B			
Approach Delay		14.9						3.6			17.5			
Approach LOS		B						A			B			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.53

Intersection Signal Delay: 12.8

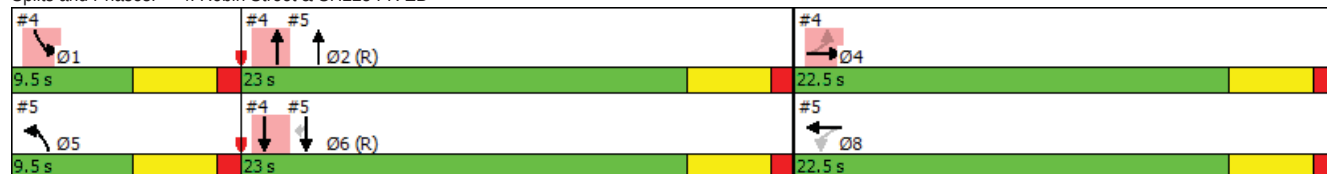
Intersection LOS: B

Intersection Capacity Utilization 42.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Robin Street & SH225 FR EB



Lanes, Volumes, Timings
5: Robin Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations					  						  			
Traffic Volume (vph)	0	0	0	59	518	62	18	123	0	0	0	0		
Future Volume (vph)	0	0	0	59	518	62	18	123	0	0	0	0		
Satd. Flow (prot)	0	0	0	0	4989	0	1770	1863	0	0	3390	1695		
Flt Permitted					0.995		0.950							
Satd. Flow (perm)	0	0	0	0	4989	0	1770	1863	0	0	3390	1695		
Satd. Flow (RTOR)					35									
Lane Group Flow (vph)	0	0	0	0	694	0	20	134	0	0	0	0		
Turn Type				Perm	NA		Prot	NA				Perm		
Protected Phases					8		5	2			6		1	4
Permitted Phases				8								6		
Total Split (s)				22.5	22.5		9.5	23.0			23.0	23.0	9.5	22.5
Total Lost Time (s)					4.5		4.5	4.5			4.5	4.5		
Act Effct Green (s)					14.0		5.7	32.0						
Actuated g/C Ratio					0.25		0.10	0.58						
v/c Ratio					0.53		0.11	0.12						
Control Delay					14.9		19.1	13.0						
Queue Delay					0.0		0.0	0.0						
Total Delay					14.9		19.1	13.0						
LOS					B		B	B						
Approach Delay					14.9			13.8						
Approach LOS					B			B						

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.53

Intersection Signal Delay: 14.7

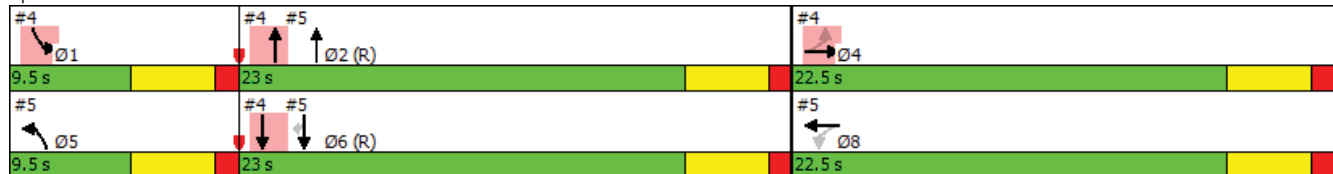
Intersection LOS: B

Intersection Capacity Utilization 42.0%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Robin Street & SH225 FR WB



HCM Unsignalized Intersection Capacity Analysis

1: Center Street & Railroad Avenue

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	162	0	551	766	129
Future Volume (Veh/h)	0	162	0	551	766	129
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	176	0	599	833	140
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					191	
pX, platoon unblocked	0.89	0.89	0.89			
vC, conflicting volume	1103	486	973			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	863	169	717			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	77	100			
cM capacity (veh/h)	261	751	781			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	176	200	200	200	555	418
Volume Left	0	0	0	0	0	0
Volume Right	176	0	0	0	0	140
cSH	751	1700	1700	1700	1700	1700
Volume to Capacity	0.23	0.12	0.12	0.12	0.33	0.25
Queue Length 95th (ft)	23	0	0	0	0	0
Control Delay (s)	11.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	B					
Approach Delay (s)	11.3	0.0			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay		1.1				
Intersection Capacity Utilization		42.0%		ICU Level of Service	A	
Analysis Period (min)		15				

Lanes, Volumes, Timings
3: Center Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8
Lane Configurations													
Traffic Volume (vph)	1	230	275	0	0	0	0	325	228	41	623	0	
Future Volume (vph)	1	230	275	0	0	0	0	325	228	41	623	0	
Satd. Flow (prot)	1610	3112	0	0	0	0	0	3539	1583	1770	3539	0	
Flt Permitted	0.950									0.950			
Satd. Flow (perm)	1610	3112	0	0	0	0	0	3539	1583	1770	3539	0	
Satd. Flow (RTOR)		179							248				
Lane Group Flow (vph)	1	549	0	0	0	0	0	353	248	45	677	0	
Turn Type	Perm	NA						NA	Perm	Prot	NA		
Protected Phases		4						2		1	6		8
Permitted Phases	4								2				
Total Split (s)	26.0	26.0						24.0	24.0	10.0	34.0		26.0
Total Lost Time (s)	4.5	4.5						4.5	4.5	4.5	4.5		
Act Effct Green (s)	19.9	19.9						27.1	27.1	5.6	31.1		
Actuated g/C Ratio	0.33	0.33						0.45	0.45	0.09	0.52		
v/c Ratio	0.00	0.48						0.22	0.29	0.27	0.37		
Control Delay	12.0	11.6						12.4	3.6	19.6	18.4		
Queue Delay	0.0	0.0						0.0	0.0	0.0	3.2		
Total Delay	12.0	11.6						12.4	3.6	19.6	21.6		
LOS	B	B						B	A	B	C		
Approach Delay		11.6						8.7			21.5		
Approach LOS		B						A			C		

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 14.5

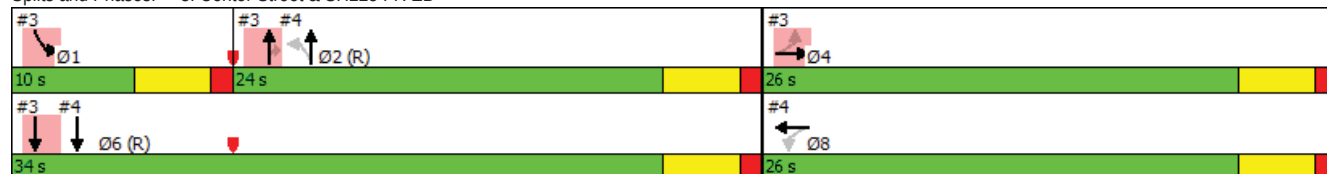
Intersection LOS: B

Intersection Capacity Utilization 61.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 3: Center Street & SH225 FR EB



Lanes, Volumes, Timings
4: Center Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

													Ø1	Ø4
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations														
Traffic Volume (vph)	0	0	0	570	517	0	338	0	0	0	87	124		
Future Volume (vph)	0	0	0	570	517	0	338	0	0	0	87	124		
Satd. Flow (prot)	0	0	0	1610	3339	0	1681	1681	0	0	3228	0		
Flt Permitted				0.950	0.985		0.608	0.608						
Satd. Flow (perm)	0	0	0	1610	3339	0	1076	1076	0	0	3228	0		
Satd. Flow (RTOR)											135			
Lane Group Flow (vph)	0	0	0	384	798	0	183	184	0	0	230	0		
Turn Type				Perm	NA		Perm	NA			NA			
Protected Phases					8			2			6		1	4
Permitted Phases				8			2							
Total Split (s)				26.0	26.0		24.0	24.0			34.0		10.0	26.0
Total Lost Time (s)				4.5	4.5		4.5	4.5			4.5			
Act Effct Green (s)				19.9	19.9		27.1	27.1			31.1			
Actuated g/C Ratio				0.33	0.33		0.45	0.45			0.52			
v/c Ratio				0.72	0.72		0.38	0.38			0.13			
Control Delay				26.0	21.6		6.0	6.0			3.9			
Queue Delay				0.9	0.3		0.2	0.2			0.0			
Total Delay				26.9	21.9		6.2	6.2			3.9			
LOS				C	C		A	A			A			
Approach Delay					23.6			6.2			3.9			
Approach LOS					C			A			A			

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 17.4

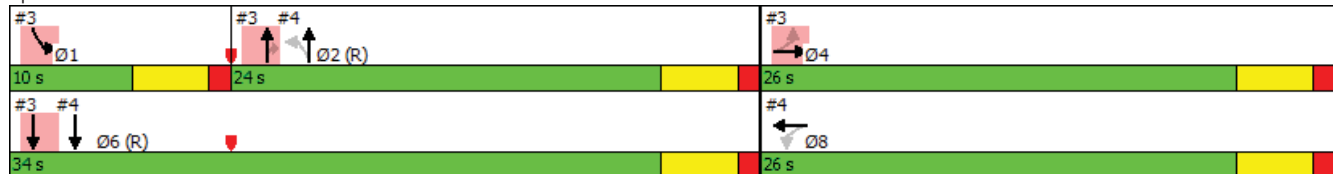
Intersection LOS: B

Intersection Capacity Utilization 61.2%

ICU Level of Service B

Analysis Period (min) 15

Splits and Phases: 4: Center Street & SH225 FR WB



Lanes, Volumes, Timings
5: Robin Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø5	Ø8
Lane Configurations														
Traffic Volume (vph)	8	295	75	0	0	0	0	22	209	1	56	0		
Future Volume (vph)	8	295	75	0	0	0	0	22	209	1	56	0		
Satd. Flow (prot)	1610	3288	0	0	0	0	0	1635	0	1681	1770	0		
Flt Permitted	0.950									0.950				
Satd. Flow (perm)	1610	3288	0	0	0	0	0	1635	0	1681	1770	0		
Satd. Flow (RTOR)		57						227						
Lane Group Flow (vph)	8	404	0	0	0	0	0	251	0	1	61	0		
Turn Type	Perm	NA						NA		Prot	NA			
Protected Phases		4						2		1	6		5	8
Permitted Phases	4													
Total Split (s)	22.5	22.5						23.0		9.5	23.0		9.5	22.5
Total Lost Time (s)	4.5	4.5						4.5		4.5	4.5			
Act Effct Green (s)	16.9	16.9						27.2		5.2	1.0			
Actuated g/C Ratio	0.31	0.31						0.49		0.09	0.02			
v/c Ratio	0.02	0.38						0.27		0.01	1.91			
Control Delay	12.7	13.6						3.5		13.0	491.8			
Queue Delay	0.0	0.0						0.0		0.0	0.0			
Total Delay	12.7	13.6						3.5		13.0	491.8			
LOS	B	B						A		B	F			
Approach Delay		13.6						3.5			484.1			
Approach LOS		B						A			F			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 45.5 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.91

Intersection Signal Delay: 50.3

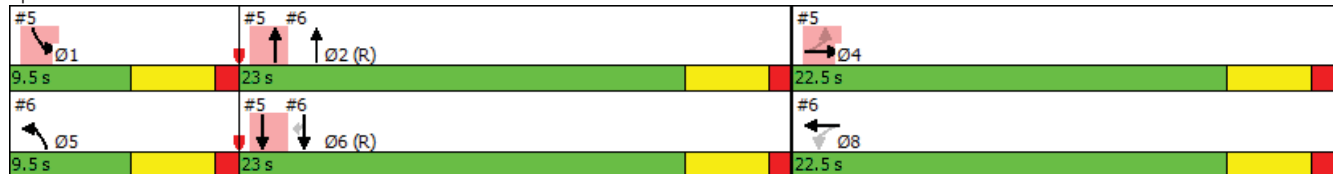
Intersection LOS: D

Intersection Capacity Utilization 38.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Robin Street & SH225 FR EB



Lanes, Volumes, Timings
6: Robin Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations					  						  			
Traffic Volume (vph)	0	0	0	62	917	10	17	7	0	0	1	0		
Future Volume (vph)	0	0	0	62	917	10	17	7	0	0	1	0		
Satd. Flow (prot)	0	0	0	0	5060	0	1770	1863	0	0	3390	1695		
Flt Permitted					0.997		0.950							
Satd. Flow (perm)	0	0	0	0	5060	0	1770	1863	0	0	3390	1695		
Satd. Flow (RTOR)					3									
Lane Group Flow (vph)	0	0	0	0	1075	0	18	8	0	0	1	0		
Turn Type				Perm	NA		Prot	NA			NA	Perm		
Protected Phases					8		5	2			6		1	4
Permitted Phases				8								6		
Total Split (s)				22.5	22.5		9.5	23.0			23.0	23.0	9.5	22.5
Total Lost Time (s)					4.5		4.5	4.5			4.5	4.5		
Act Effct Green (s)					16.9		5.2	27.2			27.2			
Actuated g/C Ratio					0.31		0.09	0.49			0.49			
v/c Ratio					0.69		0.11	0.01			0.00			
Control Delay					19.1		25.4	11.0			10.0			
Queue Delay					0.0		0.0	0.0			0.0			
Total Delay					19.1		25.4	11.0			10.0			
LOS					B		C	B			A			
Approach Delay					19.1			20.9			10.0			
Approach LOS					B			C			A			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 45.5 (83%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.91

Intersection Signal Delay: 19.2

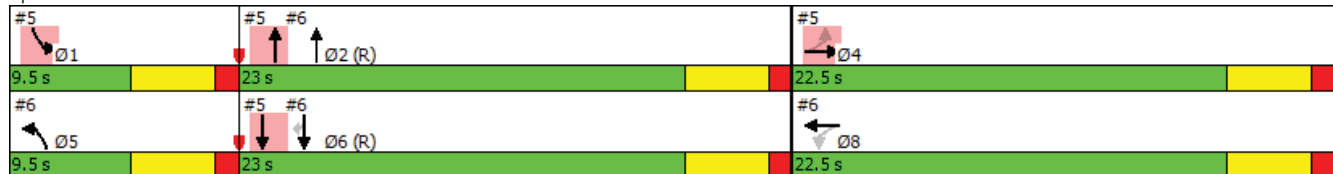
Intersection LOS: B

Intersection Capacity Utilization 38.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Robin Street & SH225 FR WB



HCM Unsignalized Intersection Capacity Analysis
1: Center Street & Railroad Avenue

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	49	624	616	121
Future Volume (Veh/h)	0	0	49	624	616	121
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	53	678	670	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					191	
pX, platoon unblocked	0.95	0.95	0.95			
vC, conflicting volume	1068	401	802			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	971	271	692			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	94			
cM capacity (veh/h)	224	692	856			
Direction, Lane #	NB 1	NB 2	NB 3	SB 1	SB 2	
Volume Total	189	271	271	447	355	
Volume Left	53	0	0	0	0	
Volume Right	0	0	0	0	132	
cSH	856	1700	1700	1700	1700	
Volume to Capacity	0.06	0.16	0.16	0.26	0.21	
Queue Length 95th (ft)	5	0	0	0	0	
Control Delay (s)	3.1	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.8			0.0		
Approach LOS						
Intersection Summary						
Average Delay			0.4			
Intersection Capacity Utilization			40.6%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Center Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8
Lane Configurations													
Traffic Volume (vph)	0	118	349	0	0	0	0	434	189	4	393	0	
Future Volume (vph)	0	118	349	0	0	0	0	434	189	4	393	0	
Satd. Flow (prot)	1695	3010	0	0	0	0	0	3539	1583	1770	3539	0	
Flt Permitted										0.950			
Satd. Flow (perm)	1695	3010	0	0	0	0	0	3539	1583	1770	3539	0	
Satd. Flow (RTOR)		369							205				
Lane Group Flow (vph)	0	507	0	0	0	0	0	472	205	4	427	0	
Turn Type	Perm	NA						NA	Perm	Prot	NA		
Protected Phases		4						2		1	6		8
Permitted Phases	4								2				
Total Split (s)	22.5	22.5						23.0	23.0	9.5	32.5		22.5
Total Lost Time (s)	4.5	4.5						4.5	4.5	4.5	4.5		
Act Effct Green (s)		12.8						31.3	31.3	5.5	33.2		
Actuated g/C Ratio		0.23						0.57	0.57	0.10	0.60		
v/c Ratio		0.52						0.23	0.21	0.02	0.20		
Control Delay		14.1						8.1	2.8	14.0	15.2		
Queue Delay		0.0						0.0	0.0	0.0	0.8		
Total Delay		14.1						8.1	2.8	14.0	16.0		
LOS		B						A	A	B	B		
Approach Delay		14.1						6.5			16.0		
Approach LOS		B						A			B		

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 11.4

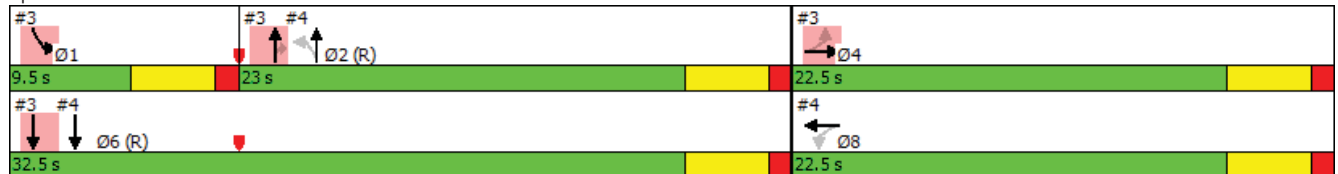
Intersection LOS: B

Intersection Capacity Utilization 49.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 3: Center Street & SH225 FR EB



Lanes, Volumes, Timings
4: Center Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations														
Traffic Volume (vph)	0	0	0	397	75	0	432	1	0	0	5	1		
Future Volume (vph)	0	0	0	397	75	0	432	1	0	0	5	1		
Satd. Flow (prot)	0	0	0	1610	3272	0	1681	1686	0	0	3451	0		
Flt Permitted				0.950	0.965		0.754	0.723						
Satd. Flow (perm)	0	0	0	1610	3272	0	1334	1279	0	0	3451	0		
Satd. Flow (RTOR)											1			
Lane Group Flow (vph)	0	0	0	216	298	0	235	236	0	0	6	0		
Turn Type				Perm	NA		Perm	NA			NA			
Protected Phases					8			2			6		1	4
Permitted Phases				8			2							
Total Split (s)				22.5	22.5		23.0	23.0			32.5		9.5	22.5
Total Lost Time (s)				4.5	4.5		4.5	4.5			4.5			
Act Effct Green (s)				12.8	12.8		31.3	31.3			33.2			
Actuated g/C Ratio				0.23	0.23		0.57	0.57			0.60			
v/c Ratio				0.58	0.39		0.31	0.32			0.00			
Control Delay				24.2	18.4		3.4	4.0			5.7			
Queue Delay				0.0	0.0		0.2	0.2			0.0			
Total Delay				24.2	18.4		3.6	4.2			5.7			
LOS				C	B		A	A			A			
Approach Delay					20.8			3.9			5.7			
Approach LOS					C			A			A			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.58

Intersection Signal Delay: 12.7

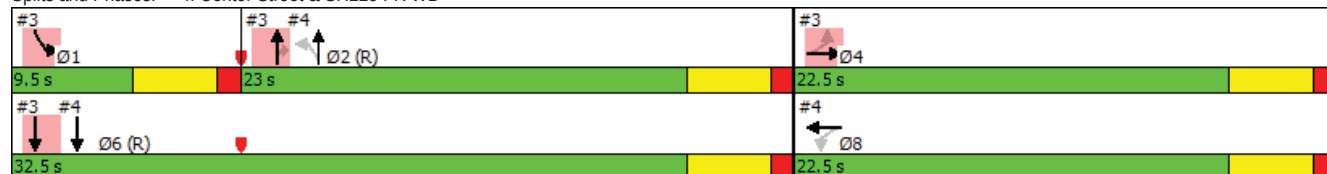
Intersection LOS: B

Intersection Capacity Utilization 49.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 4: Center Street & SH225 FR WB



Lanes, Volumes, Timings
5: Robin Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø5	Ø8
Lane Configurations														
Traffic Volume (vph)	94	235	59	0	0	0	0	23	235	0	19	0		
Future Volume (vph)	94	235	59	0	0	0	0	23	235	0	19	0		
Satd. Flow (prot)	1610	3285	0	0	0	0	0	1634	0	1770	1770	0		
Flt Permitted	0.950	0.998												
Satd. Flow (perm)	1610	3285	0	0	0	0	0	1634	0	1770	1770	0		
Satd. Flow (RTOR)		53						255						
Lane Group Flow (vph)	92	329	0	0	0	0	0	280	0	0	21	0		
Turn Type	Perm	NA						NA		Prot	NA			
Protected Phases		4						2		1	6		5	8
Permitted Phases	4													
Total Split (s)	22.5	22.5						23.0		9.5	23.0		9.5	22.5
Total Lost Time (s)	4.5	4.5						4.5		4.5	4.5			
Act Effct Green (s)	12.5	12.5						33.5			31.2			
Actuated g/C Ratio	0.23	0.23						0.61			0.57			
v/c Ratio	0.25	0.42						0.26			0.02			
Control Delay	18.1	16.1						2.7			14.1			
Queue Delay	0.0	0.0						0.0			0.0			
Total Delay	18.1	16.1						2.7			14.1			
LOS	B	B						A			B			
Approach Delay		16.6						2.7			14.1			
Approach LOS		B						A			B			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 11.1

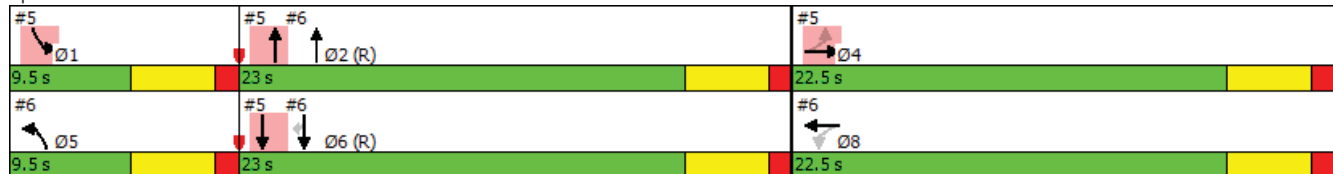
Intersection LOS: B

Intersection Capacity Utilization 49.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Robin Street & SH225 FR EB



Lanes, Volumes, Timings
6: Robin Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations					  						  			
Traffic Volume (vph)	0	0	0	10	518	62	18	123	0	0	0	0		
Future Volume (vph)	0	0	0	10	518	62	18	123	0	0	0	0		
Satd. Flow (prot)	0	0	0	0	4999	0	1770	1863	0	0	3390	1695		
Flt Permitted					0.999		0.950							
Satd. Flow (perm)	0	0	0	0	4999	0	1770	1863	0	0	3390	1695		
Satd. Flow (RTOR)					39									
Lane Group Flow (vph)	0	0	0	0	641	0	20	134	0	0	0	0		
Turn Type				Perm	NA		Prot	NA				Perm		
Protected Phases					8		5	2			6		1	4
Permitted Phases				8								6		
Total Split (s)				22.5	22.5		9.5	23.0			23.0	23.0	9.5	22.5
Total Lost Time (s)					4.5		4.5	4.5			4.5	4.5		
Act Effct Green (s)					12.5		6.1	33.5						
Actuated g/C Ratio					0.23		0.11	0.61						
v/c Ratio					0.55		0.10	0.12						
Control Delay					16.0		17.6	11.7						
Queue Delay					0.0		0.0	0.0						
Total Delay					16.0		17.6	11.7						
LOS					B		B	B						
Approach Delay					16.0			12.4						
Approach LOS					B			B						

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.55

Intersection Signal Delay: 15.3

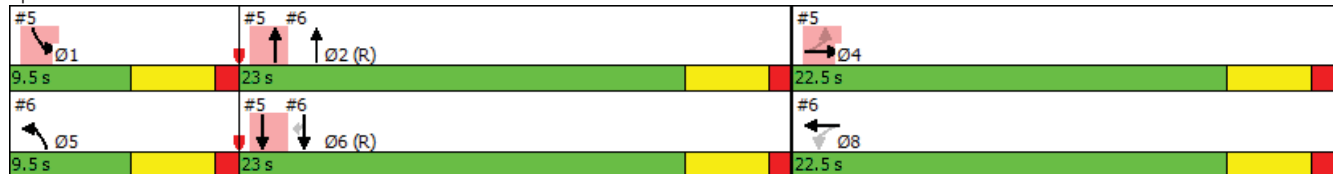
Intersection LOS: B

Intersection Capacity Utilization 49.2%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Robin Street & SH225 FR WB



HCM Unsignalized Intersection Capacity Analysis

1: Center Street & Railroad Avenue

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	0	0	28	523	931	129
Future Volume (Veh/h)	0	0	28	523	931	129
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	30	568	1012	140
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)					191	
pX, platoon unblocked	0.89	0.89	0.89			
vC, conflicting volume	1331	576	1152			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1120	269	918			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	100	100	95			
cM capacity (veh/h)	170	647	656			
Direction, Lane #	NB 1	NB 2	NB 3	SB 1	SB 2	
Volume Total	144	227	227	675	477	
Volume Left	30	0	0	0	0	
Volume Right	0	0	0	0	140	
cSH	656	1700	1700	1700	1700	
Volume to Capacity	0.05	0.13	0.13	0.40	0.28	
Queue Length 95th (ft)	4	0	0	0	0	
Control Delay (s)	2.7	0.0	0.0	0.0	0.0	
Lane LOS	A					
Approach Delay (s)	0.6			0.0		
Approach LOS						
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			34.7%	ICU Level of Service	A	
Analysis Period (min)			15			

Lanes, Volumes, Timings
3: Center Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

													
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø8
Lane Configurations													
Traffic Volume (vph)	1	230	437	0	0	0	0	297	228	41	623	0	
Future Volume (vph)	1	230	437	0	0	0	0	297	228	41	623	0	
Satd. Flow (prot)	1610	3058	0	0	0	0	0	3539	1583	1770	3539	0	
Flt Permitted	0.950									0.950			
Satd. Flow (perm)	1610	3058	0	0	0	0	0	3539	1583	1770	3539	0	
Satd. Flow (RTOR)		179							248				
Lane Group Flow (vph)	1	725	0	0	0	0	0	323	248	45	677	0	
Turn Type	Perm	NA						NA	Perm	Prot	NA		
Protected Phases		4						2		1	6		8
Permitted Phases	4								2				
Total Split (s)	26.0	26.0						24.0	24.0	10.0	34.0		26.0
Total Lost Time (s)	4.5	4.5						4.5	4.5	4.5	4.5		
Act Effct Green (s)	19.9	19.9						27.1	27.1	5.6	31.1		
Actuated g/C Ratio	0.33	0.33						0.45	0.45	0.09	0.52		
v/c Ratio	0.00	0.64						0.20	0.29	0.27	0.37		
Control Delay	12.0	15.2						12.3	3.6	19.6	18.4		
Queue Delay	0.0	0.0						0.0	0.0	0.0	3.2		
Total Delay	12.0	15.2						12.3	3.6	19.6	21.6		
LOS	B	B						B	A	B	C		
Approach Delay		15.2						8.5			21.5		
Approach LOS		B						A			C		

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 15.5

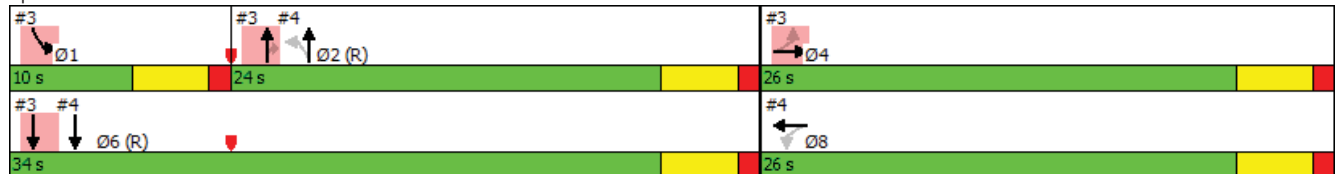
Intersection LOS: B

Intersection Capacity Utilization 64.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Center Street & SH225 FR EB



Lanes, Volumes, Timings
4: Center Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations														
Traffic Volume (vph)	0	0	0	570	517	0	310	0	0	0	87	124		
Future Volume (vph)	0	0	0	570	517	0	310	0	0	0	87	124		
Satd. Flow (prot)	0	0	0	1610	3339	0	1681	1681	0	0	3228	0		
Flt Permitted				0.950	0.985		0.608	0.608						
Satd. Flow (perm)	0	0	0	1610	3339	0	1076	1076	0	0	3228	0		
Satd. Flow (RTOR)											135			
Lane Group Flow (vph)	0	0	0	384	798	0	168	169	0	0	230	0		
Turn Type				Perm	NA		Perm	NA			NA			
Protected Phases					8			2			6		1	4
Permitted Phases				8			2							
Total Split (s)				26.0	26.0		24.0	24.0			34.0		10.0	26.0
Total Lost Time (s)				4.5	4.5		4.5	4.5			4.5			
Act Effct Green (s)				19.9	19.9		27.1	27.1			31.1			
Actuated g/C Ratio				0.33	0.33		0.45	0.45			0.52			
v/c Ratio				0.72	0.72		0.35	0.35			0.13			
Control Delay				26.0	21.6		5.6	5.6			3.9			
Queue Delay				0.9	0.3		0.2	0.2			0.0			
Total Delay				26.9	21.9		5.8	5.9			3.9			
LOS				C	C		A	A			A			
Approach Delay					23.6			5.8			3.9			
Approach LOS					C			A			A			

Intersection Summary

Cycle Length: 60

Actuated Cycle Length: 60

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 17.6

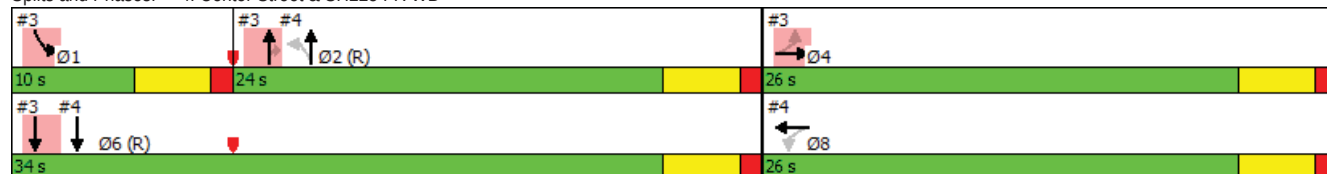
Intersection LOS: B

Intersection Capacity Utilization 64.7%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 4: Center Street & SH225 FR WB



Lanes, Volumes, Timings
5: Robin Street & SH225 FR EB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø5	Ø8
Lane Configurations														
Traffic Volume (vph)	8	295	75	0	0	0	0	22	371	1	28	0		
Future Volume (vph)	8	295	75	0	0	0	0	22	371	1	28	0		
Satd. Flow (prot)	1610	3288	0	0	0	0	0	1626	0	1681	1770	0		
Flt Permitted	0.950									0.950				
Satd. Flow (perm)	1610	3288	0	0	0	0	0	1626	0	1681	1770	0		
Satd. Flow (RTOR)		57						403						
Lane Group Flow (vph)	8	404	0	0	0	0	0	427	0	1	30	0		
Turn Type	Perm	NA						NA		Prot	NA			
Protected Phases		4						2		1	6		5	8
Permitted Phases	4													
Total Split (s)	22.5	22.5						23.0		9.5	23.0		9.5	22.5
Total Lost Time (s)	4.5	4.5						4.5		4.5	4.5			
Act Effct Green (s)	16.8	16.8						27.3		5.2	1.0			
Actuated g/C Ratio	0.31	0.31						0.50		0.09	0.02			
v/c Ratio	0.02	0.39						0.42		0.01	0.94			
Control Delay	12.7	13.7						3.4		15.0	137.9			
Queue Delay	0.0	0.0						0.0		0.0	0.0			
Total Delay	12.7	13.7						3.4		15.0	137.9			
LOS	B	B						A		B	F			
Approach Delay		13.7						3.4			133.9			
Approach LOS		B						A			F			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 12.9

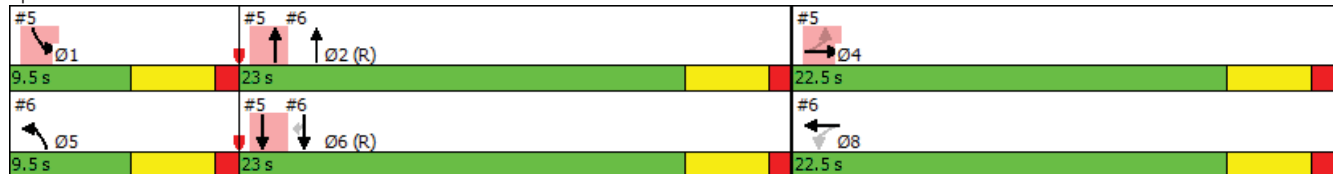
Intersection LOS: B

Intersection Capacity Utilization 38.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Robin Street & SH225 FR EB



Lanes, Volumes, Timings
6: Robin Street & SH225 FR WB

Traffic Analysis - Center St @ Railroad Ave
City of Deer Park

														
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	Ø1	Ø4
Lane Configurations					  						  			
Traffic Volume (vph)	0	0	0	34	917	10	17	7	0	0	1	0		
Future Volume (vph)	0	0	0	34	917	10	17	7	0	0	1	0		
Satd. Flow (prot)	0	0	0	0	5065	0	1770	1863	0	0	3390	1695		
Flt Permitted					0.998		0.950							
Satd. Flow (perm)	0	0	0	0	5065	0	1770	1863	0	0	3390	1695		
Satd. Flow (RTOR)					3									
Lane Group Flow (vph)	0	0	0	0	1045	0	18	8	0	0	1	0		
Turn Type				Perm	NA		Prot	NA			NA	Perm		
Protected Phases					8		5	2			6		1	4
Permitted Phases				8								6		
Total Split (s)				22.5	22.5		9.5	23.0			23.0	23.0	9.5	22.5
Total Lost Time (s)					4.5		4.5	4.5			4.5	4.5		
Act Effct Green (s)					16.8		5.2	27.3			27.3			
Actuated g/C Ratio					0.31		0.09	0.50			0.50			
v/c Ratio					0.67		0.11	0.01			0.00			
Control Delay					18.9		24.8	11.6			10.0			
Queue Delay					0.0		0.0	0.0			0.0			
Total Delay					18.9		24.8	11.6			10.0			
LOS					B		C	B			A			
Approach Delay					18.9			20.7			10.0			
Approach LOS					B			C			A			

Intersection Summary

Cycle Length: 55

Actuated Cycle Length: 55

Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 18.9

Intersection LOS: B

Intersection Capacity Utilization 38.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 6: Robin Street & SH225 FR WB

#5  Ø1	#5 #6  23 s	#5  Ø4
9.5 s	23 s	22.5 s
#6  Ø5	#5 #6  23 s	#6  Ø8
9.5 s	23 s	22.5 s