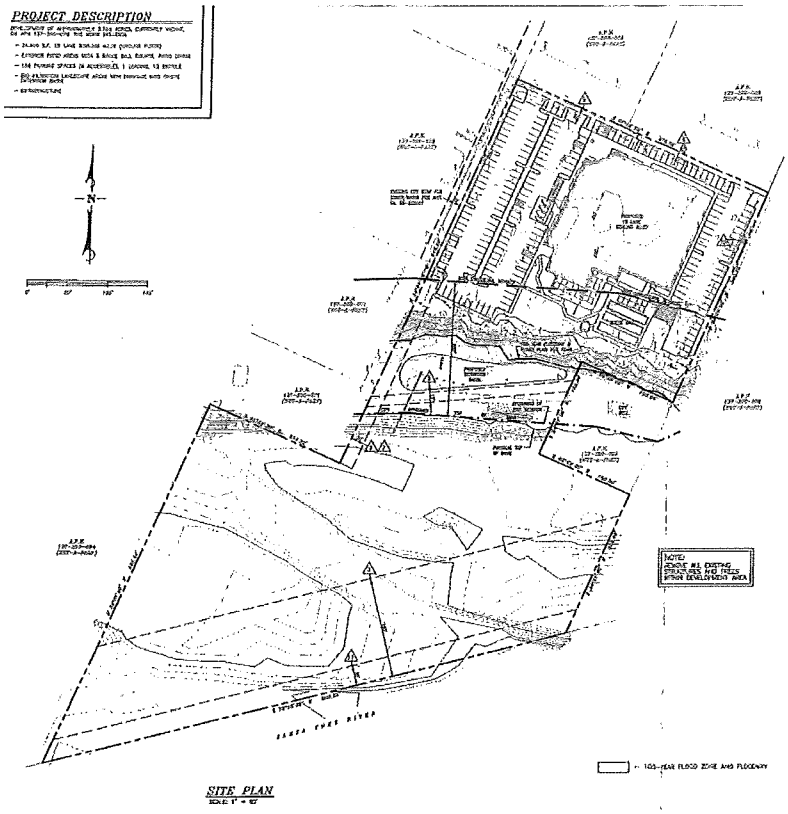
LIVE OAK LANES PROJECT
BUELLTON, CALIFORNIA

TRAFFIC AND CIRCULATION STUDY



February 9, 2017 **ATE Project 16091**

Prepared for:

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February 9, 2017

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Buellton, California 93427

TRAFFIC AND CIRCULATION STUDY FOR
LIVE OAK LANES PROJECT - CITY OF BUELLTON

Associated Transportation Engineers (ATE) is pleased to submit the following traffic and circulation study for the Live Oak Lanes Project. The study examines existing, existing + project, cumulative, and cumulative + project conditions within the study-area and assesses the traffic and circulation impacts associated with the project. It our understanding that the results of the study will be incorporated into the environmental documents being prepared for the project by the City of Buellton.

We appreciate the opportunity to assist the City of Buellton with this project.

Associated Transportation Engineers

By: Richard L. Pool, P.E.
President

REGISTERED PROFESSIONAL ENGINEER
RICHARD L. POOL
No. 18,030
CIVIL
STATE OF CALIFORNIA

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INTRODUCTION

The following study contains an analysis of the potential traffic and circulation impacts associated with the Live Oak Lanes Project in the City of Buellton. The study provides information relative to existing and future conditions. The purpose of this study is to identify potential impacts associated with the proposed project for the City to use in the environmental review process.

PROJECT DESCRIPTION

As shown on Figure 1, the Live Oak Lanes Project is located at 290 East State Route 246 east of U.S. Highway 101 in the City of Buellton. The project is a family entertainment center. The entertainment center will consist of 18 bowling lanes, restaurant/bar space, party rooms, meeting rooms, video arcade, office space, restrooms and associated uses situated on 10.35 acres. Outdoor space will be provided for patio dining/lounging and bocce ball. acres. A total of 186 parking spaces will be provided. The facility will operate seven days a week from 9:00 A.M. to midnight Sunday through Thursday and 9:00 A.M. to 1:00 A.M. Friday and Saturday. It is expected to employee 15 full-time and 30 part-time employees. The property is designated as General Commercial (CR) in the General Plan and the project is consistent with the CR land use. Regional access will be provided by U.S. Highway 101 via the State Route 246 interchange with State Route 246 providing direct access. A discussion of the projects access and circulation is provided in this study. The project site plan is illustrated on Figure 2.

EXISTING CONDITIONS

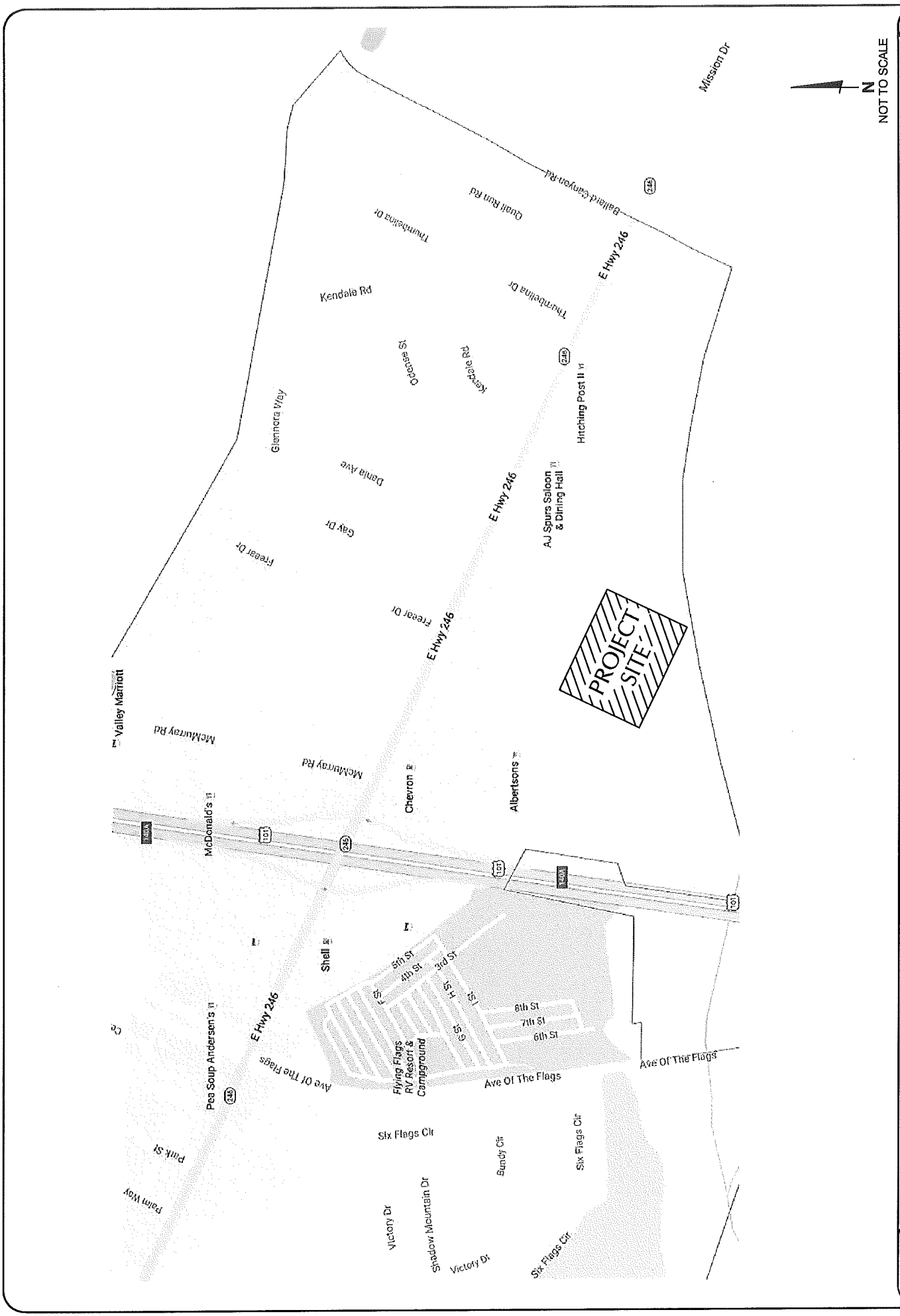
Existing Street Network

The circulation system is comprised of regional highways, arterials and collector streets, which are illustrated on Figure 1. The major roadways serving the site are discussed in the following text.

U.S. Highway 101, located west of the project, is a multi-lane highway serving the California coast between Los Angeles and San Francisco. U.S. Highway 101 is 4-lanes wide in the City of Buellton and provides regional access to the project by the signalized State Route 246 interchange.

State Route 246, located north of the project site, is an east-west state highway which extends from the Pacific Ocean west of Lompoc through Buellton, Solvang and Santa Ynez to State Route 154 on the east. State Route 246 is a 4-lane arterial from the western Buellton city limit to Freear Drive and narrows to three-lanes approximately 450 feet west of the Thumbelina Drive. Traffic signals control the study-area intersections along State Route.

Mc Murray Road, located west of the project site, is a north-south 2-lane roadway that extends southerly from Buell Ranch to its terminus south of State Route 246. Mc Murray Road provides access to the industrial and commercial areas north of State Route 246 and the commercial uses located south of State Route 246.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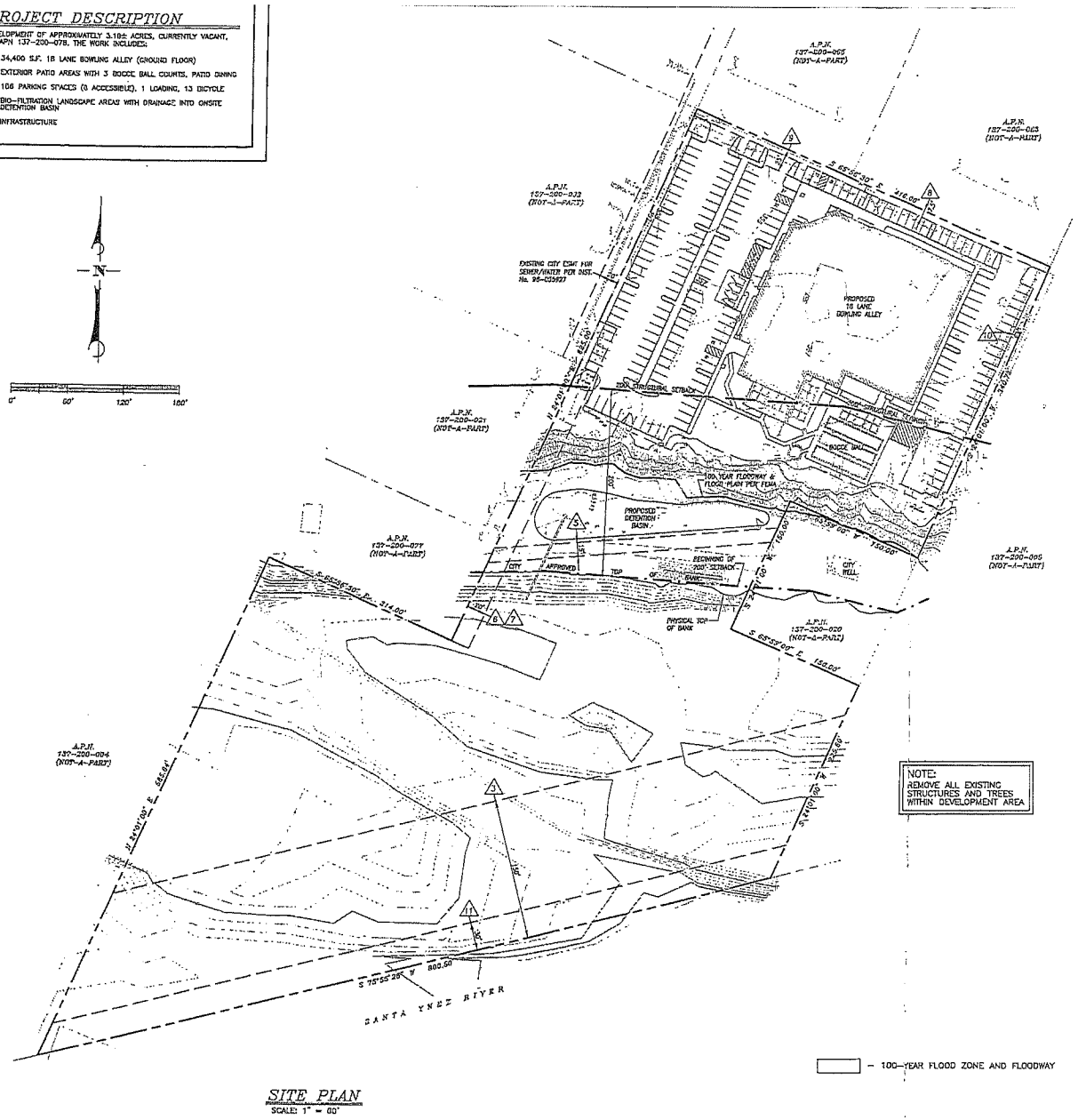
NOT TO SCALE
FIGURE 1
EKM - ATE#16091
EXISTING STREET NETWORK AND PROJECT SITE LOCATION
ASSOCIATED TRANSPORTATION ENGINEERS
PROJECT SITE
Mission Dr
Ballard Canyon Rd
Quail Run Rd
Thumbelina Dr
Kendale Rd
Glenmora Way
Oldtowne St
Kendale Rd
Hitching Post II
AJ Spurs Saloon & Dining Hall
E Hwy 246
Dalia Ave
Gay Dr
Freeer Dr
Valley Marriott
McMurray Rd
Chevron
Albertsons
McDonald's
Shell
Pea Soup Andersen's
Flying Flags RV Resort & Campground
Ave Of The Flags
5th St
4th St
3rd St
H St
I St
G St
F St
8th St
7th St
6th St
Six Flags Cir
Bundy Cir
Victory Dr
Shadow Mountain Dr
Palm Way
Park St

PROJECT DESCRIPTION

DEVELOPMENT OF APPROXIMATELY 3.10± ACRES, CURRENTLY VACANT, ON APN 137-200-078. THE WORK INCLUDES:

- 34,400 S.F. 18 LANE BOWLING ALLEY (GROUND FLOOR)
- EXTERIOR PATIO AREAS WITH 3 BOCCE BALL COURTS, PATIO DINING
- 166 PARKING STACES (3 ACCESSIBLE), 1 LOADING, 13 BICYCLE
- BIO-FILTRATION LANDSCAPE AREAS WITH DRAINAGE INTO ONSITE DETENTION BASIN
- INFRASTRUCTURE



SITE PLAN
SCALE: 1" = 60'

N
NOT TO SCALE

ASSOCIATED
TRANSPORTATION
ENGINEERS

PROJECT SITE PLAN

FIGURE 2

EKM - ATE#16091

Freear Drive, is a 2-lane north-south roadway that extends north from State Route 246 to its terminus at Glennora Way. Freear Drive provides access to the residential area north of State Route 246.

Existing Volumes and Levels of Service

Existing lane geometries and traffic controls for the six study-area intersections are illustrated on Figure 3. The existing A.M. and P.M. peak hour turning volumes for the study-area intersections are illustrated on Figure 4. These volumes were collected in October of 2016 by Associated Transportation Engineers (ATE).

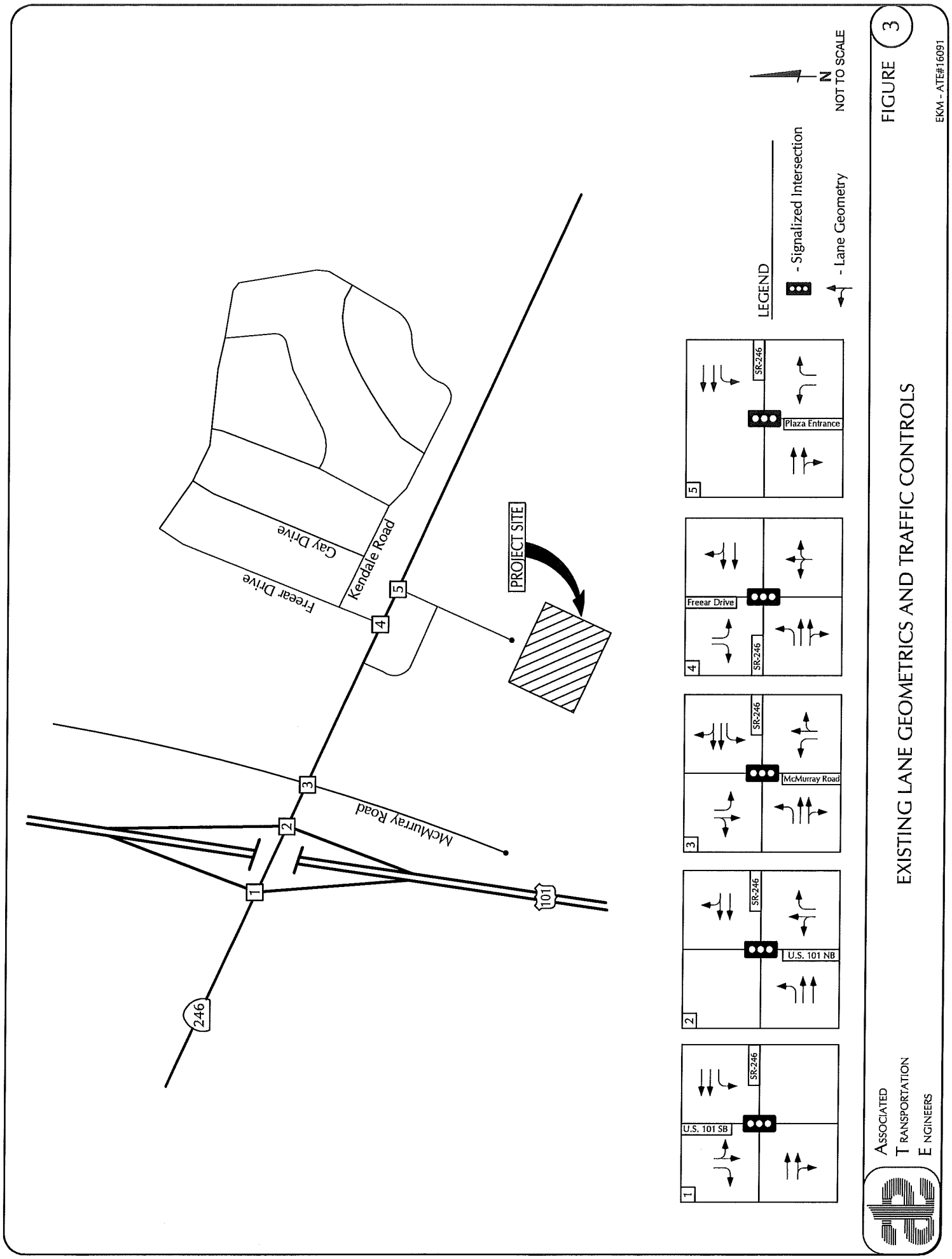
Intersection Operations

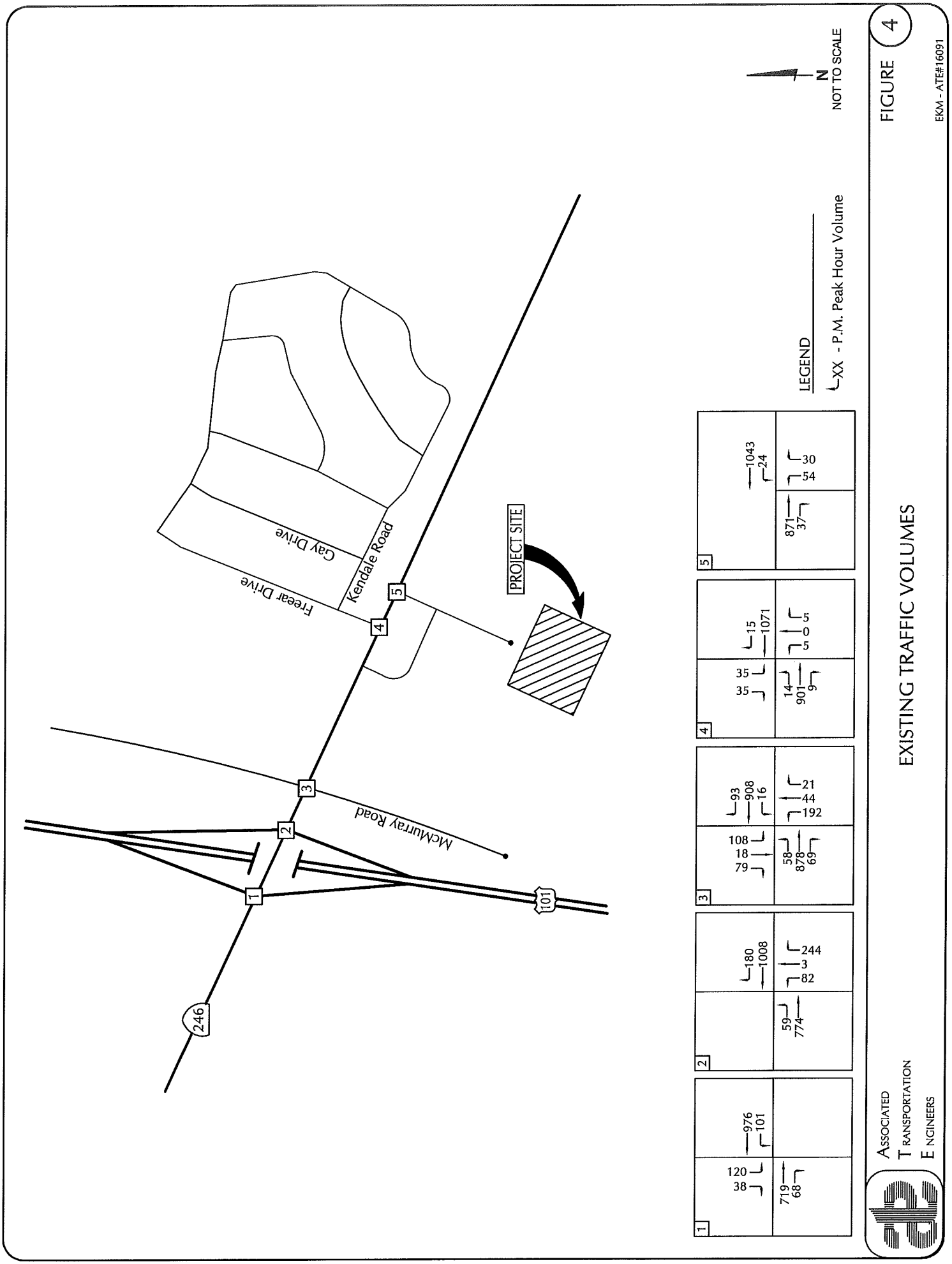
Traffic flow on urban arterials is most constrained at intersections. Therefore, a detailed analysis of traffic flows must examine the operating conditions of critical intersections during peak travel periods. Existing levels of service for the study-area intersections were calculated using the Highway Capacity Manual (HCM) signalized and unsignalized intersection methodologies as required by the City of Buellton. In rating an intersection's operating condition, "Levels of Service" (LOS) "A" through "F" are used. LOS "A" and LOS "B" represent primarily free-flow operations, LOS "C" represents stable conditions, LOS "D" nears unstable operations with restrictions on maneuverability within traffic streams, LOS "E" represents unstable operations with maneuverability very limited, and LOS "F" represents breakdown or forced flow conditions. Level of Service "C" or better traffic conditions shall generally be maintained on all streets and intersections. Lower levels of service may be accepted during peak times or as a temporary condition, if improvements to address the problem are programmed to be developed, which over time would return the LOS to acceptable levels.

Worksheets illustrating the level of service calculations are contained in the Technical Appendix for reference. Table 1 lists the intersection and level of service for the study-area intersections.

Table 1
Existing P.M. Peak Hour Levels of Service

Intersection	Control Type	P.M. Peak Delay/LOS
State Route 246/Project Driveway	Signal	6.0 sec./LOS A
State Route 246/Freear Dr.	Signal	11.8 sec./LOS B
State Route 246/Mc Murray Rd	Signal	27.5 sec./LOS C
U.S. Highway 101 NB Ramps/State Route 246	Signal	18.4 sec./LOS B
U.S. Highway 101 SB Ramps/State Route 246	Signal	15.3 sec./LOS B


246
101
McMurray Road
Freear Drive
Cay Drive
Kendale Road
PROJECT SITE
1
2
3
4
5
U.S. 101 SB
SR-246
U.S. 101 NB
McMurray Road
Freear Drive
Plaza Entrance
LEGEND
- Signalized Intersection
- Lane Geometry
N
NOT TO SCALE
FIGURE 3
EXISTING LANE GEOMETRICS AND TRAFFIC CONTROLS
EKM - ATE#16091
Associated Transportation Engineers


246
101
McMurray Road
Freeear Drive
Cay Drive
Kendale Road
PROJECT SITE
1
2
3
4
5
120
38
976
101
719
68
180
1008
59
774
244
3
82
108
18
79
93
908
16
58
878
69
21
44
192
35
35
15
1071
14
901
9
5
0
5
871
37
1043
24
30
54
LEGEND
XX - P.M. Peak Hour Volume
N
NOT TO SCALE
FIGURE 4
EXISTING TRAFFIC VOLUMES
ASSOCIATED
TRANSPORTATION
ENGINEERS
EKM - ATE#16091

The data presented in Table 1 indicates that the study-area intersections currently operate the LOS "A" - "C" range during the P.M. peak hour period.

There are funded signal modifications underway for the State Route 246/Mc Murray Road intersection. The current signal phasing for north/south Mc Murray Road approaches are split/phased. The signal modification will allow protected left-turn phasing on all four approach legs.

PROJECT GENERATED TRAFFIC VOLUMES

The following contains an estimate of the average daily and P.M. peak hour volumes that will be generated by the Live Oak Lanes Project.

Project Trip Generation

Trip generation estimates were calculated for the Live Oak Lanes Project based on the rates presented in the Institute of Transportation Engineers (ITE), Trip Generation, 9th Edition for Bowling Alley (Land-Use Code #437).[1] Table 2 summarizes the average daily (ADT), and P.M. peak hour trip generation estimates for the project.

Table 2
Project Trip Generation

Land Use	Size	ADT		P.M. Peak Hour	
		Rate	Trips	Rate	Trips
Bowling Alley	18 Lanes	33.33	1,521	1.71	78 (48/30)

The data presented in Table 2 show that the Live Oak Lanes Project would generate 1,521 average daily trips and 78 P.M. peak hour trips.

Project Trip Distribution and Assignment

The trip distribution and assignment assumes that most of the employees will reside in Buellton with some in residing in the Solvang and Lompoc areas. The project location is such that drivers on U.S. Highway 101 will use the State Route 246 interchange and local streets for their access. The project-generated peak hour traffic volumes were distributed and assigned to the study-area intersections according to the percentages listed in Table 3. The project trip assignment represents the expected travel routes used by local employees.

[1] Trip Generation, Institute of Transportation Engineers, 9th Edition, 2013.

Table 3
Project Trip Distribution

Route	Origin/Destination	Percent
U.S. Highway 101	North South	5% 5%
State Route 246	East West	20% 45%
Mc Murray Road	North	10%
Freear Drive	North	15%
	Total:	100%

Figure 5 illustrates the trip distribution and assignment of project-generated A.M. and P.M. peak hour traffic to the adjacent street system, while Figure 6 shows the existing + project traffic volumes.

PROJECT-SPECIFIC IMPACTS

Intersection Operations

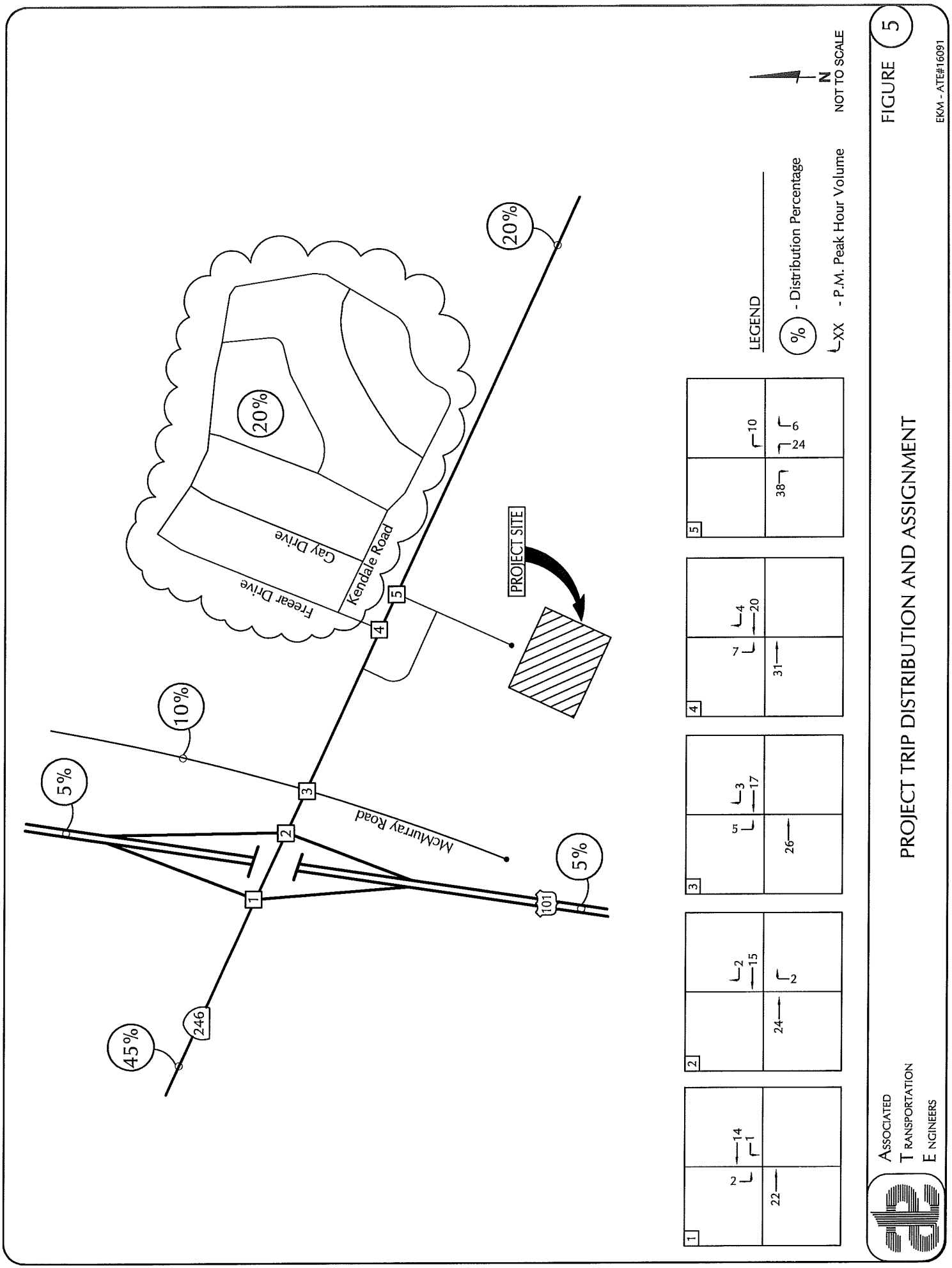
Levels of service for existing + project scenario peak hour traffic volumes were calculated for the study-area intersections. LOS worksheets are attached in the Technical Appendix. Table 4 list the existing + project P.M. peak hour LOS for each study-area intersection.

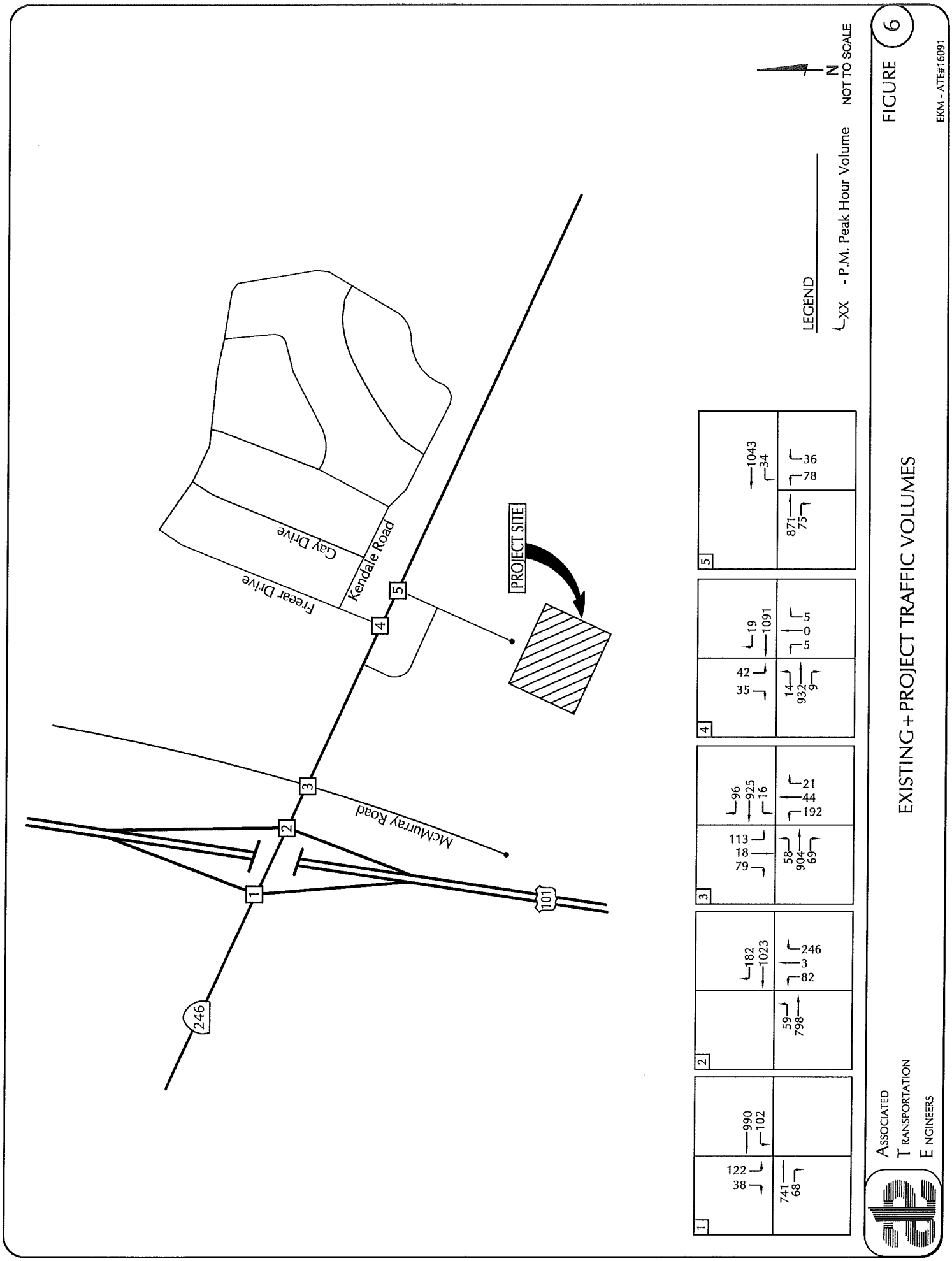
Table 4
Existing + Project P.M. Peak Hour Intersection Levels of Service

Intersection	P.M. Peak Hour			
	Existing		Existing + Project	
	Delay	LOS	Delay	LOS
State Route 246/Project Driveway	6.0 sec./veh.	LOS A	6.4 sec./veh.	LOS A
State Route 246/Freear Dr.	11.8 sec./veh.	LOS B	14.1 sec./veh.	LOS B
State Route 246/Mc Murray Rd.	27.5 sec./veh.	LOS C	30.1 sec./veh.[(a)]	LOS C
U.S. Highway 101 NB Ramps/State Route 246	18.4 sec./veh.	LOS A	18.6 sec./veh.	LOS B
U.S. Highway 101 SB Ramps/State Route 246	15.3 sec./veh.	LOS B	15.5 sec./veh.	LOS B

Note: (a) Protected left-turn phasing on all approaches.

The data presented in Table 4 indicate that with the addition of project-generated traffic the study-area intersections will continue to operate in the LOS "A" - "C" range during the P.M. peak hour period. Based on the City of Buellton impact threshold criteria, the project would not have a significant impact to the study-area intersections.


45%
246
5%
10%
20%
20%
5%
1
2
3
4
5
101
McMurray Road
Freeer Drive
Cay Drive
Kendale Road
PROJECT SITE
LEGEND
% - Distribution Percentage
XX - P.M. Peak Hour Volume
N
NOT TO SCALE
FIGURE 5
PROJECT TRIP DISTRIBUTION AND ASSIGNMENT
ASSOCIATED TRANSPORTATION ENGINEERS
EKM - ATE#16091


246
McMurray Road
101
Freeear Drive
Cay Drive
Kendale Road
PROJECT SITE
1
2
3
4
5
990
102
122
38
741
68
182
1023
59
798
246
3
82
96
925
16
113
18
79
58
904
69
21
44
192
19
1091
42
35
14
932
9
5
0
5
1043
34
871
75
36
78
LEGEND
XX - P.M. Peak Hour Volume
N
NOT TO SCALE
FIGURE 6
EXISTING + PROJECT TRAFFIC VOLUMES
ASSOCIATED
TRANSPORTATION
ENGINEERS
EKM - ATE#16091

CUMULATIVE ANALYSIS

The City of Buellton requires that intersections be analyzed with the addition of traffic generated by developments that are approved/pending that and would be operational by the opening year of the project.

Traffic Forecast

Cumulative traffic volumes were forecast for the study-area intersections assuming development of the approved and pending projects proposed within the City of Buellton. Trip generation estimates were developed for the cumulative development projects using the rates presented in the ITE, Trip Generation, 9th Edition. Table 5 summaries the trip generation for the approved/pending development projects.

Table 5
Approved/Pending Development Projects Trip Generation

No.	Project	Land Use	Size	ADT	A.M. Peak Hour	P.M. Peak Hour
1.	Riverview Villas	Multi-Family Res.	75 units	499	38	46
2.	Commons @ Zaca Creek	Commercial Restaurant Warehouse Apartment	27,437 s.f. 6,391 s.f. 13,381 s.f. 1 unit	1,216 813 48 7	36 69 4 1	74 63 4 1
3.	Flying Flags Phase III	R.V. Park	29 spaces	80	6	8
4.	Chumash Mixed-Use	Multi-Family Commercial	7 units 7,911 s.f.	46 351	4 10	4 21
5.	The Village Senior Apartments	Multi–Family	50 units	172	10	12
6.	The Village Specific Plan	Commercial Residential Hotel	48,830 s.f. 155 units 225 units.	2,097 1,418 2,007	49 107 151	182 127 158
7.	Terravant Annex	Light Industrial	48,000 s.f.	334	44	46
8.	Fig Mountain Expansion	Light Industrial	1,606 s.f.	11	1	2
9.	Flying Flags Time Ext.	RV Park	56 spaces	150	12	15
10.	Tilton Engineering	Light Industrial	15,000 s.f.	104	14	14
11.	Hampton Inn	Hotel	99 rooms	809	55	58
12.	Buellton Apartments	Multi-Family	62 units	412	32	38
13.	Davidson Development	Light Industrial	18,515 s.f	129	17	18
			Total Trips:	10,703	660	891

The data presented in Table 5 indicates that the approved/pending projects would generate a total of 10,703 average daily trips, 660 A.M. peak hour trips and 891 P.M. peak hour trips. The approved/pending projects' peak hour traffic volumes were distributed and assigned to the study-area intersections. The trip assignment for the cumulative development projects was developed based on the location of each project, recent traffic studies, existing traffic patterns observed in the study area as well as a general knowledge of the population, employment and commercial centers in Buellton and surrounding Santa Ynez Valley area. Figure 7 illustrates the cumulative peak hour traffic volumes at the study-area intersections

Intersection Operations

Levels of service for cumulative+ project scenario peak hour traffic volumes were calculated at the study-area intersections. LOS worksheets are attached in the Technical Appendix. Table 6 list the cumulative + project LOS for each study-area intersection. Figure 8 illustrates the cumulative + project peak hour traffic volumes at the study-area intersections.

Table 6
Cumulative + Project P.M. Peak Hour Intersection Levels of Service

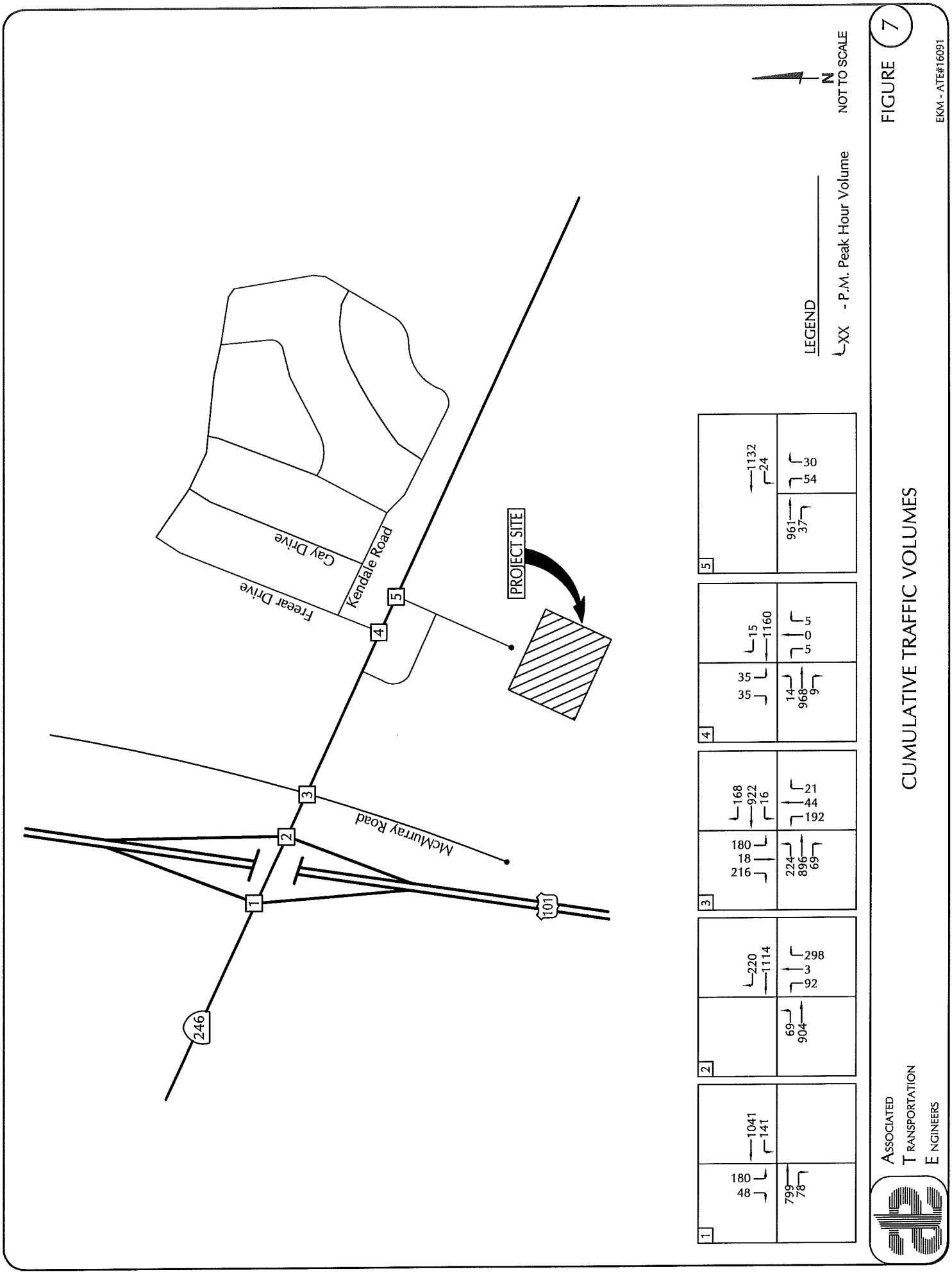
Intersection	P.M. Peak Hour			
	Cumulative		Cumulative + Project	
	Delay	LOS	Delay	LOS
State Route 246/Project Driveway	5.8 sec./veh.	LOS A	6.5 sec./veh.	LOS A
State Route 246/Freear Dr.	14.5 sec./veh.	LOS B	19.0 sec./veh.	LOS B
State Route 246/Mc Murray Rd.	41.5 sec./veh.	LOS D	45.0 sec./veh.[(a)]	LOS D
U.S. Highway 101 NB Ramps/State Route 246	18.6 sec./veh.	LOS B	18.6 sec./veh.	LOS B
U.S. Highway 101 SB Ramps/State Route 246	17.7 sec./veh.	LOS B	17.9 sec./veh.	LOS B

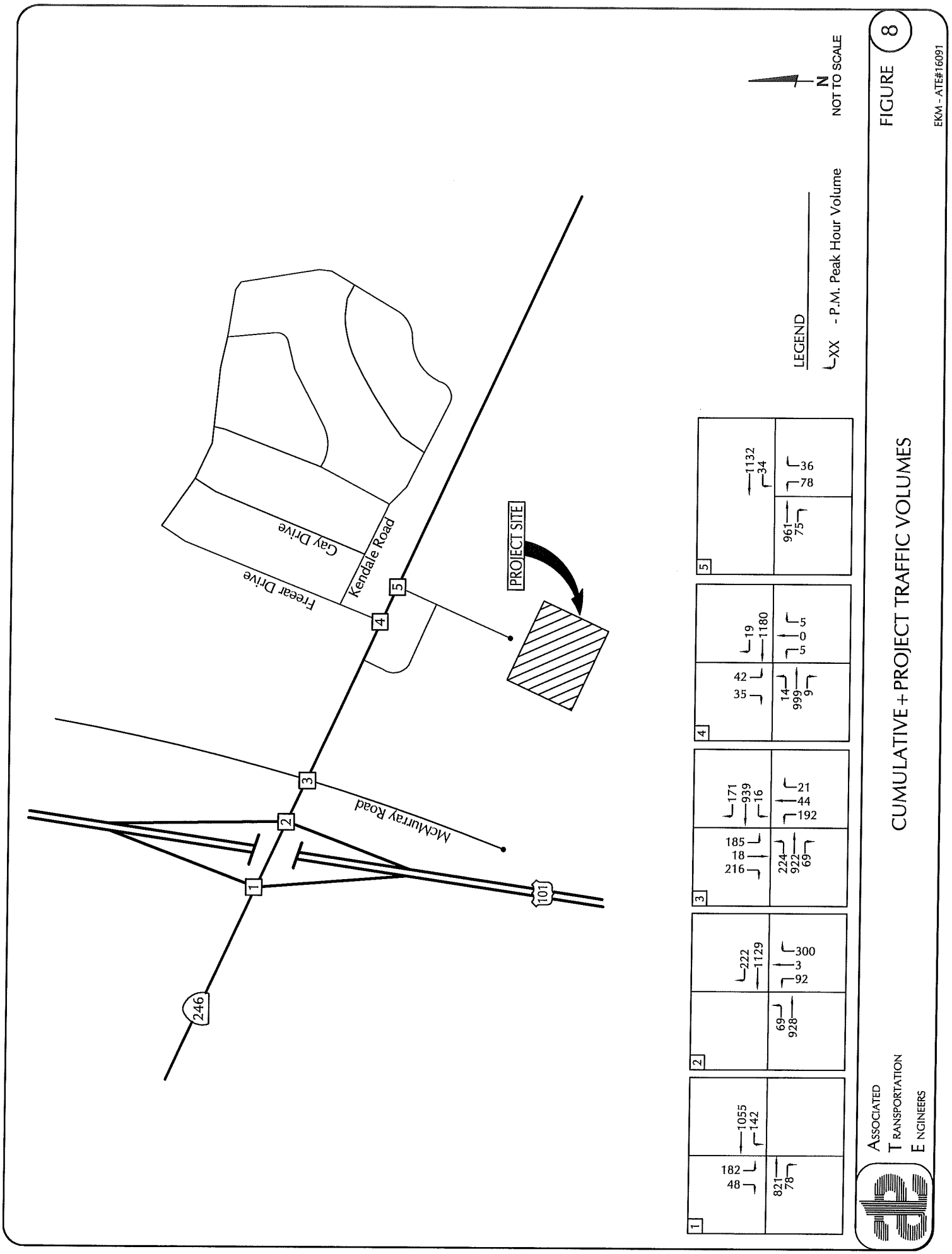
Note: (a) Protected left-turn phasing on all approaches.

The data presented in Table 6 indicate that generally with the addition of project-generated traffic the study-area intersections will continue operate in the LOS "A" -"C" range during the P.M. peak hour period. The State Route 246/McMurray Road intersection however would operate in the LOS "D" range during the P.M. peak hour period. Based on the City of Buellton impact threshold criteria, the project would have a cumulative impact to the State Route 246/McMurray Road study-area intersection. As set forth in the City's General Plan, programmatic improvements to the State Route 246/McMurray Road intersection (lane additions) would return the LOS to an acceptable level over time. New development projects in the City are required to pay into the Traffic Improvement Fee Program, with such payments representing a fair share of the cost of identified improvements to mitigate incremental project impacts.

SITE ACCESS AND CIRCULATION

Access to the project will be provided by existing driveways on State Route 246. The project will share access from State Route 246 with the existing commercial center that fronts the highway. No additional frontage or driveway improvements are required to accommodate project traffic.


246
101
McMurray Road
Freeway Drive
Cay Drive
Kendale Road
PROJECT SITE
1
2
3
4
5
180
48
1041
141
799
78
69
904
220
1114
298
3
92
180
18
216
168
922
16
224
896
69
21
44
192
35
35
15
1160
14
968
9
5
0
5
1132
24
961
37
30
54
LEGEND
XX - P.M. Peak Hour Volume
N
NOT TO SCALE
FIGURE 7
CUMULATIVE TRAFFIC VOLUMES
ASSOCIATED
TRANSPORTATION
ENGINEERS
EKM - ATE#16091


246
101
McMurray Road
Freeear Drive
Gay Drive
Kendale Road
PROJECT SITE
1
2
3
4
5
1055
142
182
48
821
78
222
1129
69
928
300
3
92
171
939
16
185
18
216
224
922
69
21
44
192
19
1180
42
35
14
999
9
5
0
5
1132
34
961
75
36
78
LEGEND
XX - P.M. Peak Hour Volume
N
NOT TO SCALE
FIGURE 8
CUMULATIVE + PROJECT TRAFFIC VOLUMES
ASSOCIATED
TRANSPORTATION
ENGINEERS
EKM - ATE#16091

MITIGATION MEASURES

The project would not result in a project-specific impact. However the project would result in a cumulative traffic impact at the State Route 246/McMurray Road intersection. The City has adopted a Traffic Improvement Fee Program to offset the capital improvement cost required to implement traffic mitigation measures to accommodate cumulative developments within the City of Buellton. There are funded signal modifications underway for the State Route 246/Mc Murray Road intersection. The current signal phasing for north/south Mc Murray Road approaches are split/phased. The signal modification will allow protected left-turn phasing on all four approach legs. The City's General Plan anticipates programmatic implementation of transportation infrastructure upgrades including improvements (lane additions) to the State Route 246/Mc Murray Road intersection. The project is consistent with the City General Plan and would be required to pay the "Traffic Improvement Fee".

CONGESTION MANAGEMENT PROGRAM ANALYSIS

Impact Criteria

The Santa Barbara County Association of Governments (SBCAG) has developed a set of traffic impact thresholds to assess the impacts of land use decisions made by local jurisdictions on regional transportation facilities located within the Congestion Management Program (CMP) roadway system. The following guidelines were developed by SBCAG to determine the significance of project-generated traffic impacts on the regional CMP system.

1. For any roadway or intersection operating at "Level of Service" (LOS) A or B, a decrease of two levels of service resulting from the addition of project-generated traffic.

2. For any roadway or intersection operating at LOS C, project-added traffic that results in LOS D or worse.

3. For intersections within the CMP system with existing congestion, the following table defines significant impacts.

Level of Service	Project-Added Peak Hour Trips
LOS D	20
LOS E	10
LOS F	10

4. For freeway or highway segments with existing congestion, the following table defines significant impacts.

Level of Service	Project-Added Peak Hour Trips
LOS D	100
LOS E	50
LOS F	50

Potential Intersection Impacts

The U.S. Highway 101/State Route 246 interchange ramps, State Rorute 246/McMurray Road, and State Route 246/Freear Drive intersections are located on the CMP network. The traffic analysis found that the intersections are forecast to operate at LOS C or better under Existing + Project traffic conditions. These operations are acceptable based on the CMP standards. Therefore, the Live Oak Lanes Project would not impact the CMP intersections in the study-area.

Potential Freeway Impacts

The Live Oak Lanes Project would add less than 100 peak hour trips to U.S. Highway 101 and State Route 246. Based on CMP criteria, the project would not significantly impact the freeway segments within the study-area.

■ ■ ■

REFERENCES AND PERSONS CONTACTED

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Darryl F. Nelson, PTP, Senior Transportation Planner
Erica K. Monson, Transportation Planner

Persons Contacted

Rose Hess, Public Works Director, City of Buellton
Andrea Olson Keefer, Assistant Planner, City of Buellton

References

City of Buellton General, City of Buellton, December 2008.

Highway Capacity Manual, Transportation Research Board, 2010.

Trip Generation, Institute of Transportation Engineers, 9th Edition, 2012.

TECHNICAL APPENDIX

CONTENTS

INTERSECTION LEVEL OF SERVICE CRITERIA

LEVEL OF SERVICE SUMMARY TABLE

INTERSECTION LEVEL OF SERVICE CALCULATION WORKSHEETS

Reference 1 - U.S. Highway 101 Southbound Ramps/State Route 246
Reference 2 - U.S. Highway 101 Northbound Ramps/State Route 246
Reference 3 - State Route 246/Mc Murray Road
Reference 4 - State Route 246/Feear Drive
Reference 5 - State Route 246/Project Signalized Driveway

INTERSECTION LEVEL OF SERVICE CRITERIA/DEFINITIONS

LEVELS OF SERVICE SUMMARY TABLE

In rating roadway and intersection operating conditions with existing or future traffic volumes, "Levels of Service" (LOS) A through F are used, with LOS A indicating very good operation and LOS F indicating poor operation. More complete level of service definitions are listed in the following table.

LOS	Delay (sec./veh.) Range	Definition
A	≤ 10.0	Conditions of free unobstructed flow, no delays and all signal phases sufficient in duration to clear all approaching vehicles.
B	10.0 - 20.0	Conditions of stable flow, very little delay, a few phases are unable to handle all approaching vehicles.
C	20.0 - 35.0	Conditions of stable flow, delays are low to moderate, full use of peak direction signal phase(s) is experienced.
D	35.0 - 55.0	Conditions approaching unstable flow, delays are moderate to heavy, significant signal time deficiencies are experienced for short durations during the peak traffic period.
E	55.0 - 80.0	Conditions of unstable flow, delays are significant, signal phase timing is generally insufficient, congestion exists for extended duration throughout the peak period.
F	> 80.0	Conditions of forced flow, travel speeds are low and volumes are well above capacity. This condition is often caused when vehicles released by an upstream signal are unable to proceed because of backup from a downstream signal.

INTERSECTION LOS CALCULATION WORKSHEETS

Reference 1 - U.S. Highway 101 SB Ramps/State Route 246
Reference 2 - U.S. Highway 101 NB Ramps/State Route 246
Reference 3 - State Route 246/McMurray Road
Reference 4 - State Route 246/Feear Drive
Reference 5 - State Route 246/Project Signalized Driveway

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	719	68	101	976	0	0	0	0	0	120	38
Future Volume (veh/h)	0	719	68	101	976	0	0	0	0	0	120	38
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	0				1900	1863	1863
Adj Flow Rate, veh/h	0	782	74	110	1061	0				0	130	41
Adj No. of Lanes	0	2	0	1	2	0				0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1471	139	306	2379	0				0	424	361
Arrive On Green	0.00	0.45	0.45	0.17	0.67	0.00				0.00	0.23	0.23
Sat Flow, veh/h	0	3362	309	1774	3632	0				0	1863	1583
Grp Volume(v), veh/h	0	423	433	110	1061	0				0	130	41
Grp Sat Flow(s),veh/h/ln	0	1770	1808	1774	1770	0				0	1863	1583
Q Serve(g_s), s	0.0	15.6	15.6	4.9	12.6	0.0				0.0	5.2	1.8
Cycle Q Clear(g_c), s	0.0	15.6	15.6	4.9	12.6	0.0				0.0	5.2	1.8
Prop In Lane	0.00		0.17	1.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	796	814	306	2379	0				0	424	361
V/C Ratio(X)	0.00	0.53	0.53	0.36	0.45	0.00				0.00	0.31	0.11
Avail Cap(c_a), veh/h	0	796	814	306	2379	0				0	424	361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.64	0.64	0.00				0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	17.9	17.9	32.9	6.9	0.0				0.0	28.8	27.5
Incr Delay (d2), s/veh	0.0	2.5	2.5	0.5	0.1	0.0				0.0	1.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	8.1	8.3	2.5	6.1	0.0				0.0	2.9	0.9
LnGrp Delay(d),s/veh	0.0	20.4	20.4	33.3	7.0	0.0				0.0	30.7	28.2
LnGrp LOS		C	C	C	A						C	C
Approach Vol, veh/h		856			1171						171	
Approach Delay, s/veh		20.4			9.5						30.1	
Approach LOS		C			A						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			20.0	45.0		25.0		65.0
Change Period (Y+Rc), s			4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s			15.5	40.5		20.5		60.5
Max Q Clear Time (g_c+I1), s			6.9	17.6		7.2		14.6
Green Ext Time (p_c), s			4.8	5.8		0.6		10.6

Intersection Summary	
HCM 2010 Ctrl Delay	15.3
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	741	68	102	990	0	0	0	0	0	122	38
Future Volume (veh/h)	0	741	68	102	990	0	0	0	0	0	122	38
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	0				1900	1863	1863
Adj Flow Rate, veh/h	0	805	74	111	1076	0				0	133	41
Adj No. of Lanes	0	2	0	1	2	0				0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1475	136	306	2379	0				0	424	361
Arrive On Green	0.00	0.45	0.45	0.17	0.67	0.00				0.00	0.23	0.23
Sat Flow, veh/h	0	3371	301	1774	3632	0				0	1863	1583
Grp Volume(v), veh/h	0	435	444	111	1076	0				0	133	41
Grp Sat Flow(s),veh/h/ln	0	1770	1810	1774	1770	0				0	1863	1583
Q Serve(g_s), s	0.0	16.1	16.1	5.0	12.9	0.0				0.0	5.3	1.8
Cycle Q Clear(g_c), s	0.0	16.1	16.1	5.0	12.9	0.0				0.0	5.3	1.8
Prop In Lane	0.00		0.17	1.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	796	814	306	2379	0				0	424	361
V/C Ratio(X)	0.00	0.55	0.55	0.36	0.45	0.00				0.00	0.31	0.11
Avail Cap(c_a), veh/h	0	796	814	306	2379	0				0	424	361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.65	0.65	0.00				0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	18.0	18.0	32.9	6.9	0.0				0.0	28.9	27.5
Incr Delay (d2), s/veh	0.0	2.7	2.6	0.5	0.1	0.0				0.0	1.9	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	8.4	8.6	2.5	6.2	0.0				0.0	3.0	0.9
LnGrp Delay(d),s/veh	0.0	20.7	20.7	33.4	7.0	0.0				0.0	30.8	28.2
LnGrp LOS		C	C	C	A						C	C
Approach Vol, veh/h		879			1187						174	
Approach Delay, s/veh		20.7			9.5						30.2	
Approach LOS		C			A						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			20.0	45.0		25.0		65.0
Change Period (Y+Rc), s			4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s			15.5	40.5		20.5		60.5
Max Q Clear Time (g_c+I1), s			7.0	18.1		7.3		14.9
Green Ext Time (p_c), s			4.9	5.9		0.6		10.8

Intersection Summary	
HCM 2010 Ctrl Delay	15.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	799	78	141	1041	0	0	0	0	0	180	48
Future Volume (veh/h)	0	799	78	141	1041	0	0	0	0	0	180	48
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	0				1900	1863	1863
Adj Flow Rate, veh/h	0	868	85	153	1132	0				0	196	52
Adj No. of Lanes	0	2	0	1	2	0				0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1393	136	345	2379	0				0	424	361
Arrive On Green	0.00	0.43	0.43	0.19	0.67	0.00				0.00	0.23	0.23
Sat Flow, veh/h	0	3350	319	1774	3632	0				0	1863	1583
Grp Volume(v), veh/h	0	472	481	153	1132	0				0	196	52
Grp Sat Flow(s),veh/h/ln	0	1770	1806	1774	1770	0				0	1863	1583
Q Serve(g_s), s	0.0	18.7	18.7	6.8	13.9	0.0				0.0	8.2	2.4
Cycle Q Clear(g_c), s	0.0	18.7	18.7	6.8	13.9	0.0				0.0	8.2	2.4
Prop In Lane	0.00		0.18	1.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	757	773	345	2379	0				0	424	361
V/C Ratio(X)	0.00	0.62	0.62	0.44	0.48	0.00				0.00	0.46	0.14
Avail Cap(c_a), veh/h	0	757	773	345	2379	0				0	424	361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.57	0.57	0.00				0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	20.1	20.1	32.0	7.1	0.0				0.0	30.0	27.7
Incr Delay (d2), s/veh	0.0	3.8	3.8	0.5	0.1	0.0				0.0	3.6	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	9.8	10.0	3.4	6.6	0.0				0.0	4.6	1.1
LnGrp Delay(d),s/veh	0.0	23.9	23.9	32.5	7.2	0.0				0.0	33.6	28.6
LnGrp LOS		C	C	C	A						C	C
Approach Vol, veh/h		953			1285						248	
Approach Delay, s/veh		23.9			10.2						32.5	
Approach LOS		C			B						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			22.0	43.0		25.0		65.0
Change Period (Y+Rc), s			4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s			17.5	38.5		20.5		60.5
Max Q Clear Time (g_c+I1), s			8.8	20.7		10.2		15.9
Green Ext Time (p_c), s			5.2	6.0		0.9		11.9

Intersection Summary	
HCM 2010 Ctrl Delay	17.7
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	821	78	142	1055	0	0	0	0	0	182	48
Future Volume (veh/h)	0	821	78	142	1055	0	0	0	0	0	182	48
Number	7	4	14	3	8	18				1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	0	1863	1900	1863	1863	0				1900	1863	1863
Adj Flow Rate, veh/h	0	892	85	154	1147	0				0	198	52
Adj No. of Lanes	0	2	0	1	2	0				0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	1397	133	345	2379	0				0	424	361
Arrive On Green	0.00	0.43	0.43	0.19	0.67	0.00				0.00	0.23	0.23
Sat Flow, veh/h	0	3359	311	1774	3632	0				0	1863	1583
Grp Volume(v), veh/h	0	483	494	154	1147	0				0	198	52
Grp Sat Flow(s),veh/h/ln	0	1770	1808	1774	1770	0				0	1863	1583
Q Serve(g_s), s	0.0	19.3	19.3	6.9	14.1	0.0				0.0	8.3	2.4
Cycle Q Clear(g_c), s	0.0	19.3	19.3	6.9	14.1	0.0				0.0	8.3	2.4
Prop In Lane	0.00		0.17	1.00		0.00				0.00		1.00
Lane Grp Cap(c), veh/h	0	757	773	345	2379	0				0	424	361
V/C Ratio(X)	0.00	0.64	0.64	0.45	0.48	0.00				0.00	0.47	0.14
Avail Cap(c_a), veh/h	0	757	773	345	2379	0				0	424	361
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	0.55	0.55	0.00				0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	20.3	20.3	32.0	7.2	0.0				0.0	30.0	27.7
Incr Delay (d2), s/veh	0.0	4.1	4.0	0.5	0.1	0.0				0.0	3.7	0.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	10.3	10.5	3.4	6.9	0.0				0.0	4.7	1.1
LnGrp Delay(d),s/veh	0.0	24.4	24.3	32.5	7.2	0.0				0.0	33.7	28.6
LnGrp LOS		C	C	C	A						C	C
Approach Vol, veh/h		977			1301						250	
Approach Delay, s/veh		24.3			10.2						32.6	
Approach LOS		C			B						C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs			3	4		6		8
Phs Duration (G+Y+Rc), s			22.0	43.0		25.0		65.0
Change Period (Y+Rc), s			4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s			17.5	38.5		20.5		60.5
Max Q Clear Time (g_c+I1), s			8.9	21.3		10.3		16.1
Green Ext Time (p_c), s			5.2	6.1		0.9		12.1

Intersection Summary	
HCM 2010 Ctrl Delay	17.9
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	774	0	0	1008	180	82	3	244	0	0	0
Future Volume (veh/h)	59	774	0	0	1008	180	82	3	244	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	64	841	0	0	1096	196	89	3	265			
Adj No. of Lanes	1	2	0	0	2	0	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	291	2300	0	0	1310	233	430	14	396			
Arrive On Green	0.33	1.00	0.00	0.00	0.44	0.44	0.25	0.25	0.25			
Sat Flow, veh/h	1774	3632	0	0	3096	535	1719	58	1583			
Grp Volume(v), veh/h	64	841	0	0	644	648	92	0	265			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1768	1777	0	1583			
Q Serve(g_s), s	2.4	0.0	0.0	0.0	29.1	29.3	3.7	0.0	13.6			
Cycle Q Clear(g_c), s	2.4	0.0	0.0	0.0	29.1	29.3	3.7	0.0	13.6			
Prop In Lane	1.00		0.00	0.00		0.30	0.97		1.00			
Lane Grp Cap(c), veh/h	291	2300	0	0	772	771	444	0	396			
V/C Ratio(X)	0.22	0.37	0.00	0.00	0.83	0.84	0.21	0.00	0.67			
Avail Cap(c_a), veh/h	291	2300	0	0	914	914	444	0	396			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.82	0.82	0.00	0.00	0.36	0.36	1.00	0.00	1.00			
Uniform Delay (d), s/veh	26.1	0.0	0.0	0.0	22.5	22.6	26.7	0.0	30.4			
Incr Delay (d2), s/veh	0.3	0.4	0.0	0.0	2.2	2.3	1.1	0.0	8.7			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.2	0.1	0.0	0.0	14.6	14.7	1.9	0.0	6.8			
LnGrp Delay(d),s/veh	26.4	0.4	0.0	0.0	24.7	24.9	27.8	0.0	39.1			
LnGrp LOS	C	A			C	C	C		D			
Approach Vol, veh/h		905			1292			357				
Approach Delay, s/veh		2.2			24.8			36.2				
Approach LOS		A			C			D				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		27.0		63.0			19.2	43.8
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		22.5		58.5			7.5	46.5
Max Q Clear Time (g_c+I1), s		15.6		2.0			4.4	31.3
Green Ext Time (p_c), s		0.8		7.6			1.7	7.9

Intersection Summary	
HCM 2010 Ctrl Delay	18.4
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	59	798	0	0	1023	182	82	3	246	0	0	0
Future Volume (veh/h)	59	798	0	0	1023	182	82	3	246	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	64	867	0	0	1112	198	89	3	267			
Adj No. of Lanes	1	2	0	0	2	0	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	320	2379	0	0	1327	236	392	13	361			
Arrive On Green	0.36	1.00	0.00	0.00	0.44	0.44	0.23	0.23	0.23			
Sat Flow, veh/h	1774	3632	0	0	3098	533	1719	58	1583			
Grp Volume(v), veh/h	64	867	0	0	653	657	92	0	267			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1769	1777	0	1583			
Q Serve(g_s), s	2.2	0.0	0.0	0.0	29.4	29.7	3.8	0.0	14.1			
Cycle Q Clear(g_c), s	2.2	0.0	0.0	0.0	29.4	29.7	3.8	0.0	14.1			
Prop In Lane	1.00		0.00	0.00		0.30	0.97		1.00			
Lane Grp Cap(c), veh/h	320	2379	0	0	782	781	405	0	361			
V/C Ratio(X)	0.20	0.36	0.00	0.00	0.84	0.84	0.23	0.00	0.74			
Avail Cap(c_a), veh/h	320	2379	0	0	922	922	405	0	361			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.81	0.81	0.00	0.00	0.31	0.31	1.00	0.00	1.00			
Uniform Delay (d), s/veh	24.3	0.0	0.0	0.0	22.2	22.3	28.3	0.0	32.3			
Incr Delay (d2), s/veh	0.2	0.4	0.0	0.0	1.9	2.0	1.3	0.0	12.8			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.1	0.1	0.0	0.0	14.7	14.8	2.0	0.0	7.4			
LnGrp Delay(d),s/veh	24.5	0.4	0.0	0.0	24.1	24.3	29.6	0.0	45.1			
LnGrp LOS	C	A			C	C	C		D			
Approach Vol, veh/h		931			1310			359				
Approach Delay, s/veh		2.0			24.2			41.1				
Approach LOS		A			C			D				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		25.0		65.0			20.7	44.3
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		20.5		60.5			9.1	46.9
Max Q Clear Time (g_c+I1), s		16.1		2.0			4.2	31.7
Green Ext Time (p_c), s		0.6		8.0			2.6	8.1

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	904	0	0	1114	220	92	3	298	0	0	0
Future Volume (veh/h)	69	904	0	0	1114	220	92	3	298	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	75	983	0	0	1211	239	100	3	324			
Adj No. of Lanes	1	2	0	0	2	0	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	237	2340	0	0	1409	276	412	12	378			
Arrive On Green	0.27	1.00	0.00	0.00	0.48	0.48	0.24	0.24	0.24			
Sat Flow, veh/h	1774	3632	0	0	3045	578	1725	52	1583			
Grp Volume(v), veh/h	75	983	0	0	722	728	103	0	324			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1761	1777	0	1583			
Q Serve(g_s), s	3.0	0.0	0.0	0.0	32.4	33.2	4.2	0.0	17.6			
Cycle Q Clear(g_c), s	3.0	0.0	0.0	0.0	32.4	33.2	4.2	0.0	17.6			
Prop In Lane	1.00		0.00	0.00		0.33	0.97		1.00			
Lane Grp Cap(c), veh/h	237	2340	0	0	845	840	424	0	378			
V/C Ratio(X)	0.32	0.42	0.00	0.00	0.85	0.87	0.24	0.00	0.86			
Avail Cap(c_a), veh/h	237	2340	0	0	934	929	424	0	378			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.73	0.73	0.00	0.00	0.09	0.09	1.00	0.00	1.00			
Uniform Delay (d), s/veh	29.7	0.0	0.0	0.0	20.8	21.0	27.7	0.0	32.8			
Incr Delay (d2), s/veh	0.6	0.4	0.0	0.0	0.7	0.8	1.4	0.0	21.4			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.5	0.1	0.0	0.0	15.8	16.2	2.2	0.0	9.9			
LnGrp Delay(d),s/veh	30.2	0.4	0.0	0.0	21.5	21.8	29.0	0.0	54.1			
LnGrp LOS	C	A			C	C	C		D			
Approach Vol, veh/h		1058			1450			427				
Approach Delay, s/veh		2.5			21.6			48.1				
Approach LOS		A			C			D				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		26.0		64.0			16.5	47.5
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		21.5		59.5			7.5	47.5
Max Q Clear Time (g_c+I1), s		19.6		2.0			5.0	35.2
Green Ext Time (p_c), s		0.4		9.6			1.6	7.8

Intersection Summary	
HCM 2010 Ctrl Delay	18.6
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	69	928	0	0	1129	222	92	3	300	0	0	0
Future Volume (veh/h)	69	928	0	0	1129	222	92	3	300	0	0	0
Number	7	4	14	3	8	18	5	2	12			
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00			
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Adj Sat Flow, veh/h/ln	1863	1863	0	0	1863	1900	1900	1863	1863			
Adj Flow Rate, veh/h	75	1009	0	0	1227	241	100	3	326			
Adj No. of Lanes	1	2	0	0	2	0	0	1	1			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92			
Percent Heavy Veh, %	2	2	0	0	2	2	2	2	2			
Cap, veh/h	231	2340	0	0	1422	277	412	12	378			
Arrive On Green	0.26	1.00	0.00	0.00	0.48	0.48	0.24	0.24	0.24			
Sat Flow, veh/h	1774	3632	0	0	3048	576	1725	52	1583			
Grp Volume(v), veh/h	75	1009	0	0	731	737	103	0	326			
Grp Sat Flow(s),veh/h/ln	1774	1770	0	0	1770	1761	1777	0	1583			
Q Serve(g_s), s	3.1	0.0	0.0	0.0	32.8	33.6	4.2	0.0	17.8			
Cycle Q Clear(g_c), s	3.1	0.0	0.0	0.0	32.8	33.6	4.2	0.0	17.8			
Prop In Lane	1.00		0.00	0.00		0.33	0.97		1.00			
Lane Grp Cap(c), veh/h	231	2340	0	0	851	847	424	0	378			
V/C Ratio(X)	0.33	0.43	0.00	0.00	0.86	0.87	0.24	0.00	0.86			
Avail Cap(c_a), veh/h	231	2340	0	0	934	930	424	0	378			
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	0.71	0.71	0.00	0.00	0.09	0.09	1.00	0.00	1.00			
Uniform Delay (d), s/veh	30.1	0.0	0.0	0.0	20.6	20.8	27.7	0.0	32.8			
Incr Delay (d2), s/veh	0.6	0.4	0.0	0.0	0.7	0.9	1.4	0.0	21.9			
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	1.5	0.1	0.0	0.0	16.0	16.4	2.2	0.0	10.1			
LnGrp Delay(d),s/veh	30.7	0.4	0.0	0.0	21.4	21.7	29.0	0.0	54.8			
LnGrp LOS	C	A			C	C	C		D			
Approach Vol, veh/h		1084			1468			429				
Approach Delay, s/veh		2.5			21.5			48.6				
Approach LOS		A			C			D				

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4			7	8
Phs Duration (G+Y+Rc), s		26.0		64.0			16.2	47.8
Change Period (Y+Rc), s		4.5		4.5			4.5	4.5
Max Green Setting (Gmax), s		21.5		59.5			7.5	47.5
Max Q Clear Time (g_c+I1), s		19.8		2.0			5.1	35.6
Green Ext Time (p_c), s		0.3		10.0			1.6	7.7

Intersection Summary	
HCM 2010 Ctrl Delay	18.5
HCM 2010 LOS	B

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	878	69	16	908	93	192	44	21	108	18	79
Future Volume (veh/h)	58	878	69	16	908	93	192	44	21	108	18	79
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	63	954	75	17	987	101	209	48	23	117	20	86
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	129	1260	99	143	1254	128	247	269	129	204	62	266
Arrive On Green	0.15	0.76	0.76	0.08	0.39	0.39	0.14	0.23	0.23	0.11	0.20	0.20
Sat Flow, veh/h	1774	3325	261	1774	3242	332	1774	1191	571	1774	307	1322
Grp Volume(v), veh/h	63	508	521	17	539	549	209	0	71	117	0	106
Grp Sat Flow(s),veh/h/ln	1774	1770	1817	1774	1770	1804	1774	0	1762	1774	0	1629
Q Serve(g_s), s	2.9	14.7	14.7	0.8	24.1	24.2	10.3	0.0	2.9	5.6	0.0	5.0
Cycle Q Clear(g_c), s	2.9	14.7	14.7	0.8	24.1	24.2	10.3	0.0	2.9	5.6	0.0	5.0
Prop In Lane	1.00		0.14	1.00		0.18	1.00		0.32	1.00		0.81
Lane Grp Cap(c), veh/h	129	670	688	143	684	698	247	0	397	204	0	328
V/C Ratio(X)	0.49	0.76	0.76	0.12	0.79	0.79	0.85	0.00	0.18	0.57	0.00	0.32
Avail Cap(c_a), veh/h	152	670	688	143	684	698	290	0	397	246	0	328
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.93	0.93	0.93	1.00	1.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	36.9	8.5	8.5	38.4	24.3	24.3	37.8	0.0	28.1	37.8	0.0	30.7
Incr Delay (d2), s/veh	2.6	7.3	7.1	0.4	6.1	6.0	18.0	0.0	1.0	2.5	0.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.5	8.1	8.3	0.4	12.8	13.1	6.3	0.0	1.5	2.9	0.0	2.5
LnGrp Delay(d),s/veh	39.5	15.8	15.7	38.8	30.4	30.3	55.8	0.0	29.1	40.3	0.0	33.3
LnGrp LOS	D	B	B	D	C	C	E		C	D		C
Approach Vol, veh/h		1092			1105			280			223	
Approach Delay, s/veh		17.1			30.5			49.0			37.0	
Approach LOS		B			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	14.8	24.8	11.8	38.6	17.0	22.6	11.1	39.3
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.5	20.3	5.1	34.1	14.7	18.1	7.7	31.5
Max Q Clear Time (g_c+I1), s	7.6	4.9	2.8	16.7	12.3	7.0	4.9	26.2
Green Ext Time (p_c), s	0.4	0.2	0.0	6.5	0.2	0.4	0.0	3.1

Intersection Summary	
HCM 2010 Ctrl Delay	27.5
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	58	904	69	16	925	96	192	44	21	113	18	79
Future Volume (veh/h)	58	904	69	16	925	96	192	44	21	113	18	79
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	63	983	75	17	1005	104	209	48	23	123	20	86
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	80	1137	87	101	1141	118	357	310	148	252	62	266
Arrive On Green	0.09	0.68	0.68	0.06	0.35	0.35	0.20	0.26	0.26	0.14	0.20	0.20
Sat Flow, veh/h	1774	3333	254	1774	3238	335	1774	1191	571	1774	307	1322
Grp Volume(v), veh/h	63	522	536	17	549	560	209	0	71	123	0	106
Grp Sat Flow(s),veh/h/ln	1774	1770	1818	1774	1770	1804	1774	0	1762	1774	0	1629
Q Serve(g_s), s	3.1	20.6	20.6	0.8	26.2	26.2	9.6	0.0	2.8	5.8	0.0	5.0
Cycle Q Clear(g_c), s	3.1	20.6	20.6	0.8	26.2	26.2	9.6	0.0	2.8	5.8	0.0	5.0
Prop In Lane	1.00		0.14	1.00		0.19	1.00		0.32	1.00		0.81
Lane Grp Cap(c), veh/h	80	604	620	101	624	636	357	0	458	252	0	328
V/C Ratio(X)	0.78	0.86	0.86	0.17	0.88	0.88	0.59	0.00	0.15	0.49	0.00	0.32
Avail Cap(c_a), veh/h	124	604	620	101	624	636	357	0	458	252	0	328
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.92	0.92	0.92	0.11	0.11	0.11	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	40.5	12.7	12.7	40.4	27.4	27.4	32.6	0.0	25.7	35.6	0.0	30.7
Incr Delay (d2), s/veh	14.8	14.2	13.9	0.1	1.8	1.7	6.9	0.0	0.7	1.5	0.0	2.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.9	12.0	12.2	0.4	13.1	13.4	5.4	0.0	1.5	2.9	0.0	2.5
LnGrp Delay(d),s/veh	55.2	26.9	26.6	40.5	29.1	29.1	39.4	0.0	26.4	37.0	0.0	33.3
LnGrp LOS	E	C	C	D	C	C	D		C	D		C
Approach Vol, veh/h		1121			1126			280			229	
Approach Delay, s/veh		28.4			29.3			36.1			35.3	
Approach LOS		C			C			D			D	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	17.3	27.9	9.6	35.2	22.6	22.6	8.6	36.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	12.8	23.4	5.1	30.7	18.1	18.1	6.3	29.5
Max Q Clear Time (g_c+I1), s	7.8	4.8	2.8	22.6	11.6	7.0	5.1	28.2
Green Ext Time (p_c), s	0.5	0.3	0.0	4.2	0.6	0.4	0.0	0.9

Intersection Summary	
HCM 2010 Ctrl Delay	30.1
HCM 2010 LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	224	896	69	16	922	168	192	44	21	180	18	216
Future Volume (veh/h)	224	896	69	16	922	168	192	44	21	180	18	216
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	243	974	75	17	1002	183	209	48	23	196	20	235
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	264	1391	107	99	970	177	225	242	116	219	25	295
Arrive On Green	0.30	0.84	0.84	0.06	0.32	0.32	0.13	0.20	0.20	0.12	0.20	0.20
Sat Flow, veh/h	1774	3331	256	1774	2991	545	1774	1191	571	1774	126	1477
Grp Volume(v), veh/h	243	517	532	17	592	593	209	0	71	196	0	255
Grp Sat Flow(s),veh/h/ln	1774	1770	1817	1774	1770	1766	1774	0	1762	1774	0	1602
Q Serve(g_s), s	11.9	10.4	10.4	0.8	29.2	29.2	10.5	0.0	3.0	9.8	0.0	13.6
Cycle Q Clear(g_c), s	11.9	10.4	10.4	0.8	29.2	29.2	10.5	0.0	3.0	9.8	0.0	13.6
Prop In Lane	1.00		0.14	1.00		0.31	1.00		0.32	1.00		0.92
Lane Grp Cap(c), veh/h	264	739	759	99	574	573	225	0	358	219	0	320
V/C Ratio(X)	0.92	0.70	0.70	0.17	1.03	1.03	0.93	0.00	0.20	0.90	0.00	0.80
Avail Cap(c_a), veh/h	264	739	759	99	574	573	225	0	358	219	0	320
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.87	0.87	0.87	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	31.1	5.2	5.2	40.5	30.4	30.4	38.9	0.0	29.8	38.9	0.0	34.3
Incr Delay (d2), s/veh	31.8	4.8	4.7	0.1	20.6	21.5	41.1	0.0	1.2	34.2	0.0	18.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	5.6	5.7	0.4	17.5	17.6	7.7	0.0	1.6	6.9	0.0	7.6
LnGrp Delay(d),s/veh	62.9	10.0	9.8	40.6	51.0	51.9	80.0	0.0	31.0	73.1	0.0	52.5
LnGrp LOS	E	A	A	D	F	F	F		C	E		D
Approach Vol, veh/h		1292			1202			280			451	
Approach Delay, s/veh		19.9			51.3			67.6			61.5	
Approach LOS		B			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.6	22.8	9.5	42.1	15.9	22.5	17.9	33.7
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	11.1	18.3	5.0	37.6	11.4	18.0	13.4	29.2
Max Q Clear Time (g_c+I1), s	11.8	5.0	2.8	12.4	12.5	15.6	13.9	31.2
Green Ext Time (p_c), s	0.0	0.2	0.2	7.8	0.0	0.3	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	41.5
HCM 2010 LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	224	922	69	16	939	171	192	44	21	185	18	216
Future Volume (veh/h)	224	922	69	16	939	171	192	44	21	185	18	216
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1900	1863	1863	1900	1863	1863	1900	1863	1863	1900
Adj Flow Rate, veh/h	243	1002	75	17	1021	186	209	48	23	201	20	235
Adj No. of Lanes	1	2	0	1	2	0	1	1	0	1	1	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	272	1406	105	99	968	176	219	241	115	215	25	295
Arrive On Green	0.31	0.84	0.84	0.06	0.32	0.32	0.12	0.20	0.20	0.12	0.20	0.20
Sat Flow, veh/h	1774	3338	250	1774	2992	544	1774	1191	571	1774	126	1477
Grp Volume(v), veh/h	243	531	546	17	603	604	209	0	71	201	0	255
Grp Sat Flow(s),veh/h/ln	1774	1770	1819	1774	1770	1767	1774	0	1762	1774	0	1602
Q Serve(g_s), s	11.8	10.7	10.7	0.8	29.1	29.1	10.5	0.0	3.0	10.1	0.0	13.6
Cycle Q Clear(g_c), s	11.8	10.7	10.7	0.8	29.1	29.1	10.5	0.0	3.0	10.1	0.0	13.6
Prop In Lane	1.00		0.14	1.00		0.31	1.00		0.32	1.00		0.92
Lane Grp Cap(c), veh/h	272	745	766	99	572	572	219	0	356	215	0	320
V/C Ratio(X)	0.89	0.71	0.71	0.17	1.05	1.06	0.96	0.00	0.20	0.94	0.00	0.80
Avail Cap(c_a), veh/h	280	745	766	99	572	572	219	0	356	215	0	320
HCM Platoon Ratio	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.87	0.87	0.87	0.09	0.09	0.09	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	30.5	5.0	5.0	40.5	30.4	30.4	39.2	0.0	29.8	39.2	0.0	34.3
Incr Delay (d2), s/veh	25.2	5.0	4.9	0.1	28.7	30.0	48.1	0.0	1.3	43.6	0.0	18.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.6	5.8	5.9	0.4	18.7	18.9	8.1	0.0	1.6	7.6	0.0	7.6
LnGrp Delay(d),s/veh	55.7	9.9	9.8	40.6	59.2	60.4	87.3	0.0	31.1	82.8	0.0	52.5
LnGrp LOS	E	A	A	D	F	F	F		C	F		D
Approach Vol, veh/h		1320			1224			280			456	
Approach Delay, s/veh		18.3			59.5			73.1			65.9	
Approach LOS		B			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2	3	4	5	6	7	8
Phs Duration (G+Y+Rc), s	15.4	22.7	9.5	42.4	15.6	22.5	18.3	33.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Max Green Setting (Gmax), s	10.9	18.2	5.0	37.9	11.1	18.0	14.2	28.7
Max Q Clear Time (g_c+I1), s	12.1	5.0	2.8	12.7	12.5	15.6	13.8	31.1
Green Ext Time (p_c), s	0.0	0.2	0.2	8.0	0.0	0.3	0.0	0.0

Intersection Summary	
HCM 2010 Ctrl Delay	45.0
HCM 2010 LOS	D

EXISTING PM PEAK HOUR
4: Freer Drive & State Route 246

12/22/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	901	9	0	1071	15	5	0	5	35	0	35
Future Volume (vph)	14	901	9	0	1071	15	5	0	5	35	0	35
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
Lane Util. Factor	1.00	0.95			0.95			1.00		1.00		1.00
Frt	1.00	1.00			1.00			0.93		1.00		0.85
Flt Protected	0.95	1.00			1.00			0.98		0.95		1.00
Satd. Flow (prot)	1770	3534			3532			1695		1770		1583
Flt Permitted	0.95	1.00			1.00			0.98		0.75		1.00
Satd. Flow (perm)	1770	3534			3532			1695		1399		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)	15	979	10	0	1164	16	5	0	5	38	0	38
RTOR Reduction (vph)	0	1	0	0	1	0	0	8	0	0	0	34
Lane Group Flow (vph)	15	988	0	0	1179	0	0	2	0	38	0	4
Turn Type	Prot	NA			NA		Split	NA		Perm		Perm
Protected Phases	7	4			8		2	2				
Permitted Phases										6		6
Actuated Green, G (s)	7.5	49.0			37.0			18.0		9.5		9.5
Effective Green, g (s)	7.5	49.0			37.0			18.0		9.5		9.5
Actuated g/C Ratio	0.08	0.54			0.41			0.20		0.11		0.11
Clearance Time (s)	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
Lane Grp Cap (vph)	147	1924			1452			339		147		167
v/s Ratio Prot	0.01	c0.28			c0.33			c0.00				
v/s Ratio Perm										c0.03		0.00
v/c Ratio	0.10	0.51			0.81			0.01		0.26		0.02
Uniform Delay, d1	38.1	13.0			23.4			28.8		37.0		36.1
Progression Factor	0.62	0.11			0.62			1.00		1.00		1.00
Incremental Delay, d2	1.1	0.8			3.2			0.0		4.2		0.3
Delay (s)	24.9	2.2			17.8			28.9		41.2		36.4
Level of Service	C	A			B			C		D		D
Approach Delay (s)		2.5			17.8			28.9			38.8	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	11.8	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.52		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	49.7%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

EXISTING+PROJECT PM PEAK HOUR
4: Freer Drive & State Route 246

12/22/2016

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	932	9	0	1091	19	5	0	5	42	0	35
Future Volume (vph)	14	932	9	0	1091	19	5	0	5	42	0	35
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
Lane Util. Factor	1.00	0.95			0.95			1.00		1.00		1.00
Frt	1.00	1.00			1.00			0.93		1.00		0.85
Flt Protected	0.95	1.00			1.00			0.98		0.95		1.00
Satd. Flow (prot)	1770	3534			3530			1695		1770		1583
Flt Permitted	0.95	1.00			1.00			0.98		0.75		1.00
Satd. Flow (perm)	1770	3534			3530			1695		1399		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)	15	1013	10	0	1186	21	5	0	5	46	0	38
RTOR Reduction (vph)	0	1	0	0	1	0	0	8	0	0	0	34
Lane Group Flow (vph)	15	1022	0	0	1206	0	0	2	0	46	0	4
Turn Type	Prot	NA			NA		Split	NA		Perm		Perm
Protected Phases	7	4			8		2	2				
Permitted Phases										6		6
Actuated Green, G (s)	7.5	49.0			37.0			18.0		9.5		9.5
Effective Green, g (s)	7.5	49.0			37.0			18.0		9.5		9.5
Actuated g/C Ratio	0.08	0.54			0.41			0.20		0.11		0.11
Clearance Time (s)	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
Lane Grp Cap (vph)	147	1924			1451			339		147		167
v/s Ratio Prot	0.01	c0.29			c0.34			c0.00				
v/s Ratio Perm										c0.03		0.00
v/c Ratio	0.10	0.53			0.83			0.01		0.31		0.02
Uniform Delay, d1	38.1	13.1			23.7			28.8		37.2		36.1
Progression Factor	0.51	0.34			0.66			1.00		1.00		1.00
Incremental Delay, d2	1.0	0.7			3.8			0.0		5.5		0.3
Delay (s)	20.6	5.2			19.6			28.9		42.7		36.4
Level of Service	C	A			B			C		D		D
Approach Delay (s)		5.4			19.6			28.9			39.8	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	14.1	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.54		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	50.3%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	968	9	0	1160	15	5	0	5	35	0	35
Future Volume (vph)	14	968	9	0	1160	15	5	0	5	35	0	35
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
Lane Util. Factor	1.00	0.95			0.95			1.00		1.00		1.00
Frt	1.00	1.00			1.00			0.93		1.00		0.85
Flt Protected	0.95	1.00			1.00			0.98		0.95		1.00
Satd. Flow (prot)	1770	3534			3533			1695		1770		1583
Flt Permitted	0.95	1.00			1.00			0.98		0.75		1.00
Satd. Flow (perm)	1770	3534			3533			1695		1399		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)	15	1052	10	0	1261	16	5	0	5	38	0	38
RTOR Reduction (vph)	0	1	0	0	1	0	0	8	0	0	0	35
Lane Group Flow (vph)	15	1061	0	0	1276	0	0	2	0	38	0	3
Turn Type	Prot	NA			NA		Split	NA		Perm		Perm
Protected Phases	7	4			8		2	2				
Permitted Phases										6		6
Actuated Green, G (s)	7.9	52.0			39.6			18.0		6.5		6.5
Effective Green, g (s)	7.9	52.0			39.6			18.0		6.5		6.5
Actuated g/C Ratio	0.09	0.58			0.44			0.20		0.07		0.07
Clearance Time (s)	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
Lane Grp Cap (vph)	155	2041			1554			339		101		114
v/s Ratio Prot	0.01	c0.30			c0.36			c0.00				
v/s Ratio Perm										c0.03		0.00
v/c Ratio	0.10	0.52			0.82			0.01		0.38		0.02
Uniform Delay, d1	37.8	11.5			22.1			28.8		39.8		38.8
Progression Factor	0.67	0.51			0.72			1.00		1.00		1.00
Incremental Delay, d2	0.9	0.7			3.2			0.0		10.4		0.4
Delay (s)	26.1	6.5			19.2			28.9		50.2		39.2
Level of Service	C	A			B			C		D		D
Approach Delay (s)		6.8			19.2			28.9			44.7	
Approach LOS		A			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	14.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.56		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	52.1%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	14	999	9	0	1180	19	5	0	5	42	0	35
Future Volume (vph)	14	999	9	0	1180	19	5	0	5	42	0	35
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
Lane Util. Factor	1.00	0.95			0.95			1.00		1.00		1.00
Frt	1.00	1.00			1.00			0.93		1.00		0.85
Flt Protected	0.95	1.00			1.00			0.98		0.95		1.00
Satd. Flow (prot)	1770	3534			3531			1695		1770		1583
Flt Permitted	0.95	1.00			1.00			0.98		0.75		1.00
Satd. Flow (perm)	1770	3534			3531			1695		1399		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)	15	1086	10	0	1283	21	5	0	5	46	0	38
RTOR Reduction (vph)	0	1	0	0	1	0	0	8	0	0	0	35
Lane Group Flow (vph)	15	1095	0	0	1303	0	0	2	0	46	0	3
Turn Type	Prot	NA			NA		Split	NA		Perm		Perm
Protected Phases	7	4			8		2	2				
Permitted Phases										6		6
Actuated Green, G (s)	7.1	52.0			40.4			18.0		6.5		6.5
Effective Green, g (s)	7.1	52.0			40.4			18.0		6.5		6.5
Actuated g/C Ratio	0.08	0.58			0.45			0.20		0.07		0.07
Clearance Time (s)	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
Lane Grp Cap (vph)	139	2041			1585			339		101		114
v/s Ratio Prot	0.01	c0.31			c0.37			c0.00				
v/s Ratio Perm										c0.03		0.00
v/c Ratio	0.11	0.54			0.82			0.01		0.46		0.02
Uniform Delay, d1	38.5	11.6			21.7			28.8		40.1		38.8
Progression Factor	1.13	1.52			0.65			1.00		1.00		1.00
Incremental Delay, d2	1.1	0.7			3.2			0.0		14.1		0.4
Delay (s)	44.7	18.5			17.3			28.9		54.1		39.2
Level of Service	D	B			B			C		D		D
Approach Delay (s)		18.8			17.3			28.9			47.4	
Approach LOS		B			B			C			D	

Intersection Summary			
HCM 2000 Control Delay	19.0	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.58		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	52.8%	ICU Level of Service	A
Analysis Period (min)	15		

c Critical Lane Group

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	871	37	24	1043	54	30
Future Volume (veh/h)	871	37	24	1043	54	30
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	947	40	26	1134	59	33
Adj No. of Lanes	2	0	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1826	77	168	2379	404	361
Arrive On Green	1.00	1.00	0.09	0.67	0.23	0.23
Sat Flow, veh/h	3554	146	1774	3632	1774	1583
Grp Volume(v), veh/h	484	503	26	1134	59	33
Grp Sat Flow(s),veh/h/ln	1770	1837	1774	1770	1774	1583
Q Serve(g_s), s	0.0	0.0	1.2	13.9	2.4	1.5
Cycle Q Clear(g_c), s	0.0	0.0	1.2	13.9	2.4	1.5
Prop In Lane		0.08	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	934	970	168	2379	404	361
V/C Ratio(X)	0.52	0.52	0.16	0.48	0.15	0.09
Avail Cap(c_a), veh/h	934	970	168	2379	404	361
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.76	0.76	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	37.5	7.1	27.8	27.4
Incr Delay (d2), s/veh	1.6	1.5	0.4	0.1	0.8	0.5
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.4	0.6	6.7	1.2	0.7
LnGrp Delay(d),s/veh	1.6	1.5	37.9	7.3	28.5	27.9
LnGrp LOS	A	A	D	A	C	C
Approach Vol, veh/h	987			1160	92	
Approach Delay, s/veh	1.5			7.9	28.3	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		25.0	13.0	52.0				65.0
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		20.5	8.5	47.5				60.5
Max Q Clear Time (g_c+I1), s		4.4	3.2	2.0				15.9
Green Ext Time (p_c), s		0.2	3.4	8.1				11.3

Intersection Summary	
HCM 2010 Ctrl Delay	6.0
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	871	75	34	1043	78	36
Future Volume (veh/h)	871	75	34	1043	78	36
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	947	82	37	1134	85	39
Adj No. of Lanes	2	0	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1740	151	168	2379	404	361
Arrive On Green	1.00	1.00	0.09	0.67	0.23	0.23
Sat Flow, veh/h	3390	285	1774	3632	1774	1583
Grp Volume(v), veh/h	508	521	37	1134	85	39
Grp Sat Flow(s),veh/h/ln	1770	1812	1774	1770	1774	1583
Q Serve(g_s), s	0.0	0.0	1.7	13.9	3.5	1.8
Cycle Q Clear(g_c), s	0.0	0.0	1.7	13.9	3.5	1.8
Prop In Lane		0.16	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	934	957	168	2379	404	361
V/C Ratio(X)	0.54	0.54	0.22	0.48	0.21	0.11
Avail Cap(c_a), veh/h	934	957	168	2379	404	361
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.74	0.74	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	37.7	7.1	28.2	27.5
Incr Delay (d2), s/veh	1.7	1.7	0.7	0.1	1.2	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.4	0.4	0.9	6.7	1.8	0.8
LnGrp Delay(d),s/veh	1.7	1.7	38.3	7.3	29.4	28.1
LnGrp LOS	A	A	D	A	C	C
Approach Vol, veh/h	1029			1171	124	
Approach Delay, s/veh	1.7			8.2	29.0	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		25.0	13.0	52.0				65.0
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		20.5	8.5	47.5				60.5
Max Q Clear Time (g_c+I1), s		5.5	3.7	2.0				15.9
Green Ext Time (p_c), s		0.3	3.1	8.6				11.3

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	961	37	24	1132	54	30
Future Volume (veh/h)	961	37	24	1132	54	30
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	1045	40	26	1230	59	33
Adj No. of Lanes	2	0	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	2109	81	47	2418	384	343
Arrive On Green	1.00	1.00	0.03	0.68	0.22	0.22
Sat Flow, veh/h	3569	133	1774	3632	1774	1583
Grp Volume(v), veh/h	532	553	26	1230	59	33
Grp Sat Flow(s),veh/h/ln	1770	1839	1774	1770	1774	1583
Q Serve(g_s), s	0.0	0.0	1.3	15.2	2.4	1.5
Cycle Q Clear(g_c), s	0.0	0.0	1.3	15.2	2.4	1.5
Prop In Lane		0.07	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	1074	1116	47	2418	384	343
V/C Ratio(X)	0.50	0.50	0.55	0.51	0.15	0.10
Avail Cap(c_a), veh/h	1074	1116	148	2418	384	343
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.71	0.71	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	43.3	6.9	28.6	28.2
Incr Delay (d2), s/veh	1.2	1.1	9.7	0.2	0.8	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.3	0.3	0.8	7.4	1.3	0.7
LnGrp Delay(d),s/veh	1.2	1.1	53.0	7.1	29.4	28.8
LnGrp LOS	A	A	D	A	C	C
Approach Vol, veh/h	1085			1256	92	
Approach Delay, s/veh	1.1			8.0	29.2	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		24.0	6.9	59.1				66.0
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		19.5	7.5	49.5				61.5
Max Q Clear Time (g_c+I1), s		4.4	3.3	2.0				17.2
Green Ext Time (p_c), s		0.2	0.0	28.5				27.3

Intersection Summary	
HCM 2010 Ctrl Delay	5.8
HCM 2010 LOS	A

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (veh/h)	961	75	34	1132	78	36
Future Volume (veh/h)	961	75	34	1132	78	36
Number	4	14	3	8	5	12
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1900	1863	1863	1863	1863
Adj Flow Rate, veh/h	1045	82	37	1230	85	39
Adj No. of Lanes	2	0	1	2	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	1792	141	148	2379	404	361
Arrive On Green	1.00	1.00	0.08	0.67	0.23	0.23
Sat Flow, veh/h	3419	261	1774	3632	1774	1583
Grp Volume(v), veh/h	556	571	37	1230	85	39
Grp Sat Flow(s),veh/h/ln	1770	1817	1774	1770	1774	1583
Q Serve(g_s), s	0.0	0.0	1.8	15.7	3.5	1.8
Cycle Q Clear(g_c), s	0.0	0.0	1.8	15.7	3.5	1.8
Prop In Lane		0.14	1.00		1.00	1.00
Lane Grp Cap(c), veh/h	954	979	148	2379	404	361
V/C Ratio(X)	0.58	0.58	0.25	0.52	0.21	0.11
Avail Cap(c_a), veh/h	954	979	148	2379	404	361
HCM Platoon Ratio	2.00	2.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.69	0.69	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	38.6	7.4	28.2	27.5
Incr Delay (d2), s/veh	1.8	1.8	0.9	0.2	1.2	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.5	0.9	7.6	1.8	0.8
LnGrp Delay(d),s/veh	1.8	1.8	39.5	7.6	29.4	28.1
LnGrp LOS	A	A	D	A	C	C
Approach Vol, veh/h	1127			1267	124	
Approach Delay, s/veh	1.8			8.5	29.0	
Approach LOS	A			A	C	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2	3	4				8
Phs Duration (G+Y+Rc), s		25.0	12.0	53.0				65.0
Change Period (Y+Rc), s		4.5	4.5	4.5				4.5
Max Green Setting (Gmax), s		20.5	7.5	48.5				60.5
Max Q Clear Time (g_c+I1), s		5.5	3.8	2.0				17.7
Green Ext Time (p_c), s		0.3	2.7	10.0				12.7

Intersection Summary	
HCM 2010 Ctrl Delay	6.5
HCM 2010 LOS	A