07PL134 / 07SV057

HYLAND CROSSING

RAPID CITY, SOUTH DAKOTA

TRAFFIC IMPACT ANALYSIS

Prepared for:

Dream Design International, Inc.
528 Kansas City Street
Rapid City, South Dakota 57701

Prepared by:

Felsburg Holt & Ullevig
6300 South Syracuse Way, Suite 600
Centennial, CO 80111
303/721-1440

Project Manager: Lyle E. DeVries, PE, PTOE
Project Engineer: Adnana Murtic

FHU Reference No. 07-235
September 2007

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

The proposed Hyland Crossing residential development is located west of US Highway 16 and south of Sammis Trail in Rapid City, South Dakota. The site's location relative to major roadways in the area can be seen on **Figure 1**. By full buildout, Hyland Crossing would include approximately 294 single family homes. Access to the proposed development would be provided along Sammis Trail via Brigadoon Way. The Hyland Crossing site plan is shown graphically in **Figure 2**.

The purpose of this study is to assess the traffic impacts on the adjacent roadways related to the proposed development and to determine if auxiliary lanes are needed at the study area intersections. This report includes information on existing traffic conditions, vehicle-trips associated with the planned development, and total traffic volume projections. To address site impacts, two future time horizons were considered:

Short Term Future (Year 2008) – It is anticipated that 40 homes would be constructed with the initial phase of development by the Year 2008.

Long Term Future (Year 2030) – It is anticipated that the development would reach buildout of 294 homes by the Year 2030.

FELSBURG
HOLT &
ULLEVIG

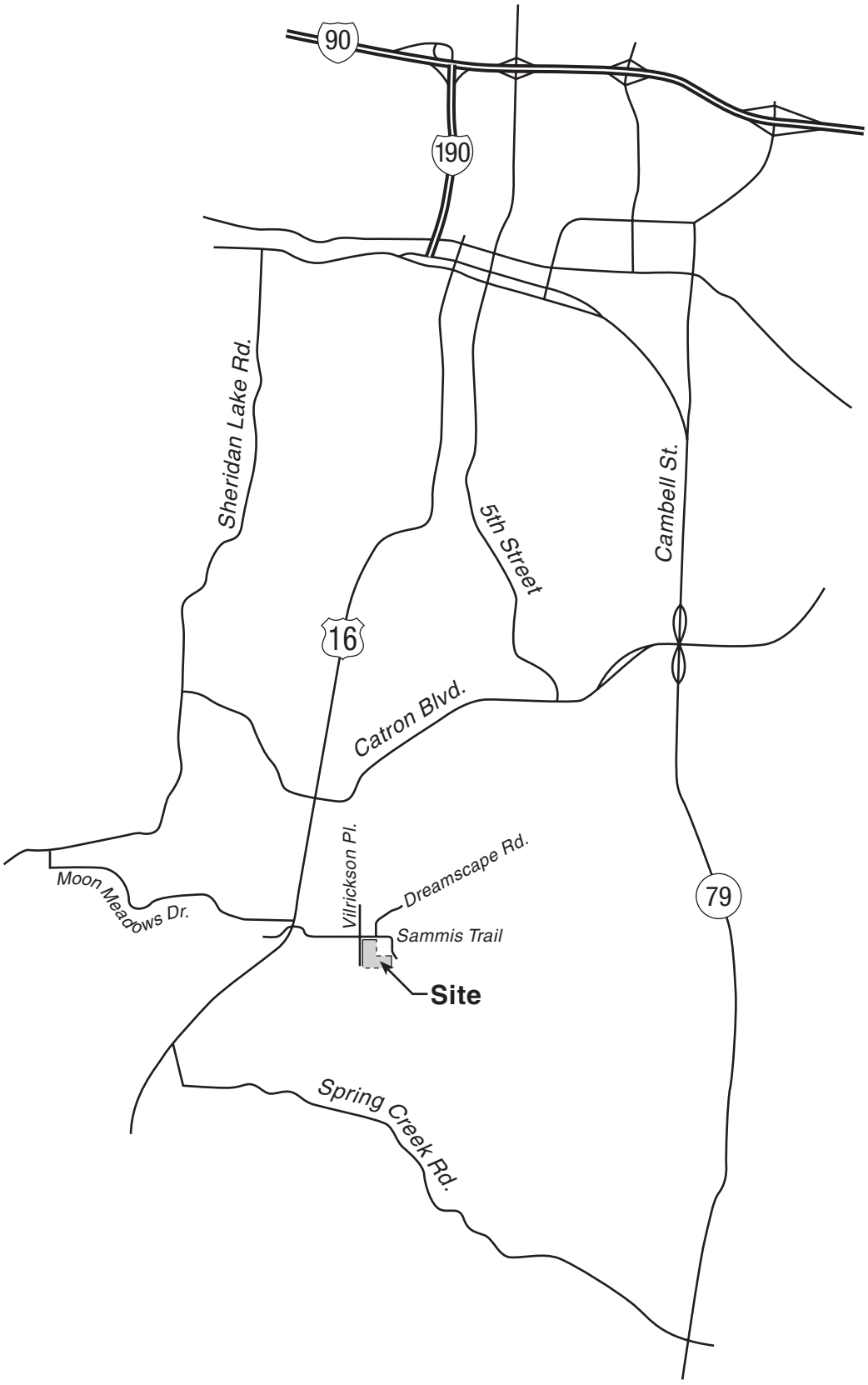


Figure 1

Vicinity Map

North

FELSBURG HOLT & ULLEVIG

Figure 2

Site Plan

North

II. EXISTING CONDITIONS

A. Surrounding Land Uses

The majority of land surrounding the proposed development is vacant and undeveloped.

B. Existing Roadway Network

The roadway network surrounding the site consists of the following facilities:

US Highway 16 - US Highway (US) 16 is a north / south arterial on the east side of Rapid City. Near the proposed project, the cross section of US Highway 16 consists of a four-lane paved roadway with a depressed, grassed center median and shoulders. The posted speed limit on US Highway 16 near the project site is 60 miles per hour (MPH).

Sammis Trail – Sammis Trail is gravel-surfaced roadway that extends east from US Highway 16 and borders the site to the north. It currently dead-ends shortly east of the proposed development site. Sammis Trail currently forms the east leg of an unsignalized intersection with US 16. The west leg of the intersection serves local development.

Moon Meadows Drive – Moon Meadows Drive is a three-lane Principal Arterial which provides a connection across the southwest portion of the Rapid City area. It connects with US Highway 16 from the west through unsignalized intersection.

C. Traffic Volumes

Peak hour traffic volumes were recorded during the month of August 2007 at the US 16 / Moon Meadows and US 16 / Sammis Trail intersections. Each of the peak hour traffic counts were collected in 15-minute intervals on a typical weekday (Tuesday, Wednesday, Thursday) during the hours of 7:00AM to 9:00am and 4:00pm to 6:00pm. Also, a 24-hour count was conducted along Sammis Trail east of US 16.

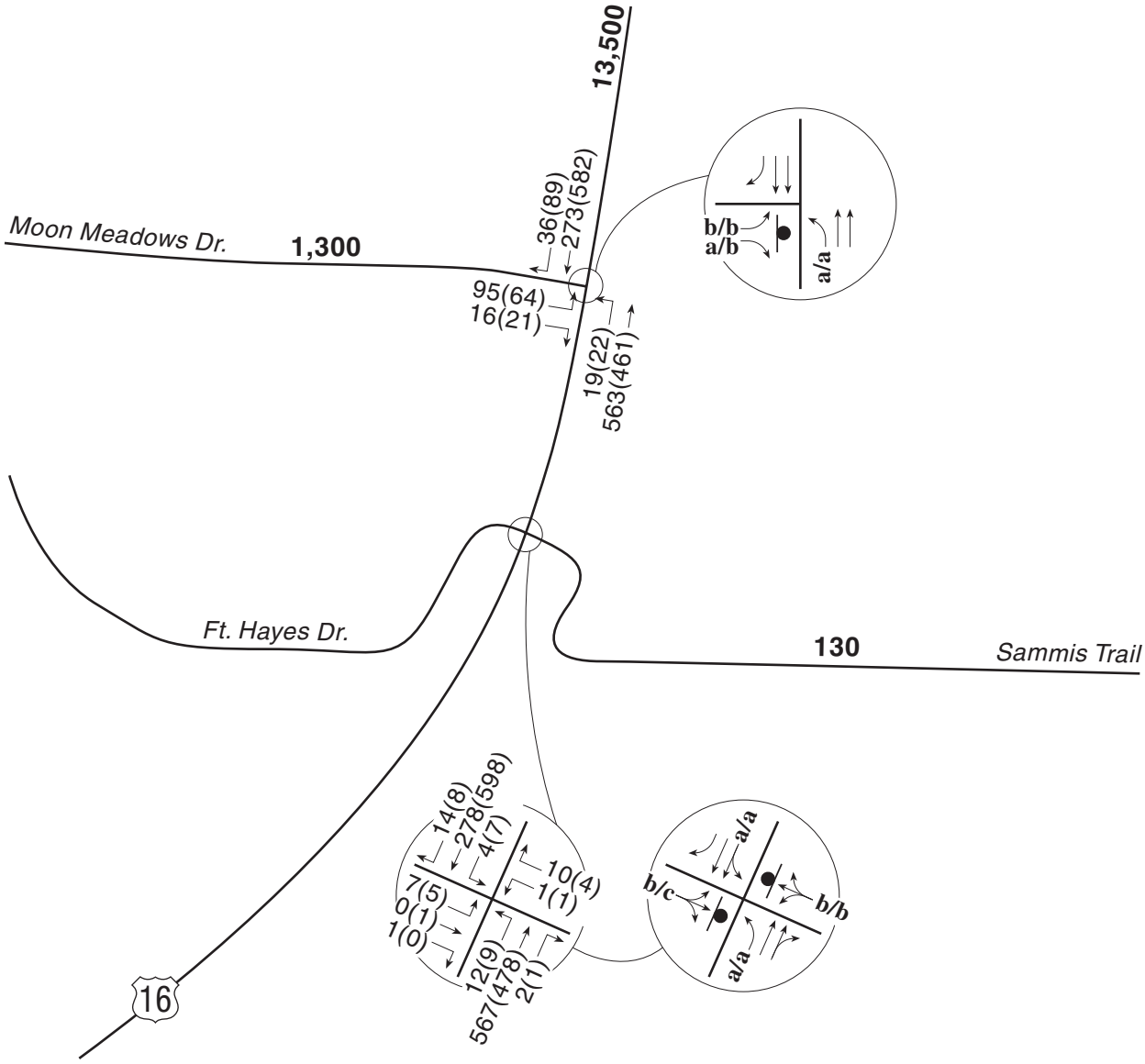
The adjusted existing traffic volumes in the vicinity of the site are presented on **Figure 3** and the raw traffic count data can also be found in **Appendix A**.

D. Traffic Operations

Traffic operations within the study area were evaluated according to techniques documented in the *Highway Capacity Manual, Transportation Research Board, 2000* using the existing traffic volumes and intersection geometry. Level of Service (LOS) is a qualitative measure of traffic operational conditions, based on roadway capacity and vehicle delay. LOS is described by a letter designation ranging from A to F, with LOS A representing almost free-flow travel, while LOS F represents congested conditions. For unsignalized intersections, LOS is calculated for movements which must yield right-of-way to other traffic movements.

The draft *City of Rapid City Street Design and Right of Way Criteria* (May 2006) specify a design objective of LOS C or better peak hour traffic operations. The results of the analyses show that movements at the US 16 intersections with Moon Meadows Drive and Sammis Trail currently operate at LOS C or better during peak hours.

FELSBURG HOLT & ULLEVIG



LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes
x/x	=	AM/PM Peak Hour Unsignalized Intersection Level of Service
	=	Stop Sign

Figure 3

Existing Traffic Conditions

North

The results of the capacity analyses are shown in **Figure 3**, and **Appendix B** contains the existing traffic operational analysis worksheets.

E. Crash History

Historical crash information was provided by City Staff for the US 16 intersections with Moon Meadows Drive and Sammis Trail for the Year 2004 and part of the Year 2005. The information, general in nature, indicated that nine crashes occurred during the approximate 1 ½ year time period. Of these, 3 involved wild animals, 4 were run-off-road collisions with fixed objects and 2 were angle collisions between vehicles. This information did not indicate any particular crash patterns at the intersections.

III. BACKGROUND TRAFFIC CONDITIONS

A. Roadway Network and Land Use

Short Term (Year 2008) Future

In the Short Term Future, Sammis Trail would be realigned to intersect with US 16 at the current US 16 / Moon Meadows Drive intersection. Fort Hayes Drive, the west leg of the existing US 16 / Sammis Trail intersection, is planned to be converted to a Right-in / Right-out (RIRO) intersection. No new development surrounding the site is anticipated to occur by the Year 2008.

Long Term (Year 2030) Future

By the Year 2030, it is anticipated that Sammis Trail would be extended east across the south edge of Rapid City as a Principal Arterial. Rearage Road would be extended north from Sammis Trail to connect to US Highway 16B (Catron Boulevard). Brigadoon Way, proposed to bisect the site as a north-south Minor Arterial, would extend south. These improvements are shown on **Figure 4**, a depiction of the City of Rapid City's Major Street Plan in the vicinity of the site.

New development is expected to be constructed in the vicinity of the site by the Year 2030. The *US Highway 16 Neighborhood Future Land Use Map* (www.rcgov.org) indicates that a cluster of commercial and office/commercial development would be built around the US 16 / Moon Meadows Drive intersection. Traffic impacts of a potential configuration for this development were addressed in the *Wal-Mart, US 16 / Sammis Trail / Moon Meadows Draft Traffic Impact Study* (HDR Engineering, 2005). Though the specific development analyzed in the study is not anticipated to be constructed, it serves to represent the type and magnitude of development that could occur west of the site and is used as such in this analysis.

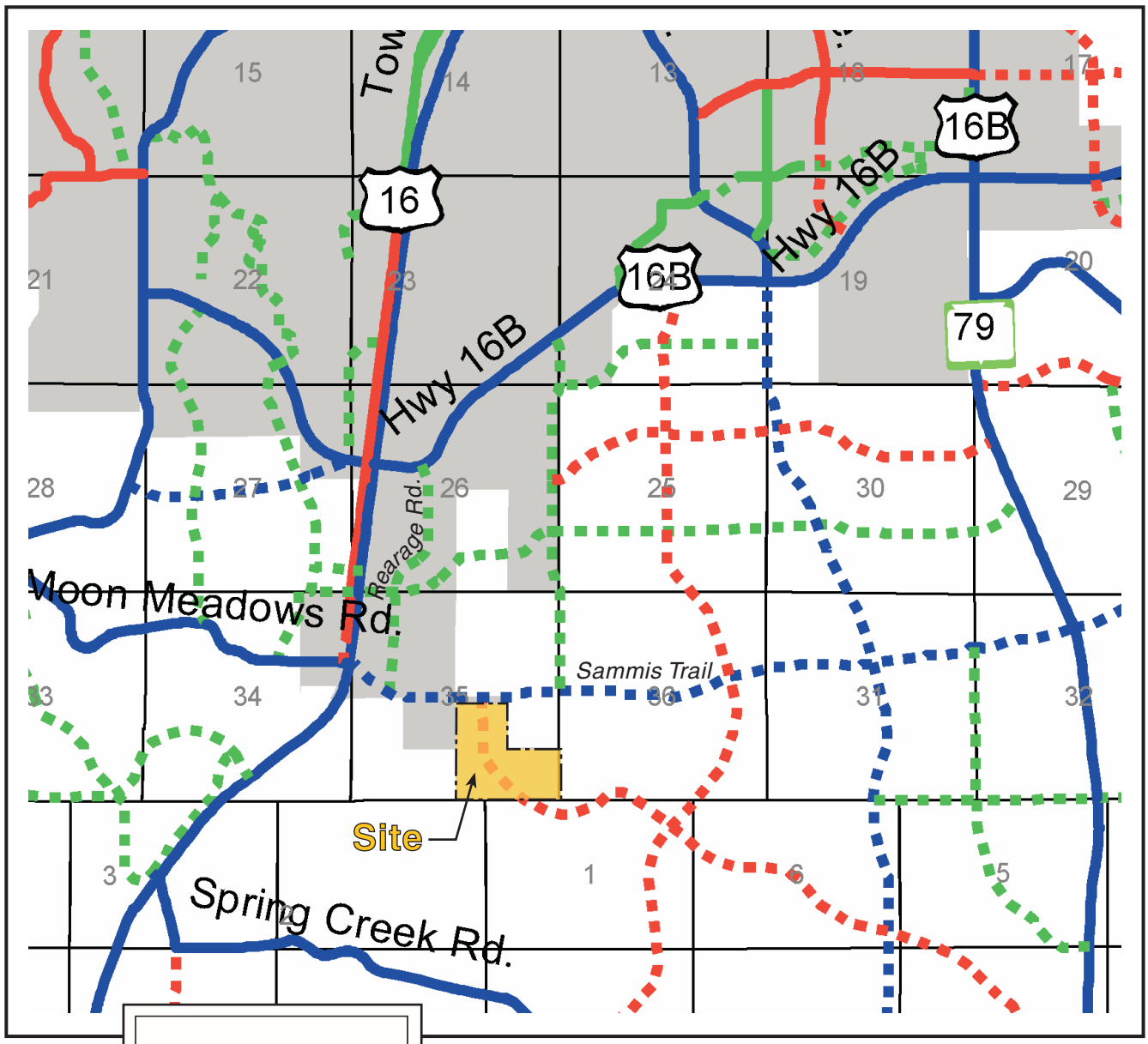
B. Traffic Volumes

Short Term Future (Year 2009)

The Rapid City area is a popular tourist destination, particularly during the summer months, given its location relative to Mount Rushmore and the annual Sturgis Motorcycle Rally. Traffic volumes throughout the Rapid City metropolitan area can fluctuate based on the type of road (arterial, collector, etc.) and the time of year (higher in the summer, lower in the winter) due to tourist related traffic. To account for these changes in travel patterns during a typical year, existing traffic volumes were adjusted to reflect average conditions. Through volumes on US Highway 16 were calibrated, based on the day of the count, to reflect '30th Highest Hour' conditions based on weekly adjustment factors along Interstate 90 from SDDOT.

Background traffic volumes represent the component of roadway volumes unrelated to the proposed development that are projected to utilize the adjacent roadway system. Based on information contained in the Rapid City regional travel demand model, existing traffic volumes along were grown at an annual rate of 2 percent to project the Short Term Future (Year 2008) background traffic volumes are shown on **Figure 5**.

FELSBURG HOLT & ULLEVIG



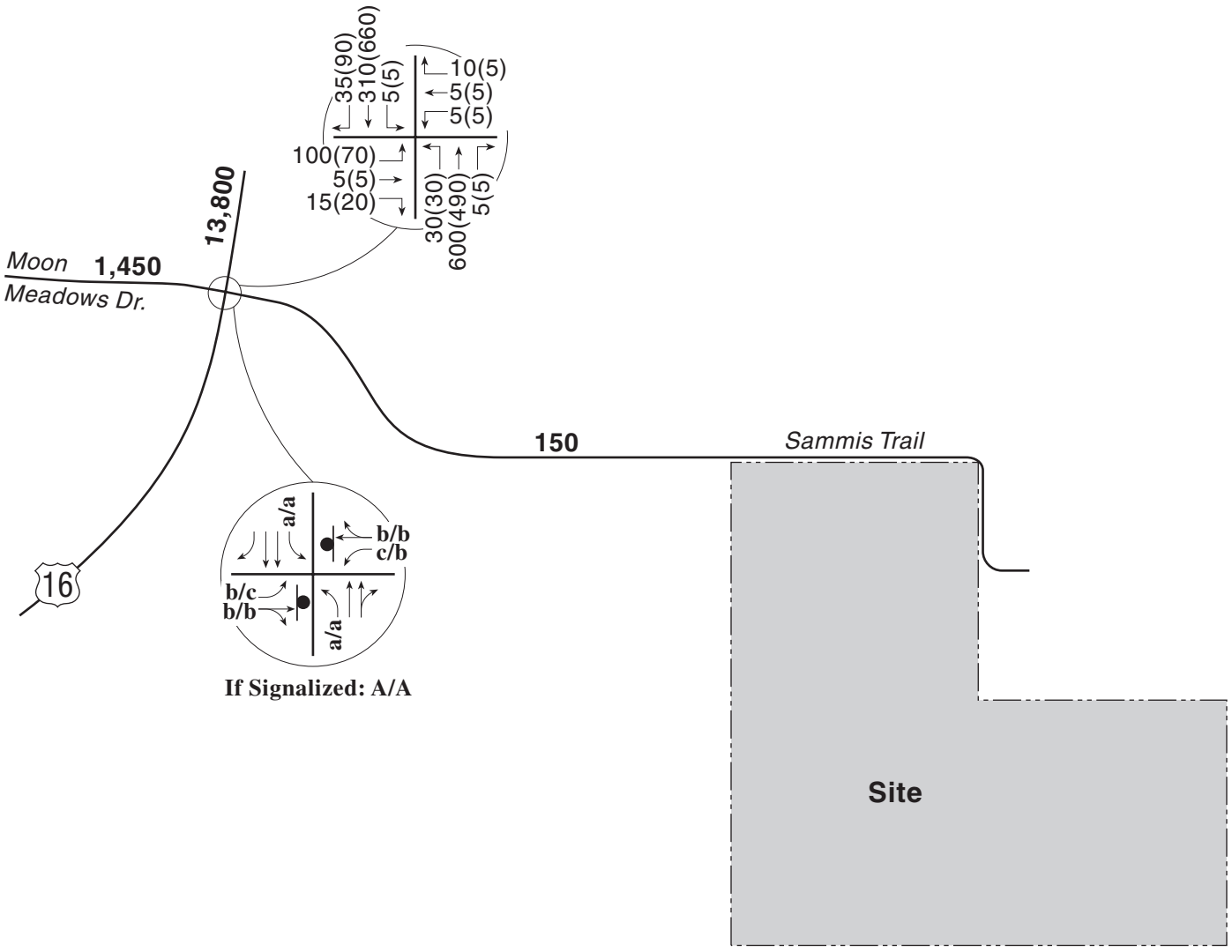
NOTE: *Roadway network adapted from Rapid City Major Street Plan (August 2, 2006)*

Figure 4

Long Term Future Roadway Network

North

FELSBURG HOLT & ULLEVIG



LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes
x/x	=	AM/PM Peak Hour Unsignalized Intersection Level of Service
●—	=	Stop Sign

Figure 5

Short Term Future (Year 2008)
Background Traffic Conditions
(With Sammis Trail Realignment)

North

Long Term Future (Year 2030)

Long Term Future (Year 2030) growth rates were projected by growing the Short Term Future Background traffic volumes at an annual rate of 2 percent, again based on the Rapid City regional travel demand model. To account for anticipated growth in the immediate vicinity of the site, Year 2020 traffic forecasts contained in the *Wal-Mart, US 16 / Sammis Trail / Moon Meadows Draft Traffic Impact Study* (HDR Engineering, 2005) were used to project turning movements at the US 16 / Moon Meadows intersection. A summary of the Long Term (Year 2030) background traffic volumes is shown on **Figure 6**.

C. Traffic Control

Traffic signal warrant analyses using Year 2008 and Year 2030 background traffic volumes were completed for the US Highway 16 / Moon Meadows Drive intersection to address the future need for a traffic signal. The analyses were based on the information contained in the *Manual on Uniform Traffic Control Devices (MUTCD), 2003 Edition*. The MUTCD contains eight warrants for traffic signal installation. These warrants are based on a variety of information and situations. Not only are traffic and pedestrian volumes considered, but the accident history of an intersection, its relationship with other intersections and whether or not an intersection is a designated school crossing are also part of the criteria for installation of a traffic signal.

By the Year 2008 without site traffic, the warrant analysis indicates that US Highway 16 / Moon Meadows Drive intersection would satisfy Warrant 1 (Condition B). This Short Term Future condition would be driven by the eastbound left turn movement, projected to reach 100 vehicles per hour (vph) by the Year 2008.

By the Year 2030, westbound traffic volumes would grow significantly due to development in the area, satisfying Warrant 2, Four Hour Volume, criteria for signalization in addition to Warrant 1. It is recommended that the intersection be signalized when actual traffic counts exceed warrant thresholds.

D. Traffic Operations

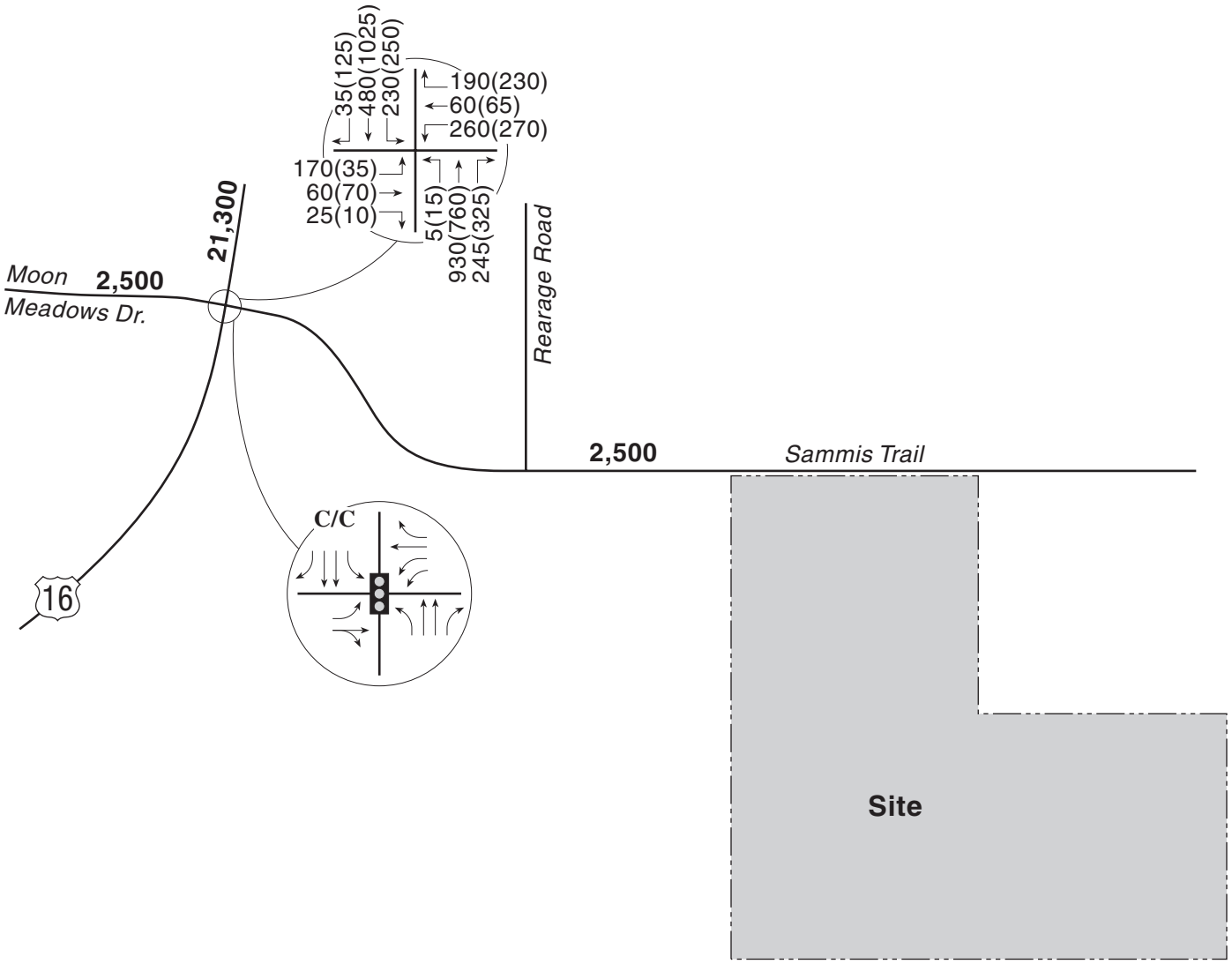
Short Term Future (Year 2008)

Level of Service analyses were conducted to evaluate Short Term Future background traffic conditions. The results of the analysis show that under unsignalized control, movements through the US Highway 16 / Moon Meadows Drive would operate at LOS C or better during peak hours. If signalized, the intersection would operate at LOS A during peak hours. The results of the capacity analyses are shown on **Figure 5**, and **Appendix C** contains the background traffic operational analysis worksheets.

Long Term Future (Year 2030)

The results of the Long Term Future background traffic analysis show that the US 16 / Moon Meadows Drive intersection would operate at LOS C during the peak hours of operation. As recommended in the Wal-Mart traffic study, dual westbound left turn lanes should be provided. The results of the capacity analyses are shown on **Figure 6** and **Appendix C** contains the background traffic operational analysis worksheets.

FELSBURG HOLT & ULLEVIG



LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes
X/X	=	AM/PM Peak Hour Signalized Intersection Level of Service
x/x	=	AM/PM Peak Hour Unsignalized Intersection Level of Service
	=	Stop Sign
	=	Traffic Signal

Figure 6

Long Term Future (Year 2030)
Background Traffic Conditions

North

IV. PROPOSED PROJECT

A. Site Trip Generation

The number of vehicle-trips generated by the proposed development was forecast based on trip rates and procedures documented in *Trip Generation, Institute of Transportation Engineers, Seventh Edition, 2003*. **Table 1** shows the trip generation estimates used for the proposed development.

Table 1. Trip Generation Summary

Land Use	Size	ITE Code	Daily Trips	AM Peak Hour			PM Peak Hour		
				In	Out	Total	In	Out	Total
Phase I									
Single Family Homes	40 Units	210	383	8	22	30	25	15	40
Buildout									
Single Family Homes	294 Units	210	2,815	55	165	220	187	110	297

The initial phase of construction would add approximately 400 vehicle-trips per day (vpd) to the roadway network, with 30-40 vehicle-trips during the AM and PM peak hours. Buildout of the site would increase site trips to approximately 2,815 vpd and nearly 300 during the PM peak hour.

B. Trip Distribution and Traffic Assignment

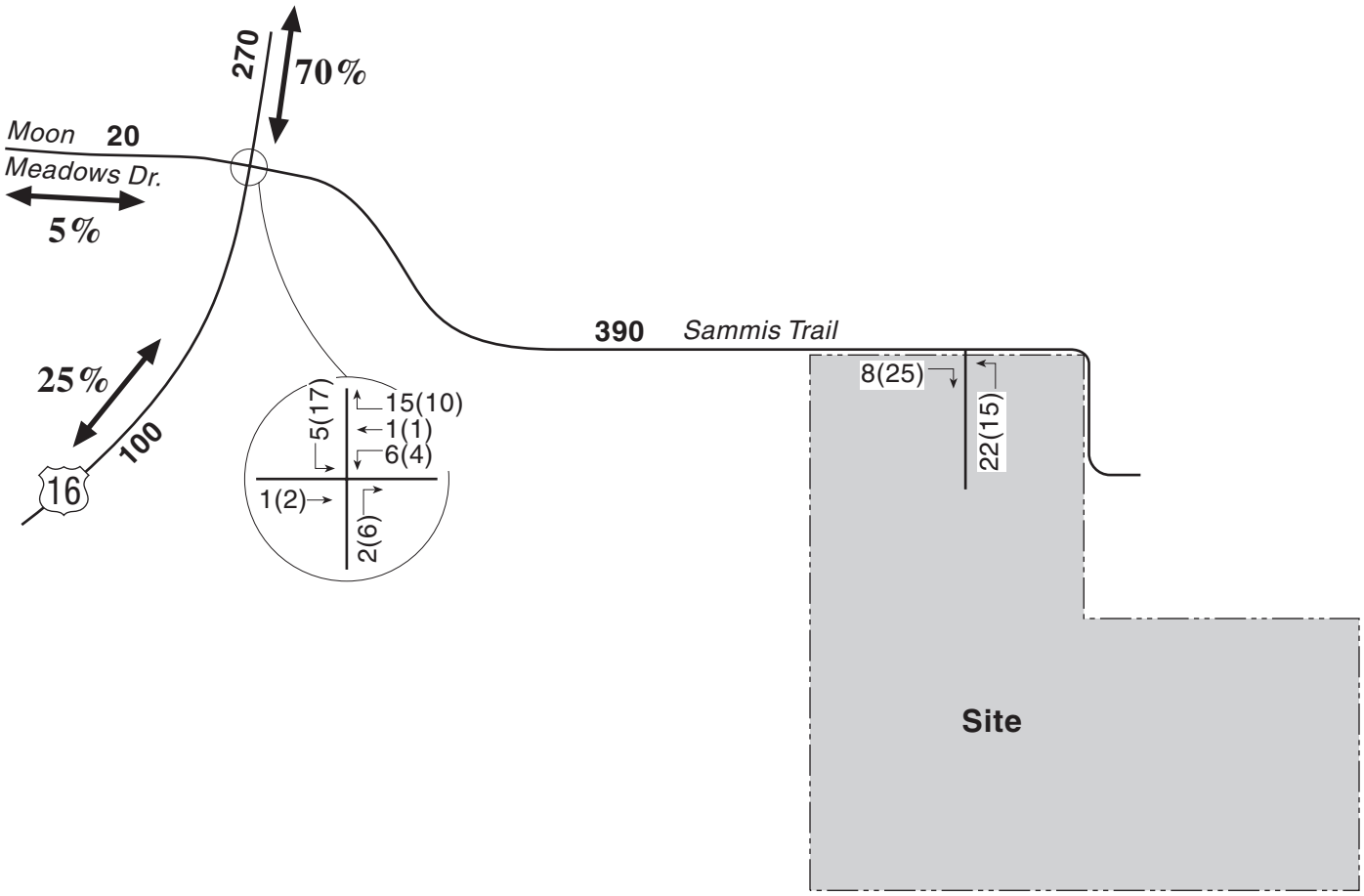
Two different site trip distribution scenarios were developed for the site. The distribution for the Short Term (Year 2008) horizon was based on the location of the site relative to existing land uses and roadways and existing travel patterns. In the Long Term Future scenario, information contained in the *Wal-Mart, US 16 / Sammis Trail / Moon Meadows Draft Traffic Impact Study* was used as the basis for trip distribution percentages. These assumptions would distribute some site traffic onto new roadways in the vicinity of the site, shown on **Figure 4**.

The site trip distribution assumptions for the Short Term and Long Term Future analysis periods are shown on **Figures 7** and **8**, respectively.

C. Site Access

With completion of Phase I (40 homes), the site would be served by a single access to Sammis Trail, which would connect with US 16. In addition, Sammis Trail would be realigned north from its current intersection with US 16 to a location directly opposite of Moon Meadows Drive. At full buildout, a number of roadway improvements to the area will provide additional site access options. These improvements are depicted on **Figure 4**.

FELSBURG HOLT & ULLEVIG



LEGEND

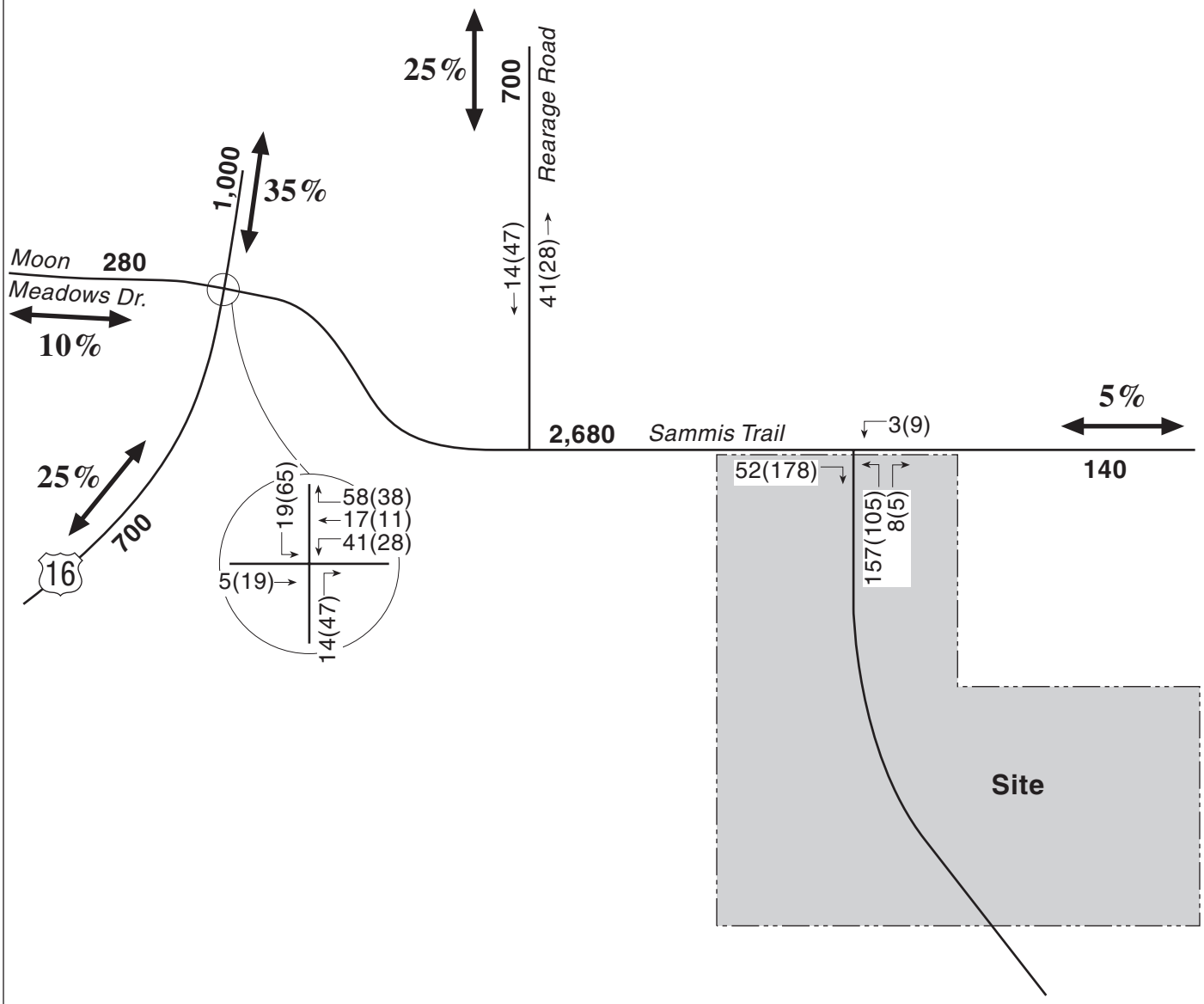
XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes
xx%	=	Site Trip Distribution

Figure 7

Short Term Future (Year 2008)
Trip Distribution and Site Generated Traffic

North

FELSBURG HOLT & ULLEVIG



LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes
xx%	=	Site Trip Distribution

Figure 8

Long Term Future (Year 2030)
Trip Distribution and Site Generated Traffic

North

V. TOTAL FUTURE TRAFFIC CONDITIONS

A. Traffic Volumes

The site generated traffic volumes were added to the background traffic volumes for each future year to determine total traffic volumes for each scenario. The projected Short Term Future and Long Term Future total traffic volumes are shown on **Figure 9** and **Figure 10,** respectively.

The site would add less than 5 percent to daily traffic volumes along US 16. The initial phase of development would roughly triple daily volumes along Sammis Trail east of US 16. In the Long Term Future, site vehicle-trips would approximately double traffic levels along Sammis Trail.

B. Traffic Control

Based on signal warrant analyses described in section III.C., it is anticipated that a traffic signal would be warranted at the US 16 / Moon Meadows Drive intersection in the future without the addition of site traffic. Therefore, signalized control is presented as an option for the Short Term Future. It is assumed that a signal would be installed by the Long Term Future.

C. Traffic Operations

Short Term (Year 2008) Future

Level of Service analyses were conducted to evaluate the traffic impact of the site on Short Term Future conditions. The US 16 / Moon Meadows Drive intersection was analyzed assuming unsignalized traffic control, indicating that movements would operate at LOS C or better during peak hours. A signalized intersection would operate at LOS A during peak hours. Though signal warrant criteria would be exceeded in the Short Term Future, a traffic signal is not anticipated to be necessary to provide acceptable traffic operations. The results of the capacity analyses are shown on **Figure 9**, and **Appendix D** contains the total traffic operational analysis worksheets.

Long Term (Year 2030) Future

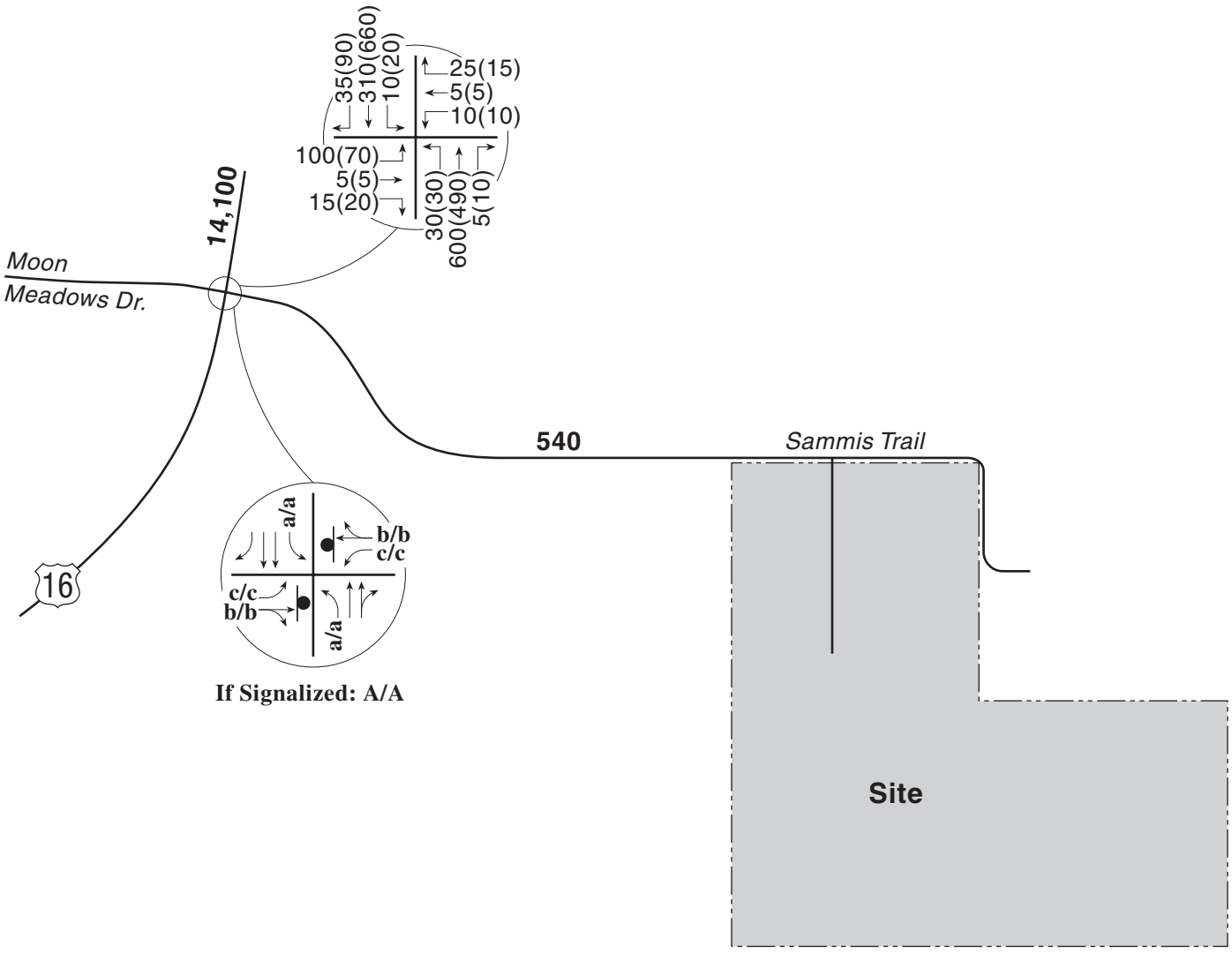
The results of the Long Term Future total traffic analysis show that the US 16 / Moon Meadows Drive intersection would operate at LOS C during peak hours with build-out of the site and provision of dual westbound left turn lanes. The future unsignalized site access (Brigadoon Way) onto Sammis Trail was also analyzed for capacity. The results of the analysis show that each individual movement at the Brigadoon Way / Sammis Trail intersection would operate at LOS B or better during the peak hours.

The results of the capacity analyses are shown on **Figure 10**, and **Appendix D** contains the total traffic operational analysis worksheets.

D. Auxiliary Lanes

The SDDOT *Roadway Design Manual* (Figure 12-16 & Figure 12-17) and engineering judgment were used to determine if auxiliary left or right-turn lanes would be required at the study intersections in the Short Term and Long Term future scenarios with the addition of site traffic. Auxiliary lane needs are discussed as follows by intersection:

FELSBURG HOLT & ULLEVIG



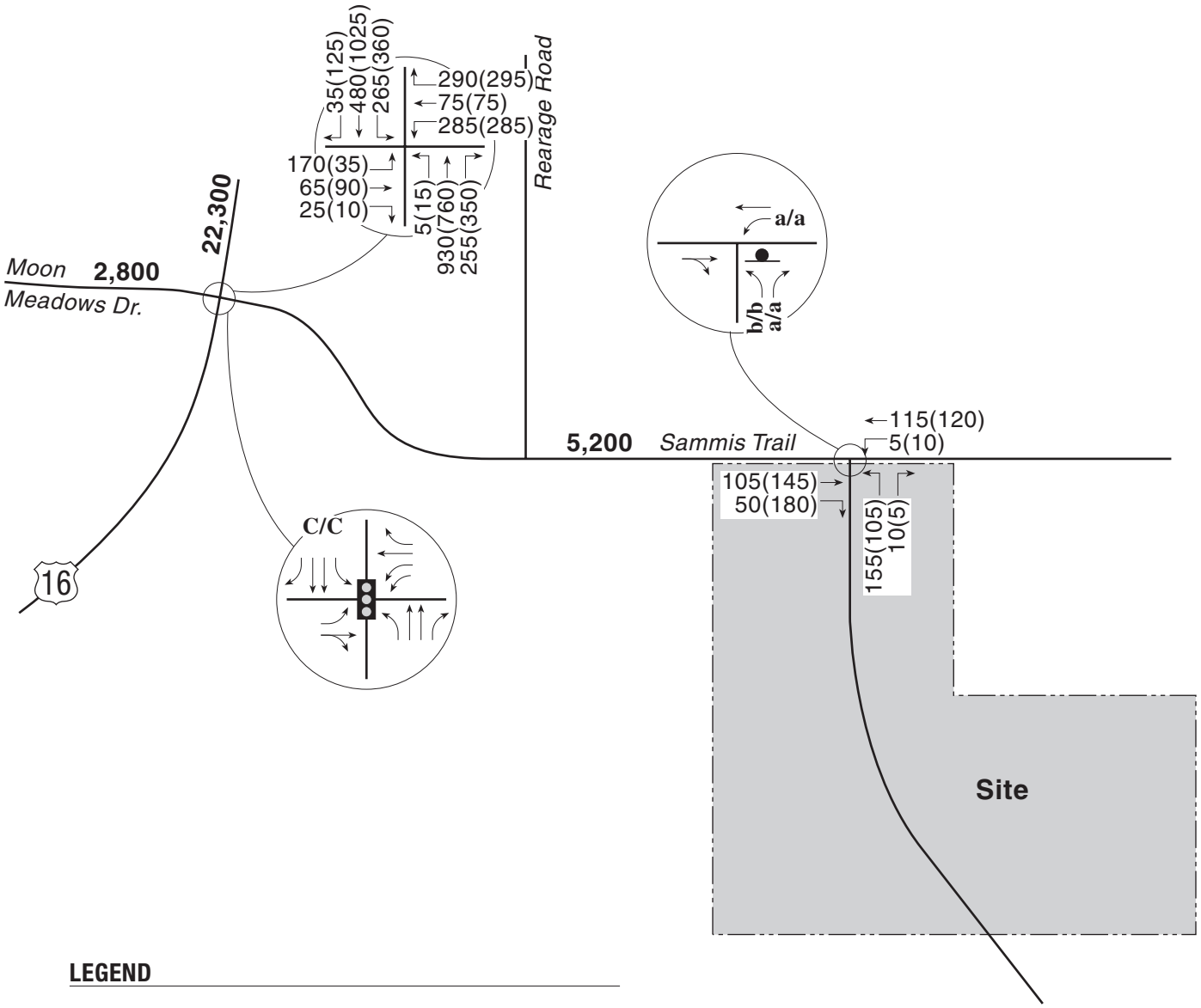
LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes
x/x	=	AM/PM Peak Hour Unsignalized Intersection Level of Service
●	=	Stop Sign

Figure 9

Short Term Future (Year 2008)
Total Traffic Conditions

North



LEGEND

XXX(XXX)	=	AM(PM) Peak Hour Traffic Volumes
XXXX	=	Daily Traffic Volumes
X/X	=	AM/PM Peak Hour Signalized Intersection Level of Service
x/x	=	AM/PM Peak Hour Unsignalized Intersection Level of Service
	=	Stop Sign
	=	Traffic Signal

Figure 10

Long Term Future (Year 2030)
Total Traffic Conditions

North

US 16 / Moon Meadows Drive - In the Short Term Future, the realignment of Sammis Trail would create a 4-leg intersection. At this intersection, it is recommended that an exclusive southbound left turn lane be provided along with an exclusive westbound left turn lane. **Table 2** summarizes the recommended auxiliary lanes and lengths for the Short Term Future.

Table 2. Short Term Future Auxiliary Lanes – US 16 / Moon Meadows Drive

Approach	Lane type	Storage Length (ft.)	Decel. Length (ft.)	Full Lane Length (ft.)
Southbound	Left Turn Lane	100	455	555
Westbound	Left Turn Lane	100	n/a	100 plus taper

In the Long Term Future, additional development surrounding the intersection is anticipated to increase the need for and length of auxiliary lanes. **Table 3** summarizes the recommended auxiliary lanes and lengths for the Long Term Future.

Table 3. Long Term Future Auxiliary Lanes – US 16 / Moon Meadows Drive

Approach	Lane type	Storage Length (ft.)	Decel. Length (ft.)	Full Lane Length (ft.)
Northbound	Right Turn Lane	100	455	555
Southbound	Left Turn Lane	325	455	780
Westbound	Right Turn Lane	100	n/a	100
	Dual Left Turn Lane	175	n/a	175

Sammis Trail / Brigadoon Way – Analyses were performed to address whether there would be a need for an exclusive eastbound right turn lane entering the site. Based on SDDOT standards and projected Short Term and Long Term Future traffic volumes, an eastbound right turn lane would not be needed at the intersection. A northbound left turn lane is recommended to accommodate the site. **Table 4** outlines the recommended length of this lane.

Table 4. Auxiliary Lanes – Sammis Trail / Brigadoon Way

Approach	Lane type	Storage Length (ft.)	Taper Length (ft.)	Full Lane Length (ft.)
Northbound	Left Turn Lane	100	120	220

E. Sammis Trail Surface and Section

In the Short Term Future, the site would increase daily traffic volumes along Sammis Trail from 150 vpd to 540 vpd. To accommodate this increase, it is recommended that Sammis Trail be paved from US 16 to Brigadoon Way with completion of the initial 40 homes of the proposed development. In the Short Term Future, Sammis Trail should provide two travel lanes. By the Long Term Future, it is recommended that Sammis Trail provide a 3-lane section between US 16 and Brigadoon Way, similar to the existing Moon Meadows Drive section west of US 16.

VI. SUMMARY AND RECOMMENDATIONS

The proposed Hyland Crossing residential development is located west of US Highway 16 and south of Sammis Trail in Rapid City, South Dakota. By full buildout, Hyland Crossing would include approximately 294 single family homes. With completion of Phase I (40 homes), the site would be served by a single access to Sammis Trail, which would connect with US 16. In addition, Sammis Trail would be realigned north from its current intersection with US 16 to a location directly opposite of Moon Meadows Drive. At full buildout, a number of roadway improvements to the area will provide additional site access options.

The initial phase of construction would add approximately 400 vehicle-trips per day (vpd) to the roadway network, with 30-40 vehicle-trips during the AM and PM peak hours. Buildout of the site would increase site trips to approximately 2,815 vpd and nearly 300 during the PM peak hour. The addition of these vehicle-trips would increase daily traffic volumes along US 16 by approximately 5 percent or less and increase traffic volumes along Sammis Trail 2 to 3 times.

The following is a summary of the findings and recommendations related to the traffic impacts of the proposed development:

- Based on the results of this analysis, the anticipated Short Term and Long Term Future roadway networks would accommodate the increased traffic due to the development of this site. Each of the study intersections are anticipated to operate at an acceptable (LOS C or better) level of service during AM and PM peak hours.
- Based on information provided in the Manual on Uniform Traffic Control Devices, a traffic signal would be warranted at the US Highway 16 / Moon Meadows Drive intersection by the Year 2008 without the proposed development. It is recommended that this intersection be signalized when field conditions satisfy warrant criteria.
- It is recommended that Sammis Trail be paved from US 16 to Brigadoon Way with completion of the initial 40 homes of the proposed development. In the Short Term Future, Sammis Trail should provide two travel lanes. By the Long Term Future, it is recommended that Sammis Trail provide a 3-lane section between US 16 and Brigadoon Way, similar to the existing Moon Meadows Drive section west of US 16.
- Auxiliary turn lanes are recommended to be installed at the study intersections by the Year 2030, as shown (with dimensions) in **Tables 2-4**. While site traffic volumes would contribute to the need for auxiliary lanes, it is important to note that these auxiliary lanes would be warranted with or without construction of the proposed development.
- The intersection of Brigadoon Way and Sammis Trail is expected to operate acceptably as an unsignalized intersection in both the Short Term and Long Term Future scenarios.

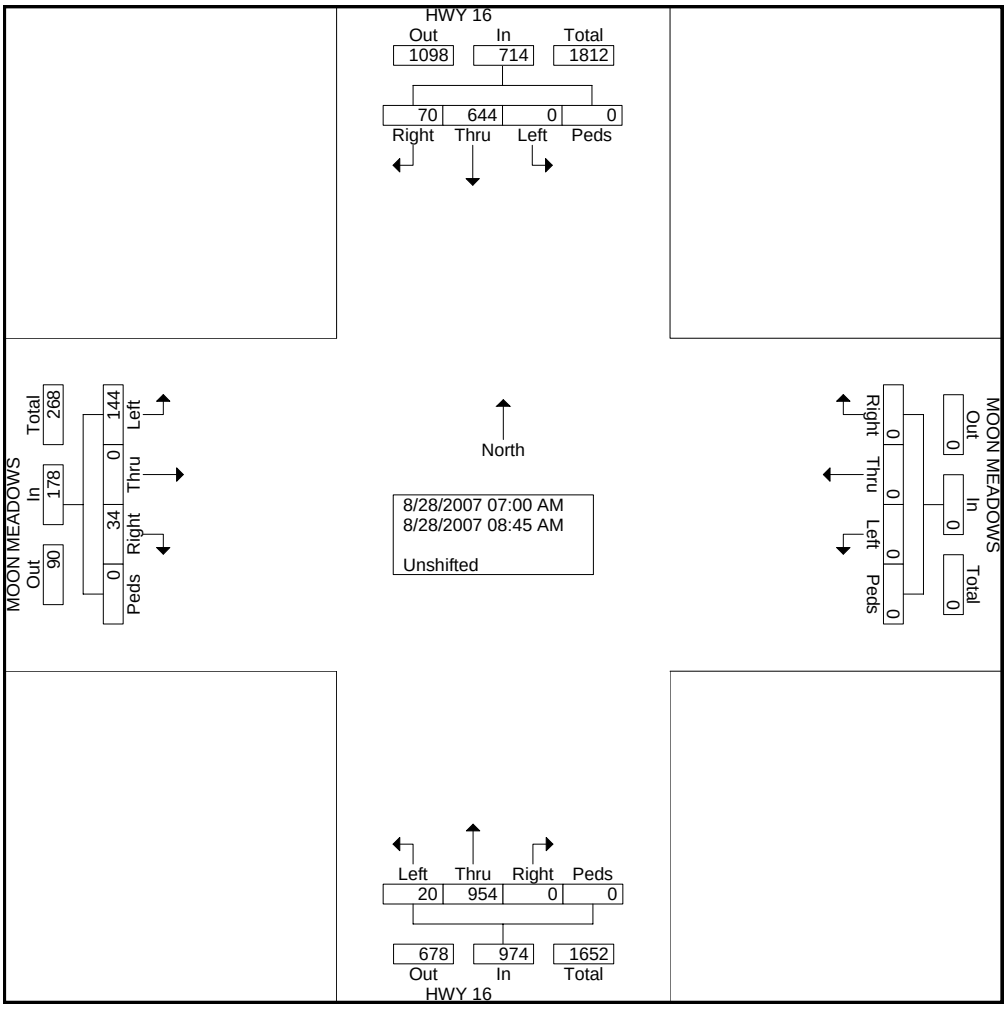
APPENDIX A EXISTING TRAFFIC COUNTS

All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SH16&MOONAM
Site Code : 00000000
Start Date : 8/28/2007
Page No : 1

Groups Printed- Unshifted

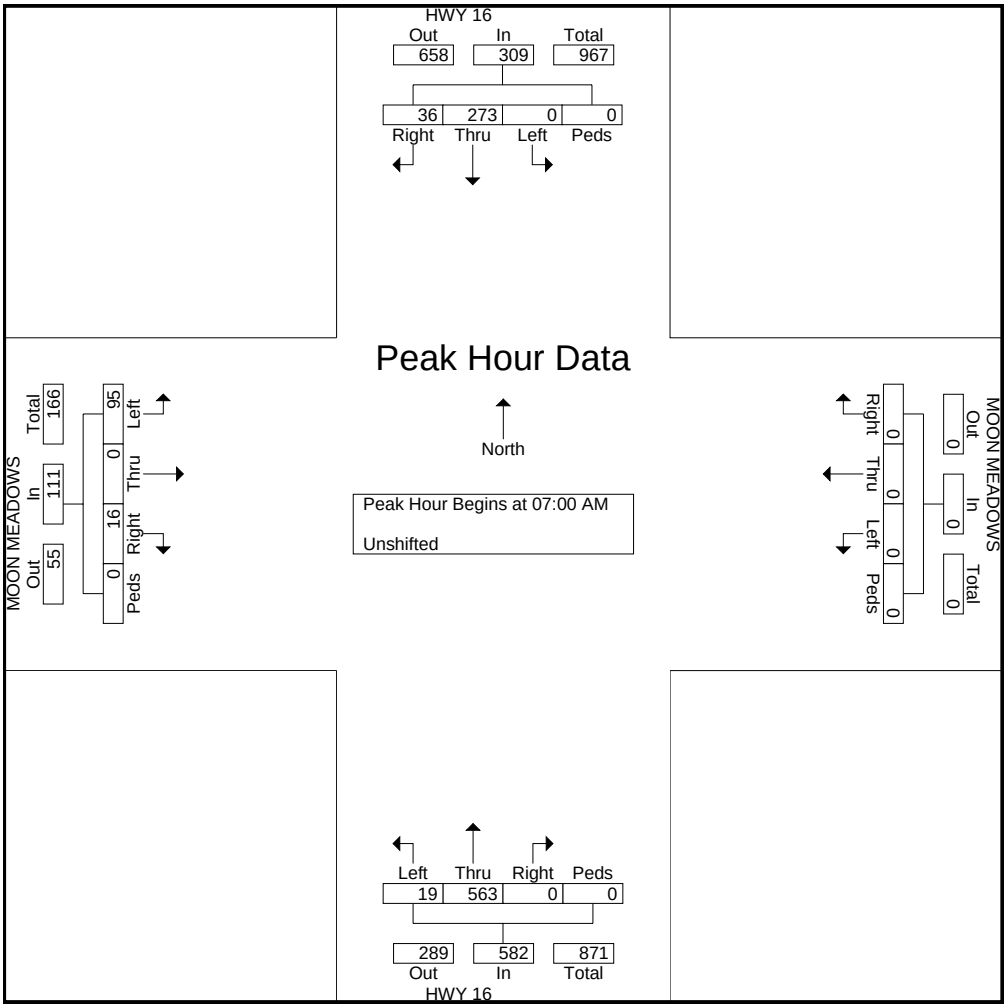
	HWY 16 Southbound				MOON MEADOWS Westbound				HWY 16 Northbound				MOON MEADOWS Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	0	70	9	0	0	0	0	0	4	107	0	0	28	0	4	0	222
07:15 AM	0	62	4	0	0	0	0	0	5	161	0	0	21	0	7	0	260
07:30 AM	0	71	10	0	0	0	0	0	2	181	0	0	26	0	1	0	291
07:45 AM	0	70	13	0	0	0	0	0	8	114	0	0	20	0	4	0	229
Total	0	273	36	0	0	0	0	0	19	563	0	0	95	0	16	0	1002
08:00 AM	0	86	9	0	0	0	0	0	0	92	0	0	14	0	4	0	205
08:15 AM	0	95	6	0	0	0	0	0	0	94	0	0	17	0	2	0	214
08:30 AM	0	103	11	0	0	0	0	0	1	105	0	0	11	0	10	0	241
08:45 AM	0	87	8	0	0	0	0	0	0	100	0	0	7	0	2	0	204
Total	0	371	34	0	0	0	0	0	1	391	0	0	49	0	18	0	864
Grand Total	0	644	70	0	0	0	0	0	20	954	0	0	144	0	34	0	1866
Apprch %	0	90.2	9.8	0	0	0	0	0	2.1	97.9	0	0	80.9	0	19.1	0	
Total %	0	34.5	3.8	0	0	0	0	0	1.1	51.1	0	0	7.7	0	1.8	0	



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SH16&MOONAM
Site Code : 00000000
Start Date : 8/28/2007
Page No : 2

	HWY 16 Southbound					MOON MEADOWS Westbound					HWY 16 Northbound					MOON MEADOWS Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	70	9	0	79	0	0	0	0	0	4	107	0	0	111	28	0	4	0	32	222
07:15 AM	0	62	4	0	66	0	0	0	0	0	5	161	0	0	166	21	0	7	0	28	260
07:30 AM	0	71	10	0	81	0	0	0	0	0	2	181	0	0	183	26	0	1	0	27	291
07:45 AM	0	70	13	0	83	0	0	0	0	0	8	114	0	0	122	20	0	4	0	24	229
Total Volume	0	273	36	0	309	0	0	0	0	0	19	563	0	0	582	95	0	16	0	111	1002
% App. Total	0	88.3	11.7	0		0	0	0	0		3.3	96.7	0	0		85.6	0	14.4	0		
PHF	.000	.961	.692	.000	.931	.000	.000	.000	.000	.000	.594	.778	.000	.000	.795	.848	.000	.571	.000	.867	.861

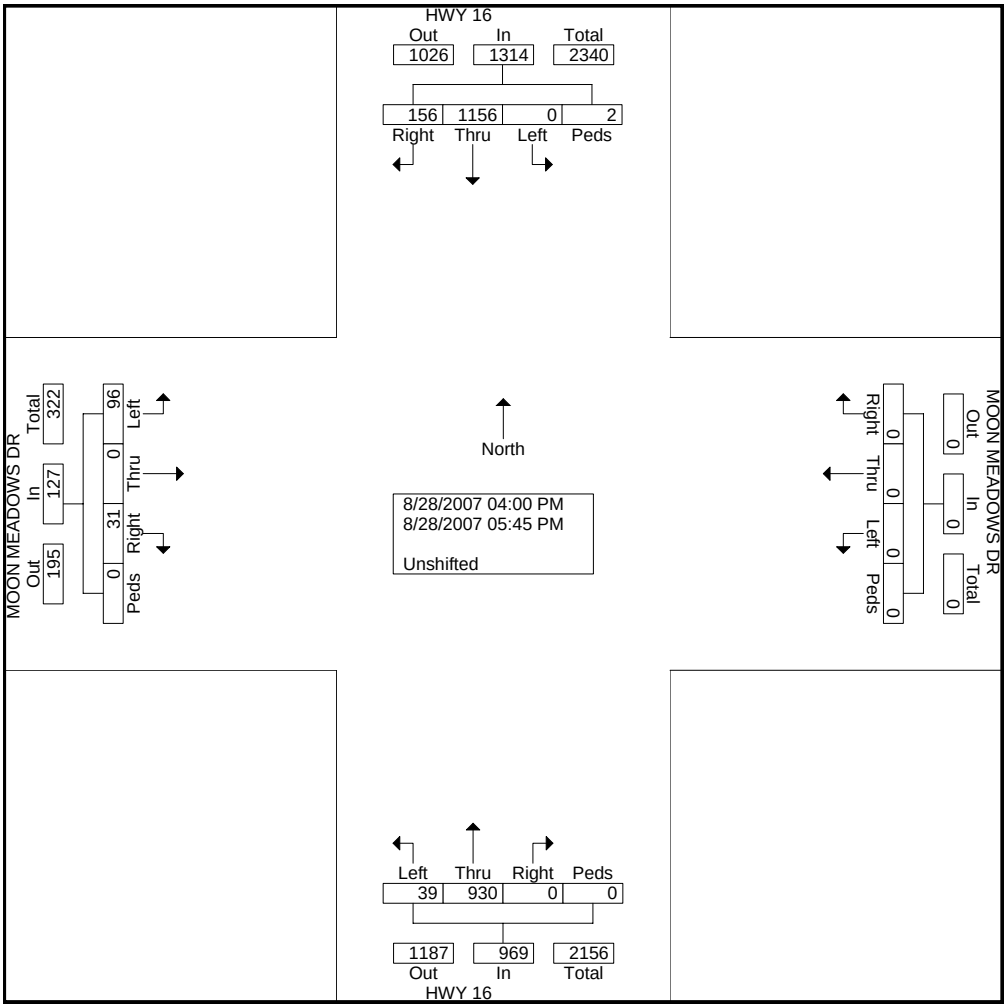


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SH16&MOONPM
Site Code : 00000000
Start Date : 8/28/2007
Page No : 1

Groups Printed- Unshifted

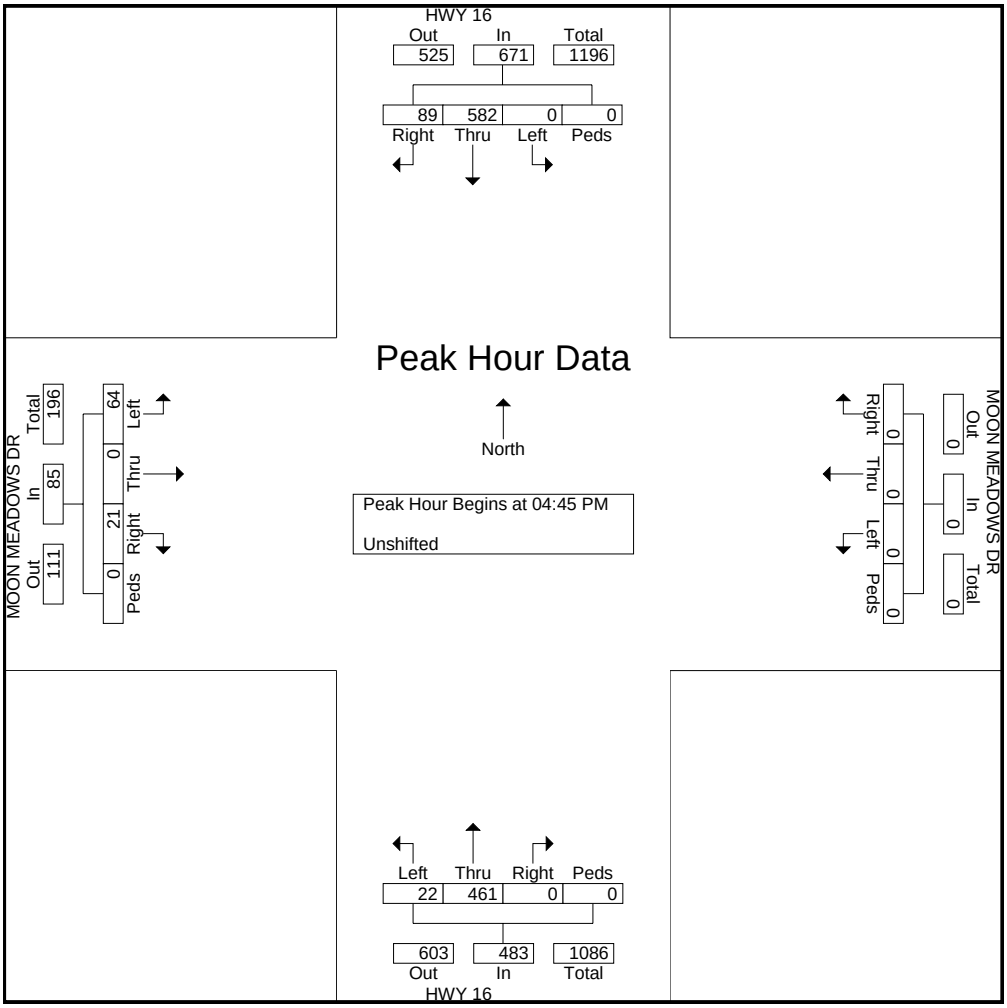
	HWY 16 Southbound				MOON MEADOWS DR Westbound				HWY 16 Northbound				MOON MEADOWS DR Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	137	17	1	0	0	0	0	6	124	0	0	12	0	4	0	301
04:15 PM	0	134	6	1	0	0	0	0	3	131	0	0	6	0	1	0	282
04:30 PM	0	129	20	0	0	0	0	0	5	115	0	0	8	0	2	0	279
04:45 PM	0	136	25	0	0	0	0	0	7	143	0	0	18	0	7	0	336
Total	0	536	68	2	0	0	0	0	21	513	0	0	44	0	14	0	1198
05:00 PM	0	129	18	0	0	0	0	0	6	107	0	0	13	0	6	0	279
05:15 PM	0	177	26	0	0	0	0	0	7	91	0	0	12	0	2	0	315
05:30 PM	0	140	20	0	0	0	0	0	2	120	0	0	21	0	6	0	309
05:45 PM	0	174	24	0	0	0	0	0	3	99	0	0	6	0	3	0	309
Total	0	620	88	0	0	0	0	0	18	417	0	0	52	0	17	0	1212
Grand Total	0	1156	156	2	0	0	0	0	39	930	0	0	96	0	31	0	2410
Apprch %	0	88	11.9	0.2	0	0	0	0	4	96	0	0	75.6	0	24.4	0	
Total %	0	48	6.5	0.1	0	0	0	0	1.6	38.6	0	0	4	0	1.3	0	



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SH16&MOONPM
Site Code : 00000000
Start Date : 8/28/2007
Page No : 2

	HWY 16 Southbound					MOON MEADOWS DR Westbound					HWY 16 Northbound					MOON MEADOWS DR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	136	25	0	161	0	0	0	0	0	7	143	0	0	150	18	0	7	0	25	336
05:00 PM	0	129	18	0	147	0	0	0	0	0	6	107	0	0	113	13	0	6	0	19	279
05:15 PM	0	177	26	0	203	0	0	0	0	0	7	91	0	0	98	12	0	2	0	14	315
05:30 PM	0	140	20	0	160	0	0	0	0	0	2	120	0	0	122	21	0	6	0	27	309
Total Volume	0	582	89	0	671	0	0	0	0	0	22	461	0	0	483	64	0	21	0	85	1239
% App. Total	0	86.7	13.3	0		0	0	0	0		4.6	95.4	0	0		75.3	0	24.7	0		
PHF	.000	.822	.856	.000	.826	.000	.000	.000	.000	.000	.786	.806	.000	.000	.805	.762	.000	.750	.000	.787	.922

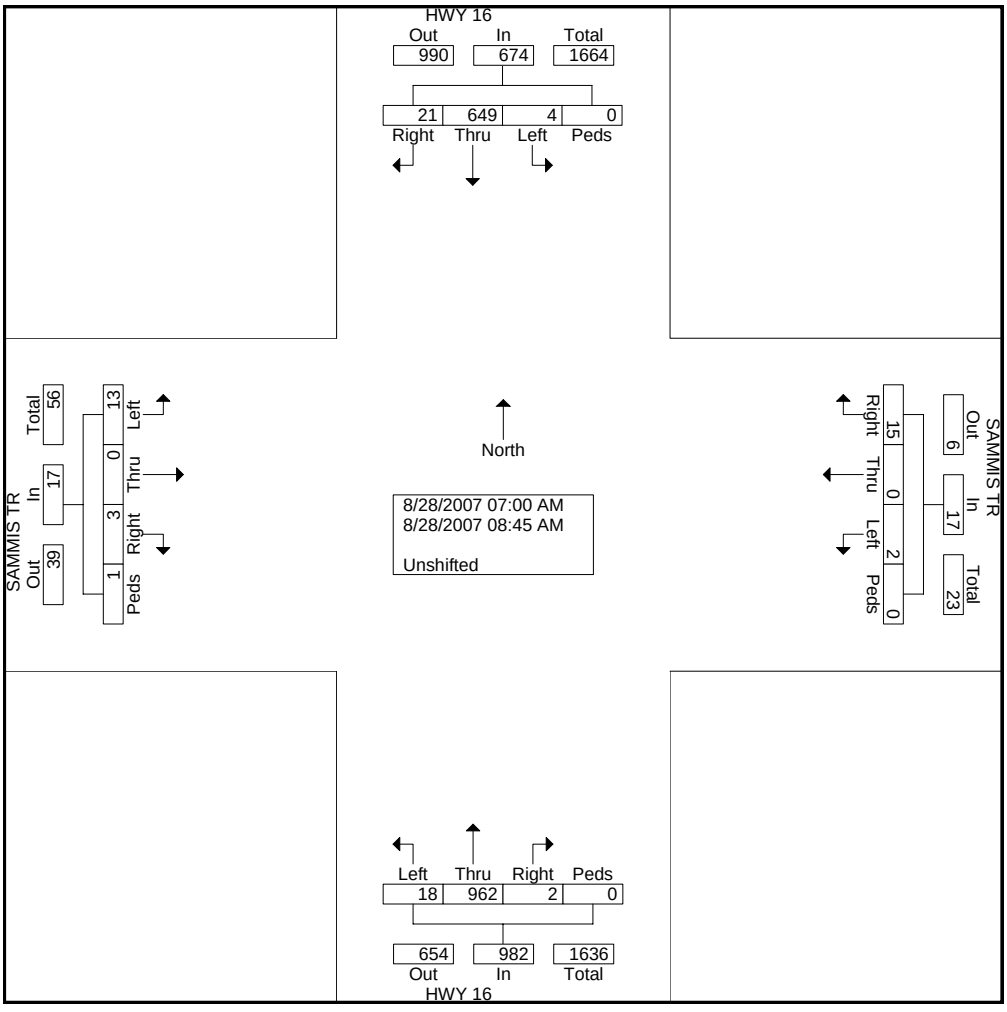


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SAMMIS&SH16AM
Site Code : 00000000
Start Date : 8/28/2007

Groups Printed- Unshifted

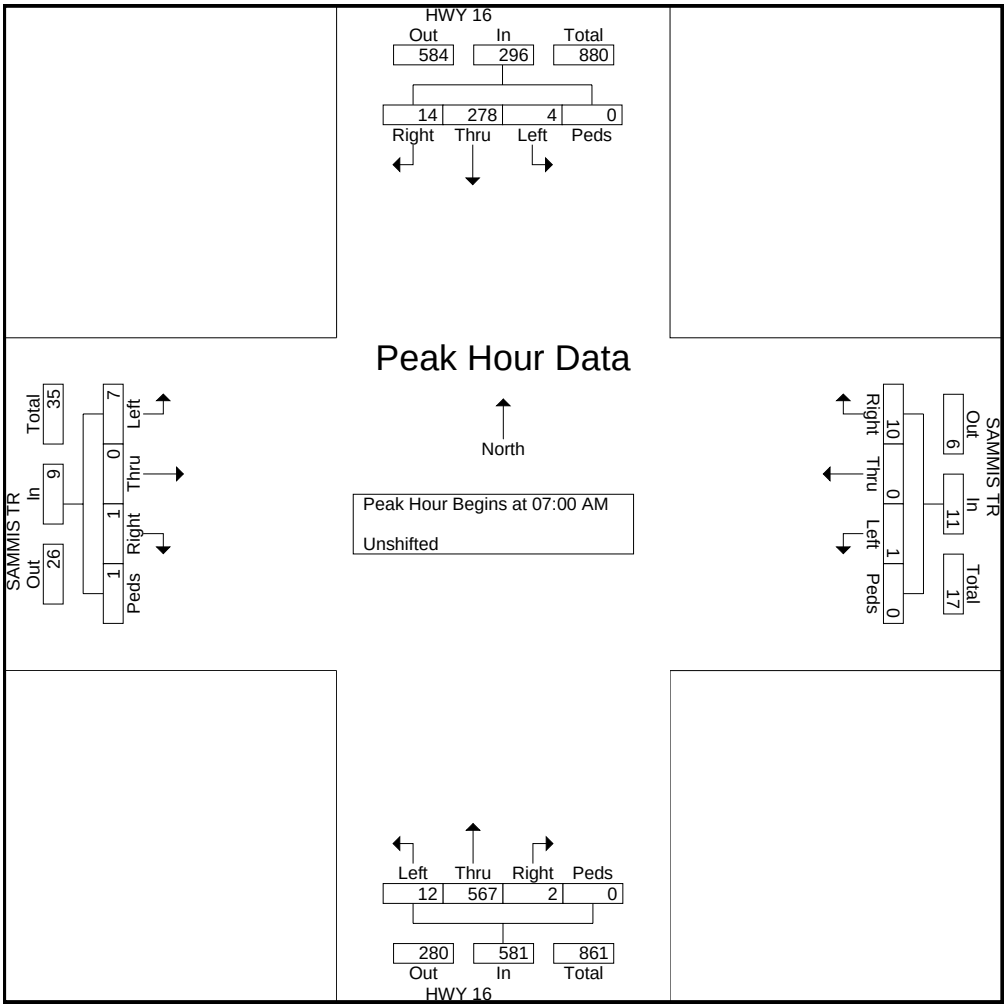
	HWY 16 Southbound				SAMMIS TR Westbound				HWY 16 Northbound				SAMMIS TR Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
07:00 AM	1	71	4	0	0	0	4	0	3	106	0	0	0	0	0	1	190
07:15 AM	1	63	6	0	0	0	2	0	4	162	0	0	4	0	1	0	243
07:30 AM	1	70	2	0	1	0	1	0	2	187	0	0	1	0	0	0	265
07:45 AM	1	74	2	0	0	0	3	0	3	112	2	0	2	0	0	0	199
Total	4	278	14	0	1	0	10	0	12	567	2	0	7	0	1	1	897
08:00 AM	0	83	1	0	0	0	3	0	3	95	0	0	0	0	2	0	187
08:15 AM	0	98	1	0	1	0	1	0	0	96	0	0	2	0	0	0	199
08:30 AM	0	101	2	0	0	0	0	0	3	101	0	0	4	0	0	0	211
08:45 AM	0	89	3	0	0	0	1	0	0	103	0	0	0	0	0	0	196
Total	0	371	7	0	1	0	5	0	6	395	0	0	6	0	2	0	793
Grand Total	4	649	21	0	2	0	15	0	18	962	2	0	13	0	3	1	1690
Apprch %	0.6	96.3	3.1	0	11.8	0	88.2	0	1.8	98	0.2	0	76.5	0	17.6	5.9	
Total %	0.2	38.4	1.2	0	0.1	0	0.9	0	1.1	56.9	0.1	0	0.8	0	0.2	0.1	



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SAMMIS&SH16AM
Site Code : 00000000
Start Date : 8/28/2007
Page No : 2

	HWY 16 Southbound					SAMMIS TR Westbound					HWY 16 Northbound					SAMMIS TR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 08:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	71	4	0	76	0	0	4	0	4	3	106	0	0	109	0	0	0	1	1	190
07:15 AM	1	63	6	0	70	0	0	2	0	2	4	162	0	0	166	4	0	1	0	5	243
07:30 AM	1	70	2	0	73	1	0	1	0	2	2	187	0	0	189	1	0	0	0	1	265
07:45 AM	1	74	2	0	77	0	0	3	0	3	3	112	2	0	117	2	0	0	0	2	199
Total Volume	4	278	14	0	296	1	0	10	0	11	12	567	2	0	581	7	0	1	1	9	897
% App. Total	1.4	93.9	4.7	0		9.1	0	90.9	0		2.1	97.6	0.3	0		77.8	0	11.1	11.1		
PHF	1.000	.939	.583	.000	.961	.250	.000	.625	.000	.688	.750	.758	.250	.000	.769	.438	.000	.250	.250	.450	.846

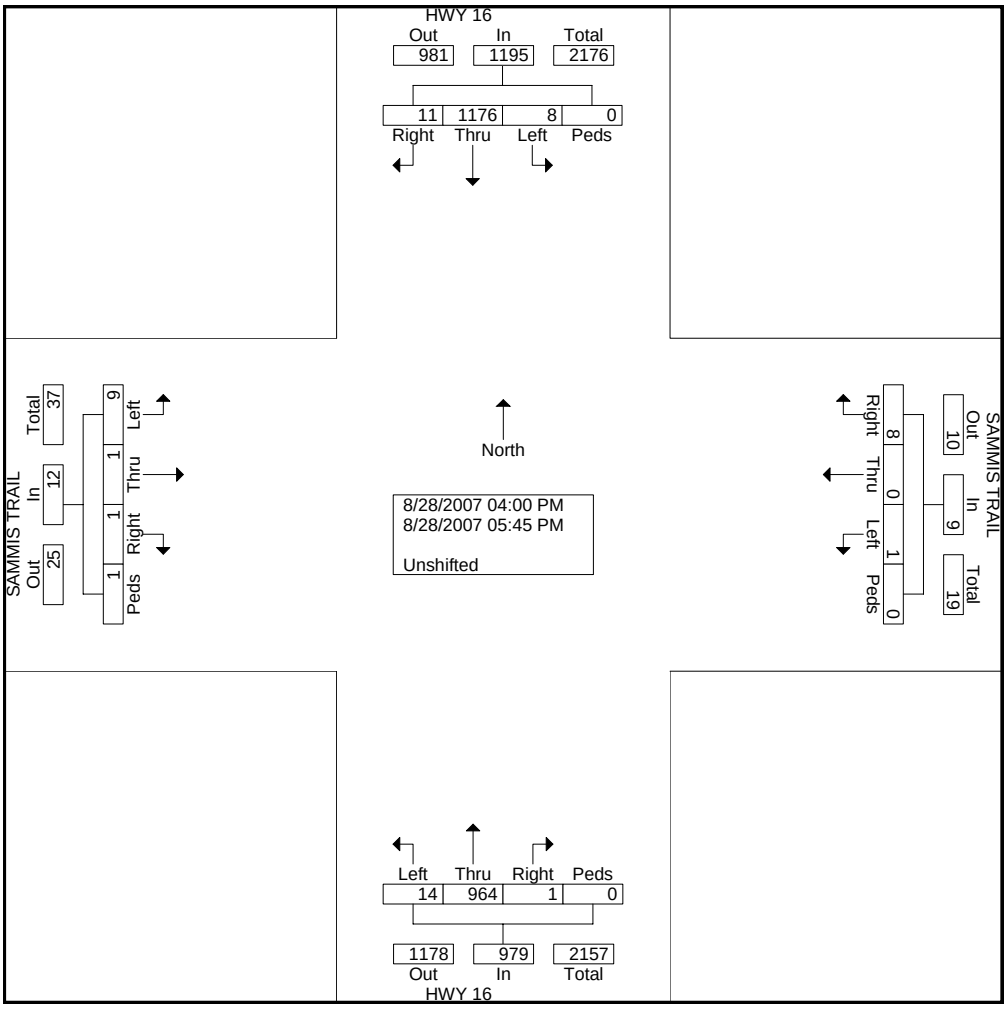


All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SAMMIS&SH16PM
Site Code : 00000000
Start Date : 8/28/2007
Page No : 1

Groups Printed- Unshifted

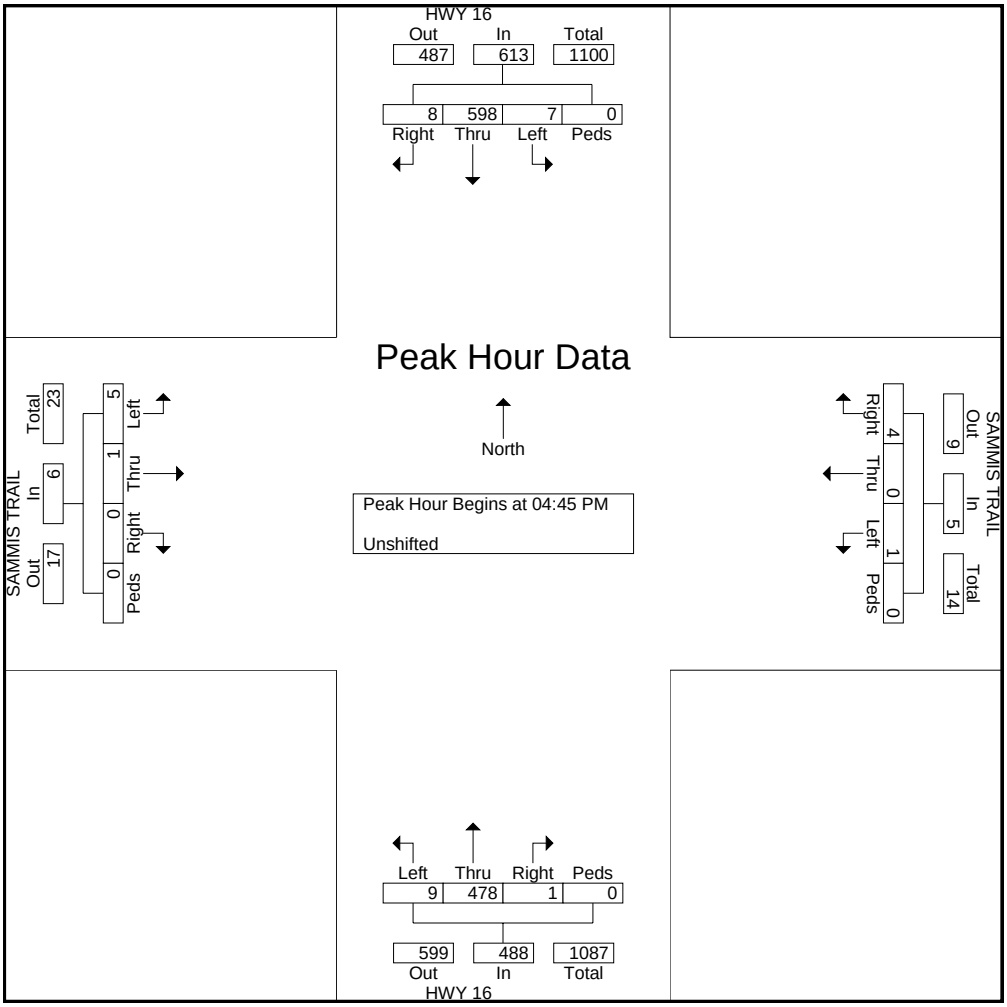
	HWY 16 Southbound				SAMMIS TRAIL Westbound				HWY 16 Northbound				SAMMIS TRAIL Eastbound				
Start Time	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Left	Thru	Right	Peds	Int. Total
04:00 PM	0	140	0	0	0	0	0	0	0	130	0	0	0	0	1	1	272
04:15 PM	0	135	0	0	0	0	3	0	0	138	0	0	1	0	0	0	277
04:30 PM	0	130	0	0	0	0	0	0	1	118	0	0	2	0	0	0	251
04:45 PM	1	142	1	0	0	0	0	0	1	149	0	0	1	0	0	0	295
Total	1	547	1	0	0	0	3	0	2	535	0	0	4	0	1	1	1095
05:00 PM	2	136	1	0	0	0	3	0	1	112	0	0	1	0	0	0	256
05:15 PM	3	178	2	0	0	0	0	0	5	96	1	0	2	0	0	0	287
05:30 PM	1	142	4	0	1	0	1	0	2	121	0	0	1	1	0	0	274
05:45 PM	1	173	3	0	0	0	1	0	4	100	0	0	1	0	0	0	283
Total	7	629	10	0	1	0	5	0	12	429	1	0	5	1	0	0	1100
Grand Total	8	1176	11	0	1	0	8	0	14	964	1	0	9	1	1	1	2195
Apprch %	0.7	98.4	0.9	0	11.1	0	88.9	0	1.4	98.5	0.1	0	75	8.3	8.3	8.3	
Total %	0.4	53.6	0.5	0	0	0	0.4	0	0.6	43.9	0	0	0.4	0	0	0	



All Traffic Data Services, Inc.
9660 W. 44th Ave.
Wheat Ridge, CO 80033

File Name : SAMMIS&SH16PM
Site Code : 00000000
Start Date : 8/28/2007
Page No : 2

	HWY 16 Southbound					SAMMIS TRAIL Westbound					HWY 16 Northbound					SAMMIS TRAIL Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	1	142	1	0	144	0	0	0	0	0	1	149	0	0	150	1	0	0	0	1	295
05:00 PM	2	136	1	0	139	0	0	3	0	3	1	112	0	0	113	1	0	0	0	1	256
05:15 PM	3	178	2	0	183	0	0	0	0	0	5	96	1	0	102	2	0	0	0	2	287
05:30 PM	1	142	4	0	147	1	0	1	0	2	2	121	0	0	123	1	1	0	0	2	274
Total Volume	7	598	8	0	613	1	0	4	0	5	9	478	1	0	488	5	1	0	0	6	1112
% App. Total	1.1	97.6	1.3	0		20	0	80	0		1.8	98	0.2	0		83.3	16.7	0	0		
PHF	.583	.840	.500	.000	.837	.250	.000	.333	.000	.417	.450	.802	.250	.000	.813	.625	.250	.000	.000	.750	.942



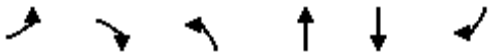
All Traffic Data Services, Inc.
9660 W 44th Ave
Wheat Ridge, CO 80033
www.alltrafficdata.net

SAMMIS TRAIL E/O SH16

Site Code: 1

Start Time	28-Aug-07 Tue	EB	WB	Total
12:00 AM		0	0	0
01:00		0	0	0
02:00		0	0	0
03:00		0	0	0
04:00		0	0	0
05:00		0	2	2
06:00		4	3	7
07:00		7	9	16
08:00		0	6	6
09:00		**8**	**10**	**18**
10:00		2	4	6
11:00		1	1	2
12:00 PM		2	2	4
01:00		1	1	2
02:00		2	3	5
03:00		2	2	4
04:00		1	3	4
05:00		8	6	**14**
06:00		**10**	2	12
07:00		7	3	10
08:00		3	2	5
09:00		1	**8**	9
10:00		2	0	2
11:00		2	0	2
Total		63	67	130
Percent		48.5%	51.5%	
AM Peak		09:00	09:00	09:00
Vol.		8	10	18
PM Peak		18:00	21:00	17:00
Vol.		10	8	14
Grand Total		63	67	130
Percent		48.5%	51.5%	
ADT		Not Calculated		

APPENDIX B EXISTING TRAFFIC LEVEL OF SERVICE WORKSHEETS



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	95	16	19	563	273	36
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	103	17	21	612	297	39
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	644	148	336			
vC1, stage 1 conf vol	297					
vC2, stage 2 conf vol	347					
vCu, unblocked vol	644	148	336			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	82	98	98			
cM capacity (veh/h)	584	872	1220			

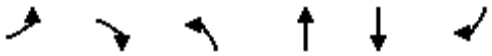
Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	103	17	21	306	306	148	148	39
Volume Left	103	0	21	0	0	0	0	0
Volume Right	0	17	0	0	0	0	0	39
cSH	584	872	1220	1700	1700	1700	1700	1700
Volume to Capacity	0.18	0.02	0.02	0.18	0.18	0.09	0.09	0.02
Queue Length 95th (ft)	16	2	1	0	0	0	0	0
Control Delay (s)	12.5	9.2	8.0	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	A	A					
Approach Delay (s)	12.0		0.3			0.0		
Approach LOS	B							

Intersection Summary			
Average Delay	1.5		
Intersection Capacity Utilization	27.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	7	0	1	1	0	10	12	567	2	4	278	14
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	8	0	1	1	0	11	13	616	2	4	302	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	656	955	151	804	970	309	317			618		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	656	955	151	804	970	309	317			618		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	98	100	100	100	100	98	99			100		
cM capacity (veh/h)	341	253	868	271	248	687	1239			958		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	9	12	13	411	208	105	201	15
Volume Left	8	1	13	0	0	4	0	0
Volume Right	1	11	0	0	2	0	0	15
cSH	369	602	1239	1700	1700	958	1700	1700
Volume to Capacity	0.02	0.02	0.01	0.24	0.12	0.00	0.12	0.01
Queue Length 95th (ft)	2	2	1	0	0	0	0	0
Control Delay (s)	15.0	11.1	7.9	0.0	0.0	0.4	0.0	0.0
Lane LOS	B	B	A			A		
Approach Delay (s)	15.0	11.1	0.2			0.1		
Approach LOS	B	B						

Intersection Summary				
Average Delay	0.4			
Intersection Capacity Utilization	32.4%	ICU Level of Service	A	
Analysis Period (min)	15			



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	64	21	22	461	582	89
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	70	23	24	501	633	97
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	TWLTL	
Median storage veh)					2	
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	931	316	729			
vC1, stage 1 conf vol	633					
vC2, stage 2 conf vol	298					
vCu, unblocked vol	931	316	729			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)	5.8					
tF (s)	3.5	3.3	2.2			
p0 queue free %	84	97	97			
cM capacity (veh/h)	445	679	870			

Direction, Lane #	EB 1	EB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	70	23	24	251	251	316	316	97
Volume Left	70	0	24	0	0	0	0	0
Volume Right	0	23	0	0	0	0	0	97
cSH	445	679	870	1700	1700	1700	1700	1700
Volume to Capacity	0.16	0.03	0.03	0.15	0.15	0.19	0.19	0.06
Queue Length 95th (ft)	14	3	2	0	0	0	0	0
Control Delay (s)	14.6	10.5	9.3	0.0	0.0	0.0	0.0	0.0
Lane LOS	B	B	A					
Approach Delay (s)	13.6		0.4			0.0		
Approach LOS	B							

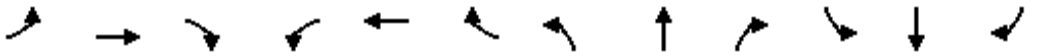
Intersection Summary			
Average Delay	1.1		
Intersection Capacity Utilization	28.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	5	1	0	1	0	4	9	478	1	7	598	8
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	5	1	0	1	0	4	10	520	1	8	650	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	949	1205	325	880	1214	260	659			521		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	949	1205	325	880	1214	260	659			521		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	99	100	100	100	99	99			99		
cM capacity (veh/h)	211	179	671	237	177	738	925			1042		

Direction, Lane #	EB 1	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	7	5	10	346	174	224	433	9
Volume Left	5	1	10	0	0	8	0	0
Volume Right	0	4	0	0	1	0	0	9
cSH	205	519	925	1700	1700	1042	1700	1700
Volume to Capacity	0.03	0.01	0.01	0.20	0.10	0.01	0.25	0.01
Queue Length 95th (ft)	2	1	1	0	0	1	0	0
Control Delay (s)	23.1	12.0	8.9	0.0	0.0	0.4	0.0	0.0
Lane LOS	C	B	A			A		
Approach Delay (s)	23.1	12.0	0.2			0.1		
Approach LOS	C	B						

Intersection Summary				
Average Delay	0.3			
Intersection Capacity Utilization	31.5%	ICU Level of Service	A	
Analysis Period (min)	15			

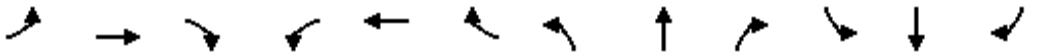
APPENDIX C BACKGROUND TRAFFIC LEVEL OF SERVICE WORKSHEETS



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	100	5	15	5	5	10	30	600	5	5	310	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	109	5	16	5	5	11	33	652	5	5	337	38
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	753	1071	168	918	1106	329	375			658		
vC1, stage 1 conf vol	348	348		720	720							
vC2, stage 2 conf vol	405	723		198	386							
vCu, unblocked vol	753	1071	168	918	1106	329	375			658		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	77	99	98	98	99	98	97			99		
cM capacity (veh/h)	475	376	846	355	371	667	1180			926		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	109	22	5	16	33	435	223	5	168	168	38
Volume Left	109	0	5	0	33	0	0	5	0	0	0
Volume Right	0	16	0	11	0	0	5	0	0	0	38
cSH	475	644	355	527	1180	1700	1700	926	1700	1700	1700
Volume to Capacity	0.23	0.03	0.02	0.03	0.03	0.26	0.13	0.01	0.10	0.10	0.02
Queue Length 95th (ft)	22	3	1	2	2	0	0	0	0	0	0
Control Delay (s)	14.8	10.8	15.3	12.1	8.1	0.0	0.0	8.9	0.0	0.0	0.0
Lane LOS	B	B	C	B	A			A			
Approach Delay (s)	14.1		12.9		0.4			0.1			
Approach LOS	B		B								

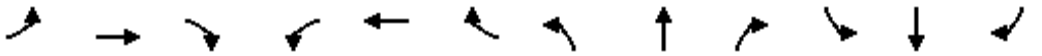
Intersection Summary					
Average Delay	2.0				
Intersection Capacity Utilization	42.3%	ICU Level of Service		A	
Analysis Period (min)	15				



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	70	5	20	5	5	5	30	490	5	5	660	90
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	76	5	22	5	5	5	33	533	5	5	717	98
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1068	1332	359	995	1427	269	815			538		
vC1, stage 1 conf vol	728	728		601	601							
vC2, stage 2 conf vol	340	603		394	826							
vCu, unblocked vol	1068	1332	359	995	1427	269	815			538		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	78	98	97	99	98	99	96			99		
cM capacity (veh/h)	341	335	638	369	297	729	808			1026		

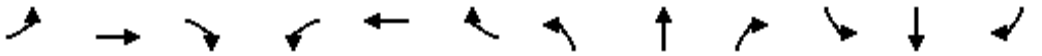
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	76	27	5	11	33	355	183	5	359	359	98
Volume Left	76	0	5	0	33	0	0	5	0	0	0
Volume Right	0	22	0	5	0	0	5	0	0	0	98
cSH	341	540	369	422	808	1700	1700	1026	1700	1700	1700
Volume to Capacity	0.22	0.05	0.01	0.03	0.04	0.21	0.11	0.01	0.21	0.21	0.06
Queue Length 95th (ft)	21	4	1	2	3	0	0	0	0	0	0
Control Delay (s)	18.5	12.0	14.9	13.8	9.6	0.0	0.0	8.5	0.0	0.0	0.0
Lane LOS	C	B	B	B	A			A			
Approach Delay (s)	16.8		14.1		0.6			0.1			
Approach LOS	C		B								

Intersection Summary				
Average Delay	1.5			
Intersection Capacity Utilization	42.1%	ICU Level of Service		A
Analysis Period (min)	15			



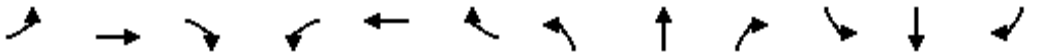
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	5	15	5	5	10	30	600	5	5	310	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.90		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1650		1770	1671		1770	3535		1770	3539	1583
Flt Permitted	0.75	1.00		0.74	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1392	1650		1385	1671		1770	3535		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)	109	5	16	5	5	11	33	652	5	5	337	38
RTOR Reduction (vph)	0	13	0	0	9	0	0	1	0	0	0	19
Lane Group Flow (vph)	109	8	0	5	7	0	33	656	0	5	337	19
Turn Type	Perm			Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	7.2	7.2		7.2	7.2		1.1	19.9		0.9	19.7	19.7
Effective Green, g (s)	7.2	7.2		7.2	7.2		1.1	19.9		0.9	19.7	19.7
Actuated g/C Ratio	0.18	0.18		0.18	0.18		0.03	0.50		0.02	0.49	0.49
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	251	297		249	301		49	1759		40	1743	780
v/s Ratio Prot		0.00			0.00		c0.02	c0.19		0.00	0.10	
v/s Ratio Perm	c0.08			0.00								0.01
v/c Ratio	0.43	0.03		0.02	0.02		0.67	0.37		0.12	0.19	0.02
Uniform Delay, d1	14.6	13.5		13.5	13.5		19.3	6.2		19.2	5.7	5.2
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	0.0		0.0	0.0		30.8	0.1		1.4	0.1	0.0
Delay (s)	15.8	13.5		13.5	13.5		50.1	6.3		20.6	5.7	5.2
Level of Service	B	B		B	B		D	A		C	A	A
Approach Delay (s)		15.4			13.5			8.4			5.9	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	8.5	HCM Level of Service	A
HCM Volume to Capacity ratio	0.35		
Actuated Cycle Length (s)	40.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.3%	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												
Volume (vph)	70	5	20	5	5	5	30	490	5	5	660	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.88		1.00	0.92		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1635		1770	1723		1770	3534		1770	3539	1583
Flt Permitted	0.75	1.00		0.74	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1399	1635		1378	1723		1770	3534		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)	76	5	22	5	5	5	33	533	5	5	717	98
RTOR Reduction (vph)	0	19	0	0	4	0	0	1	0	0	0	45
Lane Group Flow (vph)	76	8	0	5	6	0	33	537	0	5	717	53
Turn Type	Perm			Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	6.5	6.5		6.5	6.5		1.2	23.7		0.9	23.4	23.4
Effective Green, g (s)	6.5	6.5		6.5	6.5		1.2	23.7		0.9	23.4	23.4
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.03	0.55		0.02	0.54	0.54
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	211	247		208	260		49	1943		37	1921	859
v/s Ratio Prot		0.01			0.00		c0.02	0.15		0.00	c0.20	
v/s Ratio Perm	c0.05			0.00								0.03
v/c Ratio	0.36	0.03		0.02	0.02		0.67	0.28		0.14	0.37	0.06
Uniform Delay, d1	16.4	15.6		15.6	15.6		20.8	5.1		20.7	5.6	4.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.1	0.1		0.0	0.0		30.8	0.1		1.7	0.1	0.0
Delay (s)	17.5	15.7		15.6	15.6		51.6	5.2		22.4	5.8	4.7
Level of Service	B	B		B	B		D	A		C	A	A
Approach Delay (s)		17.0			15.6			7.9			5.7	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	7.4	HCM Level of Service	A
HCM Volume to Capacity ratio	0.38		
Actuated Cycle Length (s)	43.1	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.1%	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												
Volume (veh/h)	170	60	25	260	60	190	5	930	245	230	480	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	185	65	27	283	65	207	5	1011	266	250	522	38
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1777	2310	261	1976	2215	639	560			1277		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1777	2310	261	1976	2215	639	560			1277		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	96	0	0	51	99			54		
cM capacity (veh/h)	0	20	738	0	23	419	1007			539		

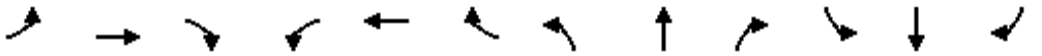
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	185	92	283	272	5	674	603	424	348	38
Volume Left	185	0	283	0	5	0	0	250	0	0
Volume Right	0	27	0	207	0	0	266	0	0	38
cSH	0	28	0	82	1007	1700	1700	539	1700	1700
Volume to Capacity	Err	3.28	Err	3.32	0.01	0.40	0.35	0.46	0.20	0.02
Queue Length 95th (ft)	Err	Err	Err	Err	0	0	0	61	0	0
Control Delay (s)	Err	Err	Err	Err	8.6	0.0	0.0	13.9	0.0	0.0
Lane LOS	F	F	F	F	A			B		
Approach Delay (s)	Err		Err		0.0			7.3		
Approach LOS	F		F							

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	91.1%	ICU Level of Service	F	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	70	10	270	65	230	15	760	325	250	1025	125
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	38	76	11	293	71	250	16	826	353	272	1114	136
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2389	2870	557	2185	2829	590	1250			1179		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2389	2870	557	2185	2829	590	1250			1179		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	98	0	0	45	97			54		
cM capacity (veh/h)	0	9	474	0	9	451	553			588		

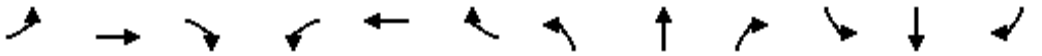
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	38	87	293	321	16	551	629	643	743	136
Volume Left	38	0	293	0	16	0	0	272	0	0
Volume Right	0	11	0	250	0	0	353	0	0	136
cSH	0	10	0	38	553	1700	1700	588	1700	1700
Volume to Capacity	Err	8.97	Err	8.37	0.03	0.32	0.37	0.46	0.44	0.08
Queue Length 95th (ft)	Err	Err	Err	Err	2	0	0	61	0	0
Control Delay (s)	Err	Err	Err	Err	11.7	0.0	0.0	12.4	0.0	0.0
Lane LOS	F	F	F	F	B			B		
Approach Delay (s)	Err		Err		0.2			5.3		
Approach LOS	F		F							

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	101.2%	ICU Level of Service	G	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	170	60	25	260	60	190	5	930	245	230	480	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1781		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1781		3433	1863	1583	1770	3539	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)	185	65	27	283	65	207	5	1011	266	250	522	38
RTOR Reduction (vph)	0	16	0	0	0	185	0	0	168	0	0	17
Lane Group Flow (vph)	185	76	0	283	65	22	5	1011	98	250	522	21
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	12.9	8.8		14.5	10.4	10.4	1.3	36.9	36.9	18.8	54.4	54.4
Effective Green, g (s)	12.9	8.8		14.5	10.4	10.4	1.3	36.9	36.9	18.8	54.4	54.4
Actuated g/C Ratio	0.13	0.09		0.14	0.10	0.10	0.01	0.37	0.37	0.19	0.54	0.54
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
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)	228	157		498	194	165	23	1306	584	333	1925	861
v/s Ratio Prot	c0.10	c0.04		0.08	0.03		0.00	c0.29		c0.14	0.15	
v/s Ratio Perm						0.01			0.06			0.01
v/c Ratio	0.81	0.48		0.57	0.34	0.13	0.22	0.77	0.17	0.75	0.27	0.02
Uniform Delay, d1	42.4	43.4		39.8	41.6	40.7	48.8	27.9	21.2	38.4	12.2	10.5
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	19.3	2.3		1.5	1.0	0.4	4.7	4.5	0.6	9.2	0.3	0.1
Delay (s)	61.6	45.7		41.3	42.6	41.1	53.6	32.4	21.8	47.6	12.5	10.6
Level of Service	E	D		D	D	D	D	C	C	D	B	B
Approach Delay (s)		56.4			41.4			30.3			23.3	
Approach LOS		E			D			C			C	

Intersection Summary			
HCM Average Control Delay	32.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.73		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	67.9%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	70	10	270	65	230	15	760	325	250	1025	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1827		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1827		3433	1863	1583	1770	3539	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)	38	76	11	293	71	250	16	826	353	272	1114	136
RTOR Reduction (vph)	0	5	0	0	0	205	0	0	222	0	0	62
Lane Group Flow (vph)	38	82	0	293	71	45	16	826	131	272	1114	74
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	4.0	9.6		12.4	18.0	18.0	2.7	37.2	37.2	19.8	54.3	54.3
Effective Green, g (s)	4.0	9.6		12.4	18.0	18.0	2.7	37.2	37.2	19.8	54.3	54.3
Actuated g/C Ratio	0.04	0.10		0.12	0.18	0.18	0.03	0.37	0.37	0.20	0.54	0.54
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
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)	71	175		426	335	285	48	1317	589	350	1922	860
v/s Ratio Prot	0.02	c0.04		c0.09	0.04		0.01	c0.23		c0.15	0.31	
v/s Ratio Perm						0.03			0.08			0.05
v/c Ratio	0.54	0.47		0.69	0.21	0.16	0.33	0.63	0.22	0.78	0.58	0.09
Uniform Delay, d1	47.1	42.8		41.9	35.0	34.6	47.8	25.7	21.5	38.0	15.2	11.0
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	7.6	2.0		4.6	0.3	0.3	4.1	2.3	0.9	10.4	1.3	0.2
Delay (s)	54.6	44.7		46.5	35.3	34.9	51.8	28.0	22.4	48.4	16.5	11.1
Level of Service	D	D		D	D	C	D	C	C	D	B	B
Approach Delay (s)		47.7			40.5			26.7			21.7	
Approach LOS		D			D			C			C	

Intersection Summary			
HCM Average Control Delay	27.7	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	62.6%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

APPENDIX D TOTAL TRAFFIC LEVEL OF SERVICE WORKSHEETS

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	100	5	15	10	5	25	30	600	5	10	310	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	109	5	16	11	5	27	33	652	5	11	337	38
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	780	1082	168	929	1117	329	375			658		
vC1, stage 1 conf vol	359	359		720	720							
vC2, stage 2 conf vol	421	723		209	397							
vCu, unblocked vol	780	1082	168	929	1117	329	375			658		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	99	98	97	99	96	97			99		
cM capacity (veh/h)	452	370	846	353	369	667	1180			926		

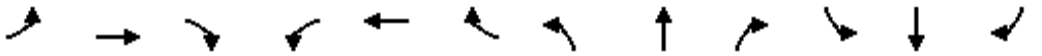
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	109	22	11	33	33	435	223	11	168	168	38
Volume Left	109	0	11	0	33	0	0	11	0	0	0
Volume Right	0	16	0	27	0	0	5	0	0	0	38
cSH	452	640	353	588	1180	1700	1700	926	1700	1700	1700
Volume to Capacity	0.24	0.03	0.03	0.06	0.03	0.26	0.13	0.01	0.10	0.10	0.02
Queue Length 95th (ft)	23	3	2	4	2	0	0	1	0	0	0
Control Delay (s)	15.5	10.8	15.5	11.5	8.1	0.0	0.0	8.9	0.0	0.0	0.0
Lane LOS	C	B	C	B	A			A			
Approach Delay (s)	14.7		12.5		0.4			0.3			
Approach LOS	B		B								

Intersection Summary				
Average Delay	2.3			
Intersection Capacity Utilization	42.3%	ICU Level of Service	A	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	70	5	20	10	5	15	30	490	10	20	660	90
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	76	5	22	11	5	16	33	533	11	22	717	98
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			TWLTL	
Median storage veh)											2	
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1111	1370	359	1030	1462	272	815			543		
vC1, stage 1 conf vol	761	761		603	603							
vC2, stage 2 conf vol	351	609		427	859							
vCu, unblocked vol	1111	1370	359	1030	1462	272	815			543		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)	6.5	5.5		6.5	5.5							
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	76	98	97	97	98	98	96			98		
cM capacity (veh/h)	320	318	638	358	285	726	808			1022		

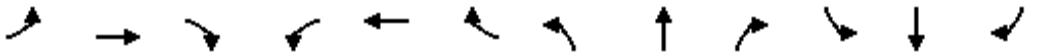
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3	SB 4
Volume Total	76	27	11	22	33	355	188	22	359	359	98
Volume Left	76	0	11	0	33	0	0	22	0	0	0
Volume Right	0	22	0	16	0	0	11	0	0	0	98
cSH	320	531	358	523	808	1700	1700	1022	1700	1700	1700
Volume to Capacity	0.24	0.05	0.03	0.04	0.04	0.21	0.11	0.02	0.21	0.21	0.06
Queue Length 95th (ft)	23	4	2	3	3	0	0	2	0	0	0
Control Delay (s)	19.7	12.1	15.4	12.2	9.6	0.0	0.0	8.6	0.0	0.0	0.0
Lane LOS	C	B	C	B	A			A			
Approach Delay (s)	17.7		13.2		0.5			0.2			
Approach LOS	C		B								

Intersection Summary				
Average Delay	1.8			
Intersection Capacity Utilization	42.1%	ICU Level of Service	A	
Analysis Period (min)	15			



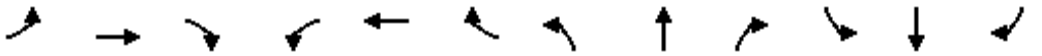
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	100	5	15	10	5	25	30	600	5	10	310	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.89		1.00	0.87		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1650		1770	1627		1770	3535		1770	3539	1583
Flt Permitted	0.74	1.00		0.74	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1372	1650		1385	1627		1770	3535		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)	109	5	16	11	5	27	33	652	5	11	337	38
RTOR Reduction (vph)	0	13	0	0	22	0	0	1	0	0	0	20
Lane Group Flow (vph)	109	8	0	11	10	0	33	656	0	11	337	18
Turn Type	Perm			Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	7.3	7.3		7.3	7.3		1.1	19.2		0.9	19.0	19.0
Effective Green, g (s)	7.3	7.3		7.3	7.3		1.1	19.2		0.9	19.0	19.0
Actuated g/C Ratio	0.19	0.19		0.19	0.19		0.03	0.49		0.02	0.48	0.48
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	254	306		257	301		49	1723		40	1707	763
v/s Ratio Prot		0.00			0.01		c0.02	c0.19		0.01	0.10	
v/s Ratio Perm	c0.08			0.01								0.01
v/c Ratio	0.43	0.03		0.04	0.03		0.67	0.38		0.28	0.20	0.02
Uniform Delay, d1	14.2	13.1		13.2	13.2		19.0	6.4		18.9	5.8	5.3
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.2	0.0		0.1	0.0		30.8	0.1		3.7	0.1	0.0
Delay (s)	15.4	13.2		13.2	13.2		49.8	6.5		22.6	5.9	5.4
Level of Service	B	B		B	B		D	A		C	A	A
Approach Delay (s)		15.0			13.2			8.6			6.3	
Approach LOS		B			B			A			A	

Intersection Summary			
HCM Average Control Delay	8.7	HCM Level of Service	A
HCM Volume to Capacity ratio	0.36		
Actuated Cycle Length (s)	39.4	Sum of lost time (s)	8.0
Intersection Capacity Utilization	42.3%	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												
Volume (vph)	70	5	20	10	5	15	30	490	10	20	660	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	0.95		1.00	0.95	1.00
Frt	1.00	0.88		1.00	0.89		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1770	1635		1770	1650		1770	3528		1770	3539	1583
Flt Permitted	0.74	1.00		0.74	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1385	1635		1378	1650		1770	3528		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)	76	5	22	11	5	16	33	533	11	22	717	98
RTOR Reduction (vph)	0	19	0	0	14	0	0	1	0	0	0	46
Lane Group Flow (vph)	76	8	0	11	7	0	33	543	0	22	717	52
Turn Type	Perm			Perm			Prot			Prot		Perm
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8								6
Actuated Green, G (s)	6.5	6.5		6.5	6.5		1.1	22.6		1.1	22.6	22.6
Effective Green, g (s)	6.5	6.5		6.5	6.5		1.1	22.6		1.1	22.6	22.6
Actuated g/C Ratio	0.15	0.15		0.15	0.15		0.03	0.54		0.03	0.54	0.54
Clearance Time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	213	252		212	254		46	1889		46	1895	848
v/s Ratio Prot		0.01			0.00		c0.02	0.15		0.01	c0.20	
v/s Ratio Perm	c0.05			0.01								0.03
v/c Ratio	0.36	0.03		0.05	0.03		0.72	0.29		0.48	0.38	0.06
Uniform Delay, d1	16.0	15.2		15.2	15.2		20.4	5.4		20.3	5.7	4.7
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.0	0.1		0.1	0.0		41.5	0.1		7.6	0.1	0.0
Delay (s)	17.0	15.2		15.3	15.2		61.9	5.5		27.9	5.8	4.7
Level of Service	B	B		B	B		E	A		C	A	A
Approach Delay (s)		16.5			15.3			8.7			6.3	
Approach LOS		B			B			A			A	

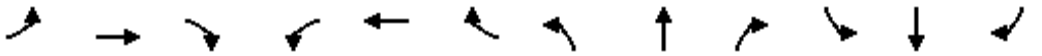
Intersection Summary			
HCM Average Control Delay	8.0	HCM Level of Service	A
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	42.2	Sum of lost time (s)	12.0
Intersection Capacity Utilization	42.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	170	65	25	285	75	290	5	930	255	265	480	35
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	185	71	27	310	82	315	5	1011	277	288	522	38
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1970	2397	261	2060	2296	644	560			1288		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1970	2397	261	2060	2296	644	560			1288		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	96	0	0	24	99			46		
cM capacity (veh/h)	0	15	738	0	18	416	1007			534		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	185	98	310	397	5	674	614	462	348	38
Volume Left	185	0	310	0	5	0	0	288	0	0
Volume Right	0	27	0	315	0	0	277	0	0	38
cSH	0	21	0	74	1007	1700	1700	534	1700	1700
Volume to Capacity	Err	4.70	Err	5.39	0.01	0.40	0.36	0.54	0.20	0.02
Queue Length 95th (ft)	Err	Err	Err	Err	0	0	0	80	0	0
Control Delay (s)	Err	Err	Err	Err	8.6	0.0	0.0	16.4	0.0	0.0
Lane LOS	F	F	F	F	A			C		
Approach Delay (s)	Err		Err		0.0			9.0		
Approach LOS	F		F							

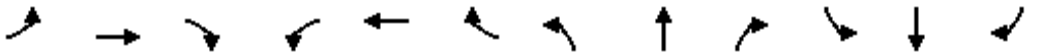
Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	99.4%	ICU Level of Service	F	
Analysis Period (min)	15			



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	35	90	10	285	75	295	15	760	350	360	1025	125
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			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
Hourly flow rate (vph)	38	98	11	310	82	321	16	826	380	391	1114	136
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2704	3136	557	2448	3082	603	1250			1207		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2704	3136	557	2448	3082	603	1250			1207		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	98	0	0	27	97			32		
cM capacity (veh/h)	0	3	474	0	4	442	553			574		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	38	109	310	402	16	551	656	763	743	136
Volume Left	38	0	310	0	16	0	0	391	0	0
Volume Right	0	11	0	321	0	0	380	0	0	136
cSH	0	4	0	17	553	1700	1700	574	1700	1700
Volume to Capacity	Err	29.20	Err	23.10	0.03	0.32	0.39	0.68	0.44	0.08
Queue Length 95th (ft)	Err	Err	Err	Err	2	0	0	131	0	0
Control Delay (s)	Err	Err	Err	Err	11.7	0.0	0.0	22.2	0.0	0.0
Lane LOS	F	F	F	F	B			C		
Approach Delay (s)	Err		Err		0.2			10.3		
Approach LOS	F		F							

Intersection Summary				
Average Delay	Err			
Intersection Capacity Utilization	109.8%	ICU Level of Service	H	
Analysis Period (min)	15			



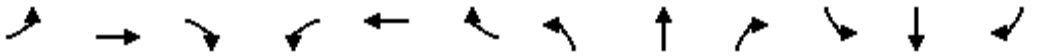
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	170	65	25	285	75	290	5	930	255	265	480	35
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.96		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1786		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.70	1.00		0.58	1.00	1.00	0.46	1.00	1.00	0.14	1.00	1.00
Satd. Flow (perm)	1311	1786		2089	1863	1583	854	3539	1583	267	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)	185	71	27	310	82	315	5	1011	277	288	522	38
RTOR Reduction (vph)	0	15	0	0	0	261	0	0	160	0	0	16
Lane Group Flow (vph)	185	83	0	310	82	54	5	1011	117	288	522	22
Turn Type	pm+pt			pm+pt		Perm	pm+pt		Perm	pm+pt		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8		8	2		2	6		6
Actuated Green, G (s)	19.8	9.7		23.2	11.4	11.4	43.0	42.1	42.1	62.5	56.6	56.6
Effective Green, g (s)	19.8	9.7		23.2	11.4	11.4	43.0	42.1	42.1	62.5	56.6	56.6
Actuated g/C Ratio	0.20	0.10		0.23	0.11	0.11	0.43	0.42	0.42	0.62	0.57	0.57
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
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)	306	173		643	212	180	375	1490	666	398	2003	896
v/s Ratio Prot	c0.06	0.05		0.06	0.04		0.00	0.29		c0.11	0.15	
v/s Ratio Perm	c0.06			0.05		0.03	0.01		0.07	c0.34		0.01
v/c Ratio	0.60	0.48		0.48	0.39	0.30	0.01	0.68	0.18	0.72	0.26	0.02
Uniform Delay, d1	35.9	42.8		32.4	41.1	40.6	16.3	23.5	18.1	15.9	11.0	9.5
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	3.4	2.1		0.6	1.2	0.9	0.0	2.5	0.6	6.4	0.3	0.0
Delay (s)	39.3	44.8		33.0	42.2	41.6	16.3	26.0	18.7	22.3	11.4	9.6
Level of Service	D	D		C	D	D	B	C	B	C	B	A
Approach Delay (s)		41.2			37.9			24.4			15.0	
Approach LOS		D			D			C			B	

Intersection Summary			
HCM Average Control Delay	26.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	15.0
Intersection Capacity Utilization	69.8%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	105	50	5	115	155	10
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	114	54	5	125	168	11
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			168		277	141
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			168		277	141
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		76	99
cM capacity (veh/h)			1409		710	907

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	168	5	125	168	11
Volume Left	0	5	0	168	0
Volume Right	54	0	0	0	11
cSH	1700	1409	1700	710	907
Volume to Capacity	0.10	0.00	0.07	0.24	0.01
Queue Length 95th (ft)	0	0	0	23	1
Control Delay (s)	0.0	7.6	0.0	11.6	9.0
Lane LOS		A		B	A
Approach Delay (s)	0.0	0.3		11.5	
Approach LOS				B	

Intersection Summary			
Average Delay	4.4		
Intersection Capacity Utilization	23.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	35	90	10	285	75	295	15	760	350	360	1025	125
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
Lane Util. Factor	1.00	1.00		0.97	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt	1.00	0.98		1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1770	1835		3433	1863	1583	1770	3539	1583	1770	3539	1583
Flt Permitted	0.95	1.00		0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1770	1835		3433	1863	1583	1770	3539	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)	38	98	11	310	82	321	16	826	380	391	1114	136
RTOR Reduction (vph)	0	4	0	0	0	252	0	0	276	0	0	66
Lane Group Flow (vph)	38	105	0	310	82	69	16	826	104	391	1114	70
Turn Type	Prot			Prot		Perm	Prot		Perm	Prot		Perm
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases						8			2			6
Actuated Green, G (s)	3.8	12.8		12.4	21.4	21.4	2.2	27.3	27.3	26.5	51.6	51.6
Effective Green, g (s)	3.8	12.8		12.4	21.4	21.4	2.2	27.3	27.3	26.5	51.6	51.6
Actuated g/C Ratio	0.04	0.13		0.12	0.21	0.21	0.02	0.27	0.27	0.26	0.52	0.52
Clearance Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	6.0	6.0	5.0	6.0	6.0
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)	67	235		426	399	339	39	966	432	469	1826	817
v/s Ratio Prot	0.02	c0.06		c0.09	0.04		0.01	c0.23		c0.22	0.31	
v/s Ratio Perm						0.04			0.07			0.04
v/c Ratio	0.57	0.45		0.73	0.21	0.20	0.41	0.86	0.24	0.83	0.61	0.09
Uniform Delay, d1	47.3	40.3		42.2	32.3	32.3	48.3	34.5	28.3	34.7	17.1	12.3
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	10.6	1.3		6.1	0.3	0.3	6.9	9.6	1.3	12.1	1.5	0.2
Delay (s)	57.8	41.7		48.3	32.6	32.6	55.1	44.1	29.6	46.7	18.6	12.5
Level of Service	E	D		D	C	C	E	D	C	D	B	B
Approach Delay (s)		45.8			39.4			39.7			24.8	
Approach LOS		D			D			D			C	

Intersection Summary			
HCM Average Control Delay	33.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	100.0	Sum of lost time (s)	21.0
Intersection Capacity Utilization	69.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	145	180	10	120	105	5
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	158	196	11	130	114	5
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			353		408	255
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			353		408	255
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		81	99
cM capacity (veh/h)			1205		594	783

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	NB 2
Volume Total	353	11	130	114	5
Volume Left	0	11	0	114	0
Volume Right	196	0	0	0	5
cSH	1700	1205	1700	594	783
Volume to Capacity	0.21	0.01	0.08	0.19	0.01
Queue Length 95th (ft)	0	1	0	18	1
Control Delay (s)	0.0	8.0	0.0	12.5	9.6
Lane LOS		A		B	A
Approach Delay (s)	0.0	0.6		12.4	
Approach LOS				B	

Intersection Summary			
Average Delay	2.5		
Intersection Capacity Utilization	31.1%	ICU Level of Service	A
Analysis Period (min)	15		