

# Carson Stormwater and Runoff Capture Project at Carriage Crest Park

Prepared for:



Prepared by:

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**April 19, 2017**



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# I. INTRODUCTION

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## *Project Description*

The Carriage Crest Park project is proposed for a regional water quality improvement, in accordance with the City of Carson's contributions to the Dominguez Channel Watershed Management Area Group (DCWMA Group) Enhanced Watershed Management Program (EWMP). Carriage Crest Park was identified in the EWMP as a high priority site for a regional storm water capture project due to its proximity to two large storm drains with a total drainage area exceeding 1,100 acres. This area discharges into Wilmington Drain which subsequently discharges into Machado Lake. The project objective is to improve the quality of Machado Lake by eliminating dry-weather runoff and reducing wet-weather pollutant loading.

The City of Carson entered into a Cooperative Implementation Agreement (CIA) with Caltrans to fund the Carson Water Capture Project at Carriage Crest Park. The City of Carson entered into a subsequent agreement with the Sanitation Districts of Los Angeles County (LACSD) to manage the project, conduct engineering and geotechnical investigations, and assist with environmental clearance, permitting, design and construction management. Tetra Tech is retained to prepare the Preliminary Engineering Design Report under the direction of the LACSD. The Preliminary Engineering Design Report will provide the City of Carson with 10% design-level documents that address hydrologic, hydraulic, and water quality analytics.

A key project constraint was the known contamination in the soil underlying Carriage Crest Park, therefore infiltration cannot be employed for pollutant load reduction or groundwater recharge. Through alternative analysis, Tetra Tech has developed a recommended concept which includes:

- a diversion by gravity flow from the storm into a subsurface storage reservoir,
- a pump station that subsequently dewateres the facility to the sanitary sewer for treatment at the JWPCP,
- diversion from the storm drain at a rate of 30 cubic feet per second (cfs),
- construction of at least 11 acre-feet and up to approximately 17 acre-feet of subsurface storage under the existing ballfields, and
- nightly discharge to the sanitary sewer at a maximum rate of 20 cfs when capacity is available.

### ***Project Location***

Carriage Crest Park is a 4.8-acre parcel owned by the City of Carson at the intersection of Figueroa Street and West Sepulveda Boulevard (**Figure 1**). The park includes basketball courts, ballfields, playground equipment, a parking lot, and several structures. Carriage Crest Park is immediately north of the Joint Water Pollution Control Plant (JWPCP), and the Sanitation Districts have expressed support and interest in diverting captured stormwater to the treatment plant for treatment.

### ***Project Schedule***

The project construction is mainly at the existing baseball field which is approximately 1.8 acres. Major construction elements and expected durations are:

1. Mobilization & Demolition – September 2017 to May 2018
2. Underground Concrete Storage, Precast Installation - May 2018 to July 2018
3. Pump Station & Storm Drain Construction – July 2018 to September 2018
4. Mass Site Grading - September 2018 to November 2018
5. Aboveground Improvements - November 2018 to April 2019

\*Note: Phases can be added/subtracted/combined

### ***Traffic Study Purpose***

This traffic study is prepared to mitigate the construction traffic impact introduced by the stormwater and runoff capture project at Carriage Crest Park in the City of Carson, as a part of preliminary engineering conducted by the Tetra Tech team. This study will identify the traffic impact of the open cut scenario for the storm drain construction. In addition, traffic mitigation measure will be proposed due to traffic lane closure at the intersection of Figueroa Street at West Sepulveda Boulevard.



Figure 1: Site location and vicinity map

## II. Methodology

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This study examines the traffic impact due to the proposed construction on Figueroa Street and the required traffic mitigations at the Figueroa Street and Sepulveda Blvd. intersection. A four stage lane by lane closure is proposed:

- **Stage 1:** Closure of Northbound lane #2 (North of Sepulveda Blvd) to construct the pipes from the pump station located at park,
- **Stage 2:** Closure of Northbound lane #1 (North of Sepulveda Blvd) to construct the pipes extending from Stage 1,
- **Stage 3:** Closure of Southbound left turn pocket (North of Sepulveda Blvd) to construct the pipes extending from Stage 2 and the rubber dam and its manholes (or remove and reconstruct the box culvert in; or to construct a drop inlet).
- **Stage 4:** Closure of Southbound lane #1 (North of Sepulveda Blvd) to construct the remaining rubber dam and its manholes (or remove and reconstruct the box culvert in; or to construct a drop inlet) from Stage 3.

Note: See Appendix for Figures of Stages

### *Traffic Counting*

The study evaluates the potential for project impacts during the weekday AM and PM peak hours of traffic, which consist of:

- 7:00 AM – 10:00 AM for AM Peak Hours
- 4:00 PM – 7:00 PM for PM Peak Hours

In addition, tube counts to document the 24-hour directional average daily traffic (ADT) were conducted.

### *Intersection Levels of Service Standards and Methodology*

The Congestion Management Program allows an intersection to operate at LOS “E”; however, the City requires a more stringent LOS “D”. In this analysis, minimum acceptable intersection operating conditions will follow the City guidelines for all intersections. Intersections operating LOS “E” or “F” are considered unsatisfactory. The definitions for the range of levels of service for signalized intersections under the Highway Capacity Manual are listed in **Table 1**.

For this study, Synchro 9 software was used for calculating the levels of service.



**Table 1: Level of Service (LOS) Definitions for Signalized Intersections**

LOS	Definition / Interpretation	Signalized Intersection Delay (seconds per vehicle)
A	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.	$\leq 10$
B	Very good operation. Many drivers begin to feel somewhat restricted within platoons of vehicles. This represents stable flow. An approach to an intersection may occasionally be fully utilized and traffic queues start to form.	$> 10$ and $\leq 20$
C	Good operation. Occasionally drivers may have to wait for more than 60 seconds, and backups may develop behind turning vehicles. Most drivers feel somewhat restricted.	$> 20$ and $\leq 35$
D	Fair operation. Cars are sometimes required to wait for more than 60 seconds during short peaks. There are no long-standing traffic queues. This level is typically associated with design practice for peak periods.	$> 35$ and $\leq 55$
E	Poor operation. Some long-standing vehicular queues develop on critical approaches.	$> 55$ and $\leq 80$
F	Forced flow. Represents jammed conditions. Backups from locations downstream or on the cross street may restrict or prevent movements of vehicles out of the intersection approach lanes; therefore, volumes carried are not predictable. Potential for stop and go type traffic flow.	$> 80$

Source: Highway Capacity Manual, Special Report 209. Transportation Research Board, Washington, DC.

### III. EXISTING CONDITIONS

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#### *Project Site, Vicinity and Street Network*

The Carriage Crest Park is 4.8 acres in size, including baseball field, basketball fields, and a 40-space parking lot. It is assumed that the majority, if not all, of the park will be closed during the project construction. It is assumed that construction crews will park their vehicles at the park site, not on street.

West of the park and Figueroa Street is Target shopping facility. It should be noted there are two driveways on the west side of Figueroa Street. The northern driveway directly connects to the signalized intersection of SR-110 Northbound off ramp for right turns only and on red. This note is to remind the City to coordinate with Target with the potential of vehicular traffic using this route to avoid the intersection of Figueroa Street at West Sepulveda Boulevard.

The intersection of Figueroa Street at West Sepulveda Boulevard is controlled by an 8-phase traffic signal, with a left turn lane on each street approach. Also, there is a right-turn lane at the Eastbound, Westbound, and Southbound approaches, except the Northbound approach.

When vehicular movements are closed due to the project construction, the next interchange to the Interstate I-110 Freeway north of the subject intersection is at 220<sup>th</sup> Street, south of the subject intersection is at Pacific Coast Highway.

The City of Carson street system is characterized by the long street blocks in the project vicinity. Each block is about half mile to one mile long. Any traffic movement resulting from full closure at the intersection of Figueroa Street at West Sepulveda Boulevard due to the Carriage Crest Park project construction will cause vehicular traffic to detour for approximately 2 extra miles.

The roadway network in the project adjacency include Interstate I-110 Freeway, South Vermont Avenue, South Main Street, 220<sup>th</sup> Street, 223<sup>th</sup> Street, 228<sup>th</sup> Street, Lomita Boulevard, and Pacific Coast Highway. The intersection is 390 feet east of the Interstate I-110 Northbound intersection.

## ***Existing Traffic Volumes and Operating Conditions***

Traffic counts were performed by National Data and Surveying Services (NDS) for the study on February 2, 2017 and February 14, 2017. The counts included average daily traffic (ADT) and intersection turn movements.

### Average Daily Traffic (ADT) Counts

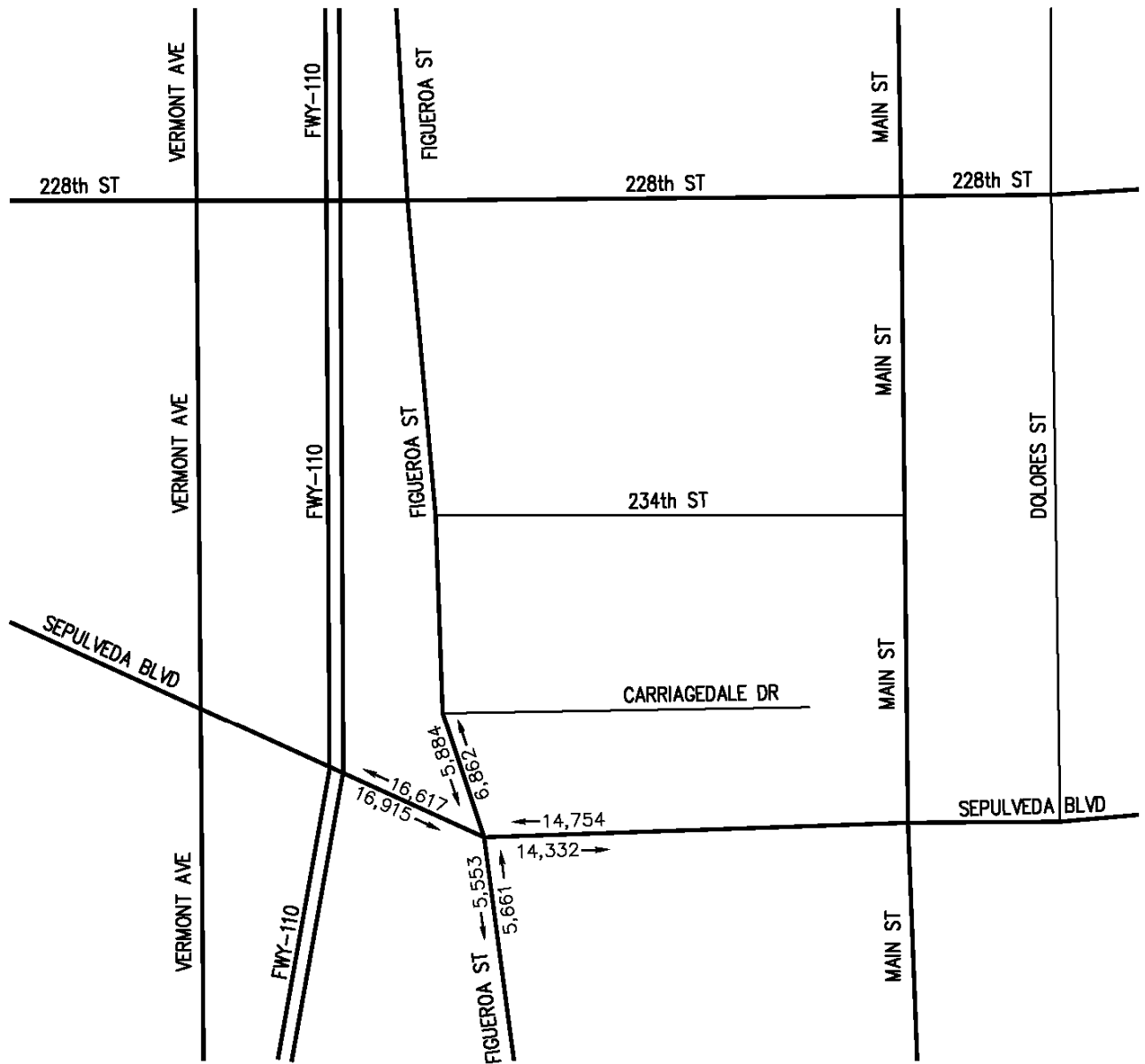
The ADT counts on Figueroa Street *north* of Sepulveda Boulevard is 12,746 vehicles, of which the Northbound ADT is 6,862 vehicles and the Southbound ADT is 5,884 vehicles. Meanwhile, the ADT counts show 11,214 vehicles on Figueroa Street *south* of Sepulveda Boulevard, comprised of 5,661 vehicles heading Northbound and 5,553 vehicles heading Southbound.

The ADT counts on Sepulveda Boulevard *east* of Figueroa Street is 29,086 vehicles, of which the Eastbound ADT is 14,332 vehicles and the Westbound ADT is 14,754 vehicles. Meanwhile, the ADT counts show 33,532 vehicles on Sepulveda Boulevard *west* of Figueroa Street, comprised of 16,915 vehicles heading Eastbound and 16,617 vehicles heading Westbound.

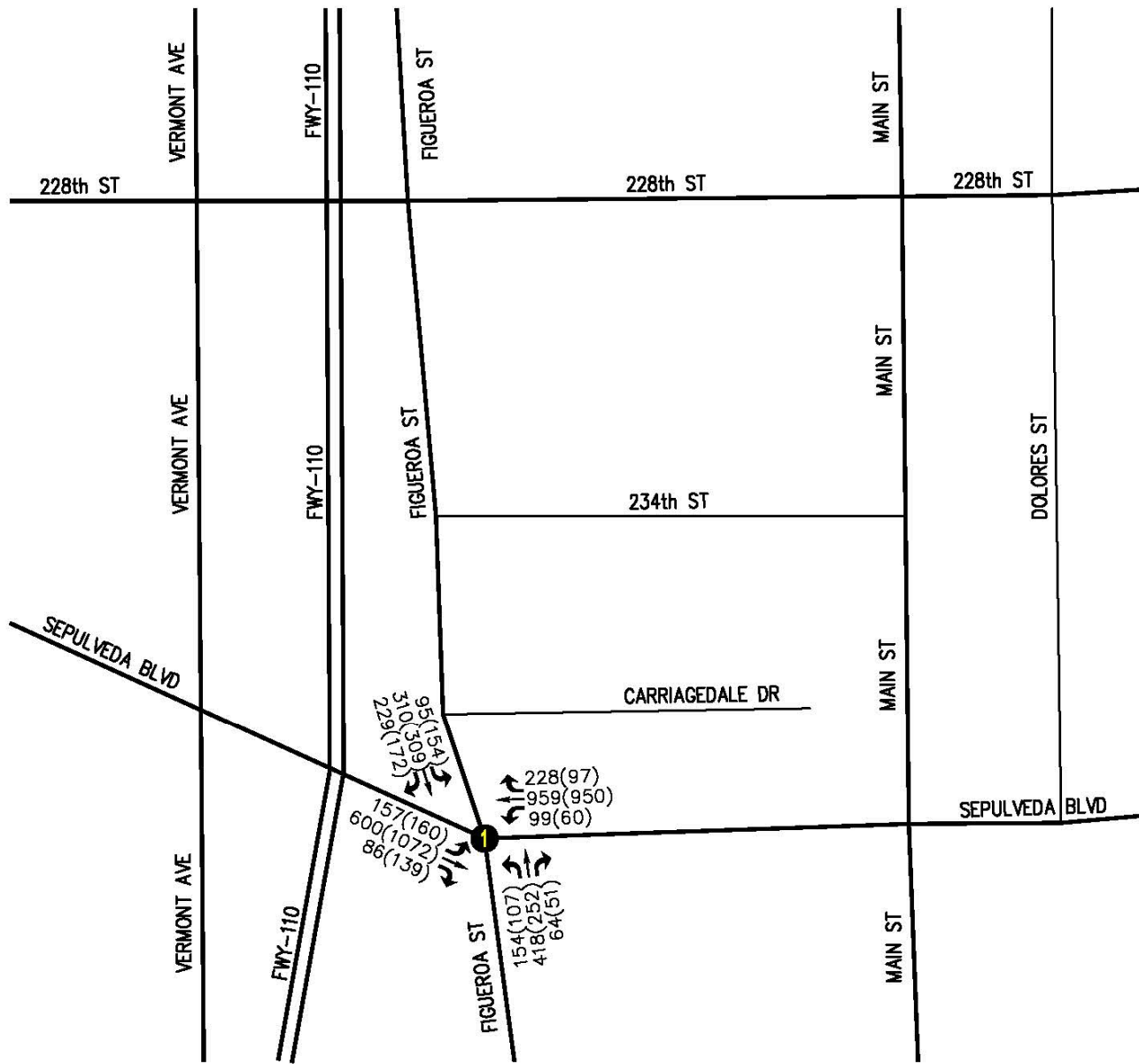
ADT count information is shown in **Figure 2**.

### Existing Peak Hour Traffic Volumes

Weekday morning and evening peak hour counts were conducted from 7:00 to 10:00 AM and from 4:00 to 7:00 PM, respectively. The AM and PM peak hour intersection turn movements are shown in **Figure 3**.



**Figure 2: Average Daily Traffic Volumes**



**LEGEND:**



ANALYZED INTERSECTION

xx(yy) AM(PM) PEAK HOUR VOLUMES



NO SCALE

**Figure 3: AM/PM Peak Hour Volumes**

## IV. Traffic Analysis

### *Existing Level of Service Intersections*

**Table 2** summarizes the LOS during the AM and the PM peak hours for the study intersections.

- The existing LOS is C for AM and PM peak hours.
- For AM peak hours, Stage 1 to 4 LOS is “D”.
- For PM peak hours, Stage 1, 3, 4 LOS is “C” and Stage 2 LOS is “D”.

**Table 2: Levels of Service for Peak Hours**

2017 AM Peak				2017 PM Peak			
Alternatives	Delay (Sec)	V/C	LOS	Alternatives	Delay (Sec)	V/C	LOS
Existing	34.0	0.76	C	Existing	33.2	0.74	C
Stage 1	37.9	0.86	D	Stage 1	33.8	0.79	C
Stage 2	40.7	0.91	D	Stage 2	36.0	0.83	D
Stage 3	36.5	0.83	D	Stage 3	34.4	0.80	C
Stage 4	36.5	0.83	D	Stage 4	34.4	0.80	C

### *Alternative Option for Closing 2 Lanes on Southbound*

An alternative option for Southbound was initially proposed, which would close off Southbound #1 lane and the left turn pocket (North of Sepulveda Blvd) for the construction of the pipes extending from Stage 2 and the rubber dam and its manholes. This proposed staging was dismissed due to the LOS increasing to an unacceptable level of “E”. The high LOS resulted in splitting the construction into two separate phases, Stage 3 and Stage 4.

**Table 3** summarizes the LOS during the AM and the PM peak hours for the alternative staging.

**Table 3: Level of Service for Alternative Option**

2017 AM Peak				2017 PM Peak			
Alternatives	Delay (Sec)	V/C	LOS	Alternatives	Delay (Sec)	V/C	LOS
Alt Option	58.1	1.00	E	Alt Option	68.3	1.02	E

### ***Signal Phase Timing***

Due to the closure of the Southbound left turn pocket in the traffic handling concept in Stage 3, the left turn lane is being shifted to the Southbound #1 lane. To avoid the opposing left turn cars colliding, vehicles traveling Northbound and Southbound will be operating as the lead-lag operation. Lead-lag operation means that the Northbound and Southbound left turns cannot be concurrent.

For the aforementioned "Alternative Option," the signal will be operated in split phase, which means the Northbound and Southbound movements cannot be concurrent.

### ***Additional Trips Due to Construction***

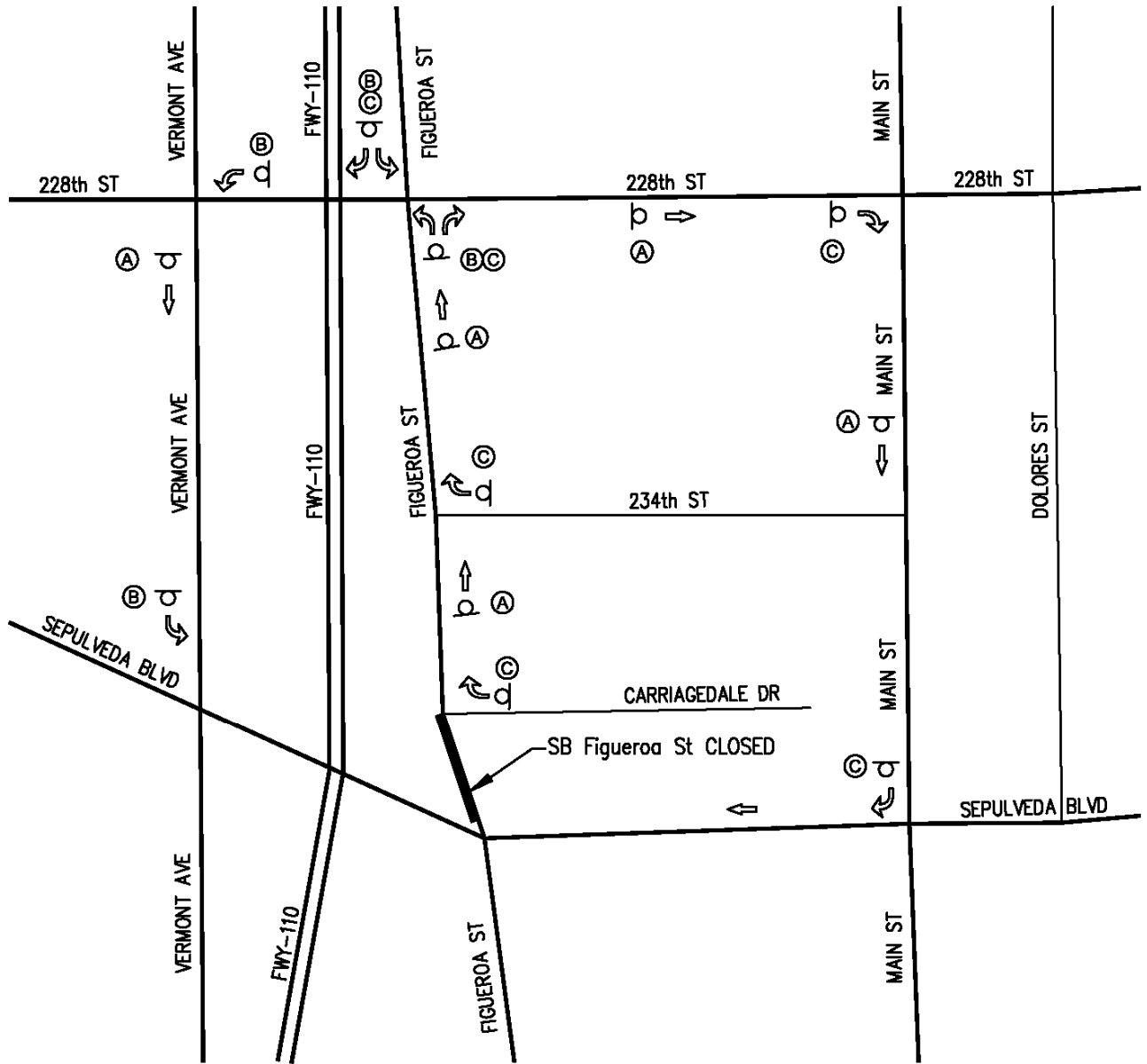
Construction trips will range from approximately 20,000 cubic yards (11 acre-feet of storage) to approximately 35,000 cubic yards (up to 17 acre-feet of storage) of excavation and transportation. For the purpose of this report it is assumed that there is 35,000 cubic yards of excavation and transportation. The 35,000 cubic yards of dirt for hauling was estimated by Tetra Tech.

The project construction in total will generate up to approximately 5,000 one-way truck trips (2,500 round truck trips). The planned hauling is approximately 40 days, operated with 8 trucks and 6 hours each day. The planned mobilization and demolition is approximately 173 days. In addition, construction trucks are planned to park on the job site and will not take up additional parking spaces. During the peak of project construction, estimated by Tetra Tech, there will be approximately 48 crew/trips at the site.

Normally construction trucks will not be using the intersection during peak hours to worsen the Level of Service (LOS).

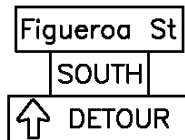
### ***Detour Southbound***

A detour map was created in the case of a full closure of the Southbound movement on Figueroa Street north of Sepulveda Boulevard, due to some unforeseen reasons. The detour is shown in **Figure 4**.

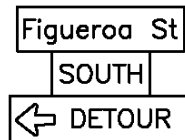


**LEGEND:**

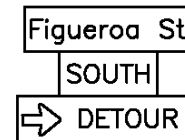
- ← DIRECTION OF DETOUR
- ⓐ DETOUR SIGN



(A)



(B)



(C)



**Figure 4: Detour Map due to Full Closure**



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## **V. PRELIMINARY SUMMARY**

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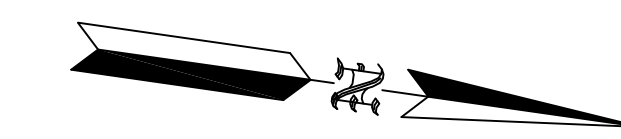
Per discussion with Tetra Tech, construction staging is desired to advance on per lane basis to avoid the LOS below D. However, the dimension of rubber dam and the associated manholes that the new storm drain pipes will connect to are in design stage. Dimensions have not been given for the rubber dam and the associated manholes, so the dimensions for traffic control concept are approximate. That is the reason why the detour plan for the Southbound full closure is prepared.

Also per Tetra Tech, the City of Carson is responsible for the maintenance of the Carriage Crest Park project. Once the project is built and in operation, it is assumed that very few maintenance vehicles are anticipated. Therefore this project is assumed no traffic impact to future conditions.

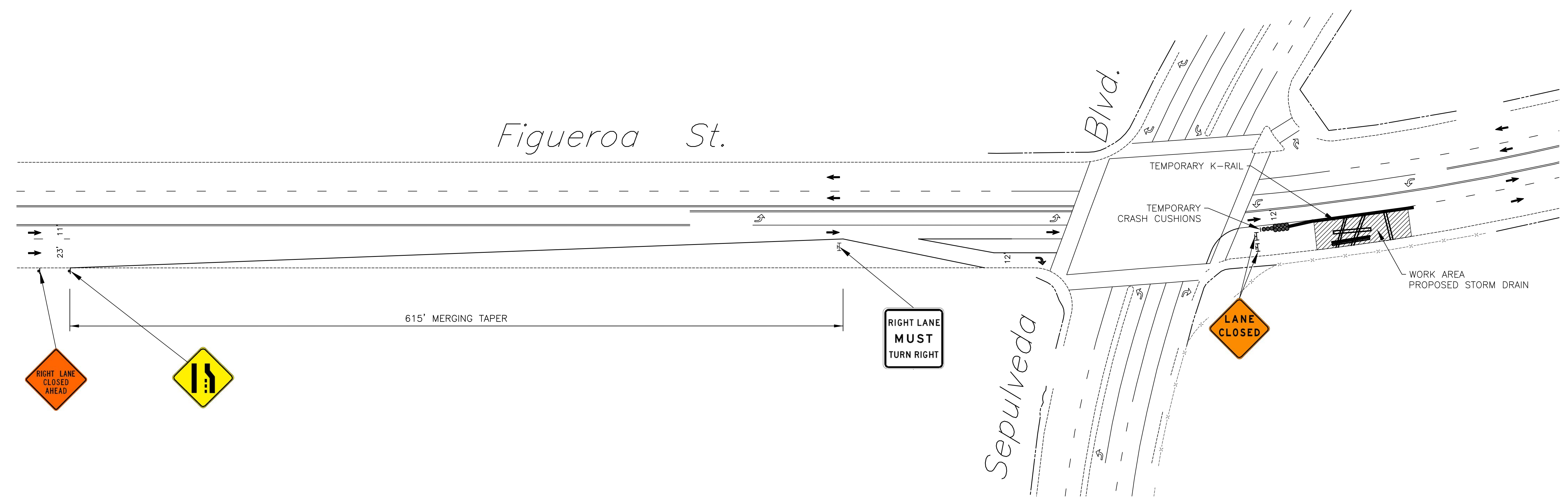
Target should be coordinated during the project construction to avoid the southbound traffic routing to its property.

## Appendix A

# Construction Staging and Traffic Handling Concept



NO SCALE



**CONCEPT  
NOT FOR CONSTRUCTION**

PLANS PREPARED BY:  
**FPL** *FPL and Associates, Inc.*  
Traffic • Transportation • Civil  
30 Corporate Park, Suite 401  
Irvine, CA 92606  
PHONE: 949-252-1688

BENCHMARK:

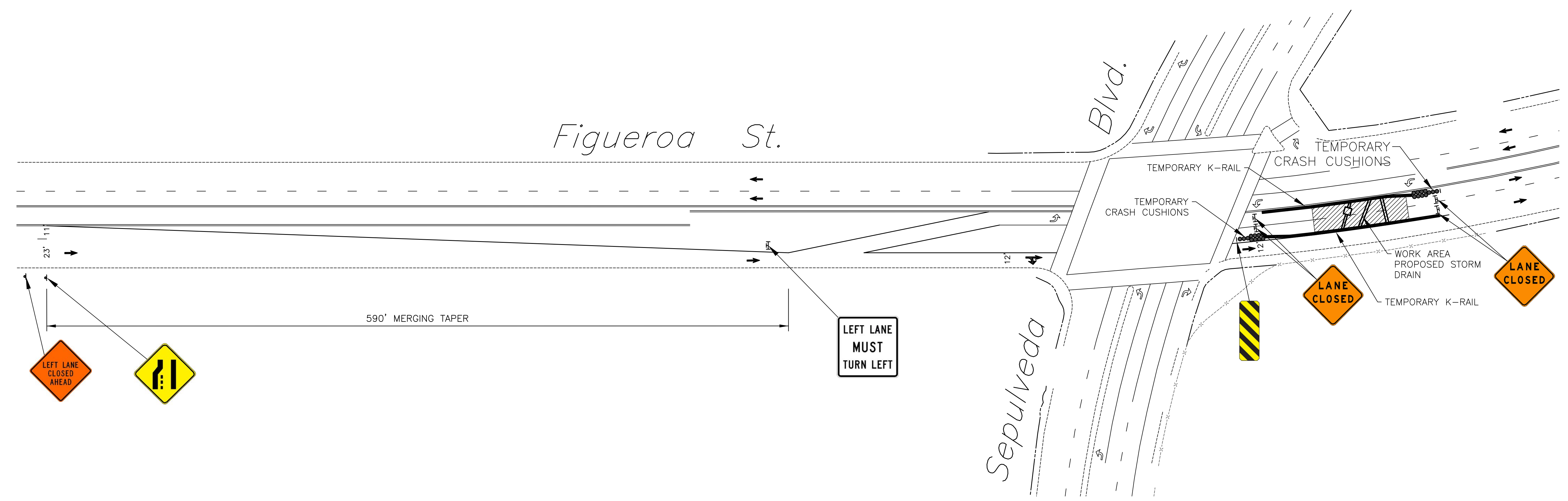
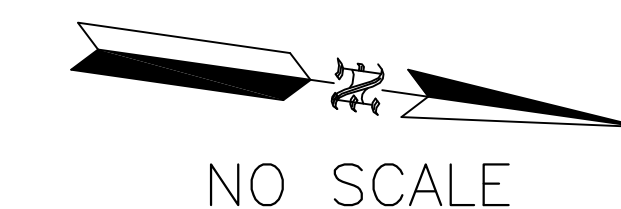
**STAGE 1: NORTHBOUND LANE #2 CLOSED**

REVISIONS			
NO	DESCRIPTION	APPROVE	DATE

**CITY OF CARSON**  
ENGINEERING SERVICES DIVISION

**TRAFFIC HANDLING CONCEPT PLAN  
CARRIAGE CREST PARK  
STORMWATER PROJECT**

PROJECT NO. <b>XXX</b>	SHEET <b>xx of XX</b>	PLAN NO. <b>XXX</b>
---------------------------	--------------------------	------------------------



**CONCEPT  
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 Irvine, CA 92606  
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BENCHMARK:

**STAGE 2: NORTHBOUND LANE #1 CLOSED**

REVISIONS			
NO	DESCRIPTION	APPROVE	DATE

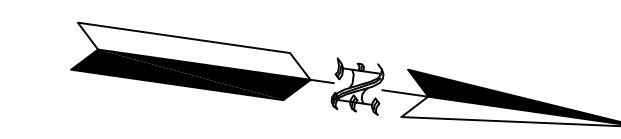
**CITY OF CARSON**  
 ENGINEERING SERVICES DIVISION

**TRAFFIC HANDLING CONCEPT PLAN  
 CARRIAGE CREST PARK  
 STORMWATER PROJECT**

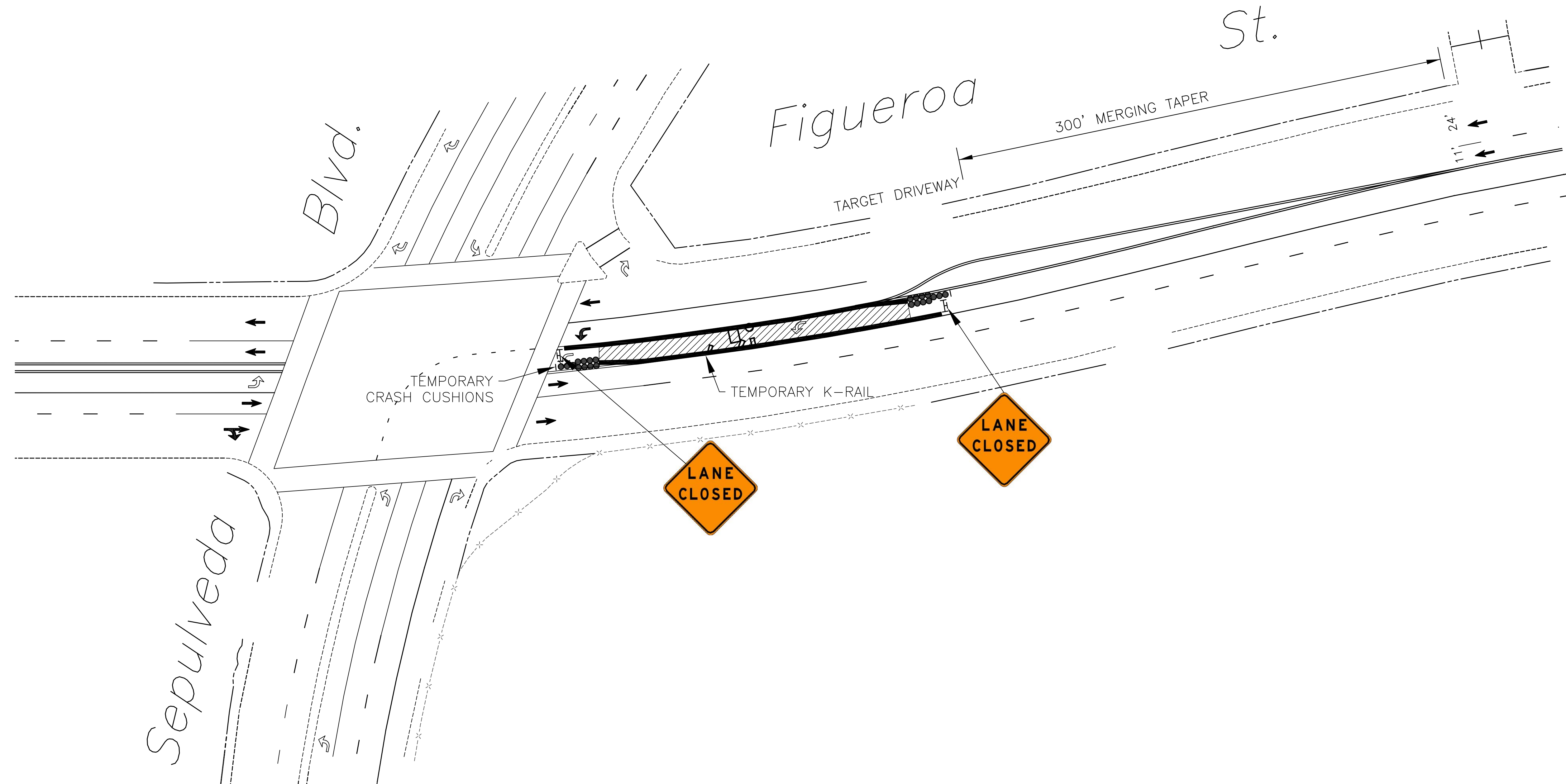
PROJECT NO. <b>XXX</b>	SHEET <b>xx of XX</b>	PLAN NO. <b>XXX</b>
---------------------------	--------------------------	------------------------

NOTE:

SIGNALL WILL BE MODIFIED TO OPERATE NORTH-SOUTH  
LEAD-LAG OPERATION.



NO SCALE



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Irvine, CA 92606  
PHONE: 949-252-1688

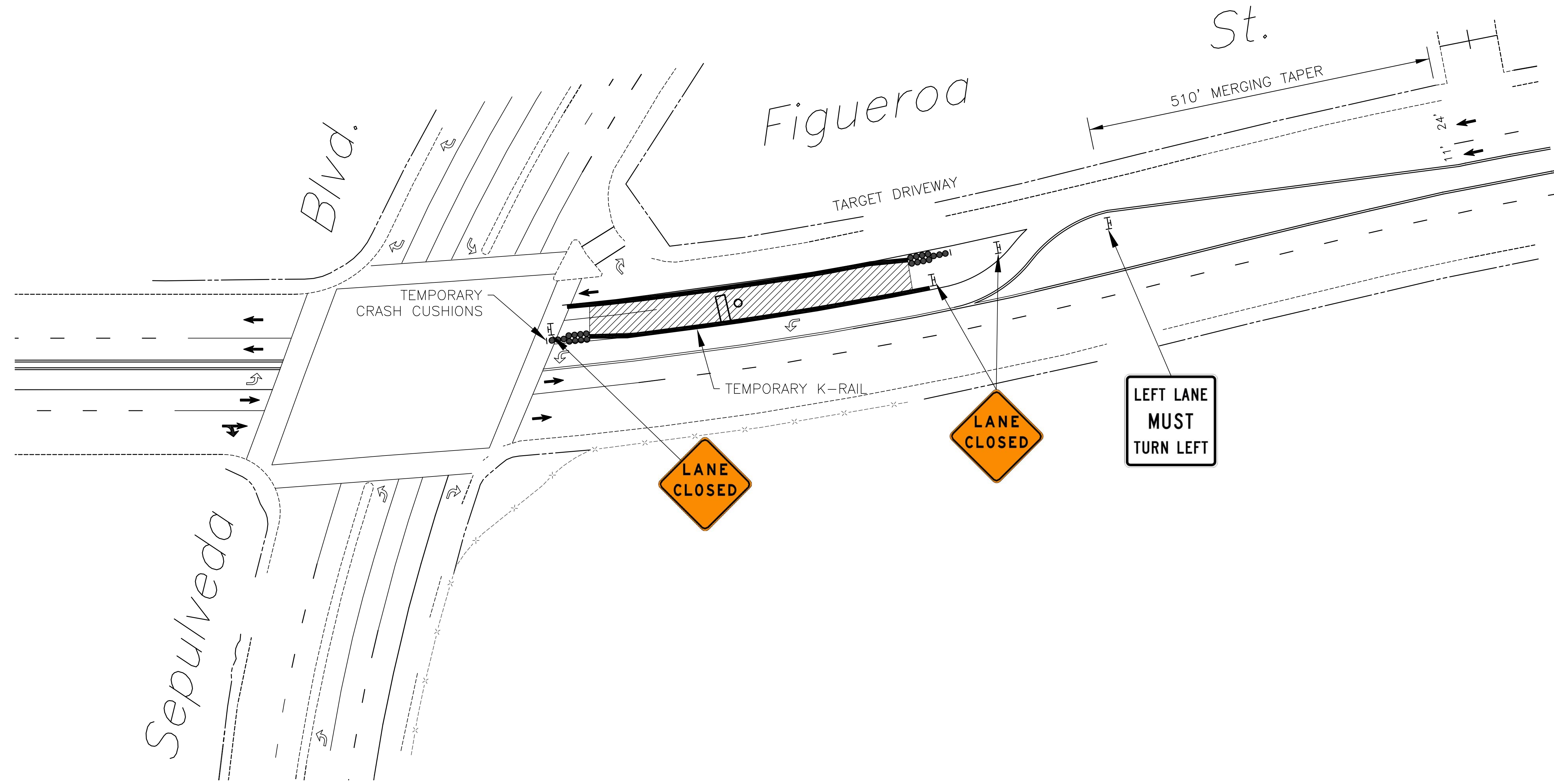
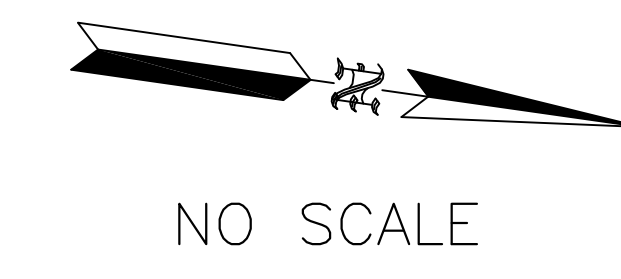
BENCHMARK:

**STAGE 3: LEFT TURN CLOSED**

REVISIONS			
NO	DESCRIPTION	APPROVE	DATE

<b>CITY OF CARSON</b>		
ENGINEERING SERVICES DIVISION		
<b>TRAFFIC HANDLING CONCEPT PLAN CARRIAGE CREST PARK STORMWATER PROJECT</b>		
PROJECT NO. <b>XXX</b>	SHEET <b>xx of XX</b>	PLAN NO. <b>XXX</b>

NOTE:  
MODIFY THE SIGNAL TO THE ORIGINAL 8-PHASE OPERATION.



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PHONE: 949-252-1688

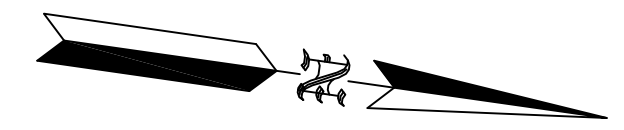
BENCHMARK:

**STAGE 4: SOUTHBOUND LANE #1 CLOSED**

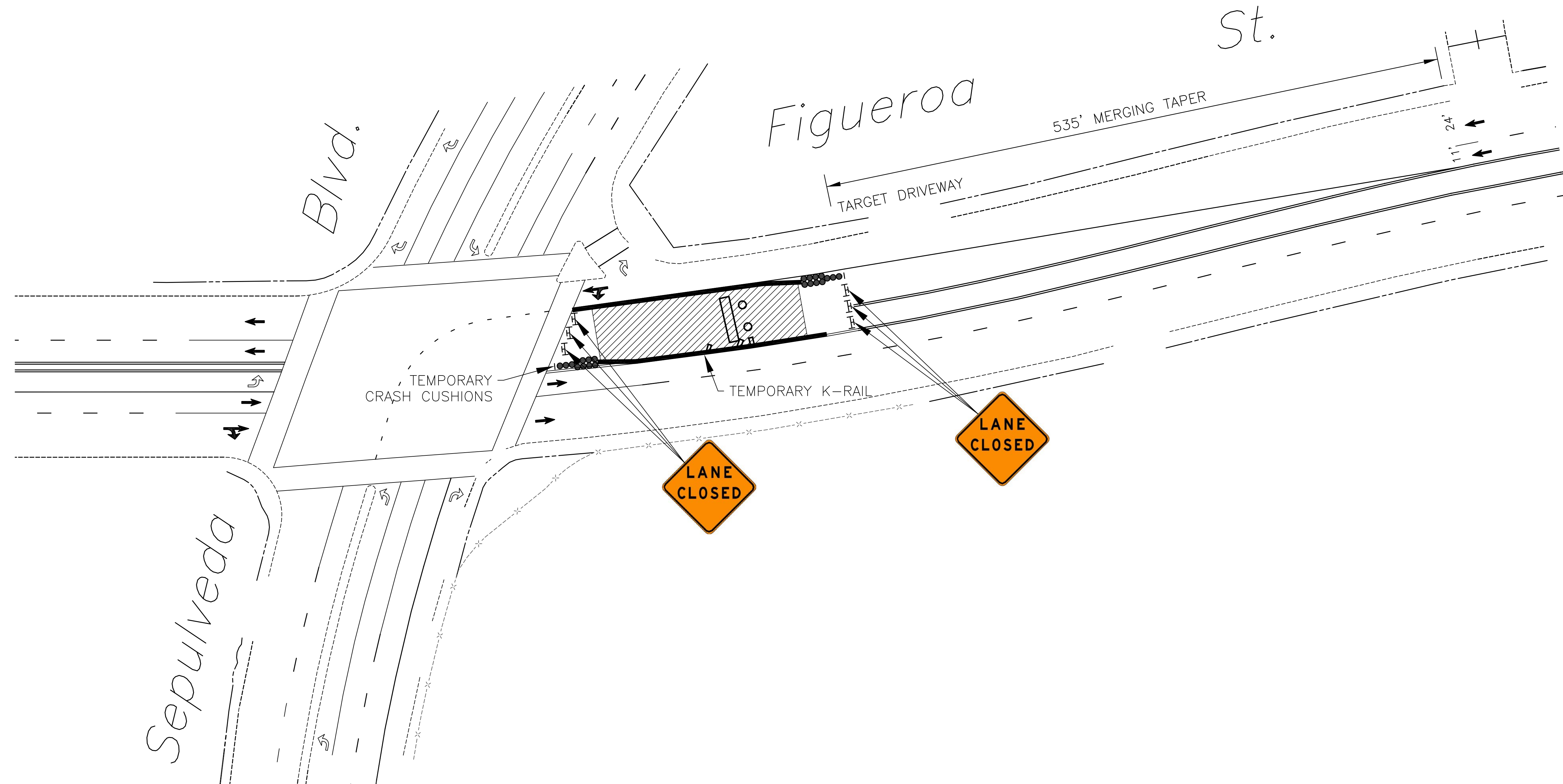
REVISIONS			
NO	DESCRIPTION	APPROVE	DATE

<b>CITY OF CARSON</b>		
ENGINEERING SERVICES DIVISION		
<b>TRAFFIC HANDLING CONCEPT PLAN CARRIAGE CREST PARK STORMWATER PROJECT</b>		
PROJECT NO. <b>XXX</b>	SHEET <b>xx of XX</b>	PLAN NO. <b>XXX</b>

NOTE:  
MODIFY THE SIGNAL TO SPLIT-PHASE.



NO SCALE



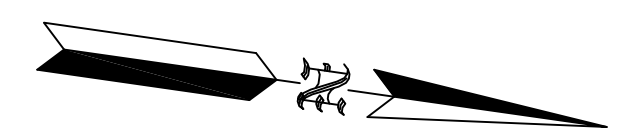
**OPTION 1: ALTERNATIVE OPTION: CLOSING 2-LANE ON SOUTHBOUND (CONSTRUCTING RUBBER DAM IN ONE STAGE)**

REVISIONS			
NO	DESCRIPTION	APPROVE	DATE

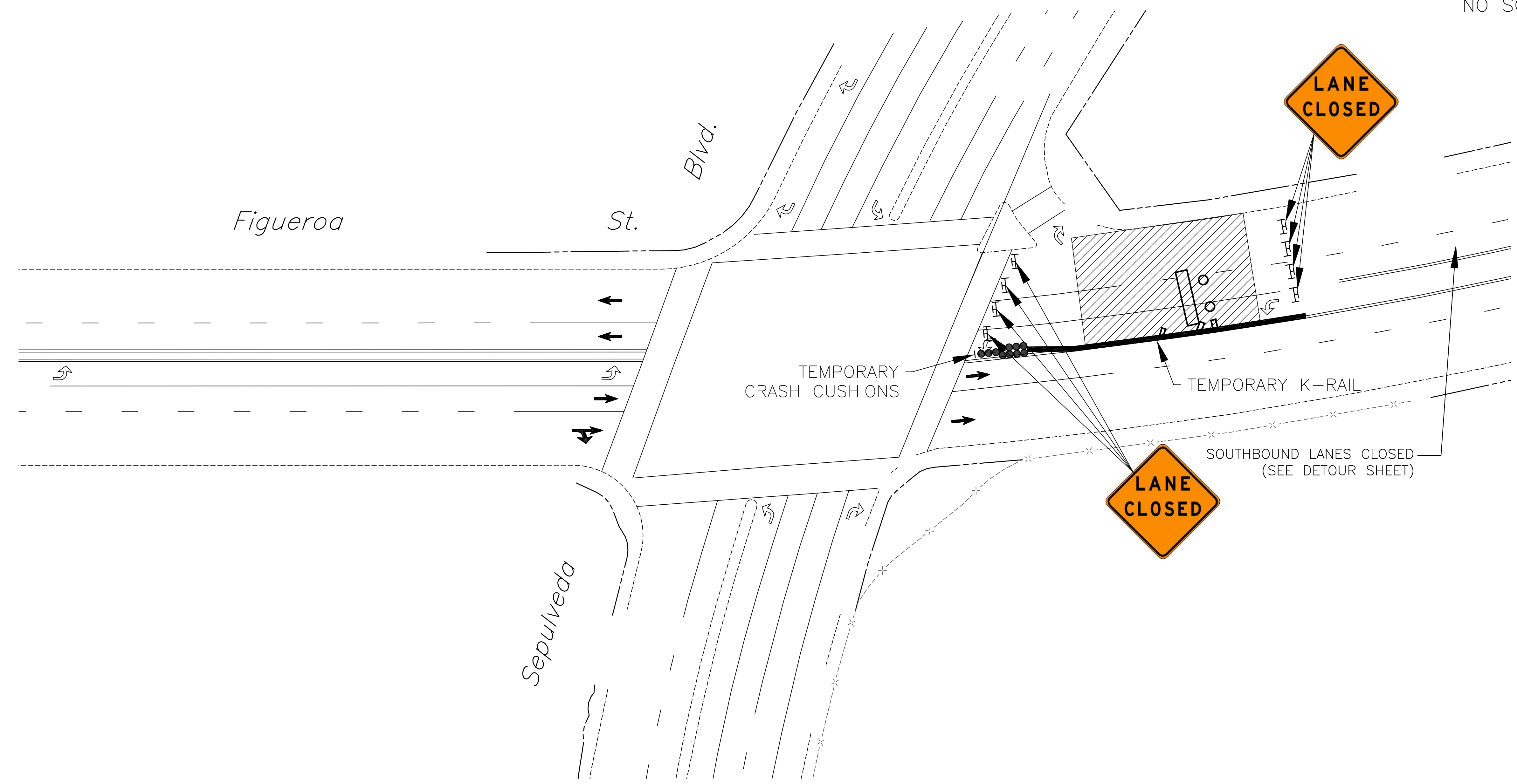
<b>CITY OF CARSON</b>		
ENGINEERING SERVICES DIVISION		
<b>TRAFFIC HANDLING CONCEPT PLAN CARRIAGE CREST PARK STORMWATER PROJECT</b>		
PROJECT NO. <b>XXX</b>	SHEET <b>xx of XX</b>	PLAN NO. <b>XXX</b>

**CONCEPT  
NOT FOR CONSTRUCTION**

PLANS PREPARED BY: <b>FPL</b> <i>FPL and Associates, Inc.</i> Traffic • Transportation • Civil 30 Corporate Park, Suite 401 Irvine, CA 92606 PHONE: 949-252-1688	BENCHMARK:
---	------------



NO SCALE



**CONCEPT  
 NOT FOR CONSTRUCTION**

**OPTION 2: SOUTHBOUND CLOSURE  
 DETOUR PLAN**

PLANS PREPARED BY:  
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 Traffic • Transportation • Civil  
 30 Corporate Park, Suite 401  
 Irvine, CA 92606  
 PHONE: 949-252-1688

BENCHMARK:

REVISIONS			
NO	DESCRIPTION	APPROVE	DATE

**CITY OF CARSON**  
 ENGINEERING SERVICES DIVISION

**TRAFFIC HANDLING CONCEPT PLAN  
 CARRIAGE CREST PARK  
 STORMWATER PROJECT**

PROJECT NO. <b>XXX</b>	SHEET <b>xx of XX</b>	PLAN NO. <b>XXX</b>
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Appendix B  
ADT Counts

# VOLUME

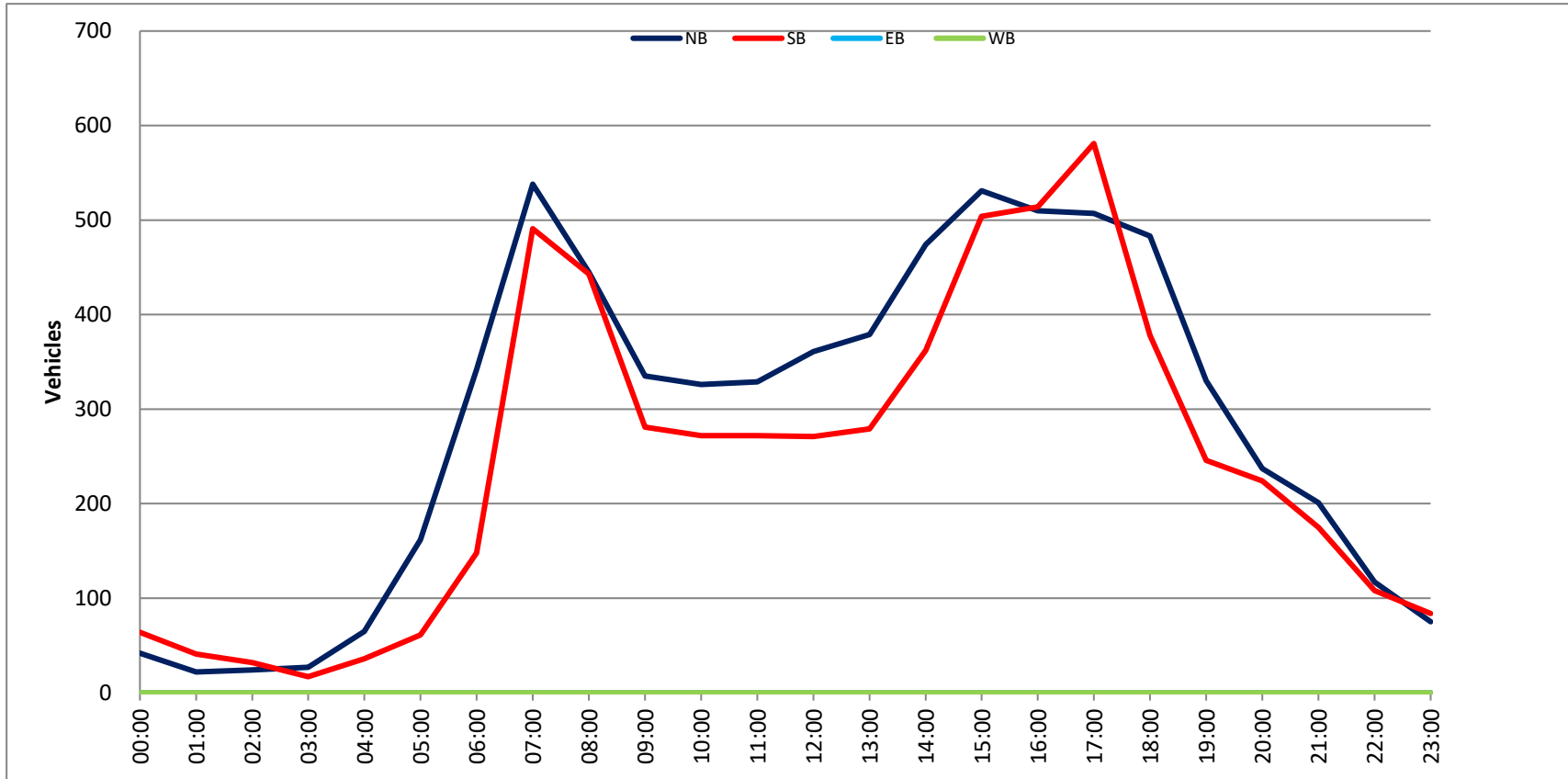
Figuroa St N/O Sepulveda Blvd

Day: Thursday  
Date: 2/2/2017

City: Carson  
Project #: CA17\_5064\_001

DAILY TOTALS					NB	SB	EB	WB	Total		
					6,862	5,884	0	0	12,746		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	13	21			34	12:00	82	65			147
00:15	6	19			25	12:15	95	68			163
00:30	15	15			30	12:30	98	71			169
00:45	8	42	9	64	17	12:45	86	361	67	271	153
					106						632
01:00	9	11			20	13:00	101	79			180
01:15	6	15			21	13:15	111	65			176
01:30	6	8			14	13:30	94	55			149
01:45	1	22	7	41	8	13:45	73	379	80	279	153
					63						658
02:00	7	13			20	14:00	121	90			211
02:15	9	4			13	14:15	83	69			152
02:30	3	4			7	14:30	144	91			235
02:45	5	24	11	32	16	14:45	126	474	112	362	238
					56						836
03:00	6	5			11	15:00	150	117			267
03:15	12	4			16	15:15	125	126			251
03:30	3	7			10	15:30	127	149			276
03:45	6	27	1	17	7	15:45	129	531	112	504	241
					44						1035
04:00	14	9			23	16:00	130	130			260
04:15	10	14			24	16:15	122	115			237
04:30	22	8			30	16:30	135	125			260
04:45	19	65	5	36	24	16:45	123	510	144	514	267
					101						1024
05:00	19	11			30	17:00	121	148			269
05:15	22	11			33	17:15	134	145			279
05:30	60	24			84	17:30	139	149			288
05:45	61	162	15	61	76	17:45	113	507	139	581	252
					223						1088
06:00	64	18			82	18:00	122	114			236
06:15	61	30			91	18:15	139	99			238
06:30	100	50			150	18:30	114	82			196
06:45	117	342	50	148	167	18:45	108	483	83	378	191
					490						861
07:00	119	98			217	19:00	113	77			190
07:15	122	114			236	19:15	77	57			134
07:30	146	136			282	19:30	78	57			135
07:45	151	538	143	491	294	19:45	62	330	55	246	117
					1029						576
08:00	138	145			283	20:00	48	56			104
08:15	129	130			259	20:15	73	58			131
08:30	93	94			187	20:30	52	52			104
08:45	85	445	74	443	159	20:45	64	237	58	224	122
					888						461
09:00	73	88			161	21:00	57	48			105
09:15	98	72			170	21:15	48	46			94
09:30	81	67			148	21:30	50	41			91
09:45	83	335	54	281	137	21:45	46	201	40	175	86
					616						376
10:00	79	67			146	22:00	31	32			63
10:15	81	73			154	22:15	34	28			62
10:30	93	61			154	22:30	25	24			49
10:45	73	326	71	272	144	22:45	27	117	24	108	51
					598						225
11:00	92	66			158	23:00	21	22			43
11:15	84	79			163	23:15	21	32			53
11:30	73	68			141	23:30	18	13			31
11:45	80	329	59	272	139	23:45	15	75	17	84	32
					601						159
<b>TOTALS</b>	<b>2657</b>	<b>2158</b>			<b>4815</b>	<b>TOTALS</b>	<b>4205</b>	<b>3726</b>			<b>7931</b>
<b>SPLIT %</b>	<b>55.2%</b>	<b>44.8%</b>			<b>37.8%</b>	<b>SPLIT %</b>	<b>53.0%</b>	<b>47.0%</b>			<b>62.2%</b>

DAILY TOTALS					NB	SB	EB	WB	Total
					6,862	5,884	0	0	12,746
AM Peak Hour	07:30	07:30			07:30	PM Peak Hour	14:30	16:45	16:45
AM Pk Volume	564	554			1118	PM Pk Volume	545	586	1103
Pk Hr Factor	0.934	0.955			0.951	Pk Hr Factor	0.908	0.983	0.957
7 - 9 Volume	983	934	0	0	1917	4 - 6 Volume	1017	1095	2112
7 - 9 Peak Hour	07:30	07:30			07:30	4 - 6 Peak Hour	16:45	16:45	16:45
7 - 9 Pk Volume	564	554	0	0	1118	4 - 6 Pk Volume	517	586	1103
Pk Hr Factor	0.934	0.955	0.000	0.000	0.951	Pk Hr Factor	0.930	0.983	0.957



# VOLUME

Sepulveda Blvd E/O Figueroa St

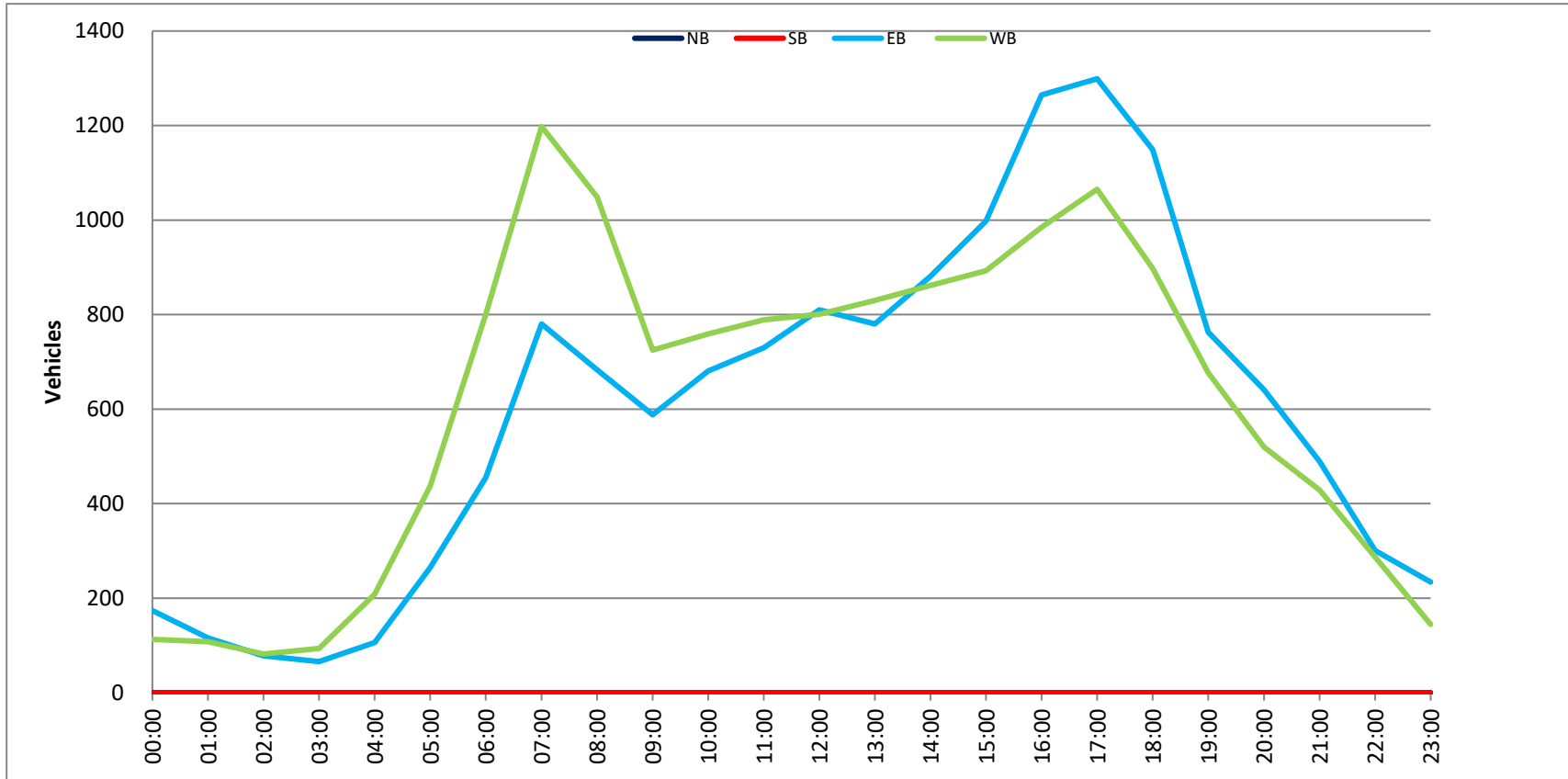
Day: Thursday  
Date: 2/2/2017

City: Carson  
Project #: CA17\_5064\_002

DAILY TOTALS					NB	SB	EB	WB	Total					
					0	0	14,332	14,754	29,086					
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL			
00:00			46	27	73	12:00			205	207	412			
00:15			45	32	77	12:15			183	213	396			
00:30			46	30	76	12:30			201	184	385			
00:45			37	174	24	113	61	287	221	810	197	801	418	1611
01:00			25	23	48	13:00			190	217	407			
01:15			42	26	68	13:15			192	205	397			
01:30			19	29	48	13:30			183	192	375			
01:45			30	116	30	108	60	224	215	780	216	830	431	1610
02:00			19	20	39	14:00			193	193	386			
02:15			23	16	39	14:15			255	234	489			
02:30			12	25	37	14:30			240	210	450			
02:45			24	78	21	82	45	160	193	881	225	862	418	1743
03:00			23	16	39	15:00			239	216	455			
03:15			10	22	32	15:15			253	229	482			
03:30			15	28	43	15:30			244	257	501			
03:45			18	66	28	94	46	160	262	998	191	893	453	1891
04:00			21	24	45	16:00			263	215	478			
04:15			19	46	65	16:15			338	227	565			
04:30			26	69	95	16:30			341	288	629			
04:45			40	106	69	208	109	314	323	1265	255	985	578	2250
05:00			63	54	117	17:00			319	258	577			
05:15			57	92	149	17:15			337	270	607			
05:30			79	135	214	17:30			332	276	608			
05:45			66	265	156	437	222	702	311	1299	261	1065	572	2364
06:00			75	141	216	18:00			335	233	568			
06:15			95	188	283	18:15			304	244	548			
06:30			134	225	359	18:30			262	233	495			
06:45			151	455	246	800	397	1255	248	1149	188	898	436	2047
07:00			136	242	378	19:00			202	188	390			
07:15			172	310	482	19:15			222	174	396			
07:30			225	340	565	19:30			157	163	320			
07:45			247	780	306	1198	553	1978	182	763	152	677	334	1440
08:00			204	275	479	20:00			163	128	291			
08:15			171	308	479	20:15			182	141	323			
08:30			169	252	421	20:30			148	142	290			
08:45			139	683	214	1049	353	1732	148	641	109	520	257	1161
09:00			139	191	330	21:00			152	115	267			
09:15			139	174	313	21:15			109	91	200			
09:30			167	174	341	21:30			138	135	273			
09:45			143	588	186	725	329	1313	90	489	88	429	178	918
10:00			171	192	363	22:00			91	79	170			
10:15			173	189	362	22:15			80	71	151			
10:30			186	185	371	22:30			60	71	131			
10:45			151	681	193	759	344	1440	70	301	66	287	136	588
11:00			194	198	392	23:00			60	55	115			
11:15			215	160	375	23:15			70	39	109			
11:30			153	222	375	23:30			58	23	81			
11:45			168	730	209	789	377	1519	46	234	28	145	74	379
<b>TOTALS</b>			4722	6362	11084	<b>TOTALS</b>			9610	8392	18002			
<b>SPLIT %</b>			42.6%	57.4%	38.1%	<b>SPLIT %</b>			53.4%	46.6%	61.9%			

DAILY TOTALS					NB	SB	EB	WB	Total
					0	0	14,332	14,754	29,086

AM Peak Hour	07:15	07:15	07:15	PM Peak Hour	16:15	16:30	16:30				
AM Pk Volume	848	1231	2079	PM Pk Volume	1321	1071	2391				
Pk Hr Factor	0.858	0.905	0.920	Pk Hr Factor	0.968	0.930	0.950				
7 - 9 Volume	0	0	1463	2247	3710	4 - 6 Volume	0	0	2564	2050	4614
7 - 9 Peak Hour	07:15	07:15	07:15	4 - 6 Peak Hour	16:15	16:30	16:30				
7 - 9 Pk Volume	0	0	848	1231	2079	4 - 6 Pk Volume	0	0	1321	1071	2391
Pk Hr Factor	0.000	0.000	0.858	0.905	0.920	Pk Hr Factor	0.000	0.000	0.968	0.930	0.950



# VOLUME

Figueroa St S/O Sepulveda Blvd

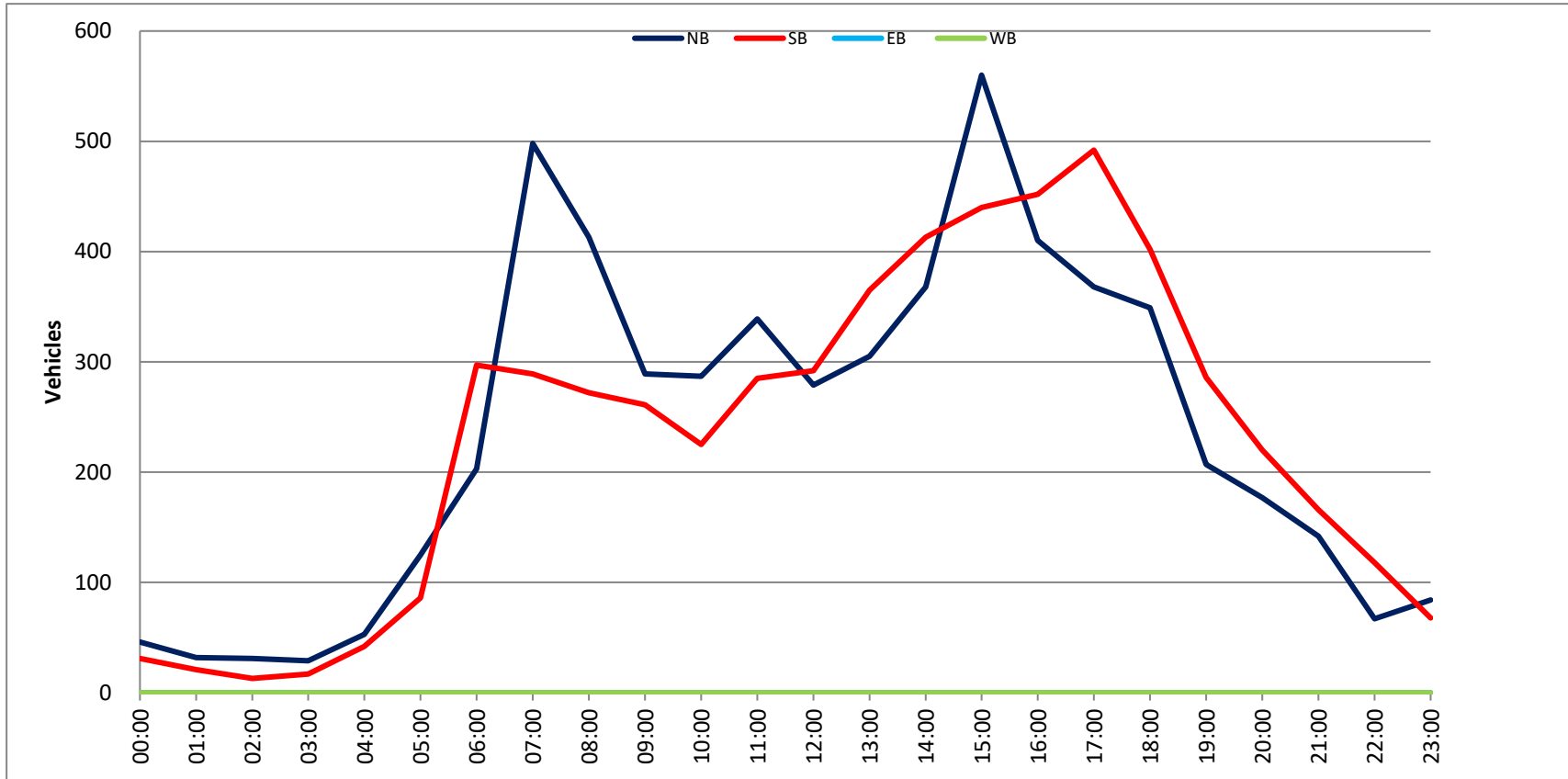
Day: Thursday  
Date: 2/2/2017

City: Carson  
Project #: CA17\_5064\_003

DAILY TOTALS					NB	SB	EB	WB	Total		
					5,661	5,553	0	0	11,214		
AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL
00:00	17	8			25	12:00	61	78			139
00:15	12	10			22	12:15	76	78			154
00:30	11	7			18	12:30	84	60			144
00:45	6	46	6	31	12	12:45	58	279	76	292	134
01:00	5	6			11	13:00	84	71			155
01:15	14	8			22	13:15	61	113			174
01:30	8	6			14	13:30	76	95			171
01:45	5	32	1	21	6	13:45	84	305	86	365	170
02:00	7	5			12	14:00	91	97			188
02:15	4	6			10	14:15	84	86			170
02:30	11	1			12	14:30	91	110			201
02:45	9	31	1	13	10	14:45	102	368	120	413	222
03:00	3	3			6	15:00	104	132			236
03:15	8	3			11	15:15	133	104			237
03:30	11	4			15	15:30	213	89			302
03:45	7	29	7	17	14	15:45	110	560	115	440	225
04:00	11	6			17	16:00	107	117			224
04:15	4	8			12	16:15	98	96			194
04:30	17	13			30	16:30	98	123			221
04:45	21	53	15	42	36	16:45	107	410	116	452	223
05:00	15	10			25	17:00	110	125			235
05:15	29	21			50	17:15	79	129			208
05:30	39	23			62	17:30	92	142			234
05:45	42	125	32	86	74	17:45	87	368	96	492	183
06:00	39	38			77	18:00	107	109			216
06:15	33	59			92	18:15	74	116			190
06:30	61	85			146	18:30	73	87			160
06:45	70	203	115	297	185	18:45	95	349	90	402	185
07:00	104	62			166	19:00	62	90			152
07:15	86	65			151	19:15	47	90			137
07:30	153	88			241	19:30	53	62			115
07:45	155	498	74	289	229	19:45	45	207	44	286	89
08:00	133	80			213	20:00	43	55			98
08:15	104	77			181	20:15	41	56			97
08:30	93	59			152	20:30	40	56			96
08:45	83	413	56	272	139	20:45	53	177	53	220	106
09:00	86	57			143	21:00	41	43			84
09:15	75	79			154	21:15	43	37			80
09:30	63	65			128	21:30	28	41			69
09:45	65	289	60	261	125	21:45	30	142	45	166	75
10:00	77	53			130	22:00	17	33			50
10:15	55	45			100	22:15	21	25			46
10:30	85	71			156	22:30	17	26			43
10:45	70	287	56	225	126	22:45	12	67	34	118	46
11:00	89	72			161	23:00	14	20			34
11:15	96	82			178	23:15	18	12			30
11:30	92	67			159	23:30	33	16			49
11:45	62	339	64	285	126	23:45	19	84	20	68	39
<b>TOTALS</b>	<b>2345</b>	<b>1839</b>			<b>4184</b>	<b>TOTALS</b>	<b>3316</b>	<b>3714</b>			<b>7030</b>
<b>SPLIT %</b>	<b>56.0%</b>	<b>44.0%</b>			<b>37.3%</b>	<b>SPLIT %</b>	<b>47.2%</b>	<b>52.8%</b>			<b>62.7%</b>

DAILY TOTALS					NB	SB	EB	WB	Total
					5,661	5,553	0	0	11,214

AM Peak Hour	07:30	06:45			07:30	PM Peak Hour	15:15	16:45			15:00
AM Pk Volume	545	330			864	PM Pk Volume	563	512			1000
Pk Hr Factor	0.879	0.717			0.896	Pk Hr Factor	0.661	0.901			0.828
7 - 9 Volume	911	561	0	0	1472	4 - 6 Volume	778	944	0	0	1722
7 - 9 Peak Hour	07:30	07:30			07:30	4 - 6 Peak Hour	16:15	16:45			16:45
7 - 9 Pk Volume	545	319	0	0	864	4 - 6 Pk Volume	413	512	0	0	900
Pk Hr Factor	0.879	0.906	0.000	0.000	0.896	Pk Hr Factor	0.939	0.901	0.000	0.000	0.957



# VOLUME

Sepulveda Blvd W/O Figueroa St

Day: Thursday  
Date: 2/2/2017

City: Carson  
Project #: CA17\_5064\_004

DAILY TOTALS					NB	SB	EB	WB	Total
					0	0	16,915	16,617	33,532

AM Period	NB	SB	EB	WB	TOTAL	PM Period	NB	SB	EB	WB	TOTAL			
00:00			48	40	88	12:00			220	216	436			
00:15			43	33	76	12:15			235	253	488			
00:30			42	33	75	12:30			214	258	472			
00:45			28	161	22	128	12:45		222	891	232	959	454	1850
01:00			21	18	39	13:00			248	277	525			
01:15			20	15	35	13:15			211	251	462			
01:30			34	23	57	13:30			256	253	509			
01:45			24	99	17	73	13:45		281	996	233	1014	514	2010
02:00			36	23	59	14:00			289	254	543			
02:15			43	30	73	14:15			291	261	552			
02:30			27	28	55	14:30			374	277	651			
02:45			31	137	26	107	14:45		376	1330	286	1078	662	2408
03:00			27	22	49	15:00			335	225	560			
03:15			18	29	47	15:15			395	250	645			
03:30			25	35	60	15:30			373	280	653			
03:45			31	101	30	116	15:45		358	1461	269	1024	627	2485
04:00			30	43	73	16:00			381	236	617			
04:15			27	31	58	16:15			401	241	642			
04:30			35	80	115	16:30			378	308	686			
04:45			37	129	80	234	16:45		306	1466	253	1038	559	2504
05:00			63	67	130	17:00			366	260	626			
05:15			70	94	164	17:15			381	265	646			
05:30			92	168	260	17:30			399	246	645			
05:45			85	310	210	539	17:45		327	1473	246	1017	573	2490
06:00			101	201	302	18:00			353	237	590			
06:15			135	195	330	18:15			300	245	545			
06:30			141	264	405	18:30			280	219	499			
06:45			180	557	272	932	18:45		235	1168	245	946	480	2114
07:00			167	293	460	19:00			231	191	422			
07:15			184	361	545	19:15			193	162	355			
07:30			217	435	652	19:30			210	160	370			
07:45			235	803	378	1467	19:45		198	832	139	652	337	1484
08:00			272	358	630	20:00			171	131	302			
08:15			267	326	593	20:15			153	115	268			
08:30			182	281	463	20:30			137	124	261			
08:45			202	923	258	1223	20:45		150	611	115	485	265	1096
09:00			198	238	436	21:00			124	121	245			
09:15			168	253	421	21:15			159	116	275			
09:30			186	230	416	21:30			131	109	240			
09:45			181	733	236	957	21:45		121	535	84	430	205	965
10:00			192	221	413	22:00			105	92	197			
10:15			167	203	370	22:15			94	65	159			
10:30			192	220	412	22:30			96	76	172			
10:45			171	722	199	843	22:45		77	372	57	290	134	662
11:00			205	204	409	23:00			78	37	115			
11:15			202	200	402	23:15			75	55	130			
11:30			232	238	470	23:30			60	57	117			
11:45			201	840	243	885	23:45		52	265	31	180	83	445
<b>TOTALS</b>			5515	7504	13019	<b>TOTALS</b>			11400	9113	20513			
<b>SPLIT %</b>			42.4%	57.6%	38.8%	<b>SPLIT %</b>			55.6%	44.4%	61.2%			

DAILY TOTALS					NB	SB	EB	WB	Total
					0	0	16,915	16,617	33,532

AM Peak Hour	07:30	07:15	07:30	PM Peak Hour	15:45	16:30	15:45				
AM Pk Volume	991	1532	2488	PM Pk Volume	1518	1086	2572				
Pk Hr Factor	0.911	0.880	0.954	Pk Hr Factor	0.946	0.881	0.937				
7 - 9 Volume	0	0	1726	2690	4416	4 - 6 Volume	0	0	2939	2055	4994
7 - 9 Peak Hour	07:30	07:15	07:30	4 - 6 Peak Hour	17:00	16:30	16:30				
7 - 9 Pk Volume	0	0	991	1532	2488	4 - 6 Pk Volume	0	0	1473	1086	2517
Pk Hr Factor	0.000	0.000	0.911	0.880	0.954	Pk Hr Factor	0.000	0.000	0.923	0.881	0.917





Appendix C  
Intersection Turn Movement  
Counts

# ITM Peak Hour Summary

Prepared by:



National Data & Surveying Services

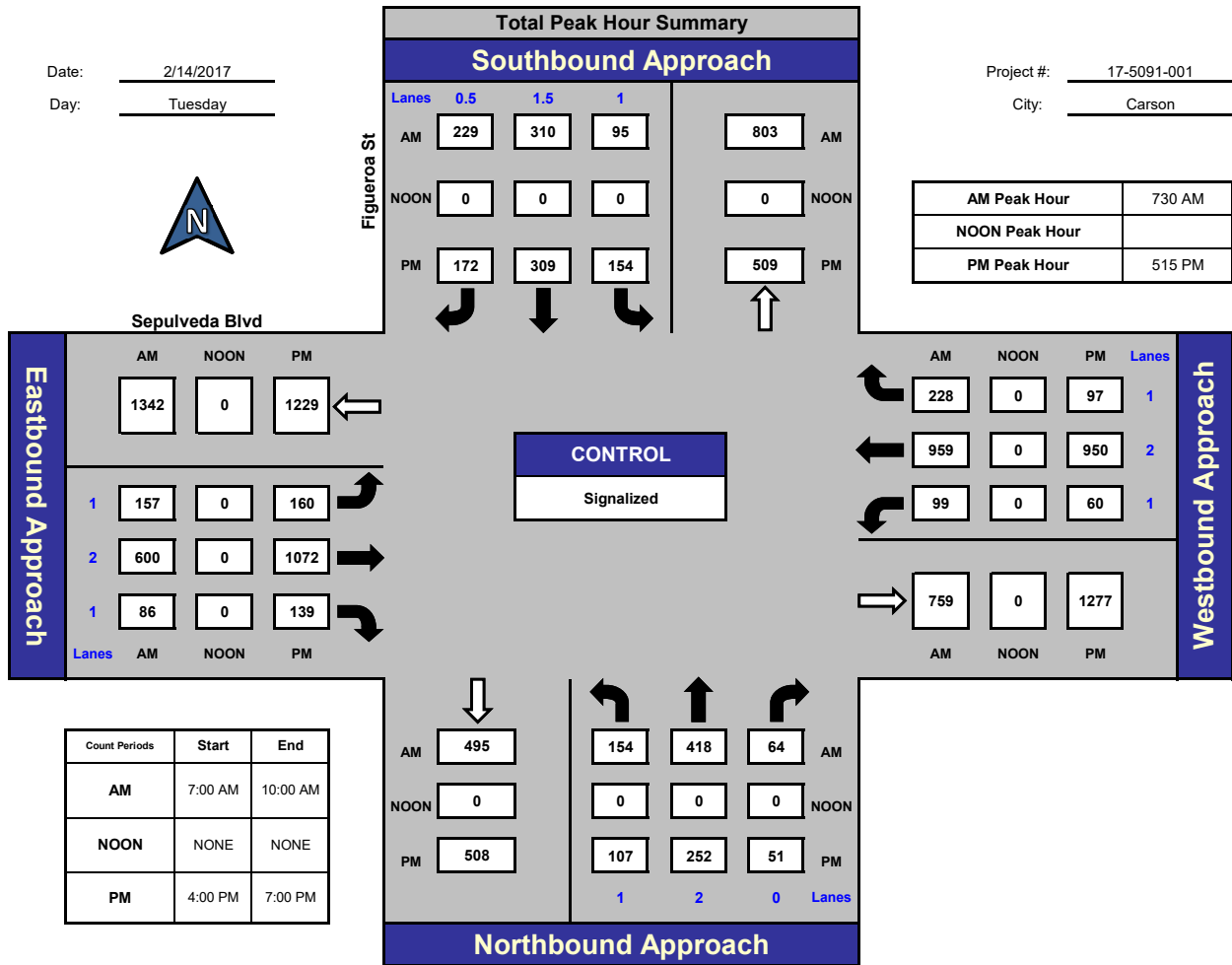
## Figueroa St and Sepulveda Blvd , Carson

Date: 2/14/2017

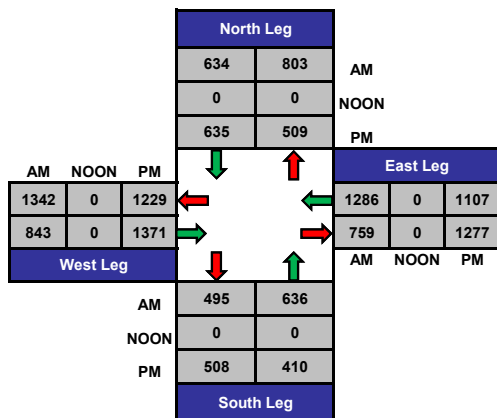
Day: Tuesday

Project #: 17-5091-001

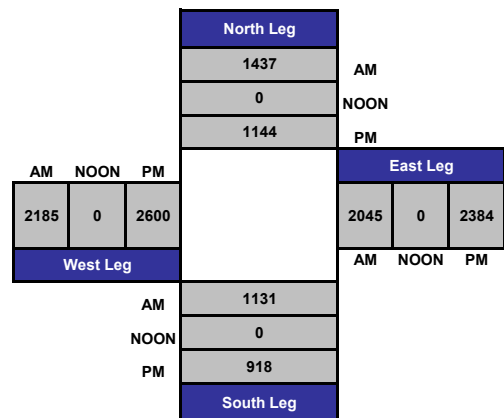
City: Carson



### Total Ins & Outs



### Total Volume Per Leg



Appendix D  
Synchro Analyses

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

2/23/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗↗	↘	↘	↗↗	↘	↘	↗↗		↘	↗↗	↘
Traffic Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Future Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3468		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3468		1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	652	93	108	1042	248	167	454	70	103	337	249
RTOR Reduction (vph)	0	0	60	0	0	162	0	13	0	0	0	193
Lane Group Flow (vph)	171	652	33	108	1042	86	167	511	0	103	337	56
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	11.0	32.4	32.4	8.6	30.0	30.0	11.0	24.9		6.5	20.4	20.4
Effective Green, g (s)	11.0	32.4	32.4	8.6	30.0	30.0	11.0	24.9		6.5	20.4	20.4
Actuated g/C Ratio	0.12	0.36	0.36	0.10	0.33	0.33	0.12	0.28		0.07	0.23	0.23
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	215	1268	567	168	1174	525	215	955		127	798	357
v/s Ratio Prot	c0.10	0.18		0.06	c0.29		c0.09	c0.15		c0.06	0.10	
v/s Ratio Perm			0.02			0.05						0.04
v/c Ratio	0.80	0.51	0.06	0.64	0.89	0.16	0.78	0.54		0.81	0.42	0.16
Uniform Delay, d1	38.6	22.8	19.0	39.4	28.6	21.3	38.5	27.8		41.3	30.0	28.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.1	0.4	0.0	8.1	8.4	0.1	16.0	2.1		31.0	1.6	0.9
Delay (s)	56.7	23.2	19.1	47.6	37.0	21.5	54.5	30.0		72.4	31.6	29.0
Level of Service	E	C	B	D	D	C	D	C		E	C	C
Approach Delay (s)		29.0			35.1			35.9			36.8	
Approach LOS		C			D			D			D	

### Intersection Summary

HCM 2000 Control Delay	34.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

2/23/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗↗	↘	↘	↗↗	↘	↘	↗	↘	↘	↗↗	↘
Traffic Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Future Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	652	93	108	1042	248	167	454	70	103	337	249
RTOR Reduction (vph)	0	0	61	0	0	163	0	0	50	0	0	190
Lane Group Flow (vph)	171	652	32	108	1042	85	167	454	20	103	337	59
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	NA	6
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.4	31.1	31.1	8.8	28.5	28.5	11.3	26.5	26.5	6.5	21.7	21.7
Effective Green, g (s)	11.4	31.1	31.1	8.8	28.5	28.5	11.3	26.5	26.5	6.5	21.7	21.7
Actuated g/C Ratio	0.13	0.34	0.34	0.10	0.31	0.31	0.12	0.29	0.29	0.07	0.24	0.24
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	221	1210	541	171	1109	496	220	543	461	126	844	377
v/s Ratio Prot	c0.10	0.18		0.06	c0.29		0.09	c0.24		c0.06	0.10	
v/s Ratio Perm			0.02			0.05			0.01			0.04
v/c Ratio	0.77	0.54	0.06	0.63	0.94	0.17	0.76	0.84	0.04	0.82	0.40	0.16
Uniform Delay, d1	38.5	24.1	20.1	39.5	30.4	22.6	38.5	30.2	23.1	41.6	29.1	27.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	15.4	0.5	0.0	7.4	14.6	0.2	13.9	14.2	0.2	32.0	1.4	0.9
Delay (s)	53.9	24.6	20.1	46.9	45.0	22.8	52.4	44.3	23.3	73.6	30.5	28.3
Level of Service	D	C	C	D	D	C	D	D	C	E	C	C
Approach Delay (s)		29.6			41.2			44.2			36.2	
Approach LOS		C			D			D			D	

### Intersection Summary

HCM 2000 Control Delay	37.9	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.86		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	77.5%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

2/23/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Future Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1825		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1825		1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	652	93	108	1042	248	167	454	70	103	337	249
RTOR Reduction (vph)	0	0	63	0	0	161	0	6	0	0	0	185
Lane Group Flow (vph)	171	652	30	108	1042	87	167	518	0	103	337	64
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	9.8	29.5	29.5	8.8	28.5	28.5	11.3	28.1		6.5	23.3	23.3
Effective Green, g (s)	9.8	29.5	29.5	8.8	28.5	28.5	11.3	28.1		6.5	23.3	23.3
Actuated g/C Ratio	0.11	0.32	0.32	0.10	0.31	0.31	0.12	0.31		0.07	0.26	0.26
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	190	1148	513	171	1109	496	220	564		126	907	405
v/s Ratio Prot	c0.10	0.18		0.06	c0.29		0.09	c0.28		c0.06	0.10	
v/s Ratio Perm			0.02			0.05						0.04
v/c Ratio	0.90	0.57	0.06	0.63	0.94	0.17	0.76	0.92		0.82	0.37	0.16
Uniform Delay, d1	40.1	25.4	21.1	39.5	30.4	22.7	38.5	30.3		41.6	27.8	26.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	38.6	0.6	0.0	7.4	14.6	0.2	13.9	22.3		32.0	1.2	0.8
Delay (s)	78.6	26.1	21.2	46.9	45.0	22.8	52.4	52.6		73.6	29.0	27.0
Level of Service	E	C	C	D	D	C	D	D		E	C	C
Approach Delay (s)		35.4			41.2			52.5			34.9	
Approach LOS		D			D			D			C	

### Intersection Summary

HCM 2000 Control Delay	40.7	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.91		
Actuated Cycle Length (s)	90.9	Sum of lost time (s)	18.0
Intersection Capacity Utilization	81.4%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

3/16/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗↗	↘	↘	↗↗	↘	↘	↗↗		↘	↗	↘
Traffic Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Future Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3468		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3468		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	171	652	93	108	1042	248	167	454	70	103	337	249
RTOR Reduction (vph)	0	0	61	0	0	164	0	13	0	0	0	190
Lane Group Flow (vph)	171	652	32	108	1042	84	167	511	0	103	337	59
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	11.3	31.9	31.9	8.7	29.3	29.3	11.3	26.0		6.8	21.5	21.5
Effective Green, g (s)	11.3	31.9	31.9	8.7	29.3	29.3	11.3	26.0		6.8	21.5	21.5
Actuated g/C Ratio	0.12	0.35	0.35	0.10	0.32	0.32	0.12	0.28		0.07	0.24	0.24
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	218	1235	552	168	1134	507	218	986		131	438	372
v/s Ratio Prot	c0.10	0.18		0.06	c0.29		c0.09	0.15		0.06	c0.18	
v/s Ratio Perm			0.02			0.05						0.04
v/c Ratio	0.78	0.53	0.06	0.64	0.92	0.16	0.77	0.52		0.79	0.77	0.16
Uniform Delay, d1	38.9	23.7	19.8	39.9	29.9	22.3	38.8	27.4		41.6	32.6	27.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	16.7	0.4	0.0	8.1	11.7	0.2	14.8	1.9		26.0	12.3	0.9
Delay (s)	55.6	24.2	19.8	48.0	41.6	22.4	53.6	29.4		67.5	44.9	28.7
Level of Service	E	C	B	D	D	C	D	C		E	D	C
Approach Delay (s)		29.6			38.7			35.2			42.4	
Approach LOS		C			D			D			D	

### Intersection Summary

HCM 2000 Control Delay	36.5	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	91.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.1%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group



# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

3/16/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229	
Future Volume (vph)	157	600	86	99	959	228	154	418	64	95	310	229	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95			1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98			1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.99	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3468			1841	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.75	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3468			1398	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	171	652	93	108	1042	248	167	454	70	103	337	249	
RTOR Reduction (vph)	0	0	59	0	0	163	0	12	0	0	0	185	
Lane Group Flow (vph)	171	652	34	108	1042	85	167	512	0	0	440	64	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA			Prot	NA	Perm
Protected Phases	7	4		3	8		5	2			1	6	
Permitted Phases			4			8							6
Actuated Green, G (s)	11.9	32.4	32.4	8.6	29.1	29.1	11.0	35.0			19.5	19.5	
Effective Green, g (s)	11.9	32.4	32.4	8.6	29.1	29.1	11.0	35.0			19.5	19.5	
Actuated g/C Ratio	0.13	0.36	0.36	0.10	0.33	0.33	0.12	0.39			0.22	0.22	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	
Lane Grp Cap (vph)	235	1281	573	170	1150	514	217	1356			304	344	
v/s Ratio Prot	c0.10	0.18		0.06	c0.29		c0.09	0.15					
v/s Ratio Perm			0.02			0.05					c0.31	0.04	
v/c Ratio	0.73	0.51	0.06	0.64	0.91	0.16	0.77	0.38			1.45	0.19	
Uniform Delay, d1	37.2	22.3	18.6	38.9	28.9	21.5	38.0	19.5			35.0	28.5	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	10.7	0.3	0.0	7.5	10.2	0.2	15.1	0.8			218.9	1.2	
Delay (s)	47.9	22.6	18.7	46.5	39.1	21.7	53.1	20.3			253.9	29.7	
Level of Service	D	C	B	D	D	C	D	C			F	C	
Approach Delay (s)		27.0			36.6			28.2			172.9		
Approach LOS		C			D			C			F		

### Intersection Summary

HCM 2000 Control Delay	58.1	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.00		
Actuated Cycle Length (s)	89.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	85.4%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

2/23/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Future Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3450		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3450		1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	1165	151	65	1033	105	116	274	55	167	336	187
RTOR Reduction (vph)	0	0	90	0	0	70	0	19	0	0	0	141
Lane Group Flow (vph)	174	1165	61	65	1033	35	116	310	0	167	336	46
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases			4			8						6
Actuated Green, G (s)	11.0	36.1	36.1	4.7	29.8	29.8	8.6	19.5		11.1	22.0	22.0
Effective Green, g (s)	11.0	36.1	36.1	4.7	29.8	29.8	8.6	19.5		11.1	22.0	22.0
Actuated g/C Ratio	0.12	0.40	0.40	0.05	0.33	0.33	0.10	0.22		0.12	0.25	0.25
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	217	1429	639	93	1179	527	170	752		219	870	389
v/s Ratio Prot	c0.10	c0.33		0.04	0.29		c0.07	c0.09		c0.09	0.09	
v/s Ratio Perm			0.04			0.02						0.03
v/c Ratio	0.80	0.82	0.10	0.70	0.88	0.07	0.68	0.41		0.76	0.39	0.12
Uniform Delay, d1	38.1	23.7	16.5	41.7	28.1	20.3	39.1	30.0		37.9	28.1	26.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.8	3.7	0.1	20.5	7.5	0.1	10.7	1.7		14.5	1.3	0.6
Delay (s)	57.0	27.4	16.6	62.1	35.6	20.4	49.8	31.7		52.4	29.4	26.8
Level of Service	E	C	B	E	D	C	D	C		D	C	C
Approach Delay (s)		29.8			35.7			36.4			34.2	
Approach LOS		C			D			D			C	

### Intersection Summary




























HCM 2000 Control Delay	33.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	89.4	Sum of lost time (s)	18.0
Intersection Capacity Utilization	67.2%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

2/23/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			 						 	
Traffic Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Future Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1863	1583	1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	1165	151	65	1033	105	116	274	55	167	336	187
RTOR Reduction (vph)	0	0	90	0	0	70	0	0	43	0	0	141
Lane Group Flow (vph)	174	1165	61	65	1033	35	116	274	12	167	336	46
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm	Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8			2			6
Actuated Green, G (s)	11.0	36.1	36.1	4.7	29.8	29.8	8.6	19.5	19.5	11.1	22.0	22.0
Effective Green, g (s)	11.0	36.1	36.1	4.7	29.8	29.8	8.6	19.5	19.5	11.1	22.0	22.0
Actuated g/C Ratio	0.12	0.40	0.40	0.05	0.33	0.33	0.10	0.22	0.22	0.12	0.25	0.25
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	217	1429	639	93	1179	527	170	406	345	219	870	389
v/s Ratio Prot	c0.10	c0.33		0.04	0.29		0.07	c0.15		c0.09	0.09	
v/s Ratio Perm			0.04			0.02			0.01			0.03
v/c Ratio	0.80	0.82	0.10	0.70	0.88	0.07	0.68	0.67	0.03	0.76	0.39	0.12
Uniform Delay, d1	38.1	23.7	16.5	41.7	28.1	20.3	39.1	32.0	27.5	37.9	28.1	26.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	18.8	3.7	0.1	20.5	7.5	0.1	10.7	8.7	0.2	14.5	1.3	0.6
Delay (s)	57.0	27.4	16.6	62.1	35.6	20.4	49.8	40.7	27.7	52.4	29.4	26.8
Level of Service	E	C	B	E	D	C	D	D	C	D	C	C
Approach Delay (s)		29.8			35.7			41.5			34.2	
Approach LOS		C			D			D			C	
<b>Intersection Summary</b>												
HCM 2000 Control Delay			33.8				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.79									
Actuated Cycle Length (s)			89.4				Sum of lost time (s)			18.0		
Intersection Capacity Utilization			71.9%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

2/23/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Future Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	0.95	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	1816		1770	3539	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	1816		1770	3539	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	1165	151	65	1033	105	116	274	55	167	336	187
RTOR Reduction (vph)	0	0	91	0	0	71	0	8	0	0	0	139
Lane Group Flow (vph)	174	1165	60	65	1033	34	116	321	0	167	336	48
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases			4			8						6
Actuated Green, G (s)	11.1	35.6	35.6	4.7	29.2	29.2	8.6	21.5		10.3	23.2	23.2
Effective Green, g (s)	11.1	35.6	35.6	4.7	29.2	29.2	8.6	21.5		10.3	23.2	23.2
Actuated g/C Ratio	0.12	0.40	0.40	0.05	0.32	0.32	0.10	0.24		0.11	0.26	0.26
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	218	1398	625	92	1146	513	168	433		202	911	407
v/s Ratio Prot	c0.10	c0.33		0.04	0.29		0.07	c0.18		c0.09	0.09	
v/s Ratio Perm			0.04			0.02						0.03
v/c Ratio	0.80	0.83	0.10	0.71	0.90	0.07	0.69	0.74		0.83	0.37	0.12
Uniform Delay, d1	38.4	24.6	17.1	42.0	29.1	21.0	39.5	31.7		39.0	27.4	25.6
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.1	4.4	0.1	21.8	9.9	0.1	11.6	10.9		23.3	1.1	0.6
Delay (s)	56.5	29.0	17.2	63.8	38.9	21.1	51.0	42.6		62.3	28.6	26.2
Level of Service	E	C	B	E	D	C	D	D		E	C	C
Approach Delay (s)		31.0			38.7			44.8			36.1	
Approach LOS		C			D			D			D	

### Intersection Summary

HCM 2000 Control Delay	36.0	HCM 2000 Level of Service	D
HCM 2000 Volume to Capacity ratio	0.83		
Actuated Cycle Length (s)	90.1	Sum of lost time (s)	18.0
Intersection Capacity Utilization	75.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

3/16/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Future Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3450		1770	1863	1583
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3450		1770	1863	1583
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	174	1165	151	65	1033	105	116	274	55	167	336	187
RTOR Reduction (vph)	0	0	90	0	0	70	0	19	0	0	0	140
Lane Group Flow (vph)	174	1165	61	65	1033	35	116	310	0	167	336	47
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA		Prot	NA	Perm
Protected Phases	7	4		3	8		5	2		1		6
Permitted Phases			4			8						6
Actuated Green, G (s)	11.0	36.1	36.1	4.7	29.8	29.8	8.5	19.8		11.0	22.3	22.3
Effective Green, g (s)	11.0	36.1	36.1	4.7	29.8	29.8	8.5	19.8		11.0	22.3	22.3
Actuated g/C Ratio	0.12	0.40	0.40	0.05	0.33	0.33	0.09	0.22		0.12	0.25	0.25
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	217	1425	637	92	1177	526	167	762		217	463	393
v/s Ratio Prot	c0.10	c0.33		0.04	0.29		c0.07	0.09		0.09	c0.18	
v/s Ratio Perm			0.04			0.02						0.03
v/c Ratio	0.80	0.82	0.10	0.71	0.88	0.07	0.69	0.41		0.77	0.73	0.12
Uniform Delay, d1	38.2	23.8	16.6	41.8	28.2	20.4	39.3	29.9		38.1	30.8	26.0
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	18.8	3.8	0.1	21.8	7.6	0.1	11.8	1.6		15.1	9.5	0.6
Delay (s)	57.1	27.6	16.7	63.6	35.8	20.5	51.1	31.5		53.2	40.4	26.7
Level of Service	E	C	B	E	D	C	D	C		D	D	C
Approach Delay (s)		29.9			36.0			36.6			39.8	
Approach LOS		C			D			D			D	

### Intersection Summary

HCM 2000 Control Delay	34.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.80		
Actuated Cycle Length (s)	89.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	72.3%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

# HCM Signalized Intersection Capacity Analysis

## 1: Figueroa St & Sepulveda Blvd

3/16/2017



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172	
Future Volume (vph)	160	1072	139	60	950	97	107	252	51	154	309	172	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95			1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.97			1.00	0.85	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.98	1.00	
Satd. Flow (prot)	1770	3539	1583	1770	3539	1583	1770	3450			1832	1583	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00			0.76	1.00	
Satd. Flow (perm)	1770	3539	1583	1770	3539	1583	1770	3450			1408	1583	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	
Adj. Flow (vph)	174	1165	151	65	1033	105	116	274	55	167	336	187	
RTOR Reduction (vph)	0	0	88	0	0	69	0	16	0	0	0	142	
Lane Group Flow (vph)	174	1165	63	65	1033	36	116	313	0	0	503	45	
Turn Type	Prot	NA	Perm	Prot	NA	Perm	Prot	NA			Prot	NA	Perm
Protected Phases	7	4		3	8		5	2			1	6	
Permitted Phases			4			8							6
Actuated Green, G (s)	11.7	37.0	37.0	5.1	30.4	30.4	8.9	33.0			19.6	19.6	
Effective Green, g (s)	11.7	37.0	37.0	5.1	30.4	30.4	8.9	33.0			19.6	19.6	
Actuated g/C Ratio	0.13	0.42	0.42	0.06	0.34	0.34	0.10	0.37			0.22	0.22	
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5			4.5	4.5	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0			3.0	3.0	
Lane Grp Cap (vph)	233	1477	661	101	1214	543	177	1284			311	350	
v/s Ratio Prot	c0.10	c0.33		0.04	0.29		c0.07	0.09					
v/s Ratio Perm			0.04			0.02					c0.36	0.03	
v/c Ratio	0.75	0.79	0.10	0.64	0.85	0.07	0.66	0.24			1.62	0.13	
Uniform Delay, d1	37.0	22.4	15.6	40.9	27.0	19.6	38.4	19.2			34.5	27.7	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			1.00	1.00	
Incremental Delay, d2	12.3	2.9	0.1	13.2	5.9	0.1	8.4	0.5			292.2	0.8	
Delay (s)	49.3	25.3	15.7	54.1	32.9	19.6	46.8	19.6			326.7	28.4	
Level of Service	D	C	B	D	C	B	D	B			F	C	
Approach Delay (s)		27.1			32.9			26.7			245.9		
Approach LOS		C			C			C			F		

### Intersection Summary

HCM 2000 Control Delay	68.3	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.02		
Actuated Cycle Length (s)	88.6	Sum of lost time (s)	18.0
Intersection Capacity Utilization	83.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group