



needs to be updated for new design

LSC TRANSPORTATION CONSULTANTS, INC.

516 North Tejon Street  
Colorado Springs, CO 80903  
(719) 633-2868  
FAX (719) 633-5430  
E-mail: lsc@lscs.com

September 6, 2011

Mr. David Spearman  
Place Properties Development Group, LLC  
3445 Peachtree Road NE, Suite 1400  
Atlanta, GA 30326

RE: Independence Place at Cheyenne Mountain  
Updated Report  
El Paso County, Colorado  
LSC #104740

Dear Mr. Spearman:

In response to your request, LSC Transportation Consultants, Inc. has completed this updated traffic impact and access analysis for the proposed Independence Place at Cheyenne Mountain site 240-unit apartment development to be located southwest of the intersection of Venetucci Boulevard and Bob Johnson Drive in unincorporated El Paso County, Colorado. Figure 1 shows the site location. One full-movement site access points is proposed to Venetucci Boulevard at the current intersection with Bob Johnson Drive and one emergency-only access is proposed to Westmark Avenue. This report has been updated to show and analyze traffic signal intersection control at the main site access to Venetucci Boulevard. The previous report date was January 12, 2011.

## REPORT CONTENTS

This report is being prepared as part of a submittal to El Paso County. The report identifies the proposed access plan for the site, presents the anticipated traffic impacts of the proposed development on the adjacent roadways and presents recommended roadway system improvements to mitigate the traffic impacts. The report contains the following: a determination of the existing traffic and roadway conditions adjacent to the site including existing traffic volumes, the lane geometries and traffic controls; the projected average weekday and peak-hour vehicle-trips to be generated by the proposed development; the assignment of the projected traffic volumes to the adjacent roadways; a projection of the future background and resulting total traffic volumes; and the resulting traffic impacts. LSC has made recommendations for roadway system improvements to mitigate the anticipated traffic impacts.

VERSION # 4  
DATE 11-10-11

## **SITE DEVELOPMENT AND LAND USE**

The proposed site plan is attached. The 16-acre site is undeveloped land zoned RS-6000 Residential Suburban and RM-30 Residential Multi-Dwelling. The site is planned to contain 240 apartment units. The project would likely be developed in one phase.

One full-movement site access point is proposed to Venetucci Boulevard at the intersection with Bob Johnson Drive. This site access would form the fourth leg of this existing full-movement, three-leg intersection. Access opportunities for the site are very limited due to the topography and a lower-density residential neighborhood to the west, a vacant privately owned parcel to the north, a substandard county road, Westmark Avenue, to the south, and a Principal Arterial-classified roadway (Venetucci) with strict County access spacing criteria to the east. An emergency-only access to Westmark is proposed. This access would be gated and closed to daily use and could only be used by emergency services vehicles when necessary.

## **ROADWAY AND TRAFFIC CONDITIONS**

### **Area Roadways**

The roadway system in the vicinity of the site is shown in Figure 1. The roadways are identified below, followed by brief descriptions. Figure 2 shows the existing traffic controls and lane geometries for the intersections and roadway segments in the vicinity of the site.

- **Venetucci Boulevard** is a north/south Principal Arterial extending south from Lake Avenue to the City of Fountain. The roadway is referred to as Old Highway 85-87 south of B Street where it is classified as a Non-Rural Regional Highway (NRA) by the Colorado Department of Transportation (CDOT). It is our understanding that north of B Street, it is under City of Colorado Springs jurisdiction for maintenance. The posted speed limit on Venetucci in the vicinity of the site is 45 miles per hour (mph) south of Bob Johnson Drive and 40 mph north of Bob Johnson Drive in the City of Colorado Springs. Venetucci Boulevard is a four-lane urban arterial with auxiliary turn lanes north of Bob Johnson Drive and a two-lane rural roadway between Bob Johnson Drive and the frontage road interchange to the south. Additional merge/auxiliary lanes exist between the frontage road interchange to the south and the B Street intersection.

The intersections with Bob Johnson Drive and Westmark Avenue are unsignalized with Stop-sign traffic control for these minor side streets. The intersections with Cheyenne Meadows Drive and B Street are signalized.

### **Existing Traffic Conditions**

Figure 2 shows the current morning and afternoon peak-hour traffic volumes at the Venetucci/Bob Johnson and Venetucci/Westmark intersections. These peak-hour traffic volumes were based on manual peak-hour traffic counts conducted by LSC in November 2010. Also shown are the results of a 24-hour machine traffic count on Venetucci Boulevard just south Bob Johnson. The traffic count reports are attached. Venetucci adjacent to the site currently carries just under 12,000 vehicles per day and about 1,100 in the peak hour.

### **Existing Levels of Service**

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection. Level of service is indicated on a scale from "A" to "F." LOS A is indicative of very little congestion or delay. LOS F is indicative of a high level of congestion or delay.

The Venetucci/Bob Johnson intersection has been analyzed to determine the existing levels of service based on real time traffic simulation using the SimTraffic analysis program. The unsignalized LOS criteria is from the *Highway Capacity Manual, 2000 Edition* by the Transportation Research Board. SimTraffic was used to estimate the level of service as the simulation better accounts for traffic gaps created by the adjacent traffic signal at Cheyenne Mountain Boulevard. Figure 2 shows the level of service analysis results. The analysis reports are attached.

As shown in Table 1, all of the minor side street (from Bob Johnson) and the southbound major street left-turn movement at the analyzed intersections are currently operating at acceptable levels of service during the peak hours.

### **TRIP GENERATION**

Estimates of the traffic volumes expected to be generated by the site have been made using the nationally published trip generation rates found in *Trip Generation, 8th Edition, 2003* by the Institute of Transportation Engineers (ITE). Table 1 shows the trip generation estimate results.

As shown in Table 1, the site could be expected to generate about 1,600 vehicle-trips on the average weekday, with about 800 vehicles entering and 800 vehicles exiting the site in a 24-hour period. During the morning peak hour, which typically occurs for one hour between 6:30 and 8:30 a.m., about 25 vehicles would enter and 100 vehicles would exit the site. During the afternoon peak hour, which typically occurs for one hour between 4:30 and 6:30 p.m., about 100 vehicles would enter and 50 vehicles would exit the site. These are rounded values from the table.

### **TRIP DISTRIBUTION AND ASSIGNMENT**

The directional distribution of the site-generated traffic volumes on the adjacent roadways is an important factor in determining the development's traffic impacts. The specific distribution estimates for the site-generated traffic volumes are shown in Figure 3. The estimates were based on the

following factors: the location of the site with respect to the area employment, commercial, and activity centers including Fort Carson, Fountain, and Colorado Springs; the land use proposed for the site; the proposed access plan for the site; and the roadway network serving the site.

When the distribution percentages are applied to the trip generation estimates (from Table 1), the site-generated traffic volumes on the adjacent roadway system can be determined. Figure 3 also shows the forecasted site-generated traffic volumes.

### **EXISTING PLUS SITE-GENERATED TRAFFIC**

Figure 4 shows the sum of the existing traffic volumes (from Figure 2) plus the site-generated traffic volumes (from Figure 3). The existing plus site-generated traffic volumes identify the development's immediate/short-term impacts. The project would likely be developed in one phase.

### **2035 BACKGROUND TRAFFIC**

The background traffic volumes for the year 2035 are shown in Figure 5. Background traffic is the traffic estimated to be on the adjacent roadways without consideration of the proposed development. The background traffic volumes include increases in through traffic on Venetucci Boulevard and minor increases in traffic turning to/from Bob Johnson Drive. At this point, no background traffic turning movements have been added to the site access for potential future traffic generated by the site to the north (assuming the access is shared) due to uncertainty and numerous variables such as its site circulation and access. The study for that site would address this intersection again if the access becomes a shared access.

The 2035 background traffic volume estimates were based on LSC's previous work in the area including the *South Academy Station Traffic Impact and Access Analysis Report*. The 2035 estimates include an estimated base increase of one percent per year for 25 years on Venetucci Boulevard. Estimates of traffic estimated to be generated by the future South Academy Station development were then added on top of this base one percent increase.

### **2035 TOTAL TRAFFIC**

The total traffic volumes for the year 2035 are shown in Figure 6. The 2035 total traffic volumes are the sum of the site-generated traffic volumes (from Figure 3) plus the 2030 background traffic volumes (from Figure 5).

### **PROJECTED LEVELS OF SERVICE**

The Bob Johnson/Venetucci intersection has been analyzed to determine the projected levels of service for the existing plus site-generated and 2035 total traffic volumes using Synchro. Future background traffic level of service for Venetucci/Bob Johnson is not particularly relevant. Level of service for 2035 total traffic is shown in Figure 6.

As shown in the figure, the intersection is projected to operate at level of service A for the future short-term and long-term scenarios during the peak hours. This level of service is based on the intersection as a conventional “cross” intersection (four-leg intersection) with traffic signal control.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **Trip Generation**

1. The site is expected to generate about 1,600 vehicle-trips on the average weekday, with about 800 vehicles entering and 800 vehicles exiting the site in a 24-hour period. During the morning peak hour, about 25 vehicles would enter and 100 vehicles would exit the site. During the afternoon peak hour about 100 vehicles would enter and 50 vehicles would exit the site.

### **Projected Levels of Service**

2. Based on the long-term projected total traffic volumes, the Bob Johnson/Venetucci intersection is projected to operate at LOS A during the peak hours. This level of service represents the results of the analysis of the intersection as a conventional four-leg “cross” intersection with traffic signal intersection control.
3. The intersection would need to remain full movement. If the left/through turning movements were prohibited or restricted, there would be no way for site traffic to travel to the north without significant and unacceptable out-of-direction travel.

### **Recommended Improvements**

Figure 7 shows the recommended auxiliary lanes that need to be constructed with the project and the addition of the fourth leg (west) to the existing intersection.

1. LSC recommends that the access drive provide at least three lanes—two exiting and one entering.
2. Additional auxiliary lanes at the site access/Bob Johnson/Venetucci intersection will be required. These are shown in Figure 7:
  - A northbound left-turn deceleration lane on Venetucci—258-foot lane plus 200-foot lane bay taper
  - A southbound right-turn deceleration lane on Venetucci—200-foot lane plus 180-foot approach taper.
  - South of the intersection, use redirect tapers of 45:1 for redirecting the through lanes when designing the new northbound left-turn lane.

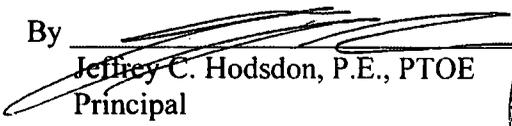
The project should reserve one-half of the remaining ultimate required right-of-way for an Urban Principal Arterial along the site frontage.

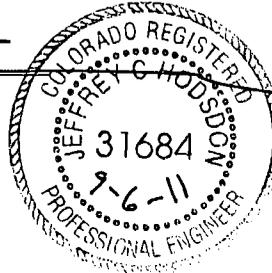
\* \* \* \* \*

We trust that this traffic impact and access analysis will assist you in gaining approval of the proposed residential apartment development. Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By   
Jeffrey C. Hodsdon, P.E., PTOE  
Principal



JCH:bjwb

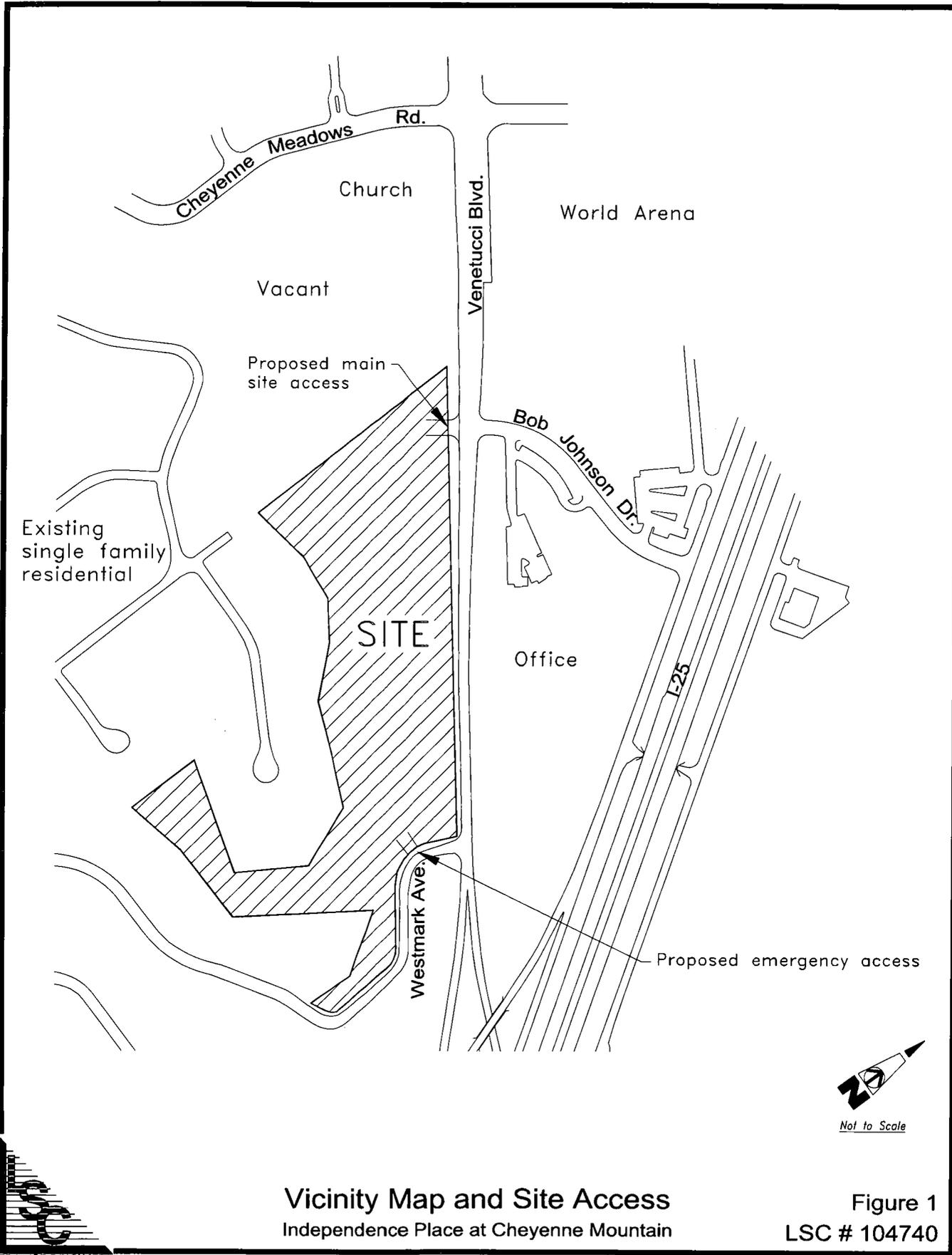
Enclosures: Table 1  
Figures 1-7  
Traffic Count Reports  
Level of Service Reports

**Table 1**  
**Trip Generation Estimate**  
**Independence Place at Cheyenne Mountain**

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates <sup>(1)</sup>				Total Trips Generated					
			Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour	
				In	Out	In	Out		In	Out	In	Out
220	Apartment	240 DU <sup>(2)</sup>	6.65	0.10	0.41	0.40	0.22	1,596	24	98	96	53

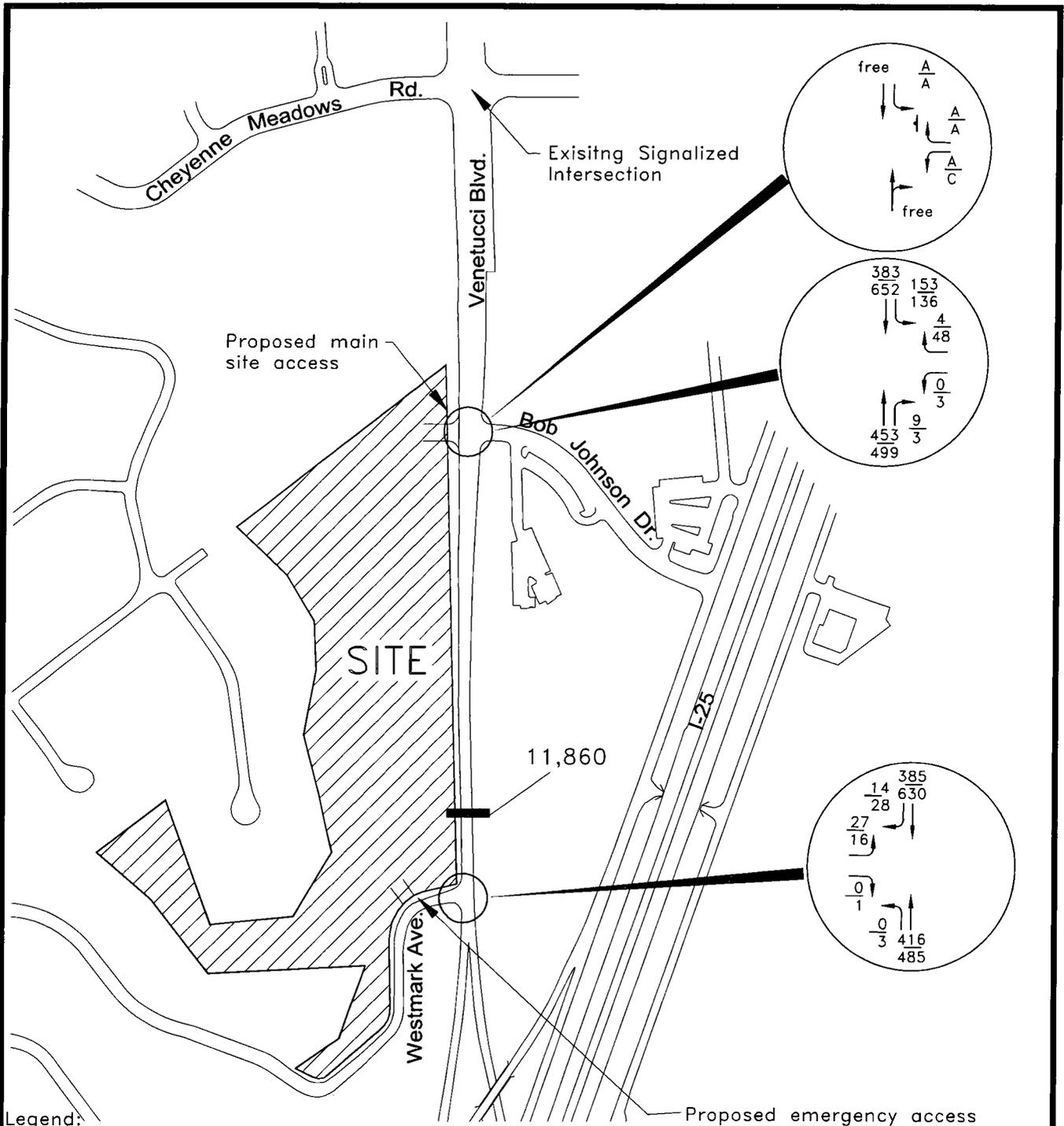
Notes:  
(1) Source: "Trip Generation, 8th Edition" by the Institute of Transportation Engineers  
(2) DU = dwelling unit

Source: LSC Transportation Consultants, Inc.



Vicinity Map and Site Access  
 Independence Place at Cheyenne Mountain

Figure 1  
 LSC # 104740



Legend:

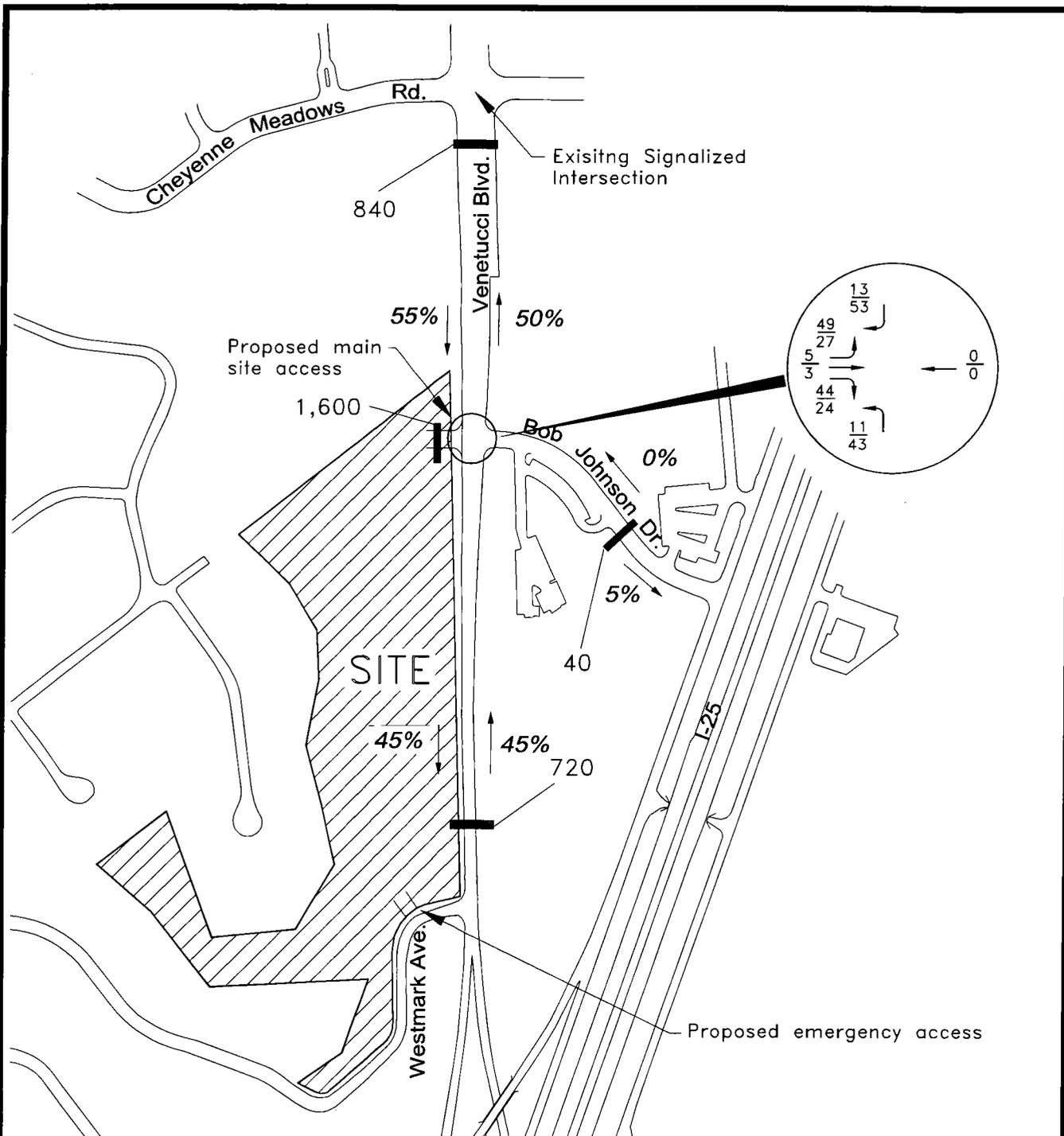
- $\frac{xxx}{xxx} \frac{am}{pm}$  -Weekday peak-hour traffic (vehicles per hour) - counts by LSC 11/18/10 & 11/19/10
- XX,XXX -Average weekday traffic (vehicles per day) - counts by LSC 12/1/10 & 12/2/10
- $\frac{X}{X} \frac{am}{pm}$  -Individual movement peak-hour Level of Service
- † -Stop sign

**Existing Traffic, Lane Geometry,  
Traffic Control and Level of Service**  
Independence Place at Cheyenne Mountain



*Not to Scale*  
**Figure 2**

**LSC # 104740**



Legend:

**XX%** - Directional distribution of site-generated traffic (% of entering or exiting traffic)

$\frac{xxx}{xxx}$   $\frac{am}{pm}$  - Weekday peak-hour traffic (vehicles per hour)

XX,XXX - Average weekday traffic (vehicles per day)

### Directional Distribution and Site-Generated Traffic

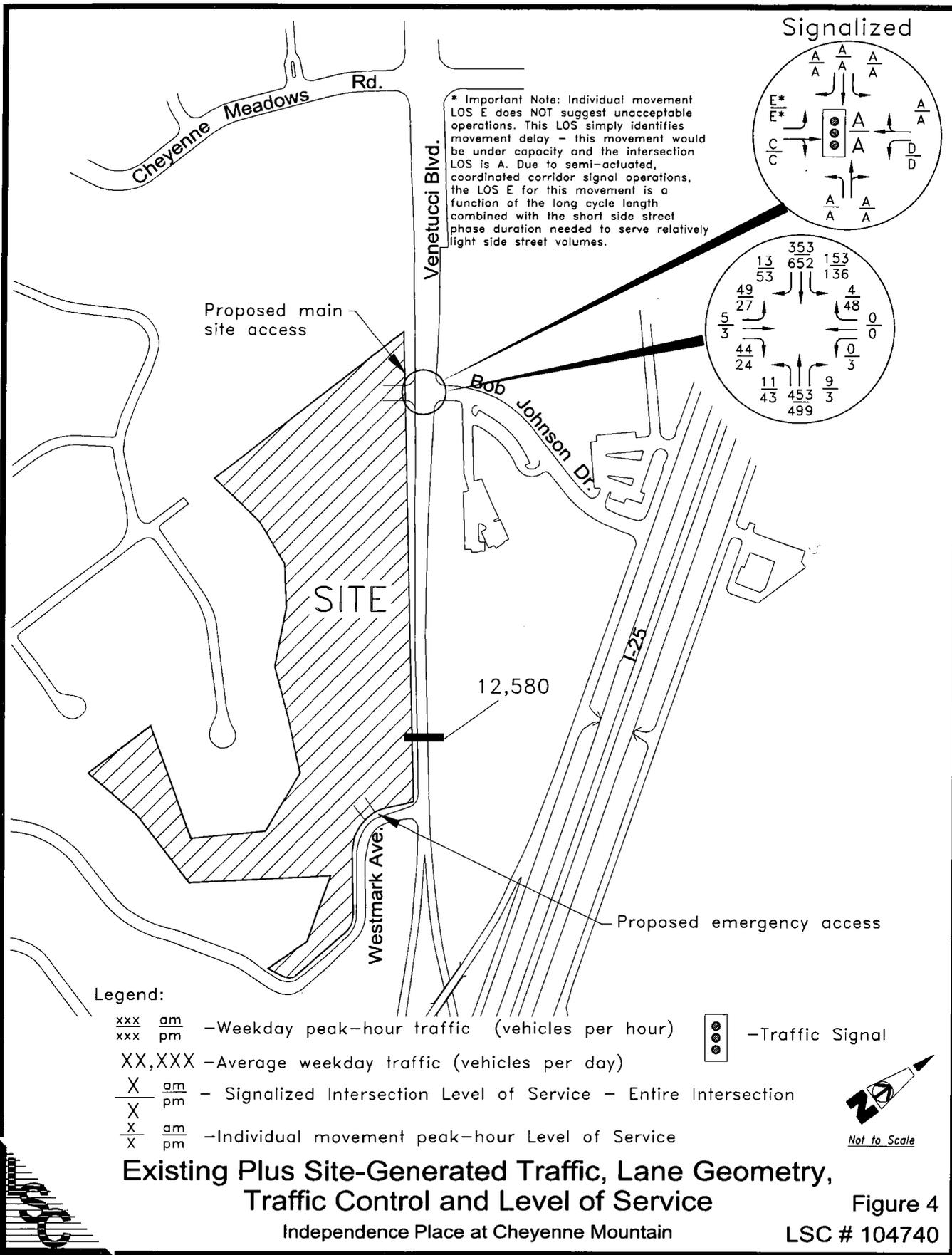
Independence Place at Cheyenne Mountain

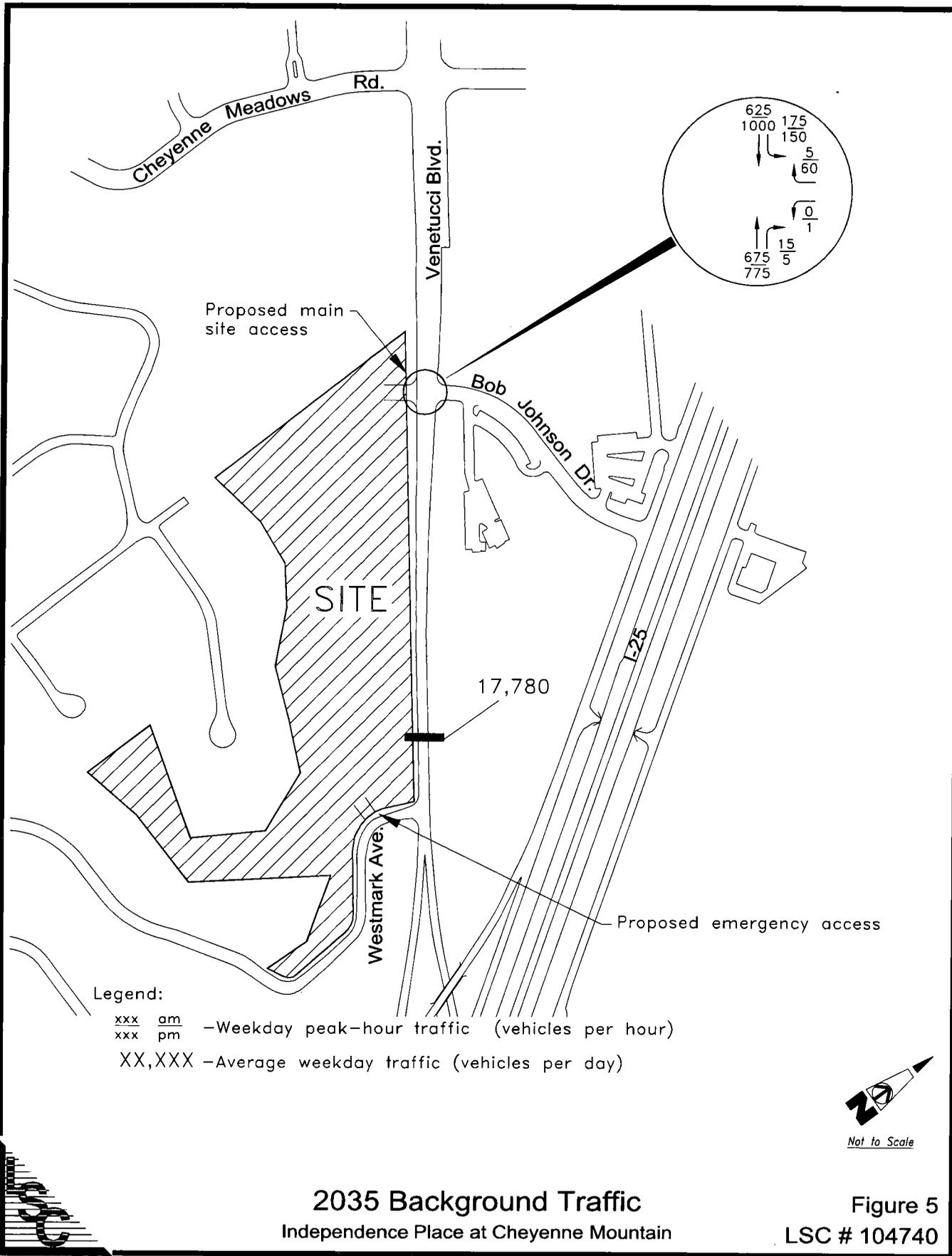


Not to Scale

Figure 3

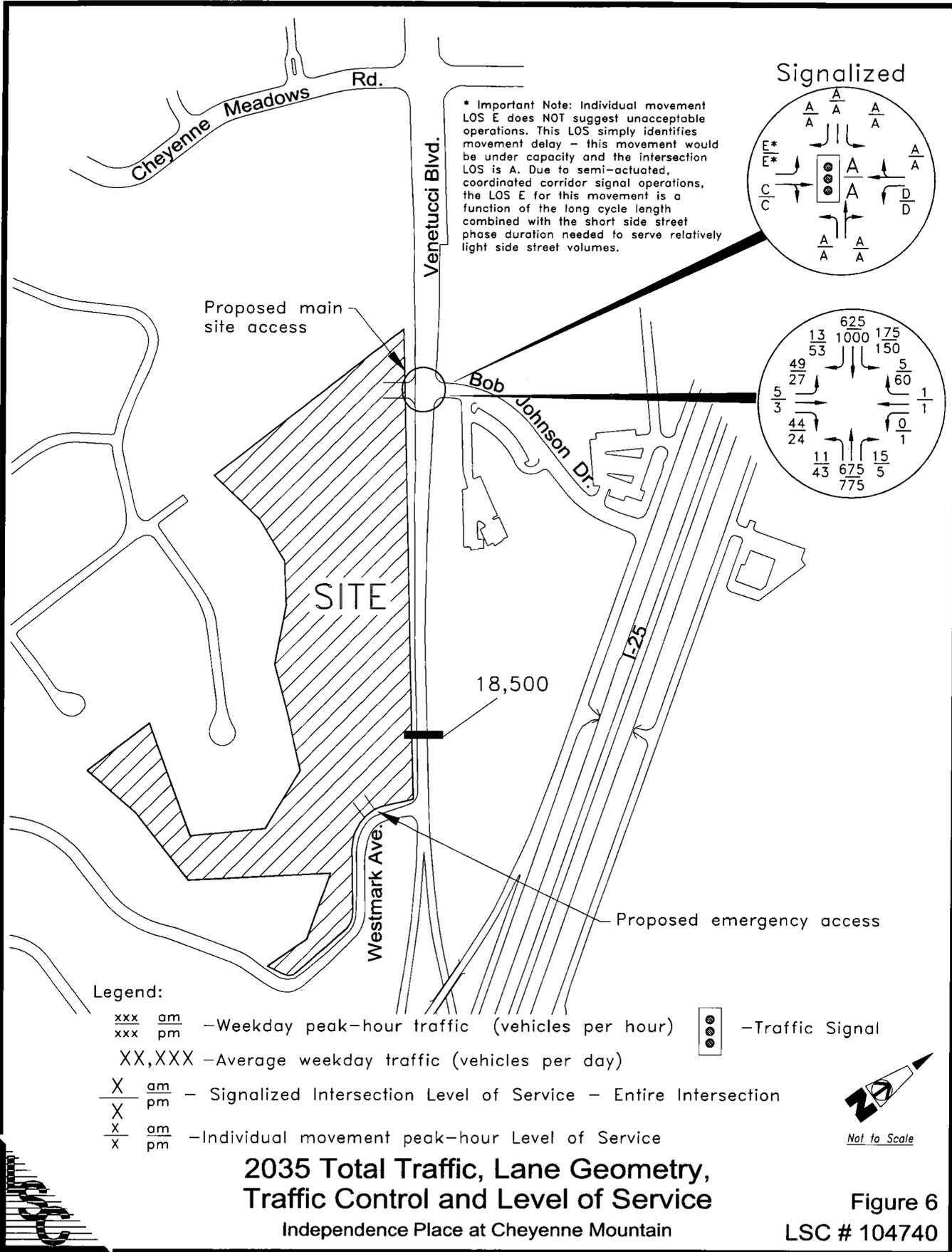
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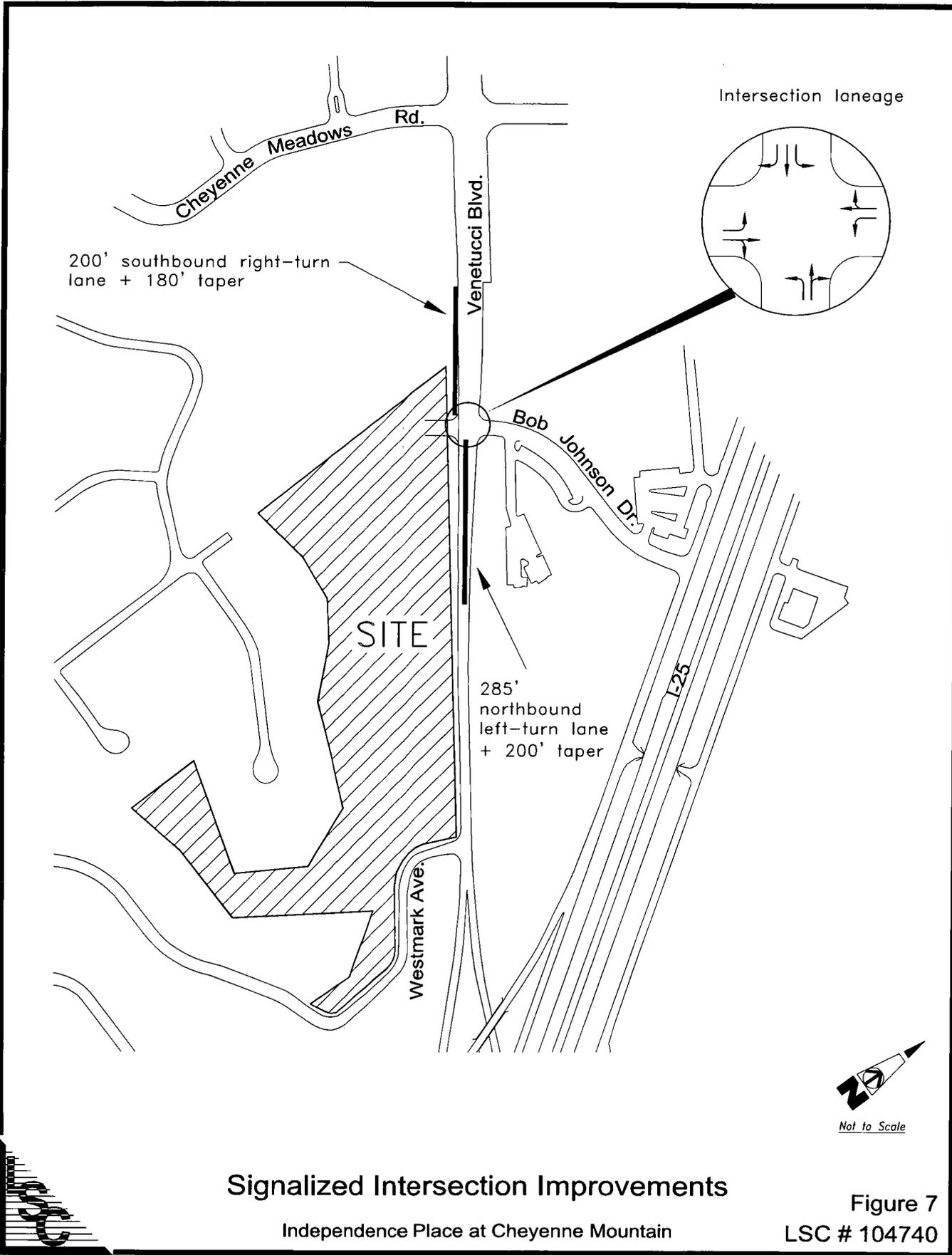




Legend:

$\frac{xxx}{xxx} \frac{am}{pm}$  - Weekday peak-hour traffic (vehicles per hour)  
 XX,XXX - Average weekday traffic (vehicles per day)





**Signalized Intersection Improvements**

Independence Place at Cheyenne Mountain

Figure 7

LSC # 104740

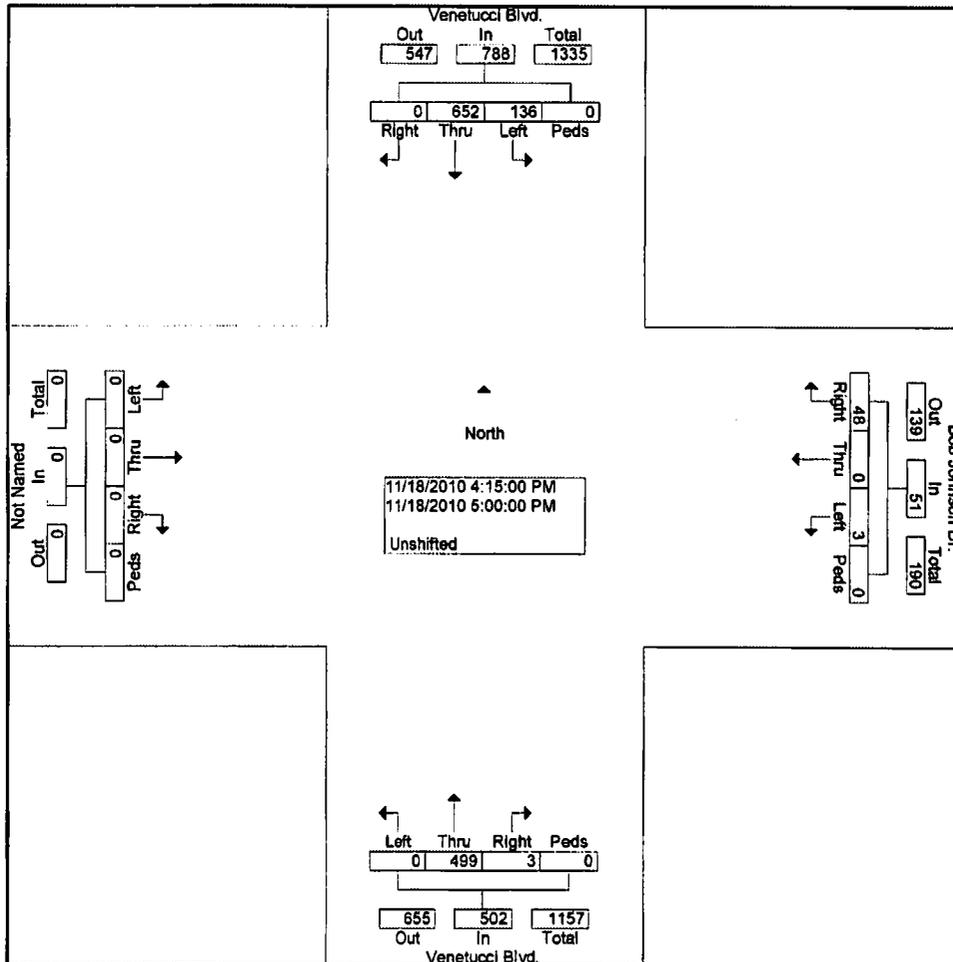




LSC Transportation Consultants, Inc.  
 516 N. Tejon St.  
 Colorado Springs, CO  
 (719) 633-2868

File Name : Venetucci - Bob Johnson pm  
 Site Code : 00000000  
 Start Date : 11/18/2010  
 Page No : 2

Start Time	Venetucci Blvd. From North					Bob Johnson Dr. From East					Venetucci Blvd. From South					From West					Int. Total	
	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total		
Peak Hour From 04:15 PM to 06:00 PM - Peak 1 of 1																						
Intersection	04:15 PM																					
Volume	0	652	136	0	788	48	0	3	0	51	3	499	0	0	502	0	0	0	0	0	0	1341
Percent	0.0	82.7	17.3	0.0		94.1	0.0	5.9	0.0		0.6	99.4	0.0	0.0		0.0	0.0	0.0	0.0			
04:30 Volume	0	150	27	0	177	23	0	1	0	24	0	150	0	0	150	0	0	0	0	0	0	351
Peak Factor	0.955																					
High Int. Volume	04:15 PM					04:30 PM					04:30 PM					4:00:00 PM						
Peak Factor	0	177	29	0	206	23	0	1	0	24	0	150	0	0	150							
					0.956					0.531					0.837							

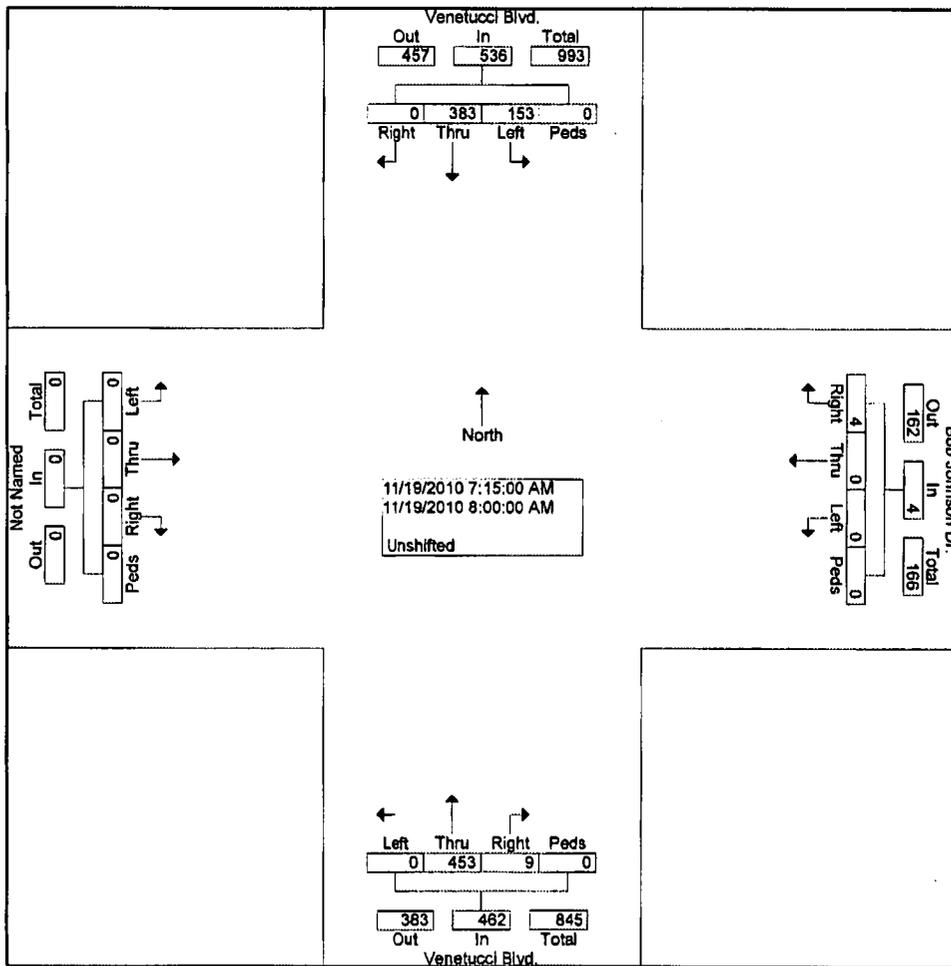




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	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	
Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Intersection	07:15 AM																				
Volume	0	383	153	0	536	4	0	0	0	4	9	453	0	0	462	0	0	0	0	0	1002
Percent	0.0	71.5	28.5	0.0		100.0	0.0	0.0	0.0		1.9	98.1	0.0	0.0		0.0	0.0	0.0	0.0		
07:45 Volume Peak Factor	0	104	49	0	153	0	0	0	0	0	3	134	0	0	137	0	0	0	0	0	290
High Int. Volume Peak Factor	0	104	49	0	153	2	0	0	0	2	3	134	0	0	137	6:15:00 AM					0.864
					0.876					0.500					0.843						



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File Name : Venetucci - Westmark am  
 Site Code : 00000000  
 Start Date : 11/19/2010  
 Page No : 1

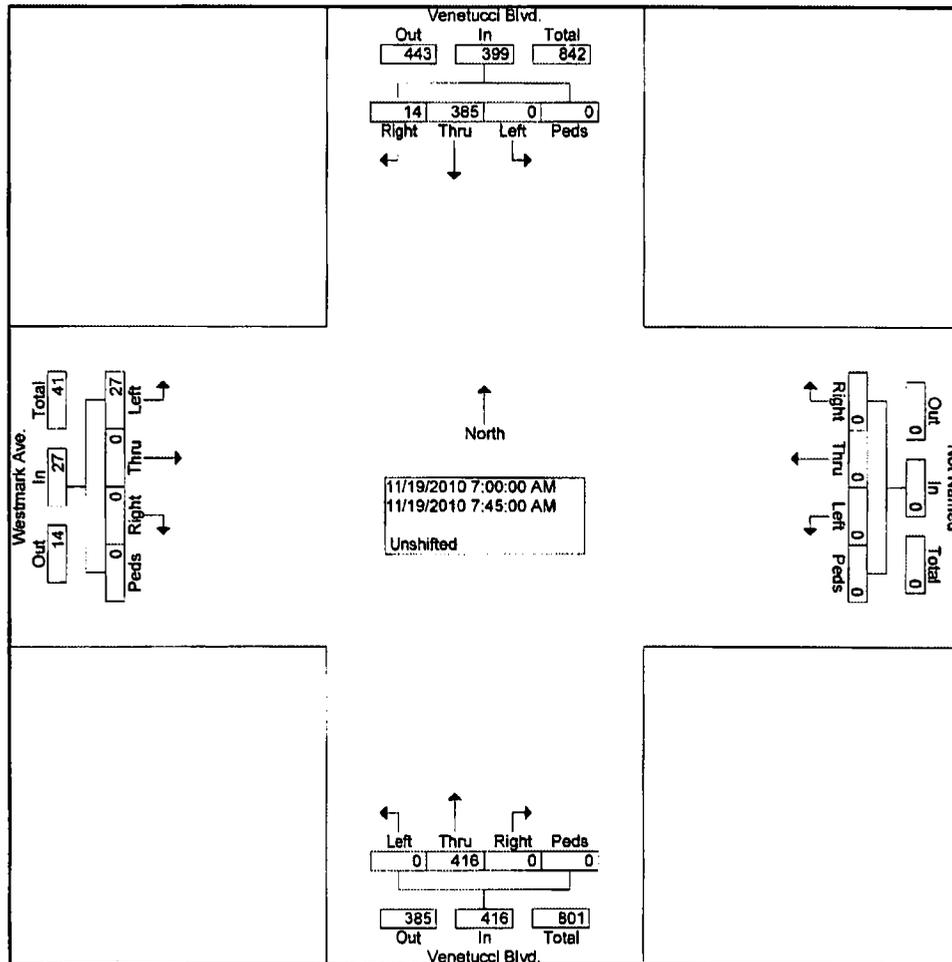
Groups Printed- Unshifted

Start Time	Venetucci Blvd. From North				From East				Venetucci Blvd. From South				Westmark Ave. From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
06:30 AM	0	75	0	0	0	0	0	0	0	72	0	0	0	0	3	0	150
06:45 AM	0	67	0	0	0	0	0	0	0	75	0	0	0	0	1	0	143
Total	0	142	0	0	0	0	0	0	0	147	0	0	0	0	4	0	293
07:00 AM	1	103	0	0	0	0	0	0	0	67	0	0	0	0	3	0	174
07:15 AM	3	106	0	0	0	0	0	0	0	95	0	0	0	0	11	0	215
07:30 AM	4	78	0	0	0	0	0	0	0	125	0	0	0	0	9	0	216
07:45 AM	6	98	0	0	0	0	0	0	0	129	0	0	0	0	4	0	237
Total	14	385	0	0	0	0	0	0	0	416	0	0	0	0	27	0	842
08:00 AM	5	82	0	0	0	0	0	0	0	79	0	0	0	0	4	0	170
08:15 AM	0	89	0	0	0	0	0	0	0	80	0	0	2	0	5	0	176
Grand Total	19	698	0	0	0	0	0	0	0	722	0	0	2	0	40	0	1481
Apprch %	2.6	97.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	4.8	0.0	95.2	0.0	
Total %	1.3	47.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.8	0.0	0.0	0.1	0.0	2.7	0.0	

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	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Intersecti on	07:00 AM																				
Volume	14	385	0	0	399	0	0	0	0	0	0	416	0	0	416	0	0	27	0	27	842
Percent	3.5	96.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		
07:45 Volume	6	98	0	0	104	0	0	0	0	0	0	129	0	0	129	0	0	4	0	4	237
Peak Factor																					0.888
High Int. Volume	07:15 AM					6:15:00 AM					07:45 AM					07:15 AM					
Peak Factor	3	106	0	0	109.5	0	0	0	0	0	0	129	0	0	129.6	0	0	11	0	11.6	



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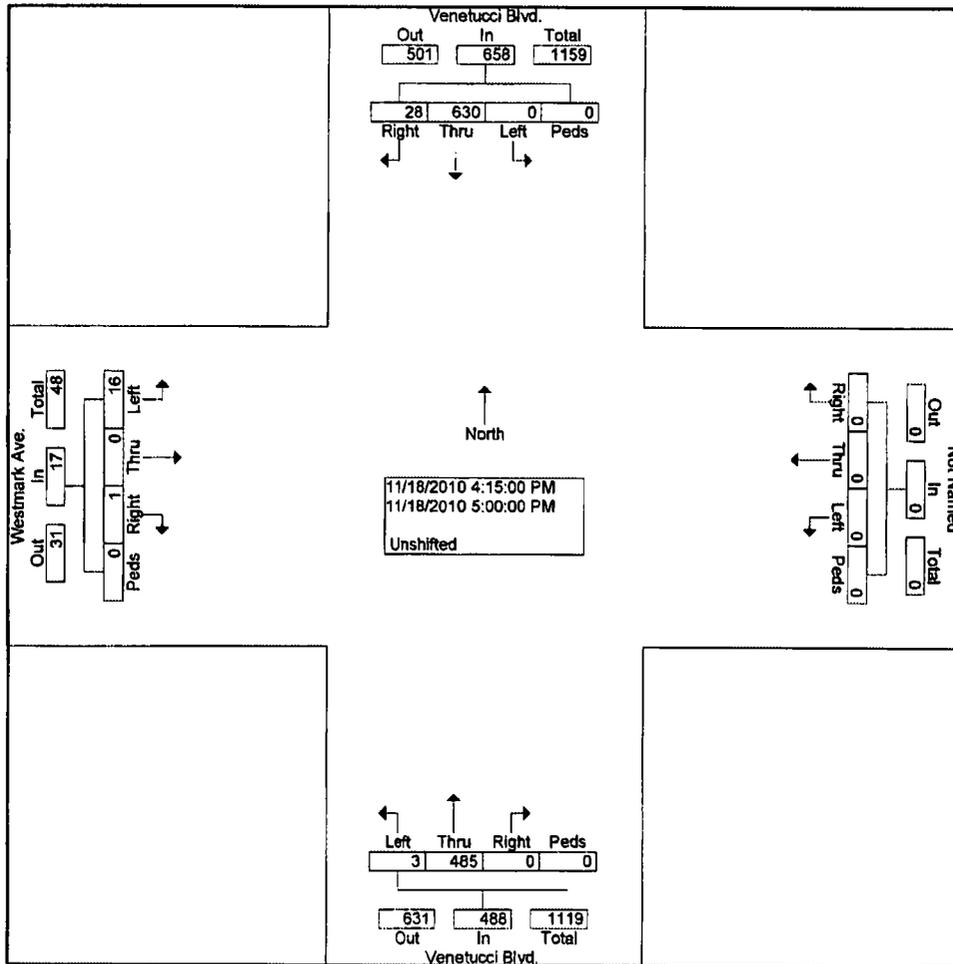
Groups Printed- Unshifted

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	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds		
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:15 PM	7	169	0	0	0	0	0	0	0	102	0	0	1	0	2	0		281
04:30 PM	5	151	0	0	0	0	0	0	0	141	2	0	0	0	11	0		310
04:45 PM	7	163	0	0	0	0	0	0	0	111	0	0	0	0	2	0		283
Total	19	483	0	0	0	0	0	0	0	354	2	0	1	0	15	0		874
05:00 PM	9	147	0	0	0	0	0	0	0	131	1	0	0	0	1	0		289
05:15 PM	5	148	0	0	0	0	0	0	0	95	1	0	0	0	3	0		252
05:30 PM	7	129	0	0	0	0	0	0	0	103	0	0	1	0	3	0		243
05:45 PM	9	109	0	0	0	0	0	0	0	89	0	0	0	0	1	0		208
Total	30	533	0	0	0	0	0	0	0	418	2	0	1	0	8	0		992
06:00 PM	2	121	0	0	0	0	0	0	0	83	0	0	0	0	10	0		216
Grand Total	51	1137	0	0	0	0	0	0	0	855	4	0	2	0	33	0		2082
Apprch %	4.3	95.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.5	0.5	0.0	5.7	0.0	94.3	0.0		
Total %	2.4	54.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.1	0.2	0.0	0.1	0.0	1.6	0.0		

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Peak Hour From 04:15 PM to 06:00 PM - Peak 1 of 1																						
Intersecti on	04:15 PM																					
Volume	28	630	0	0	658	0	0	0	0	0	0	485	3	0	488	1	0	16	0	17	1163	
Percent	4.3	95.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	99.4	0.6	0.0		5.9	0.0	94.1	0.0			
04:30 Volume	5	151	0	0	156	0	0	0	0	0	0	141	2	0	143	0	0	11	0	11	310	
Peak Factor	0.938																					
High Int. Volume	04:15 PM					4:00:00 PM					04:30 PM					04:30 PM						
Peak Factor	7	169	0	0	176	0	0	0	0	0	0	141	2	0	143	0	0	11	0	11	0.93	
																					6	



# LSC Transportation Consultants

516 N. Tejon St.  
Colorado Springs, Co 80903  
(719) 633-2868

Venetucci s-o Bob Johnson-VOL  
Site Code:  
Station ID:

Latitude: 0' 0.000 South

Start Time	01-Dec-10		02-Dec-10		03-Dec-10		04-Dec-10		05-Dec-10		06-Dec-10		07-Dec-10		Week Average	
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound
12:00 AM	*	*	23	50	*	*	*	*	*	*	*	*	*	*	23	50
01:00	*	*	23	30	*	*	*	*	*	*	*	*	*	*	23	30
02:00	*	*	15	19	*	*	*	*	*	*	*	*	*	*	15	19
03:00	*	*	19	24	*	*	*	*	*	*	*	*	*	*	19	24
04:00	*	*	31	39	*	*	*	*	*	*	*	*	*	*	31	39
05:00	*	*	95	175	*	*	*	*	*	*	*	*	*	*	95	175
06:00	*	*	269	223	*	*	*	*	*	*	*	*	*	*	269	223
07:00	*	*	412	351	*	*	*	*	*	*	*	*	*	*	412	351
08:00	*	*	309	338	*	*	*	*	*	*	*	*	*	*	309	338
09:00	*	*	266	288	*	*	*	*	*	*	*	*	*	*	266	288
10:00	*	*	318	301	*	*	*	*	*	*	*	*	*	*	318	301
11:00	*	*	431	390	*	*	*	*	*	*	*	*	*	*	431	390
12:00 PM	*	*	379	455	*	*	*	*	*	*	*	*	*	*	379	455
01:00	*	*	363	451	*	*	*	*	*	*	*	*	*	*	363	451
02:00	342	401	*	*	*	*	*	*	*	*	*	*	*	*	342	401
03:00	426	494	*	*	*	*	*	*	*	*	*	*	*	*	426	494
04:00	455	535	*	*	*	*	*	*	*	*	*	*	*	*	455	535
05:00	417	508	*	*	*	*	*	*	*	*	*	*	*	*	417	508
06:00	343	370	*	*	*	*	*	*	*	*	*	*	*	*	343	370
07:00	203	325	*	*	*	*	*	*	*	*	*	*	*	*	203	325
08:00	124	249	*	*	*	*	*	*	*	*	*	*	*	*	124	249
09:00	90	181	*	*	*	*	*	*	*	*	*	*	*	*	90	181
10:00	70	123	*	*	*	*	*	*	*	*	*	*	*	*	70	123
11:00	44	73	*	*	*	*	*	*	*	*	*	*	*	*	44	73
<b>Total</b>	<b>2514</b>	<b>3259</b>	<b>2953</b>	<b>3134</b>	<b>0</b>	<b>5467</b>	<b>6393</b>									
<b>Day</b>	<b>5773</b>		<b>6087</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>11860</b>	
<b>AM Peak</b>			<b>11:00</b>	<b>11:00</b>											<b>11:00</b>	<b>11:00</b>
<b>Vol.</b>			<b>431</b>	<b>390</b>											<b>431</b>	<b>390</b>
<b>PM Peak</b>	<b>16:00</b>	<b>16:00</b>	<b>12:00</b>	<b>12:00</b>											<b>16:00</b>	<b>16:00</b>
<b>Vol.</b>	<b>455</b>	<b>535</b>	<b>379</b>	<b>455</b>											<b>455</b>	<b>535</b>

Comb. Total      5773                      6087                      0                      0                      0                      0                      0                      11860

ADT                      Not Calculated

# LSC Transportation Consultants

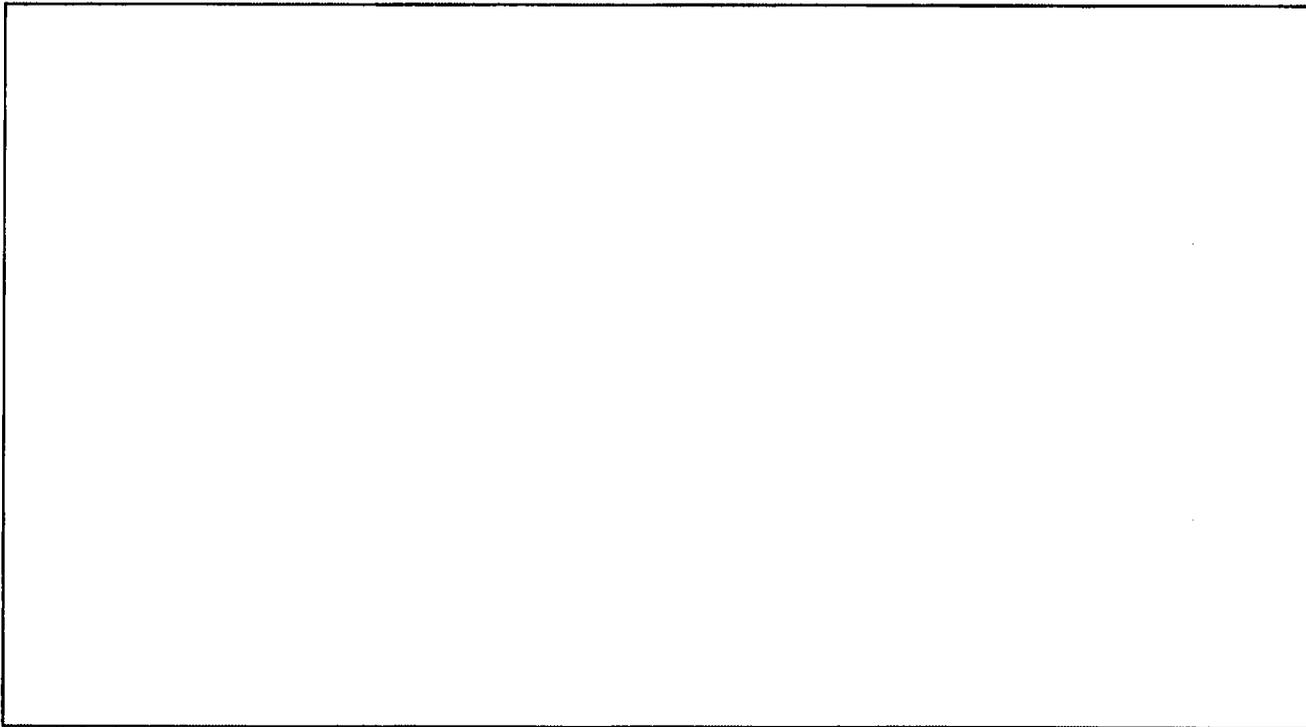
516 N. Tejon St.  
Colorado Springs, Co 80903  
(719) 633-2868

Venetucci s-o Bob Johnson-VOL  
Site Code:  
Station ID:

Latitude: 0' 0.000 South

Start Time	01-Dec-10 Wed	Northbound		Southbound		Combined		02-Dec- Thu	Northbound		Southbound		Combined	
		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		*	*	*	*	*	*		4	103	23	103	27	206
12:15		*	*	*	*	*	*		9	91	11	124	20	215
12:30		*	*	*	*	*	*		4	93	11	124	15	217
12:45		*	*	*	*	*	*		6	92	5	104	11	196
01:00		*	*	*	*	*	*		6	81	7	108	13	189
01:15		*	*	*	*	*	*		8	88	13	119	21	207
01:30		*	*	*	*	*	*		5	91	6	105	11	196
01:45		*	*	*	*	*	*		4	103	4	119	8	222
02:00		*	78	*	91	*	169		6	*	4	*	10	*
02:15		*	75	*	114	*	189		2	*	4	*	6	*
02:30		*	93	*	106	*	199		2	*	5	*	7	*
02:45		*	96	*	90	*	186		5	*	6	*	11	*
03:00		*	109	*	127	*	236		4	*	6	*	10	*
03:15		*	101	*	119	*	220		4	*	10	*	14	*
03:30		*	98	*	128	*	226		2	*	4	*	6	*
03:45		*	118	*	120	*	238		9	*	4	*	13	*
04:00		*	97	*	139	*	236		7	*	7	*	14	*
04:15		*	112	*	127	*	239		5	*	7	*	12	*
04:30		*	126	*	121	*	247		9	*	14	*	23	*
04:45		*	120	*	148	*	268		10	*	11	*	21	*
05:00		*	165	*	128	*	293		11	*	18	*	29	*
05:15		*	112	*	131	*	243		20	*	38	*	58	*
05:30		*	109	*	117	*	226		29	*	62	*	91	*
05:45		*	91	*	132	*	223		35	*	57	*	92	*
06:00		*	98	*	94	*	192		38	*	52	*	90	*
06:15		*	97	*	108	*	205		64	*	51	*	115	*
06:30		*	81	*	103	*	184		73	*	53	*	126	*
06:45		*	67	*	65	*	132		94	*	67	*	161	*
07:00		*	63	*	103	*	166		66	*	81	*	147	*
07:15		*	51	*	83	*	134		94	*	100	*	194	*
07:30		*	43	*	73	*	116		129	*	86	*	215	*
07:45		*	46	*	66	*	112		123	*	84	*	207	*
08:00		*	35	*	68	*	103		81	*	82	*	163	*
08:15		*	32	*	64	*	96		94	*	85	*	179	*
08:30		*	23	*	61	*	84		66	*	83	*	149	*
08:45		*	34	*	56	*	90		68	*	88	*	156	*
09:00		*	27	*	49	*	76		72	*	85	*	157	*
09:15		*	17	*	44	*	61		61	*	67	*	128	*
09:30		*	23	*	42	*	65		56	*	67	*	123	*
09:45		*	23	*	46	*	69		77	*	69	*	146	*
10:00		*	25	*	41	*	66		84	*	65	*	149	*
10:15		*	17	*	33	*	50		66	*	75	*	141	*
10:30		*	16	*	27	*	43		73	*	90	*	163	*
10:45		*	12	*	22	*	34		95	*	71	*	166	*
11:00		*	15	*	20	*	35		93	*	93	*	186	*
11:15		*	15	*	20	*	35		109	*	100	*	209	*
11:30		*	6	*	14	*	20		101	*	93	*	194	*
11:45		*	8	*	19	*	27		128	*	104	*	232	*
<b>Total</b>		0	2514	0	3259	0	5773		2211	742	2228	906	4439	1648
<b>Day Total</b>			2514		3259		5773		2953		3134		6087	
<b>% Total</b>		0.0%	43.5%	0.0%	56.5%				36.3%	12.2%	36.6%	14.9%		
<b>Peak</b>			04:15		04:00		04:30		11:00	12:00	11:00	00:15	11:00	12:00
<b>Vol.</b>			463		535		991		431	379	390	460	821	834
<b>P.H.F.</b>			0.919		0.904		0.924		0.835	0.920	0.938	0.927	0.885	0.961

ADT Not Calculated



## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #1 7:00

Movement	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.2	0.0	0.0	0.0	0.3
Delay / Veh (s)	2.0	6.3	6.7	4.4	1.5	4.3
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)	2.1	0.1	0.1	2.0	0.1	0.4
Total Stops	1	0	0	13	0	14
Stop/Veh	1.00	0.00	0.00	0.38	0.00	0.05
Travel Dist (mi)	0.4	92.9	1.8	6.0	16.2	117.1
Travel Time (hr)	0.0	2.4	0.0	0.2	0.4	3.1
Avg Speed (mph)	27	39	38	28	37	38

5: Bob Johnson & Venetucci Performance by movement Interval #2 7:15

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.3	0.0	0.1	0.1	0.4
Delay / Veh (s)	8.7	1.7	8.4	6.2	5.8	1.7	5.5
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)	7.4	1.9	0.1	0.1	3.0	0.2	0.6
Total Stops	1	2	0	0	19	0	22
Stop/Veh	1.00	1.00	0.00	0.00	0.44	0.00	0.08
Travel Dist (mi)	0.3	0.6	108.1	2.4	7.4	18.1	137.0
Travel Time (hr)	0.0	0.0	2.8	0.1	0.3	0.5	3.7
Avg Speed (mph)	22	28	38	37	26	37	37

5: Bob Johnson & Venetucci Performance by movement Interval #3 7:30

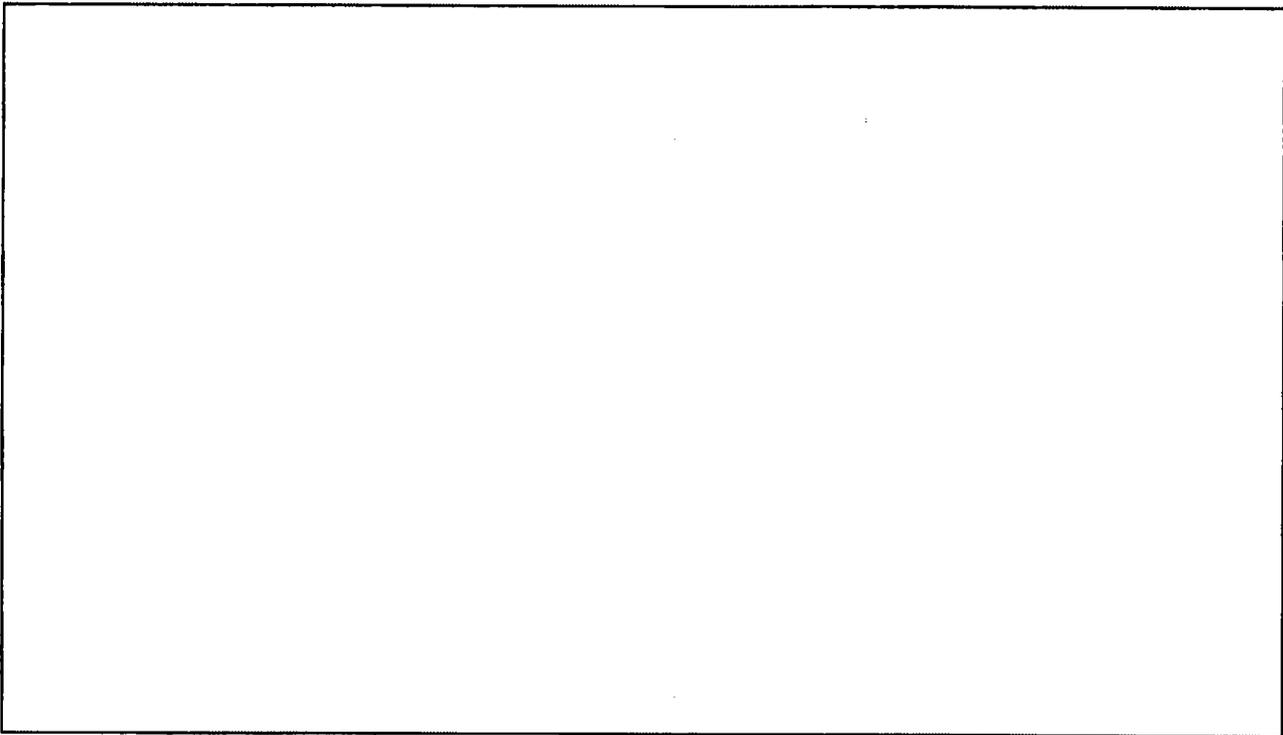
Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.1	0.0	0.3
Delay / Veh (s)		1.6	6.4	5.7	4.7	1.4	4.5
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		1.6	0.1	0.1	2.2	0.1	0.4
Total Stops	0	1	0	0	13	0	14
Stop/Veh		1.00	0.00	0.00	0.32	0.00	0.06
Travel Dist (mi)	0.1	0.3	90.0	1.6	6.9	14.4	113.4
Travel Time (hr)	0.0	0.0	2.3	0.0	0.3	0.4	3.0
Avg Speed (mph)	21	25	39	38	27	38	38

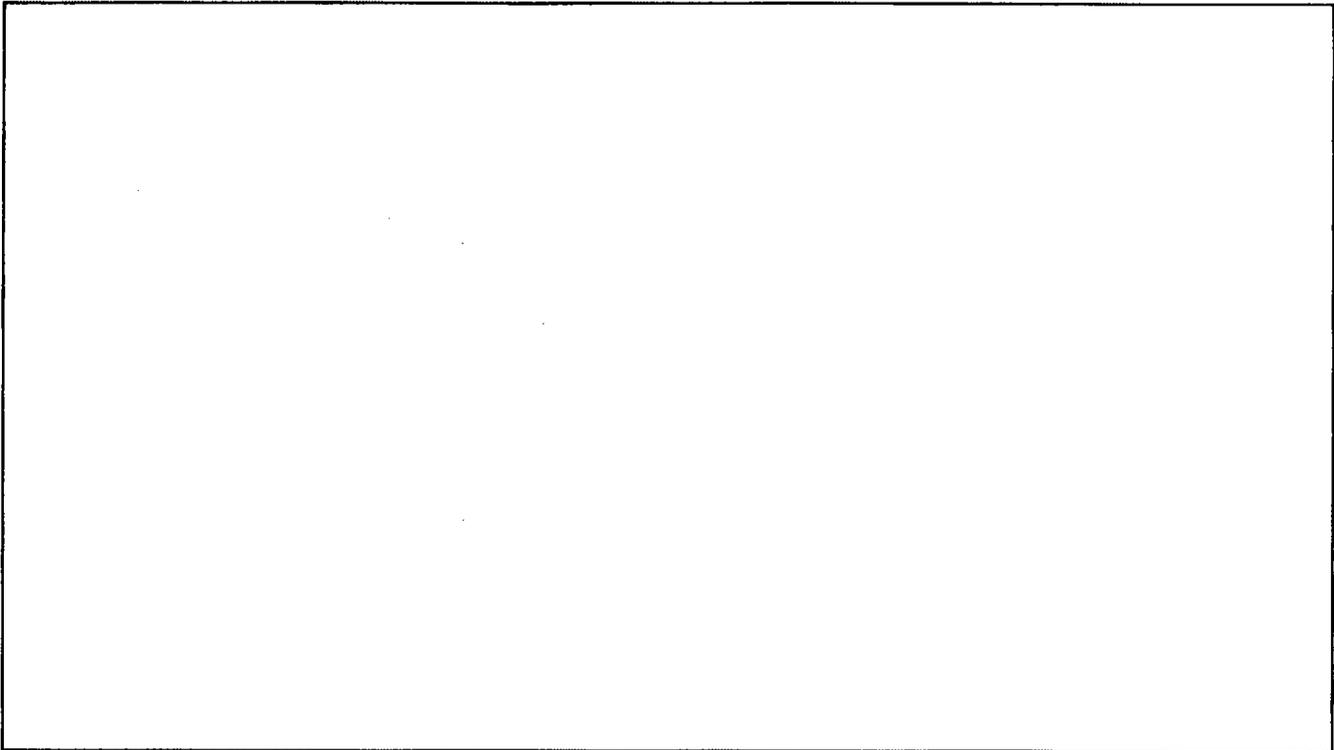
5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.0	0.3
Delay / Veh (s)		1.6	6.5	7.7	4.0	1.5	4.4
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		1.7	0.1	0.0	1.7	0.1	0.3
Total Stops	0	1	0	0	11	1	13
Stop/Veh		1.00	0.00	0.00	0.32	0.01	0.05
Travel Dist (mi)	0.0	0.3	93.4	1.5	6.0	15.6	116.8
Travel Time (hr)	0.0	0.0	2.4	0.0	0.2	0.4	3.1
Avg Speed (mph)	22	27	39	37	28	37	38

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	WBL	WBR	NBL	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	1.0	0.0	0.2	0.2	1.4
Delay/Veh (s)	13.5	2.1	6.9	6.6	4.8	1.6	4.7
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.1
St Del/Veh (s)	11.7	2.3	0.1	0.1	2.3	0.1	0.4
Total Stops	1	4	0	0	56	2	63
Stop/Veh	1.00	1.00	0.00	0.00	0.37	0.01	0.06
Travel Dist (mi)	0.4	1.6	384.4	7.3	26.3	64.2	484.2
Travel Time (hr)	0.0	0.1	9.9	0.2	1.0	1.7	12.8
Avg Speed (mph)	22	27	39	37	27	37	38





## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #1 7:00

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.3	0.0	0.0	0.1	0.5
Delay/Veh (s)	2.4	7.0	4.1	4.8	2.6	4.7	
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stp Del/Veh (s)	2.4	0.1	0.1	2.0	0.2	0.4	
Total Stops	0	8	0	0	12	2	22
Stop/Veh	1.00	0.00	0.00	0.38	0.01	0.06	
Travel Dist (mi)	0.1	2.8	112.4	0.7	5.7	29.3	151.0
Travel Time (hr)	0.0	0.1	3.0	0.0	0.2	0.9	4.2
Avg Speed (mph)	25	26	38	37	26	34	36

5: Bob Johnson & Venetucci Performance by movement Interval #2 7:15

Movement	WBL	WBR	NBL	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.4	0.0	0.1	0.2	0.7
Delay / Veh (s)	19.3	3.6	8.7	6.2	6.2	3.1	5.8
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	17.7	2.8	0.1	0.1	2.7	0.2	0.6
Total Stops	1	22	0	0	17	2	42
Stop/Veh	1.00	1.00	0.00	0.00	0.44	0.01	0.10
Travel Dist (mi)	0.5	8.3	130.2	1.0	6.9	31.9	178.8
Travel Time (hr)	0.0	0.3	3.5	0.0	0.3	0.9	5.1
Avg Speed (mph)	21	26	37	36	25	34	35

5: Bob Johnson & Venetucci Performance by movement Interval #3 7:30

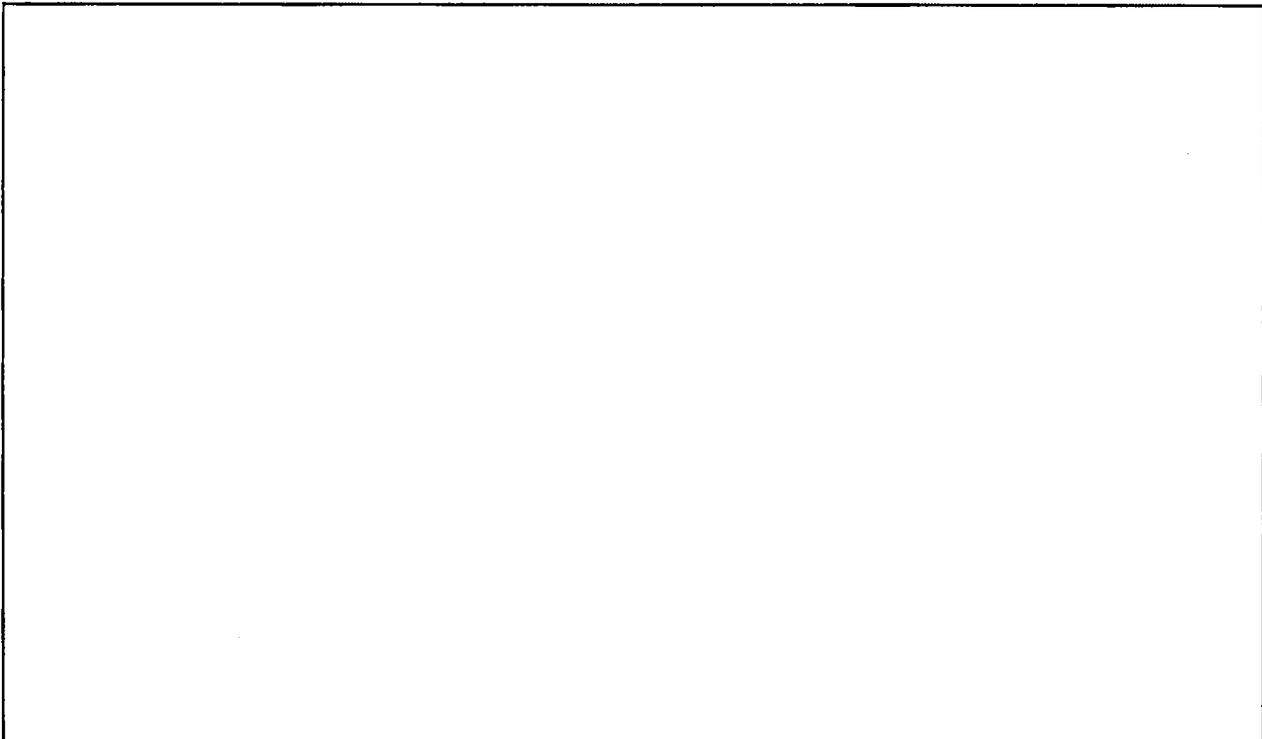
Movement	WBL	WBR	NBL	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.4	0.0	0.0	0.1	0.5
Delay / Veh (s)		2.6	7.5	4.2	4.6	2.7	5.0
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		2.5	0.1	0.2	1.8	0.2	0.3
Total Stops	0	8	0	0	11	1	20
Stop/Veh		1.00	0.00	0.00	0.34	0.01	0.05
Travel Dist (mi)	0.1	2.9	115.2	0.7	5.5	28.7	153.1
Travel Time (hr)	0.0	0.1	3.1	0.0	0.2	0.8	4.3
Avg Speed (mph)	21	26	38	35	27	34	36

5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

Movement	WBL	WBR	NBL	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.1	0.4
Delay / Veh (s)		2.8	7.4	7.5	5.2	2.7	5.0
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		2.8	0.1	0.0	2.2	0.2	0.4
Total Stops	0	6	0	0	9	2	17
Stop/Veh		1.00	0.00	0.00	0.41	0.02	0.07
Travel Dist (mi)	0.2	2.0	76.8	0.4	3.8	19.8	103.0
Travel Time (hr)	0.0	0.1	2.0	0.0	0.1	0.6	2.9
Avg Speed (mph)	22	26	38	33	26	34	36

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	WBI	WBR	NBI	NBR	SBI	SBT	All
Total Delay (hr)	0.0	0.0	1.4	0.0	0.2	0.5	2.1
Delay/Veh (s)	15.7	3.1	7.7	5.5	5.2	2.8	5.2
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.2
Stp Del/Veh (s)	14.2	2.7	0.1	0.1	2.2	0.2	0.4
Total Stops	2	44	0	0	49	7	102
Stop/Veh	1.00	1.00	0.00	0.00	0.39	0.01	0.07
Travel Dist (mi)	0.9	16.0	434.6	2.8	21.9	109.7	585.9
Travel time (hr)	0.0	0.6	11.6	0.1	0.8	3.2	16.4
Avg Speed (mph)	22	26	38	35	26	34	36



Lanes, Volumes, Timings  
5: Bob Johnson & Venetucci

Existing plus Site AM Peak  
Baseline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
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	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	50
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.876			0.850			0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1648	0	1787	1599	0	1787	1876	0	1787	1881	1599
Flt Permitted	0.752			0.735			0.507			0.427		
Satd. Flow (perm)	1415	1648	0	1383	1599	0	954	1876	0	803	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			458			3				15
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2400			2000			4205			932	
Travel Time (s)		54.5			45.5			63.7			14.1	
Volume (vph)	49	5	24	2	0	4	11	453	9	153	353	13
Peak Hour Factor	0.85	0.85	0.85	0.50	0.75	0.50	0.84	0.84	0.84	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	58	6	28	4	0	8	13	539	11	176	406	15
Lane Group Flow (vph)	58	34	0	4	8	0	13	550	0	176	406	15
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phases	4	4		8	8		2	2		6	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	20.0	20.0	0.0	20.0	20.0	0.0	100.0	100.0	0.0	100.0	100.0	100.0
Total Split (%)	16.7%	16.7%	0.0%	16.7%	16.7%	0.0%	83.3%	83.3%	0.0%	83.3%	83.3%	83.3%
Yellow Time (s)	3.5	3.5		3.5	3.5		4.5	4.5		4.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	11.6	11.6		11.6	11.6		103.4	103.4		103.4	103.4	103.4
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.86	0.86		0.86	0.86	0.86
v/c Ratio	0.42	0.18		0.03	0.01		0.02	0.34		0.25	0.25	0.01
Control Delay	59.3	22.4		47.0	0.0		2.2	3.0		2.3	1.6	0.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	59.3	22.4		47.0	0.0		2.2	3.0		2.3	1.6	0.5
LOS	E	C		D	A		A	A		A	A	A
Approach Delay		45.7			15.7			3.0			1.7	
Approach LOS		D			B			A			A	

Intersection Summary

Area Type: Other  
Cycle Length: 120

Lanes, Volumes, Timings  
 5: Bob Johnson & Venetucci

Existing plus Site AM Peak  
 Baseline

Actuated Cycle Length: 120	
Offset: 27 (23%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 50	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.42	
Intersection Signal Delay: 5.6	Intersection LOS: A
Intersection Capacity Utilization 52.2%	ICU Level of Service A
Analysis Period (min) 15	

Splits and Phases: 5: Bob Johnson & Venetucci

 ø2	 ø4
100 s	20 s
 ø6	 ø8
100 s	20 s

Lanes, Volumes, Timings  
5: Bob Johnson & Venetucci

Existing Plus Site PM Peak  
Baseline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
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	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	50
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.869			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1635	0	1787	1599	0	1787	1879	0	1787	1881	1599
Flt Permitted	0.614			0.736			0.329			0.402		
Satd. Flow (perm)	1155	1635	0	1385	1599	0	619	1879	0	756	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		28			418			1				61
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2400			2000			4205			932	
Travel Time (s)		54.5			45.5			63.7			14.1	
Volume (vph)	27	3	24	3	0	48	43	500	3	136	652	53
Peak Hour Factor	0.85	0.85	0.85	0.50	0.75	0.50	0.84	0.84	0.84	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	32	4	28	6	0	96	51	595	4	156	749	61
Lane Group Flow (vph)	32	32	0	6	96	0	51	599	0	156	749	61
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phases	4	4		8	8		2	2		6	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	20.0	20.0	0.0	20.0	20.0	0.0	100.0	100.0	0.0	100.0	100.0	100.0
Total Split (%)	16.7%	16.7%	0.0%	16.7%	16.7%	0.0%	83.3%	83.3%	0.0%	83.3%	83.3%	83.3%
Yellow Time (s)	3.5	3.5		3.5	3.5		4.5	4.5		4.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	10.3	10.3		10.3	10.3		101.7	101.7		101.7	101.7	101.7
Actuated g/C Ratio	0.09	0.09		0.09	0.09		0.85	0.85		0.85	0.85	0.85
v/c Ratio	0.32	0.19		0.05	0.18		0.10	0.38		0.24	0.47	0.04
Control Delay	59.2	22.2		49.3	0.8		2.3	3.0		2.7	4.0	0.5
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	59.2	22.2		49.3	0.8		2.3	3.0		2.7	4.0	0.5
LOS	E	C		D	A		A	A		A	A	A
Approach Delay		40.7			3.6			2.9			3.6	
Approach LOS		D			A			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 120

Lanes, Volumes, Timings  
 5: Bob Johnson & Venetucci

Existing Plus Site PM Peak  
 Baseline

Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 55	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.47	
Intersection Signal Delay: 4.7	Intersection LOS: A
Intersection Capacity Utilization 55.8%	ICU Level of Service B
Analysis Period (min) 15	

Splits and Phases: 5: Bob Johnson & Venetucci

  ø2	  ø4
100 s	20 s
  ø6	  ø8
100 s	20 s

Lanes, Volumes, Timings  
5: Bob Johnson & Venetucci

2035 Total Traffic AM Peak  
Baseline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
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	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	50
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.866			0.850			0.997				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1629	0	1787	1599	0	1787	1876	0	1787	1881	1599
Flt Permitted	0.751			0.719			0.344			0.296		
Satd. Flow (perm)	1413	1629	0	1353	1599	0	647	1876	0	557	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		52			296			3				15
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			45				45
Link Distance (ft)		2400			2000			2103				932
Travel Time (s)		54.5			45.5			31.9				14.1
Volume (vph)	49	5	44	2	0	5	11	675	15	175	625	13
Peak Hour Factor	0.85	0.85	0.85	0.50	0.75	0.50	0.84	0.84	0.84	0.87	0.87	0.87
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	58	6	52	4	0	10	13	804	18	201	718	15
Lane Group Flow (vph)	58	58	0	4	10	0	13	822	0	201	718	15
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phases	4	4		8	8		2	2		6	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	20.0	20.0	0.0	20.0	20.0	0.0	100.0	100.0	0.0	100.0	100.0	100.0
Total Split (%)	16.7%	16.7%	0.0%	16.7%	16.7%	0.0%	83.3%	83.3%	0.0%	83.3%	83.3%	83.3%
Yellow Time (s)	3.5	3.5		3.5	3.5		4.5	4.5		4.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	11.6	11.6		11.6	11.6		103.4	103.4		103.4	103.4	103.4
Actuated g/C Ratio	0.10	0.10		0.10	0.10		0.86	0.86		0.86	0.86	0.86
v/c Ratio	0.42	0.28		0.03	0.02		0.02	0.51		0.42	0.44	0.01
Control Delay	59.4	18.6		47.0	0.2		2.3	4.2		4.7	2.7	0.3
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay	59.4	18.6		47.0	0.2		2.3	4.2		4.7	2.7	0.3
LOS	E	B		D	A		A	A		A	A	A
Approach Delay		39.0			13.6			4.2			3.1	
Approach LOS		D			B			A			A	

Intersection Summary

Area Type: Other

Cycle Length: 120

Lanes, Volumes, Timings  
 5: Bob Johnson & Venetucci

2035 Total Traffic AM Peak  
 Baseline

Actuated Cycle Length: 120	
Offset: 31 (26%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.51	
Intersection Signal Delay: 5.8	Intersection LOS: A
Intersection Capacity Utilization 65.5%	ICU Level of Service C
Analysis Period (min) 15	

Splits and Phases: 5: Bob Johnson & Venetucci

 ø2	 ø4
100 s	20 s
 ø6	 ø8
100 s	20 s

Lanes, Volumes, Timings  
5: Bob Johnson & Venetucci

2035 Total PM Peak  
Baseline



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗		↖	↗	↖
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	4.0	4.0	4.0
Leading Detector (ft)	50	50		50	50		50	50		50	50	50
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frnt		0.867			0.850			0.999				0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1787	1631	0	1787	1599	0	1787	1879	0	1787	1881	1599
Flt Permitted	0.534			0.740			0.183			0.334		
Satd. Flow (perm)	1005	1631	0	1392	1599	0	344	1879	0	628	1881	1599
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		24			332			1				58
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		30			30			45			45	
Link Distance (ft)		2400			2000			2103			932	
Travel Time (s)		54.5			45.5			31.9			14.1	
Volume (vph)	27	3	24	2	0	60	43	675	5	150	1000	53
Peak Hour Factor	1.00	1.00	1.00	0.50	0.75	0.50	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Adj. Flow (vph)	27	3	24	4	0	120	47	734	5	163	1087	58
Lane Group Flow (vph)	27	27	0	4	120	0	47	739	0	163	1087	58
Turn Type	Perm			Perm			Perm			Perm		Perm
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		6
Detector Phases	4	4		8	8		2	2		6	6	6
Minimum Initial (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	4.0
Minimum Split (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	20.0
Total Split (s)	20.0	20.0	0.0	20.0	20.0	0.0	100.0	100.0	0.0	100.0	100.0	100.0
Total Split (%)	16.7%	16.7%	0.0%	16.7%	16.7%	0.0%	83.3%	83.3%	0.0%	83.3%	83.3%	83.3%
Yellow Time (s)	3.5	3.5		3.5	3.5		4.5	4.5		4.5	4.5	4.5
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	2.0
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode	None	None		None	None		C-Max	C-Max		C-Max	C-Max	C-Max
Act Effct Green (s)	10.3	10.3		10.3	10.3		101.7	101.7		101.7	101.7	101.7
Actuated g/C Ratio	0.09	0.09		0.09	0.09		0.85	0.85		0.85	0.85	0.85
v/c Ratio	0.31	0.17		0.03	0.27		0.16	0.46		0.31	0.68	0.04
Control Delay	59.9	22.4		48.5	1.5		3.3	3.6		2.4	6.4	0.2
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.1	0.0
Total Delay	59.9	22.4		48.5	1.5		3.3	3.6		2.4	6.5	0.2
LOS	E	C		D	A		A	A		A	A	A
Approach Delay		41.2			3.0			3.6			5.7	
Approach LOS		D			A			A			A	

Intersection Summary

Area Type: Other  
Cycle Length: 120

Lanes, Volumes, Timings  
 5: Bob Johnson & Venetucci

2035 Total PM Peak  
 Baseline

Actuated Cycle Length: 120	
Offset: 26 (22%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	
Natural Cycle: 65	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 5.7	Intersection LOS: A
Intersection Capacity Utilization 74.1%	ICU Level of Service D
Analysis Period (min) 15	

Splits and Phases: 5: Bob Johnson & Venetucci

 ø2	 ø4
100 s	20 s
 ø6	 ø8
100 s	20 s



**LSC TRANSPORTATION CONSULTANTS, INC.**

**516 North Tejon Street  
Colorado Springs, CO 80903  
(719) 633-2868  
FAX (719) 633-5430  
E-mail: lsc@lscs.com**

January 12, 2011

Mr. David Spearman  
Place Properties Development Group, LLC  
3445 Peachtree Road NE, Suite 1400  
Atlanta, GA 30326

RE: Independence Place at Cheyenne Mountain  
El Paso County, Colorado  
LSC #104740

Dear Mr. Spearman:

In response to your request, LSC Transportation Consultants, Inc. has completed this traffic impact and access analysis for the proposed Independence Place at Cheyenne Mountain site 240-unit apartment development to be located southwest of the intersection of Venetucci Boulevard and Bob Johnson Drive in unincorporated El Paso County, Colorado. Figure 1 shows the site location. One full-movement site access points is proposed to Venetucci Boulevard at the current intersection with Bob Johnson Drive and one emergency-only access is proposed to Westmark Avenue.

**REPORT CONTENTS**

This report is being prepared as part of a submittal to El Paso County. The report identifies the proposed access plan for the site, presents the anticipated traffic impacts of the proposed development on the adjacent roadways and presents recommended roadway system improvements to mitigate the traffic impacts. The report contains the following: a determination of the existing traffic and roadway conditions adjacent to the site including existing traffic volumes, the lane geometries and traffic controls; the projected average weekday and peak-hour vehicle-trips to be generated by the proposed development; the assignment of the projected traffic volumes to the adjacent roadways; a projection of the future background and resulting total traffic volumes; and the resulting traffic impacts. LSC has made recommendations for roadway system improvements to mitigate the anticipated traffic impacts.

**SITE DEVELOPMENT AND LAND USE**

The proposed site plan is attached. The 16-acre site is undeveloped land zoned RS-6000 Residential Suburban and RM-30 Residential Multi-Dwelling. The site is planned to contain 240 apartment units. The project would likely be developed in one phase.

**VERSION # 1**

**DATE 1-27-11**

One full-movement site access point is proposed to Venetucci Boulevard at the intersection with Bob Johnson Drive. This site access would form the fourth leg of this existing full-movement, three-leg intersection. Access opportunities for the site are very limited due to the topography and a lower-density residential neighborhood to the west, a vacant privately owned parcel to the north, a substandard county road, Westmark Avenue, to the south, and a Principal Arterial-classified roadway (Venetucci) with strict County access spacing criteria to the east. An emergency-only access to Westmark is proposed. This access would be gated and closed to daily use and could only be used by emergency services vehicles when necessary.

## **ROADWAY AND TRAFFIC CONDITIONS**

### **Area Roadways**

The roadway system in the vicinity of the site is shown in Figure 1. The roadways are identified below, followed by brief descriptions. Figure 2 shows the existing traffic controls and lane geometries for the intersections and roadway segments in the vicinity of the site.

- **Venetucci Boulevard** is a north/south Principal Arterial extending south from Lake Avenue to the City of Fountain. The roadway is referred to as Old Highway 85-87 south of B Street where it is classified as a Non-Rural Regional Highway (NRA) by the Colorado Department of Transportation (CDOT). It is our understanding that north of B Street, it is under City of Colorado Springs jurisdiction for maintenance. The posted speed limit on Venetucci in the vicinity of the site is 45 miles per hour (mph) south of Bob Johnson Drive and 40 mph north of Bob Johnson Drive in the City of Colorado Springs. Venetucci Boulevard is a four-lane urban arterial with auxiliary turn lanes north of Bob Johnson Drive and a two-lane rural roadway between Bob Johnson Drive and the frontage road interchange to the south. Additional merge/auxiliary lanes exist between the frontage road interchange to the south and the B Street intersection.

The intersections with Bob Johnson Drive and Westmark Avenue are unsignalized with Stop-sign traffic control for these minor side streets. The intersections with Cheyenne Meadows Drive and B Street are signalized.

### **Existing Traffic Conditions**

Figure 2 shows the current morning and afternoon peak-hour traffic volumes at the Venetucci/Bob Johnson and Venetucci/Westmark intersections. These peak-hour traffic volumes were based on manual peak-hour traffic counts conducted by LSC in November 2010. Also shown are the results of a 24-hour machine traffic count on Venetucci Boulevard just south Bob Johnson. The traffic count reports are attached. Venetucci adjacent to the site currently carries just under 12,000 vehicles per day and about 1,100 in the peak hour.

### **Existing Levels of Service**

Level of service (LOS) is a quantitative measure of the level of congestion or delay at an intersection. Level of service is indicated on a scale from "A" to "F." LOS A is indicative of very little congestion or delay. LOS F is indicative of a high level of congestion or delay. Attached are level of service definitions for unsignalized and signalized intersections.

The Venetucci/Bob Johnson intersection has been analyzed to determine the existing levels of service based on real time traffic simulation using the SimTraffic analysis program. The unsignalized LOS criteria is from the *Highway Capacity Manual, 2000 Edition* by the Transportation Research Board. SimTraffic was used to estimate the level of service as the simulation better accounts for traffic gaps created by the adjacent traffic signal at Cheyenne Mountain Boulevard. Figure 2 shows the level of service analysis results. The analysis reports are attached.

As shown in Table 1, all of the minor side street (from Bob Johnson) and the southbound major street left-turn movement at the analyzed intersections are currently operating at acceptable levels of service during the peak hours.

### **TRIP GENERATION**

Estimates of the traffic volumes expected to be generated by the site have been made using the nationally published trip generation rates found in *Trip Generation, 8th Edition, 2003* by the Institute of Transportation Engineers (ITE). Table 1 shows the trip generation estimate results.

As shown in Table 1, the site could be expected to generate about 1,600 vehicle-trips on the average weekday, with about 800 vehicles entering and 800 vehicles exiting the site in a 24-hour period. During the morning peak hour, which typically occurs for one hour between 6:30 and 8:30 a.m., about 25 vehicles would enter and 100 vehicles would exit the site. During the afternoon peak hour, which typically occurs for one hour between 4:30 and 6:30 p.m., about 100 vehicles would enter and 50 vehicles would exit the site. These are rounded values from the table.

### **TRIP DISTRIBUTION AND ASSIGNMENT**

The directional distribution of the site-generated traffic volumes on the adjacent roadways is an important factor in determining the development's traffic impacts. The specific distribution estimates for the site-generated traffic volumes are shown in Figure 3. The estimates were based on the following factors: the location of the site with respect to the area employment, commercial, and activity centers including Fort Carson, Fountain, and Colorado Springs; the land use proposed for the site; the proposed access plan for the site; and the roadway network serving the site.

When the distribution percentages are applied to the trip generation estimates (from Table 1), the site-generated traffic volumes on the adjacent roadway system can be determined. Figure 3 also shows the forecasted site-generated traffic volumes.

### **EXISTING PLUS SITE-GENERATED TRAFFIC**

Figure 4 shows the sum of the existing traffic volumes (from Figure 2) plus the site-generated traffic volumes (from Figure 3). The existing plus site-generated traffic volumes identify the development's immediate/short-term impacts. The project would likely be developed in one phase.

### **2035 BACKGROUND TRAFFIC**

The background traffic volumes for the year 2035 are shown in Figure 5. Background traffic is the traffic estimated to be on the adjacent roadways without consideration of the proposed development. The background traffic volumes include increases in through traffic on Venetucci Boulevard and minor increases in traffic turning to/from Bob Johnson Drive. At this point, no background traffic turning movements have been added to the site access for potential future traffic generated by the site to the north (assuming the access is shared) due to uncertainty and numerous variables such as its site circulation and access. The study for that site would address this intersection again if the access becomes a shared access.

The 2035 background traffic volume estimates were based on LSC's previous work in the area including the *South Academy Station Traffic Impact and Access Analysis Report*. The 2035 estimates include an estimated base increase of one percent per year for 25 years on Venetucci Boulevard. Estimates of traffic estimated to be generated by the future South Academy Station development were then added on top of this base one percent increase.

### **2035 TOTAL TRAFFIC**

The total traffic volumes for the year 2035 are shown in Figure 6. The 2035 total traffic volumes are the sum of the site-generated traffic volumes (from Figure 3) plus the 2030 background traffic volumes (from Figure 5).

### **PROJECTED LEVELS OF SERVICE**

The Bob Johnson/Venetucci Intersection has been analyzed to determine the projected levels of service for the existing plus site-generated and 2035 total traffic volumes using the procedure discussed in the "Existing Level of Service" section above. Future background traffic level of service for Venetucci/Bob Johnson is not particularly relevant. Level of service for 2035 total traffic is shown in Figure 6.

As shown in the figure, the eastbound left-turn movement at the intersection—site traffic exiting the site and turning left to travel north on Venetucci—is projected to operate at level of service F for the future short-term and long-term scenarios during the peak hours. This level of service is based on the intersection as a conventional “cross” intersection (four-leg intersection) with two-way Stop-sign control.

The level of service at this intersection would be improved if signalized, however a signal would not be warranted based on the volumes of traffic exiting the site and it would not be needed for or warranted based on traffic on the westbound approach from Bob Johnson. There is a possibility that with development of the vacant parcel to the north, a signal could become warranted in the future if the access were planned to be shared with the parcel to the north. The warrants for a traffic signal would depend on the land use and trip generation intensity as well as the access plan for that site. If the intersection were reconstructed as a single-lane modern roundabout, the level of service for all approaches would be B or better.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **Trip Generation**

1. The site is expected to generate about 1,600 vehicle-trips on the average weekday, with about 800 vehicles entering and 800 vehicles exiting the site in a 24-hour period. During the morning peak hour, about 25 vehicles would enter and 100 vehicles would exit the site. During the afternoon peak hour about 100 vehicles would enter and 50 vehicles would exit the site.

### **Projected Levels of Service**

2. Based on the long-term projected total traffic volumes, the eastbound left-turn movement out of the site at the Bob Johnson/Venetucci intersection is projected to operate at LOS F during the peak hours. As the level of service is for traffic exiting the site, vehicle queuing would occur on site rather than backing onto Venetucci. This level of service represents the results of the analysis of the intersection as a conventional four-leg “cross” intersection with two-way Stop-sign control.
3. Although the level of service is projected to be F, which indicates significant delay for exiting traffic turning left (or going straight through the intersection) during peak periods, the intersection would need to remain full movement. If the left/through turning movements were prohibited or restricted, there would be no way for site traffic to travel to the north without significant and unacceptable out-of-direction travel. If the intersection were reconstructed as a single-lane modern roundabout, the level of service for all approaches would be B or better.

### **Traffic Signal Warrants**

4. The level of service at this intersection would be improved if signalized, however a signal would not be warranted based on the volumes of traffic exiting the site and it would not be needed for or warranted based on traffic on the westbound approach from Bob Johnson. There is a possibility that with development of the vacant parcel to the north, a signal could become warranted in the future if the access were planned to be shared with the parcel to the north. The warrants for a traffic signal would depend on the land use and trip generation intensity as well as the access plan for that site.

### **Recommended Improvements**

LSC presents two options for the access intersection. The first, shown in Figure 7, is to add a fourth leg (west) to the existing intersection to create a conventional “cross” (four-leg) intersection that would be controlled with Stop signs on eastbound/westbound approaches. The second would be to reconstruct the intersection as a one-lane modern roundabout.

#### Option 1: Conventional “Cross” Intersection with Two-Way Stop-Sign Control

This option would have higher delay for exiting traffic—LOS F.

1. LSC recommends that the access drive provide at least three lanes—two exiting and one entering.
2. Additional auxiliary lanes at the Bob Johnson/Venetucci intersection will be required. These are shown in Figure 7:
  - A northbound left-turn deceleration lane on Venetucci—258-foot lane plus 200-foot taper
  - A southbound right-turn deceleration lane on Venetucci—200-foot lane plus 180-foot taper
  - The turn lanes should be designed to El Paso County standards.

#### Option 2: Reconstruction as a Modern Roundabout

This option, shown in Figure 8, would involve reconstructing the intersection of Bob Johnson/Venetucci as a one-lane modern roundabout and adding the site access as the fourth leg of this roundabout. No turn lanes would be required as is the case with Option 1. The LOS would improve for the side street approaches. The roundabout would provide a good transition between the city street to the north and county road to the south. It would provide a turnaround location (U-turns).

The project should reserve one-half of the remaining ultimate required right-of-way for an Urban Principal Arterial along the site frontage.

\* \* \* \* \*

Mr. David Spearman  
Independence Place at Cheyenne Mountain

Page 7

January 12, 2011  
Traffic Impact and Access Analysis

We trust that this traffic impact and access analysis will assist you in gaining approval of the proposed residential apartment development. Please contact me if you have any questions or need further assistance.

Sincerely,

LSC TRANSPORTATION CONSULTANTS, INC.

By

  
Jeffrey C. Hodsdon, P.E.  
Principal



JCH:bjwb

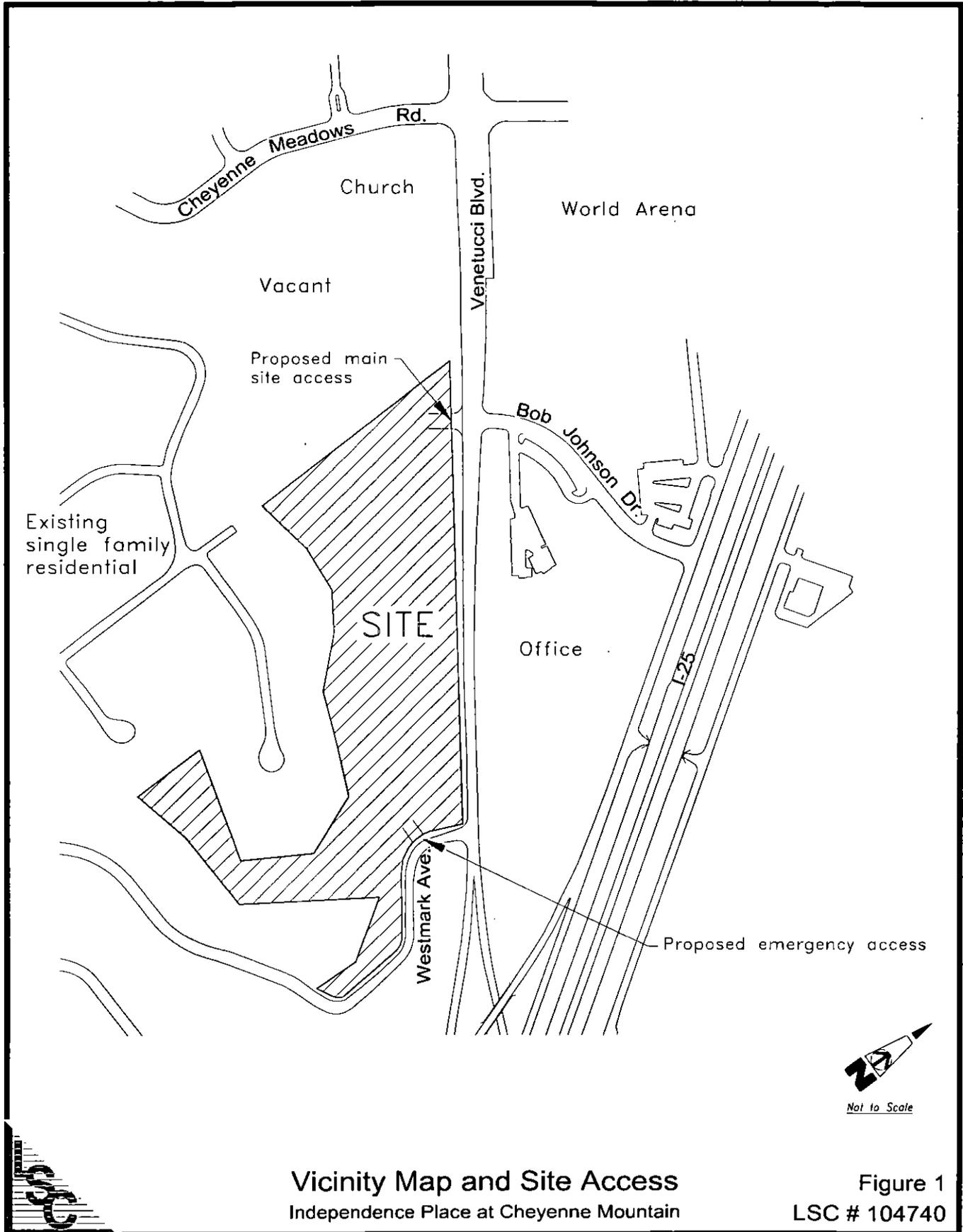
Enclosures: Table 1  
Figures 1-8  
Traffic Count Reports  
Level of Service Definitions  
Level of Service Reports

**Table 1**  
**Trip Generation Estimate**  
**Independence Place at Cheyenne Mountain**

Land Use Code	Land Use Description	Trip Generation Units	Trip Generation Rates <sup>(1)</sup>				Total Trips Generated					
			Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour		Average Weekday Traffic	Morning Peak Hour		Afternoon Peak Hour	
				In	Out	In	Out		In	Out		
220	Apartment	240 DU <sup>(2)</sup>	6.65	0.10	0.41	0.40	0.22	1,596	24	98	96	53

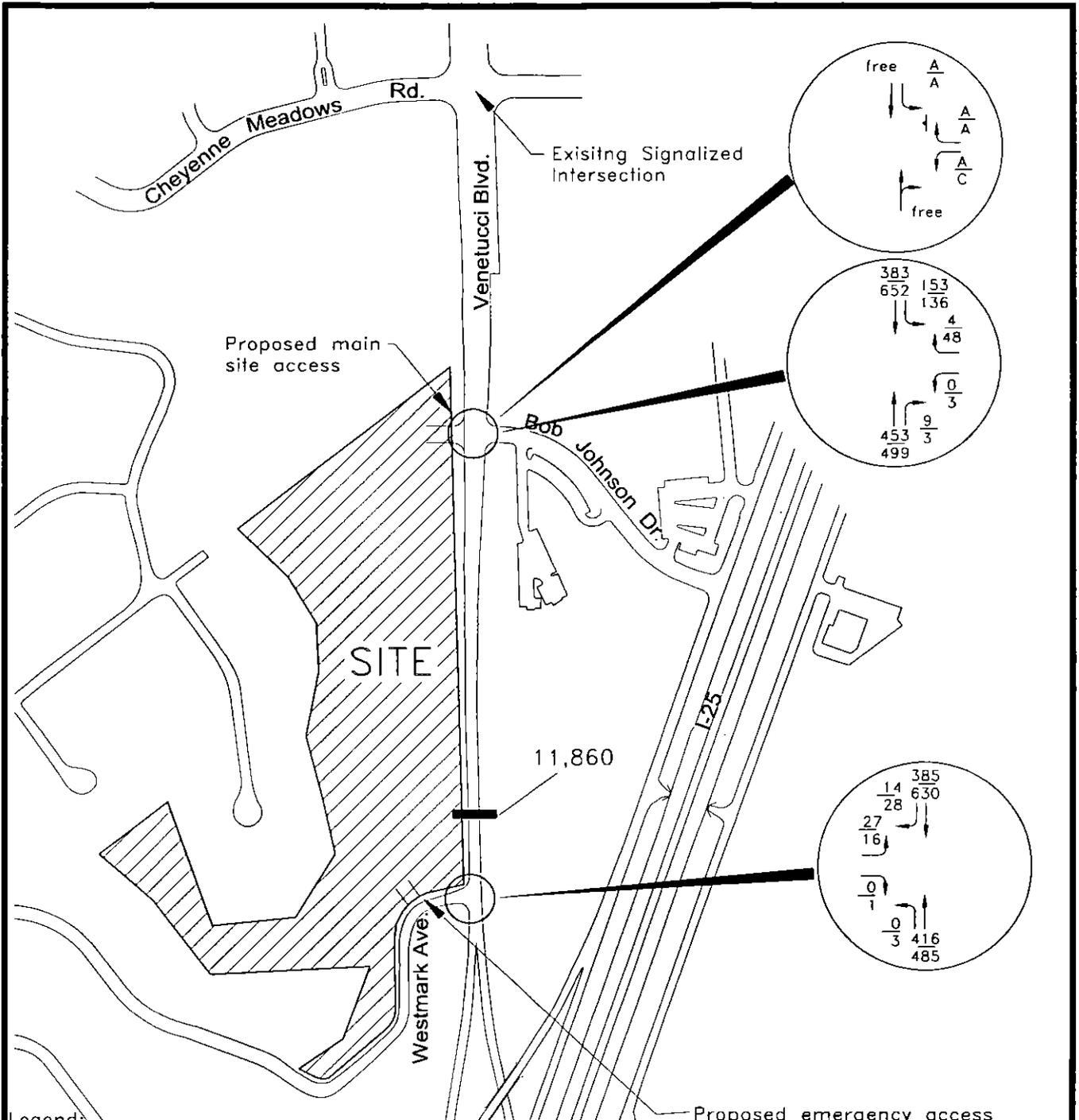
Notes:  
(1) Source: "Trip Generation, 8th Edition" by the Institute of Transportation Engineers  
(2) DU = dwelling unit

Source: LSC Transportation Consultants, Inc.



**Vicinity Map and Site Access**  
 Independence Place at Cheyenne Mountain

**Figure 1**  
 LSC # 104740



Legend:

- $\frac{xxx}{xxx}$   $\frac{am}{pm}$  - Weekday peak-hour traffic (vehicles per hour) - counts by LSC 11/18/10 & 11/19/10
- XX,XXX - Average weekday traffic (vehicles per day) - counts by LSC 12/1/10 & 12/2/10
- $\frac{X}{X}$   $\frac{am}{pm}$  - Individual movement peak-hour Level of Service
- † - Stop sign

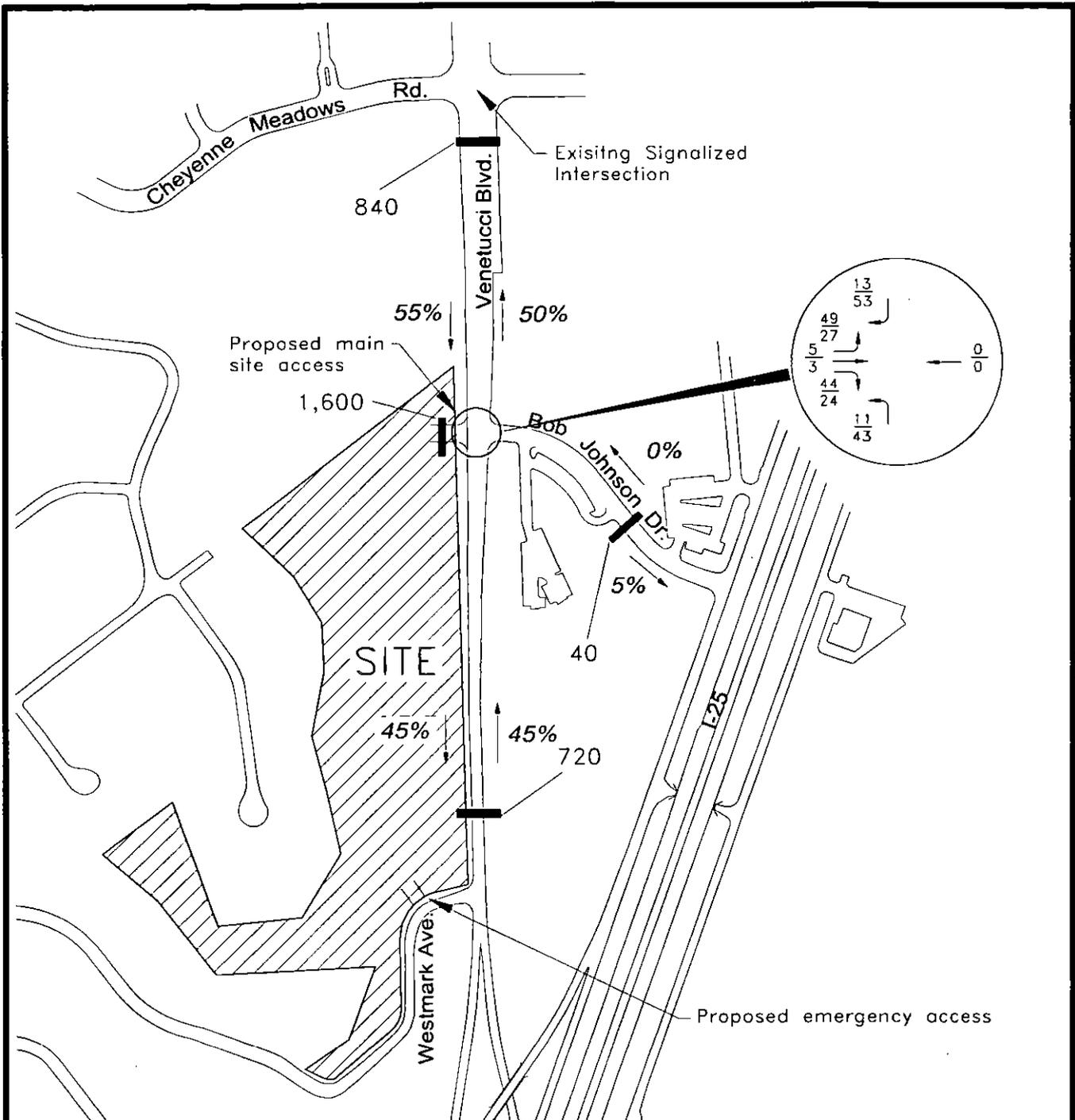


Not to Scale  
Figure 2

### Existing Traffic, Lane Geometry, Traffic Control and Level of Service

Independence Place at Cheyenne Mountain

LSC # 104740



Legend:

**XX%** - Directional distribution of site-generated traffic (% of entering or exiting traffic)

$\frac{xxx}{xxx}$   $\frac{am}{pm}$  - Weekday peak-hour traffic (vehicles per hour)

XX,XXX - Average weekday traffic (vehicles per day)

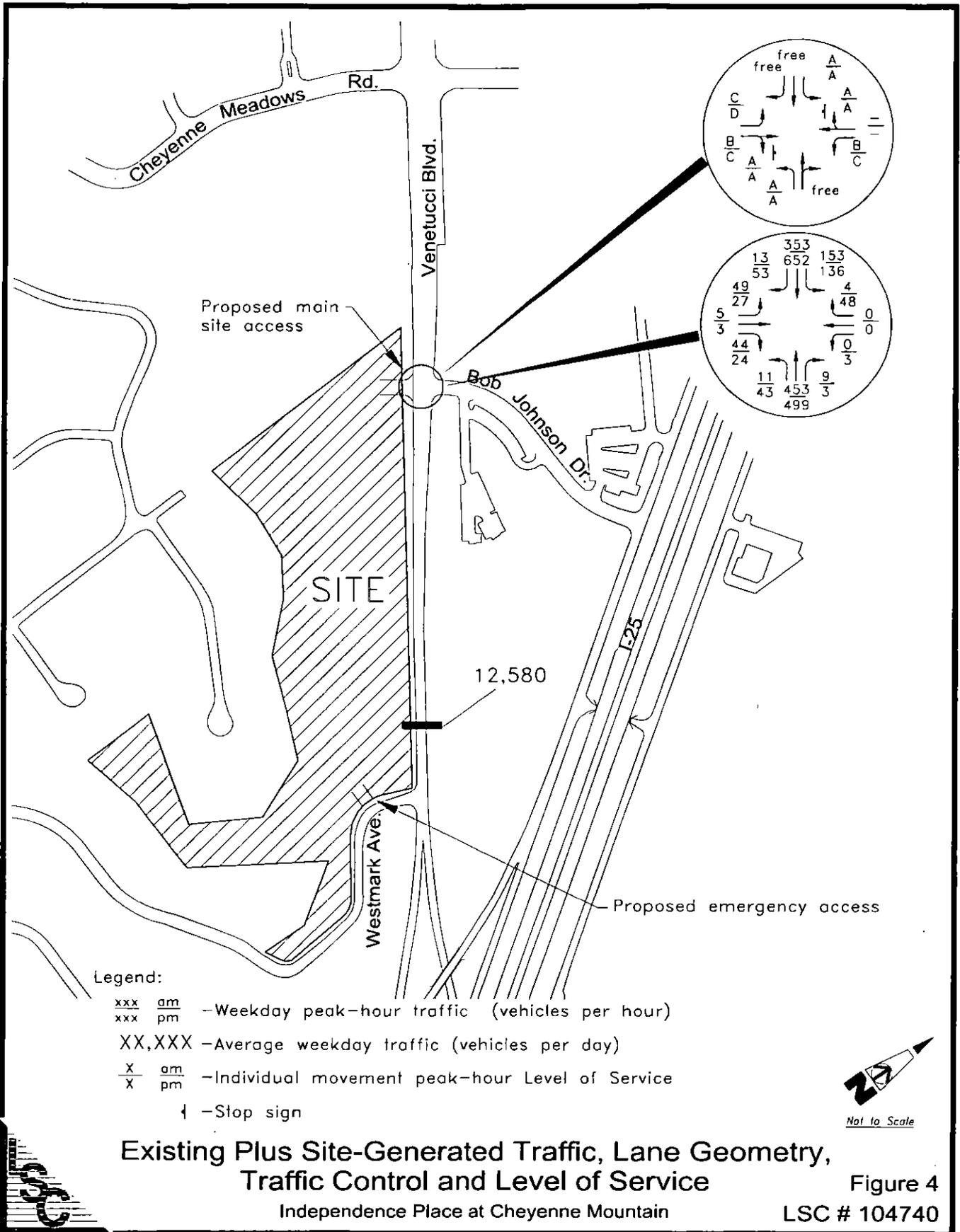
### Directional Distribution and Site-Generated Traffic

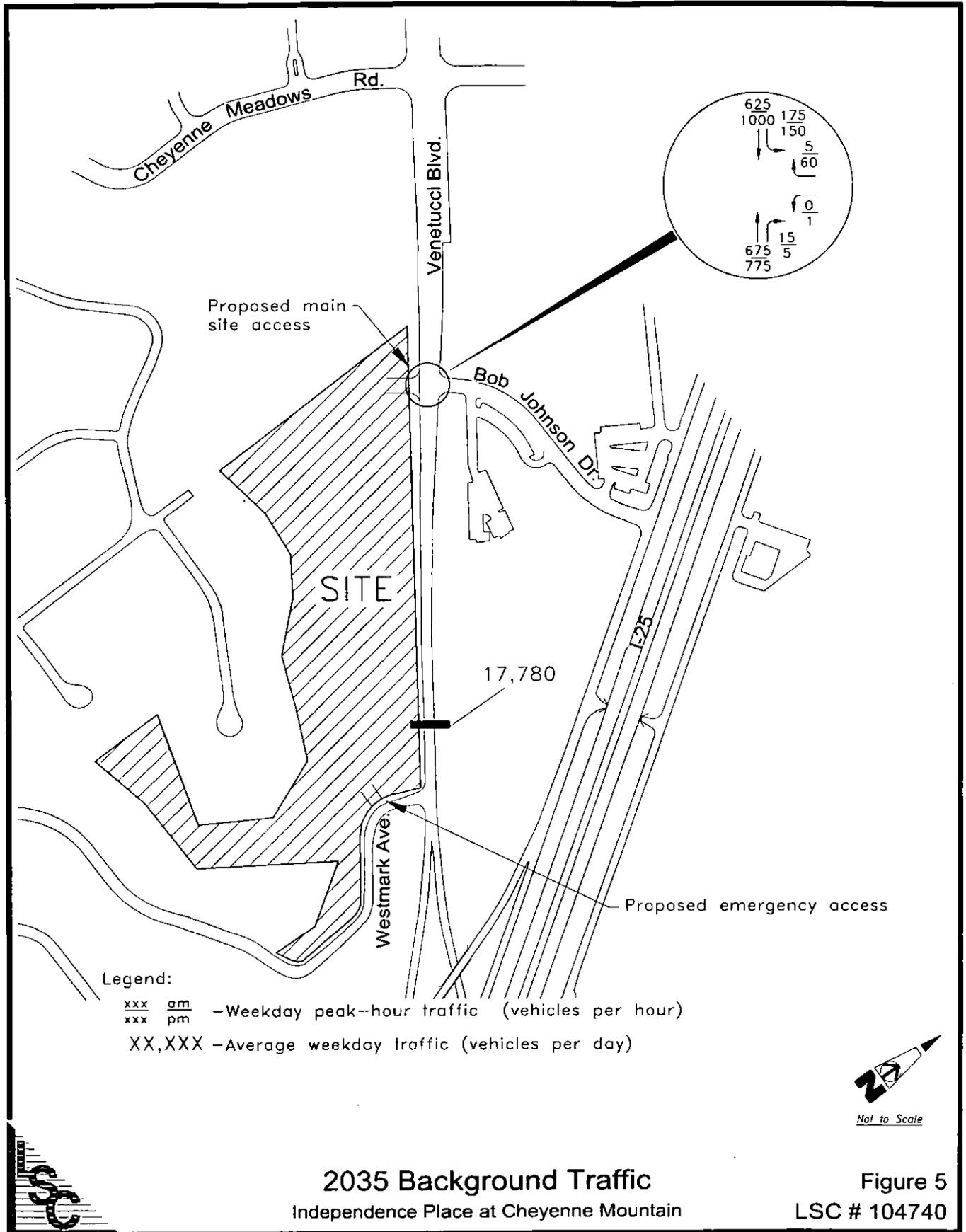
Independence Place at Cheyenne Mountain



*Not to Scale*  
Figure 3

LSC # 104740

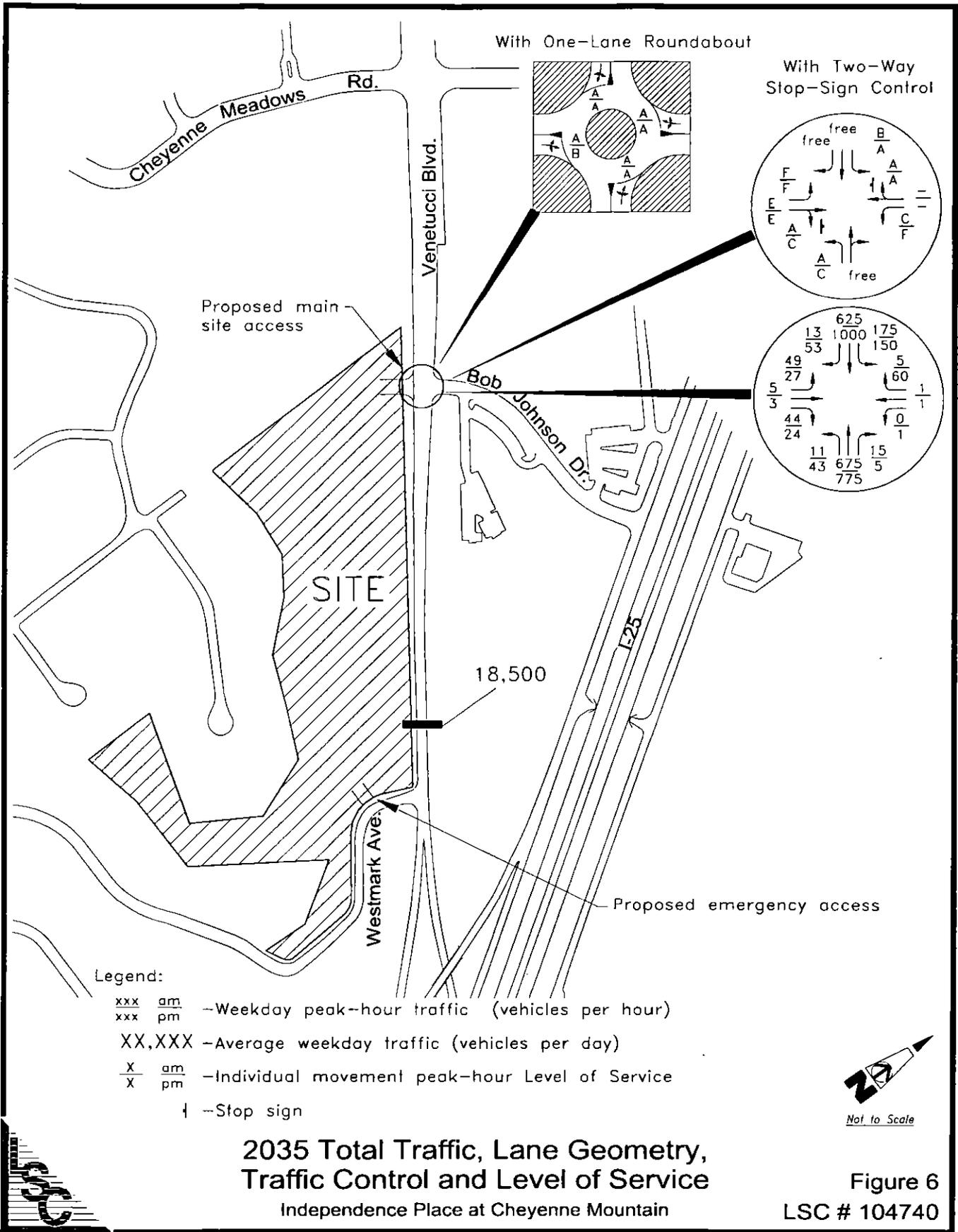


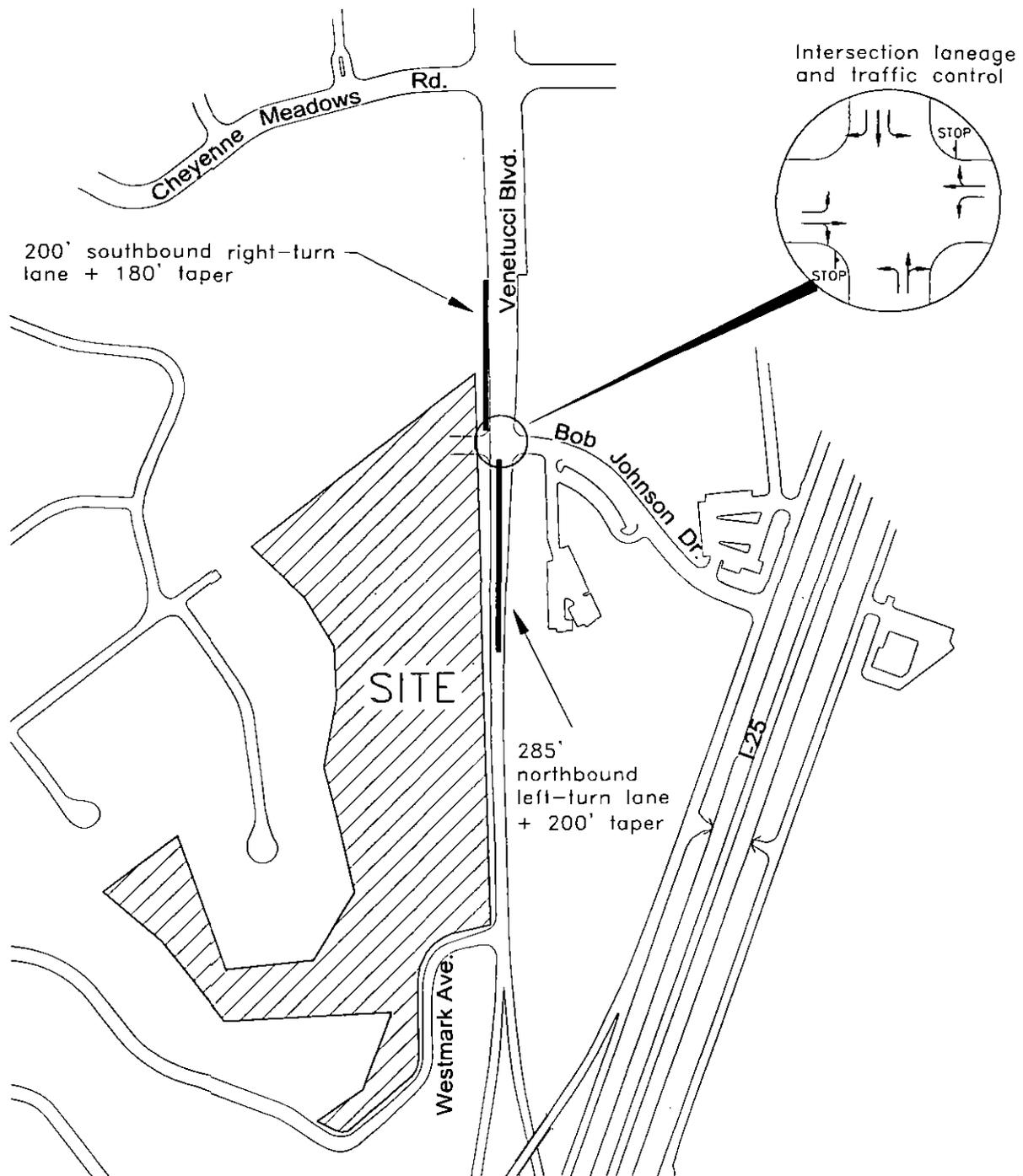


Legend:

xxx am - Weekday peak-hour traffic (vehicles per hour)  
xxx pm

XX,XXX - Average weekday traffic (vehicles per day)



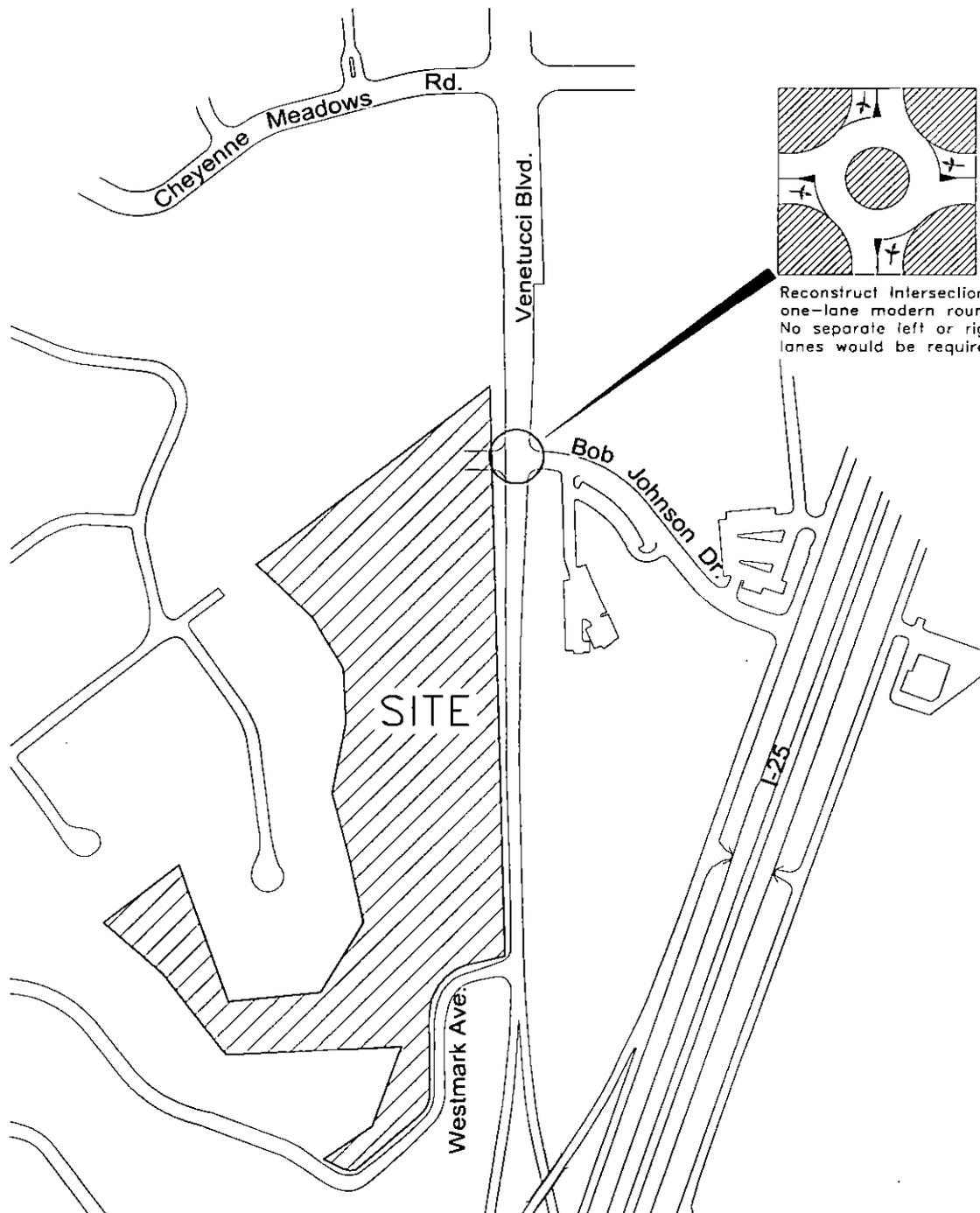


Not to Scale

**Option 1: Conventional Intersection  
w/ Two-Way Stop-Sign Traffic Control**

Independence Place at Cheyenne Mountain

Figure 7  
LSC # 104740



Reconstruct intersection as a one-lane modern roundabout. No separate left or right turn lanes would be required.



Not to Scale

**Option 2: Reconstruct Intersection  
as a One-Lane Modern Roundabout**

Independence Place at Cheyenne Mountain

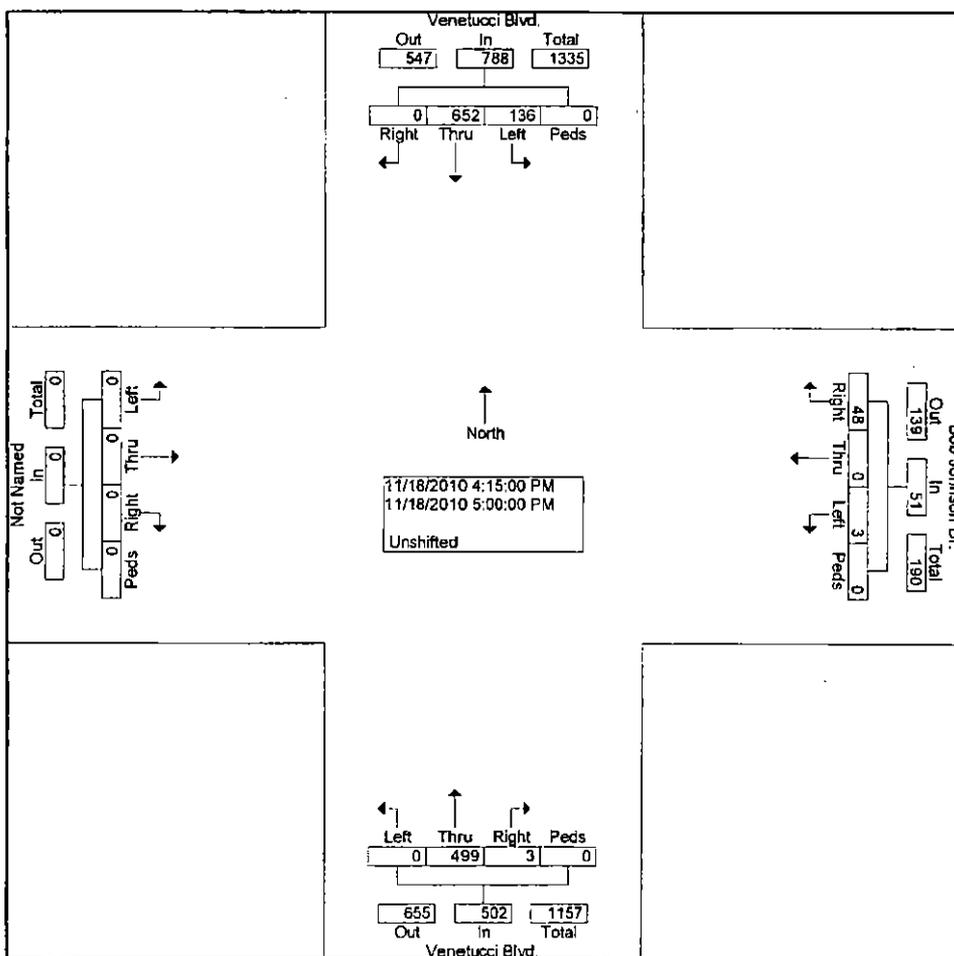
Figure 8  
LSC # 104740



LSC Transportation Consultants, Inc.  
 516 N. Tejon St.  
 Colorado Springs, CO  
 (719) 633-2868

File Name : Venetucci - Bob Johnson pm  
 Site Code : 00000000  
 Start Date : 11/18/2010  
 Page No : 2

Start Time	Venetucci Blvd. From North					Bob Johnson Dr. From East					Venetucci Blvd. From South					From West					Int. Total
	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
Peak Hour From 04:15 PM to 06:00 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	0	652	136	0	788	48	0	3	0	51	3	499	0	0	502	0	0	0	0	0	1341
Percent	0.0	82.7	17.3	0.0		94.1	0.0	5.9	0.0		0.6	99.4	0.0	0.0		0.0	0.0	0.0	0.0		
04:30 Volume	0	150	27	0	177	23	0	1	0	24	0	150	0	0	150	0	0	0	0	0	351
Peak Factor	0.955																				
High Int. Volume	04:15 PM					04:30 PM					04:30 PM					4:00:00 PM					
Peak Factor	0.956					0.531					0.837										

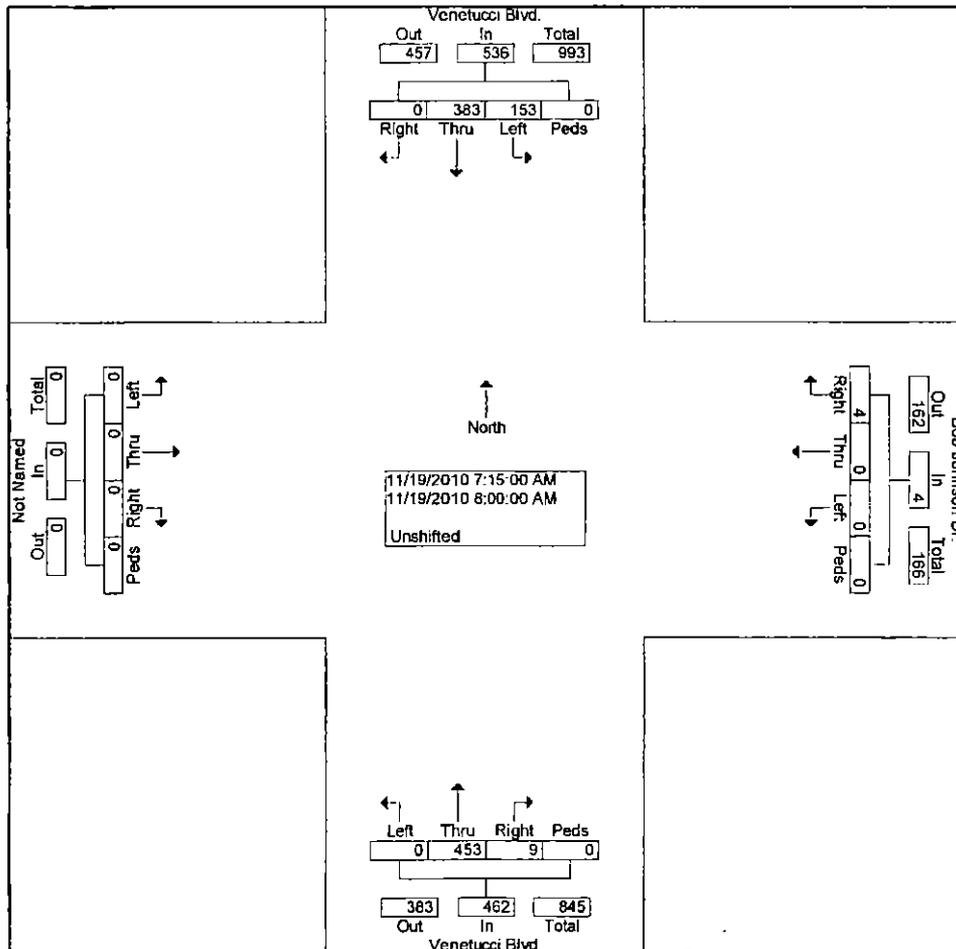




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 516 N. Tejon St.  
 Colorado Springs, CO  
 (719) 633-2868

File Name : Venetucci - Bob Johnson am  
 Site Code : 00000000  
 Start Date : 11/19/2010  
 Page No : 2

Start Time	Venetucci Blvd. From North					Bob Johnson Dr. From East					Venetucci Blvd. From South					From West					Int. Total				
	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total					
Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1																									
Intersection	07:15 AM																								
Volume	0	383	153	0	536	4	0	0	0	4	9	453	0	0	462	0	0	0	0	0	1002				
Percent	0.0	71.5	28.5	0.0		100.0	0.0	0.0	0.0		1.9	98.1	0.0	0.0		0.0	0.0	0.0	0.0						
07:45 Volume Peak Factor	0	104	49	0	153	0	0	0	0	0	3	134	0	0	137	0	0	0	0	0	290				
High Int. Volume Peak Factor	07:45 AM	0	104	49	0	153	07:15 AM	2	0	0	0	2	07:45 AM	3	134	0	0	137	6:15:00 AM	0	0	0	0	0	0.864
					0.876					0.500					0.843										



LSC Transportation Consultants, Inc.

516 N. Tejon St.

Colorado Springs, CO

(719) 633-2868

LSC Transportation Consultants, Inc.

File Name : Venetucci - Westmark am

Site Code : 00000000

Start Date : 11/19/2010

Page No : 1

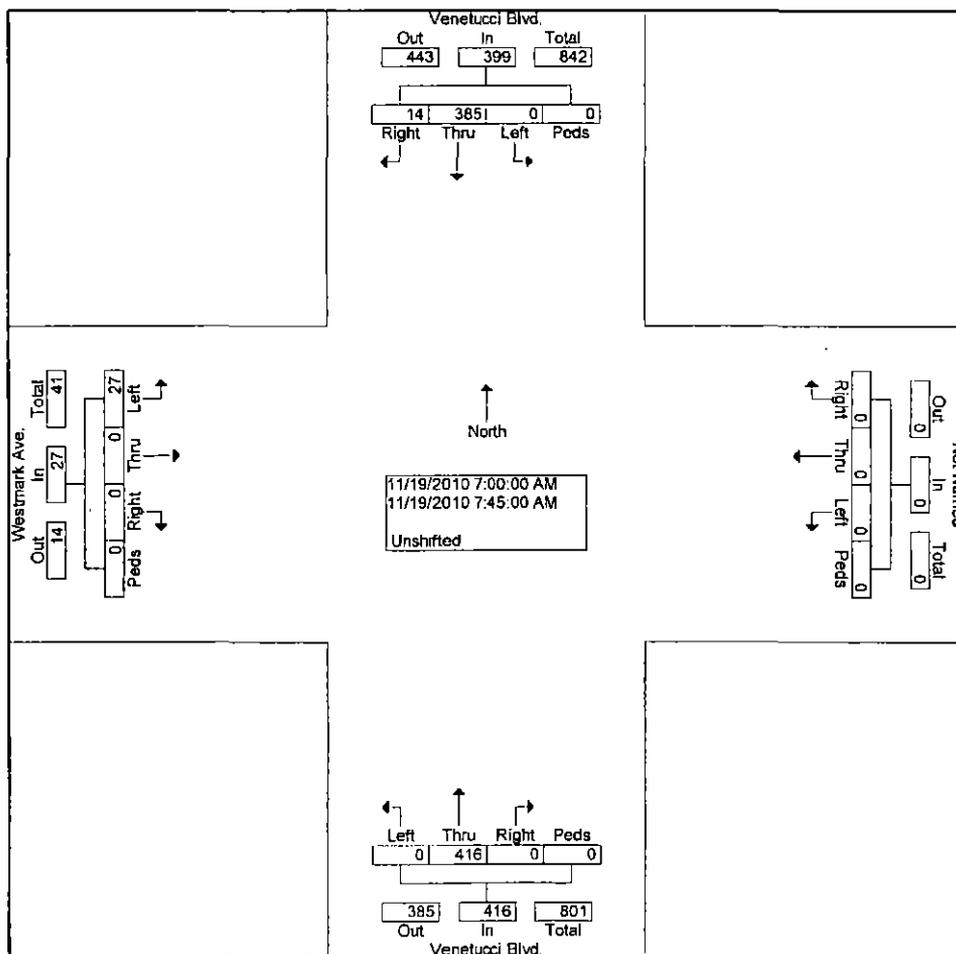
Groups Printed- Unshifted

Start Time	Venetucci Blvd. From North				From East				Venetucci Blvd. From South				Westmark Ave. From West				Int. Total
	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	Right	Thru	Left	Peds	
Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
06:30 AM	0	75	0	0	0	0	0	0	0	72	0	0	0	0	3	0	150
06:45 AM	0	67	0	0	0	0	0	0	0	75	0	0	0	0	1	0	143
Total	0	142	0	0	0	0	0	0	0	147	0	0	0	0	4	0	293
07:00 AM	1	103	0	0	0	0	0	0	0	67	0	0	0	0	3	0	174
07:15 AM	3	106	0	0	0	0	0	0	0	95	0	0	0	0	11	0	215
07:30 AM	4	78	0	0	0	0	0	0	0	125	0	0	0	0	9	0	216
07:45 AM	6	98	0	0	0	0	0	0	0	129	0	0	0	0	4	0	237
Total	14	385	0	0	0	0	0	0	0	416	0	0	0	0	27	0	842
08:00 AM	5	82	0	0	0	0	0	0	0	79	0	0	0	0	4	0	170
08:15 AM	0	89	0	0	0	0	0	0	0	80	0	0	2	0	5	0	176
Grand Total	19	698	0	0	0	0	0	0	0	722	0	0	2	0	40	0	1481
Apprch %	2.6	97.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	4.8	0.0	95.2	0.0	
Total %	1.3	47.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.8	0.0	0.0	0.1	0.0	2.7	0.0	

LSC Transportation Consultants, Inc.  
 516 N. Tejon St.  
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Start Time	Venetucci Blvd. From North					From East					Venetucci Blvd. From South					Westmark Ave. From West					Int. Total
	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	Rig ht	Thr u	Left	Ped s	App. Total	
Peak Hour From 06:30 AM to 08:15 AM - Peak 1 of 1																					
Intersection	07:00 AM																				
Volume	14	385	0	0	399	0	0	0	0	0	0	416	0	0	416	0	0	27	0	27	842
Percent	3.5	96.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	100.0	0.0	0.0		0.0	0.0	100.0	0.0		
07:45 Volume	6	98	0	0	104	0	0	0	0	0	0	129	0	0	129	0	0	4	0	4	237
Peak Factor																					0.888
High Int. Volume	07:15 AM					6:15:00 AM					07:45 AM					07:15 AM					
Peak Factor	3	106	0	0	109	0	0	0	0	0	0	129	0	0	129	0	0	11	0	11	
	0.915										0.806					0.614					



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Page No : 1

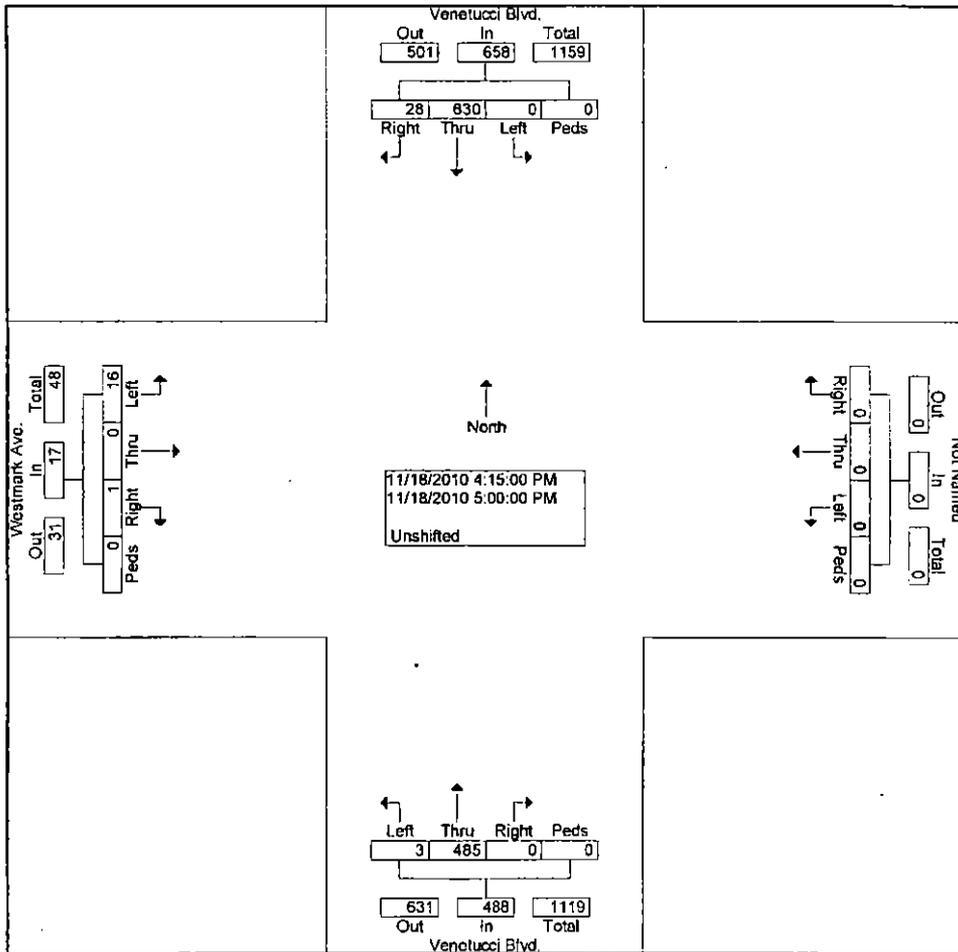
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Factor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
04:15 PM	7	169	0	0	0	0	0	0	0	102	0	0	1	0	2	0	281
04:30 PM	5	151	0	0	0	0	0	0	0	141	2	0	0	0	11	0	310
04:45 PM	7	163	0	0	0	0	0	0	0	111	0	0	0	0	2	0	283
Total	19	483	0	0	0	0	0	0	0	354	2	0	1	0	15	0	874
05:00 PM	9	147	0	0	0	0	0	0	0	131	1	0	0	0	1	0	289
05:15 PM	5	148	0	0	0	0	0	0	0	95	1	0	0	0	3	0	252
05:30 PM	7	129	0	0	0	0	0	0	0	103	0	0	1	0	3	0	243
05:45 PM	9	109	0	0	0	0	0	0	0	89	0	0	0	0	1	0	208
Total	30	533	0	0	0	0	0	0	0	418	2	0	1	0	8	0	992
06:00 PM	2	121	0	0	0	0	0	0	0	83	0	0	0	0	10	0	216
Grand Total	51	1137	0	0	0	0	0	0	0	855	4	0	2	0	33	0	2082
Apprch %	4.3	95.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.5	0.5	0.0	5.7	0.0	94.3	0.0	
Total %	2.4	54.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	41.1	0.2	0.0	0.1	0.0	1.6	0.0	

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 516 N. Tejon St.  
 Colorado Springs, CO  
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Start Time	Venetucci Blvd. From North					From East					Venetucci Blvd. From South					Westmark Ave. From West					Int. Total
	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	Rig ht	Thru	Left	Ped s	App. Total	
Peak Hour From 04:15 PM to 06:00 PM - Peak 1 of 1																					
Intersection	04:15 PM																				
Volume	28	630	0	0	658	0	0	0	0	0	0	485	3	0	488	1	0	16	0	17	1163
Percent	4.3	95.7	0.0	0.0		0.0	0.0	0.0	0.0		0.0	99.4	0.6	0.0		5.9	0.0	94.1	0.0		
04:30 Volume	5	151	0	0	156	0	0	0	0	0	0	141	2	0	143	0	0	11	0	11	310
Peak Factor	0.938																				
High Int. Volume	04:15 PM					4:00:00 PM					04:30 PM					04:30 PM					
Peak Factor	7	169	0	0	176	0	0	0	0	0	0	141	2	0	143	0	0	11	0	11	6
	0.935										0.853					0.386					



# LSC Transportation Consultants

516 N. Tejon St.  
 Colorado Springs, Co 80903  
 (719) 633-2868

Venetucci s-o Bob Johnson-VOL  
 Site Code:  
 Station ID:

Latitude: 0' 0.000 South

Start Time	01-Dec-10		02-Dec-10		03-Dec-10		04-Dec-10		05-Dec-10		06-Dec-10		07-Dec-10		Week Average			
	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound	Northbound	Southbound		
12:00 AM	*	*	23	50	*	*	*	*	*	*	*	*	*	*	23	50		
01:00	*	*	23	30	*	*	*	*	*	*	*	*	*	*	23	30		
02:00	*	*	15	19	*	*	*	*	*	*	*	*	*	*	15	19		
03:00	*	*	19	24	*	*	*	*	*	*	*	*	*	*	19	24		
04:00	*	*	31	39	*	*	*	*	*	*	*	*	*	*	31	39		
05:00	*	*	95	175	*	*	*	*	*	*	*	*	*	*	95	175		
06:00	*	*	269	223	*	*	*	*	*	*	*	*	*	*	269	223		
07:00	*	*	412	351	*	*	*	*	*	*	*	*	*	*	412	351		
08:00	*	*	309	338	*	*	*	*	*	*	*	*	*	*	309	338		
09:00	*	*	266	288	*	*	*	*	*	*	*	*	*	*	266	288		
10:00	*	*	318	301	*	*	*	*	*	*	*	*	*	*	318	301		
11:00	*	*	431	390	*	*	*	*	*	*	*	*	*	*	431	390		
12:00 PM	*	*	379	455	*	*	*	*	*	*	*	*	*	*	379	455		
01:00	*	*	363	451	*	*	*	*	*	*	*	*	*	*	363	451		
02:00	342	401	*	*	*	*	*	*	*	*	*	*	*	*	342	401		
03:00	426	494	*	*	*	*	*	*	*	*	*	*	*	*	426	494		
04:00	455	535	*	*	*	*	*	*	*	*	*	*	*	*	455	535		
05:00	417	508	*	*	*	*	*	*	*	*	*	*	*	*	417	508		
06:00	343	370	*	*	*	*	*	*	*	*	*	*	*	*	343	370		
07:00	203	325	*	*	*	*	*	*	*	*	*	*	*	*	203	325		
08:00	124	249	*	*	*	*	*	*	*	*	*	*	*	*	124	249		
09:00	90	181	*	*	*	*	*	*	*	*	*	*	*	*	90	181		
10:00	70	123	*	*	*	*	*	*	*	*	*	*	*	*	70	123		
11:00	44	73	*	*	*	*	*	*	*	*	*	*	*	*	44	73		
<b>Total</b>	<b>2514</b>	<b>3259</b>	<b>2953</b>	<b>3134</b>	<b>0</b>	<b>5467</b>	<b>6393</b>											
<b>Day</b>	<b>5773</b>		<b>6087</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>0</b>		<b>11860</b>			
<b>AM Peak</b>			11:00	11:00													11:00	11:00
<b>Vol.</b>			431	390													431	390
<b>PM Peak</b>	16:00	16:00	12:00	12:00													16:00	16:00
<b>Vol.</b>	455	535	379	455													455	535

Comb. Total      5773                      6087                      0                      0                      0                      0                      0                      11860

ADT                      Not Calculated

# LSC Transportation Consultants

516 N. Tejon St.  
Colorado Springs, Co 80903  
(719) 633-2868

Venetucci s-o Bob Johnson-VOL  
Site Code:  
Station ID:

Latitude: 0' 0.000 South

Start Time	01-Dec-10		Northbound		Southbound		Combined		02-Dec-		Northbound		Southbound		Combined	
	Wed		A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	Thu	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	
12:00									4	103		23	103	27	206	
12:15									9	91		11	124	20	215	
12:30									4	93		11	124	15	217	
12:45									6	92		5	104	11	196	
01:00									6	81		7	108	13	189	
01:15									8	88		13	119	21	207	
01:30									5	91		6	105	11	196	
01:45									4	103		4	119	8	222	
02:00				78		91		169	6			4		10		
02:15				75		114		189	2			4		6		
02:30				93		106		199	2			5		7		
02:45				96		90		186	5			6		11		
03:00				109		127		236	4			6		10		
03:15				101		119		220	4			10		14		
03:30				98		128		226	2			4		6		
03:45				118		120		238	9			4		13		
04:00				97		139		236	7			7		14		
04:15				112		127		239	5			7		12		
04:30				126		121		247	9			14		23		
04:45				120		148		268	10			11		21		
05:00				105				233	11			18		29		
05:15				112		131		243	20			38		58		
05:30				109		117		226	29			62		91		
05:45				91		132		223	35			57		92		
06:00				98		94		192	38			52		90		
06:15				97		108		205	64			51		115		
06:30				81		103		184	73			53		126		
06:45				67		65		132	94			67		161		
07:00				63		103		166	66			81		147		
07:15				51		83		134	94			100		194		
07:30				43		73		116	129			86		215		
07:45				46		66		112	123			84		207		
08:00				35		68		103	81			82		163		
08:15				32		64		96	94			85		179		
08:30				23		61		84	66			83		149		
08:45				34		56		90	68			88		156		
09:00				27		49		76	72			85		157		
09:15				17		44		61	61			67		128		
09:30				23		42		65	56			67		123		
09:45				23		46		69	77			69		146		
10:00				25		41		66	84			65		149		
10:15				17		33		50	66			75		141		
10:30				16		27		43	73			90		163		
10:45				12		22		34	95			71		166		
11:00				15		20		35	93			93		186		
11:15				15		20		35	109			100		209		
11:30				6		14		20	101			93		194		
11:45				8		19		27	128			104		232		
<b>Total</b>			0	2514	0	3259	0	5773	2211	742	2228	906	4439	1648		
<b>Day Total</b>			2514		3259		5773		2953		3134		6087			
<b>% Total</b>			0.0%	43.5%	0.0%	56.5%			36.3%	12.2%	36.6%	14.9%				
<b>Peak</b>			04:15		04:00		04:30		11:00	12:00	11:00	00:15	11:00	12:00		
<b>Vol.</b>			463		535		991		431	379	390	460	821	834		
<b>P.H.F.</b>			0.919		0.904		0.924		0.835	0.920	0.938	0.927	0.885	0.961		

ADT Not Calculated

# Level of Service Definitions

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The following descriptions have been adopted directly from the Transportation Research Board's *Highway Capacity Manual (HCM 2000)*, *Fourth Edition*. The methodologies used in the preceding report are consistent with the descriptions listed herein and within the original text.

Quality of service requires quantitative measures to characterize operational conditions within a traffic stream. Level of service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six levels of service are defined for each type of facility that has analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver's perception of those conditions. Safety is not included in the measures that establish service levels.

## SERVICE FLOW RATES

The analytical methods in the HCM 2000 attempt to establish or predict the maximum flow rate for various facilities at each level of service—except for LOS F, for which the flows are unstable or the vehicle delay is high. Thus, each facility has five service flow rates, one for each level of service (A through E). For LOS F, it is difficult to predict flow due to stop-and-start conditions.

The service flow rate is the maximum hourly rate at which persons or vehicles reasonably can be expected to traverse a point or uniform segment of a lane or roadway during a given period under prevailing roadway, traffic, and control conditions while maintaining a designated level of service. The service flow rates generally are based on a 15-minute period. Typically, the hourly service flow rate is defined as four times the peak 15-minute volume.

Note that service flow rates are discrete values, whereas levels of service represent a range of conditions. Because the service flow rates are the maximums for each level of service, they effectively define the flow boundaries between levels of service.

Most design or planning efforts typically use service flow rates at LOS C or D, to ensure an acceptable operating service for facility users.

### **SIGNALIZED INTERSECTIONS LEVEL OF SERVICE**

The average control delay per vehicle is estimated for each lane group and aggregated for each approach and for the intersection as a whole. LOS is directly related to the control delay value. The criteria are listed in the following table.

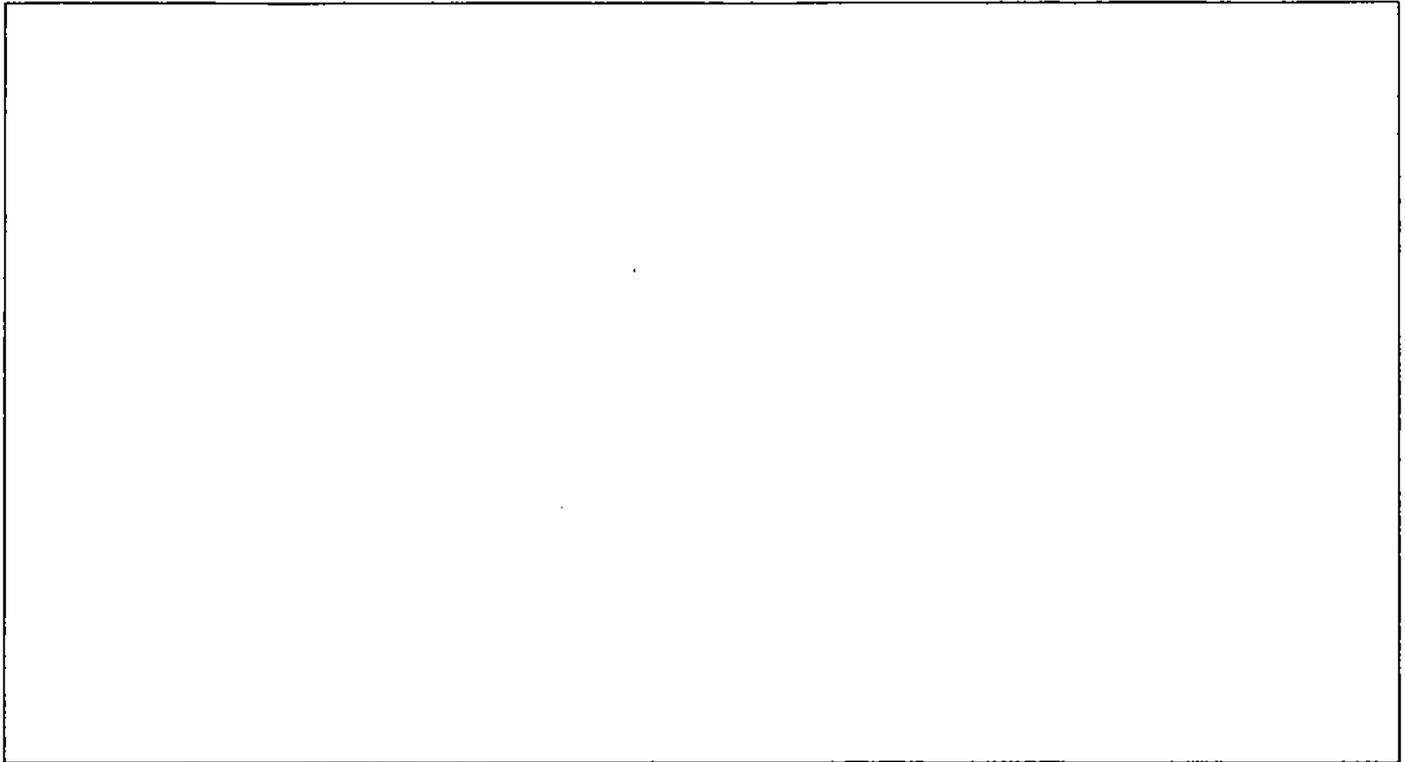
<b>Level of Service Criteria for Signalized Intersections</b>	
<b>Level of Service</b>	<b>Control Delay per Vehicle (Sec/Veh)</b>
A	≤10
B	>10 - 20
C	>20 - 35
D	>35 - 55
E	>55 - 80
F	>80

*Source: Highway Capacity Manual 2000, Exhibit 16-2.*

### **UNSIGNALIZED INTERSECTIONS LEVEL OF SERVICE**

Level of service (LOS) for a TWSC intersection is determined by the computed or measure control delay and is defined for each minor movement. LOS is not defined for the intersection as a whole. LOS criteria are shown in the following table.

<b>Level of Service Criteria for TWSC* Intersections</b>	
<b>Level of Service</b>	<b>Average Control Delay (Sec/Veh)</b>
A	0 - 10
B	>10 - 15
C	>15 - 25
D	>25 - 35
E	>35 - 50
F	>50
*TWSC - Two-Way Stop Controlled	
<i>Source: Highway Capacity Manual 2000, Exhibit 17-2.</i>	



## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #1 7:00

Movement	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.2	0.0	0.0	0.0	0.3
Delay / Veh (s)	2.0	6.3	6.7	4.4	1.5	4.3
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)	2.1	0.1	0.1	2.0	0.1	0.4
Total Stops	1	0	0	13	0	14
Stop/Veh	1.00	0.00	0.00	0.38	0.00	0.05
Travel Dist (mi)	0.4	92.9	1.8	6.0	16.2	117.1
Travel Time (hr)	0.0	2.4	0.0	0.2	0.4	3.1
Avg Speed (mph)	27	39	38	28	37	38

5: Bob Johnson & Venetucci Performance by movement Interval #2 7:15

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.3	0.0	0.1	0.1	0.4
Delay / Veh (s)	8.7	1.7	8.4	6.2	5.8	1.7	5.5
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)	7.4	1.9	0.1	0.1	3.0	0.2	0.6
Total Stops	1	2	0	0	19	0	22
Stop/Veh	1.00	1.00	0.00	0.00	0.44	0.00	0.08
Travel Dist (mi)	0.3	0.6	108.1	2.4	7.4	18.1	137.0
Travel Time (hr)	0.0	0.0	2.8	0.1	0.3	0.5	3.7
Avg Speed (mph)	22	28	38	37	26	37	37

5: Bob Johnson & Venetucci Performance by movement Interval #3 7:30

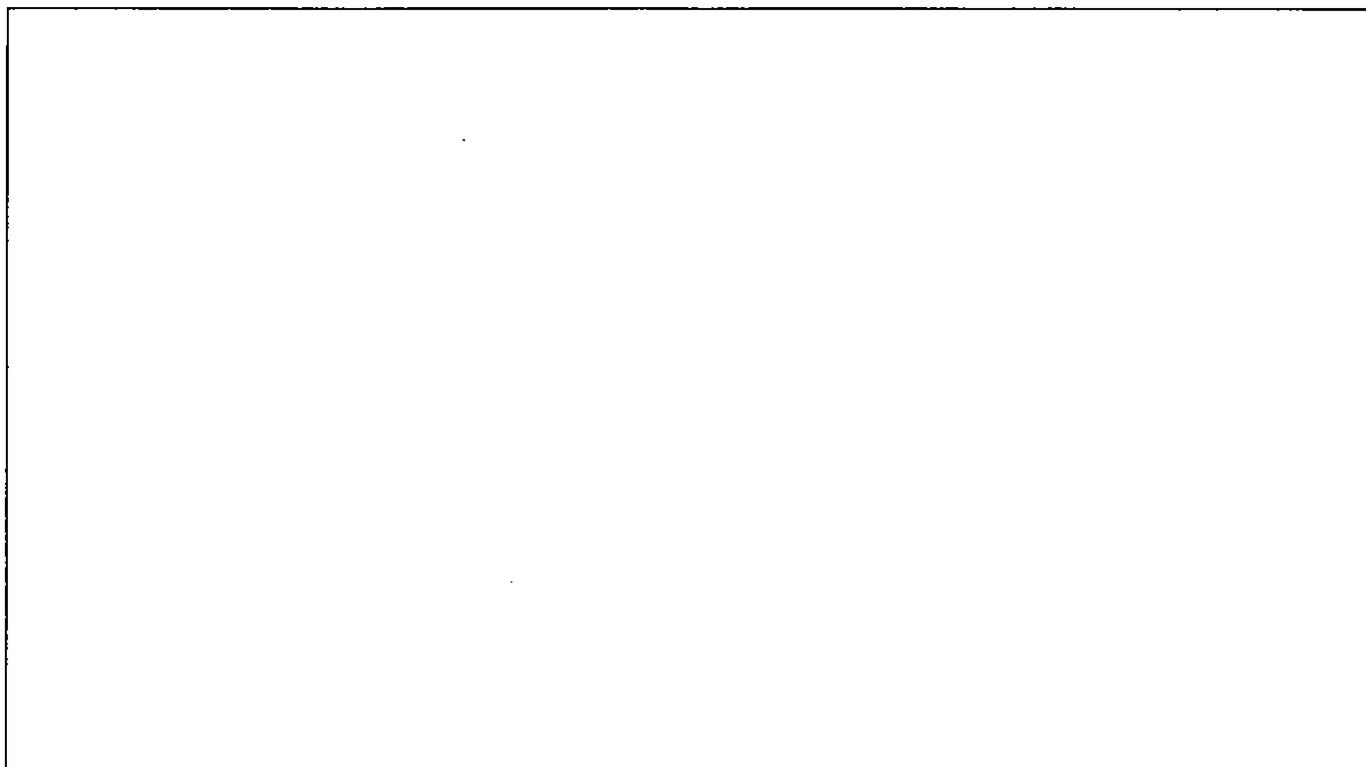
Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.1	0.0	0.3
Delay / Veh (s)		1.6	6.4	5.7	4.7	1.4	4.5
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		1.6	0.1	0.1	2.2	0.1	0.4
Total Stops	0	1	0	0	13	0	14
Stop/Veh		1.00	0.00	0.00	0.32	0.00	0.06
Travel Dist (mi)	0.1	0.3	90.0	1.6	6.9	14.4	113.4
Travel Time (hr)	0.0	0.0	2.3	0.0	0.3	0.4	3.0
Avg Speed (mph)	21	25	39	38	27	38	38

5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.0	0.3
Delay / Veh (s)		1.6	6.5	7.7	4.0	1.5	4.4
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		1.7	0.1	0.0	1.7	0.1	0.3
Total Stops	0	1	0	0	11	1	13
Stop/Veh		1.00	0.00	0.00	0.32	0.01	0.05
Travel Dist (mi)	0.0	0.3	93.4	1.5	6.0	15.6	116.8
Travel Time (hr)	0.0	0.0	2.4	0.0	0.2	0.4	3.1
Avg Speed (mph)	22	27	39	37	28	37	38

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	1.0	0.0	0.2	0.2	1.4
Delay / Veh (s)	13.5	2.1	6.9	6.6	4.8	1.6	4.7
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.1
St Del/Veh (s)	11.7	2.3	0.1	0.1	2.3	0.1	0.4
Total Stops	1	4	0	0	56	2	63
Stop/Veh	1.00	1.00	0.00	0.00	0.37	0.01	0.06
Travel Dist (mi)	0.4	1.6	384.4	7.3	26.3	64.2	484.2
Travel Time (hr)	0.0	0.1	9.9	0.2	1.0	1.7	12.8
Avg Speed (mph)	22	27	39	37	27	37	38



## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #1 7:00

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.3	0.0	0.0	0.1	0.5
Delay / Veh (s)		2.4	7.0	4.1	4.8	2.6	4.7
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		2.4	0.1	0.1	2.0	0.2	0.4
Total Stops	0	8	0	0	12	2	22
Stop/Veh		1.00	0.00	0.00	0.38	0.01	0.06
Travel Dist (mi)	0.1	2.8	112.4	0.7	5.7	29.3	151.0
Travel Time (hr)	0.0	0.1	3.0	0.0	0.2	0.9	4.2
Avg Speed (mph)	25	26	38	37	26	34	36

5: Bob Johnson & Venetucci Performance by movement Interval #2 7:15

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.4	0.0	0.1	0.2	0.7
Delay / Veh (s)	19.3	3.6	8.7	6.2	6.2	3.1	5.8
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	17.7	2.8	0.1	0.1	2.7	0.2	0.6
Total Stops	1	22	0	0	17	2	42
Stop/Veh	1.00	1.00	0.00	0.00	0.44	0.01	0.10
Travel Dist (mi)	0.5	8.3	130.2	1.0	6.9	31.9	178.8
Travel Time (hr)	0.0	0.3	3.5	0.0	0.3	0.9	5.1
Avg Speed (mph)	21	26	37	36	25	34	35

5: Bob Johnson & Venetucci Performance by movement Interval #3 7:30

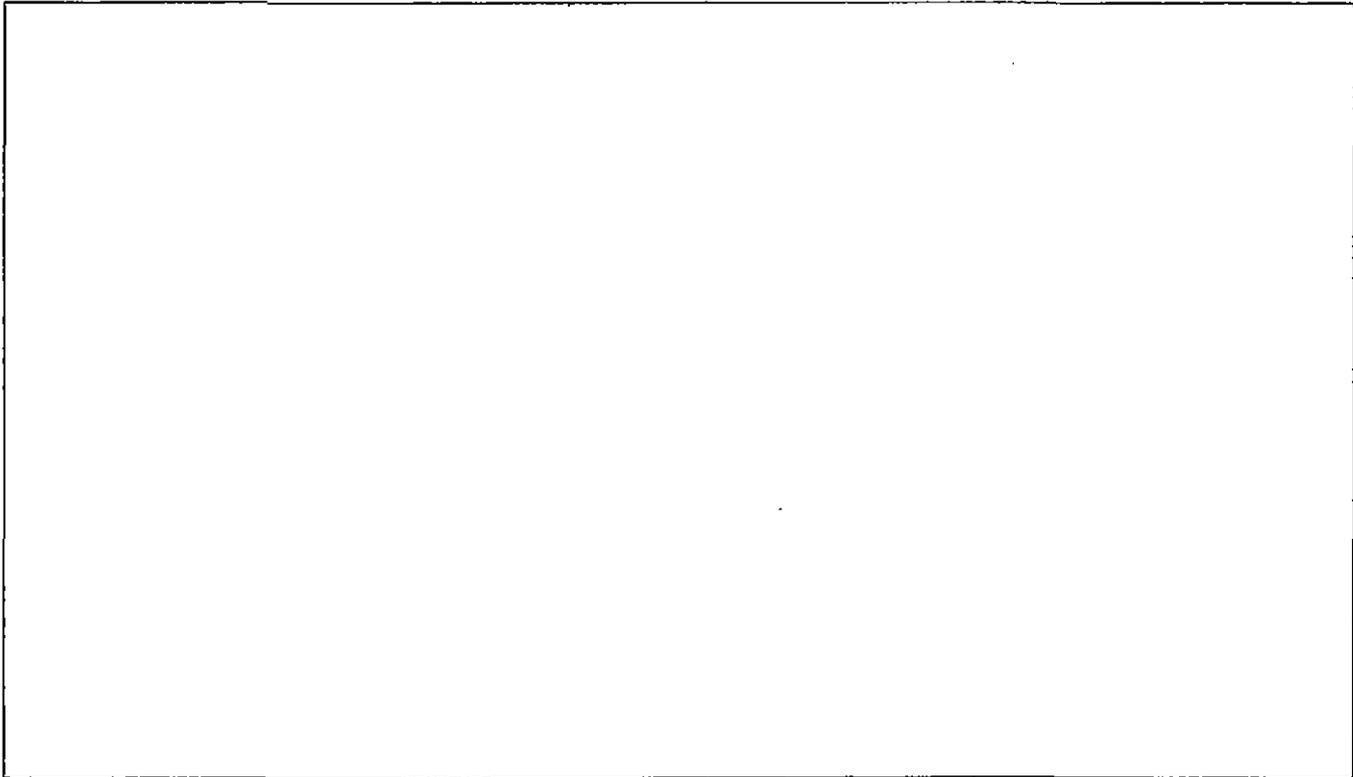
Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.4	0.0	0.0	0.1	0.5
Delay / Veh (s)		2.6	7.5	4.2	4.6	2.7	5.0
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		2.5	0.1	0.2	1.8	0.2	0.3
Total Stops	0	8	0	0	11	1	20
Stop/Veh		1.00	0.00	0.00	0.34	0.01	0.05
Travel Dist (mi)	0.1	2.9	115.2	0.7	5.5	28.7	153.1
Travel Time (hr)	0.0	0.1	3.1	0.0	0.2	0.8	4.3
Avg Speed (mph)	21	26	38	35	27	34	36

5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	0.2	0.0	0.0	0.1	0.4
Delay / Veh (s)		2.8	7.4	7.5	5.2	2.7	5.0
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
St Del/Veh (s)		2.8	0.1	0.0	2.2	0.2	0.4
Total Stops	0	6	0	0	9	2	17
Stop/Veh		1.00	0.00	0.00	0.41	0.02	0.07
Travel Dist (mi)	0.2	2.0	76.8	0.4	3.8	19.8	103.0
Travel Time (hr)	0.0	0.1	2.0	0.0	0.1	0.6	2.9
Avg Speed (mph)	22	26	38	33	26	34	36

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	WBL	WBR	NBT	NBR	SBL	SBT	All
Total Delay (hr)	0.0	0.0	1.4	0.0	0.2	0.5	2.1
Delay / Veh (s)	15.7	3.1	7.7	5.5	5.2	2.8	5.2
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.1	0.0	0.2
St Del/Veh (s)	14.2	2.7	0.1	0.1	2.2	0.2	0.4
Total Stops	2	44	0	0	49	7	102
Stop/Veh	1.00	1.00	0.00	0.00	0.39	0.01	0.07
Travel Dist (mi)	0.9	16.0	434.6	2.8	21.9	109.7	585.9
Travel Time (hr)	0.0	0.6	11.6	0.1	0.8	3.2	16.4
Avg Speed (mph)	22	26	38	35	26	34	36



## SimTraffic Performance Report

Baseline

## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #1 7:00

Movement	EBL	EBT	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3
Delay / Veh (s)	14.0	15.4	3.1	1.7	4.3	4.5	3.4	4.0	1.4	0.4	3.8
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	12.0	11.1	2.8	1.8	0.5	0.1	0.1	1.8	0.1	0.1	1.0
Total Stops	12	1	6	1	0	0	0	13	0	0	33
Stop/Veh	1.00	1.00	1.00	1.00	0.00	0.00	0.00	0.37	0.00	0.00	0.12
Travel Dist (mi)	5.0	0.4	2.6	0.3	1.8	90.7	2.0	6.2	14.4	0.7	124.2
Travel Time (hr)	0.2	0.0	0.1	0.0	0.0	2.2	0.1	0.2	0.4	0.0	3.3
Avg Speed (mph)	22	23	26	27	40	41	40	28	38	34	37

## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #2 7:15

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0	0.4
Delay / Veh (s)	20.7	12.9	3.3	14.4	3.4	3.8	5.9	4.4	5.5	1.8	0.3	5.0
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	18.5	10.5	3.0	13.4	3.5	1.4	0.1	0.0	2.8	0.2	0.1	1.4
Total Stops	13	2	5	1	2	1	0	0	19	0	0	43
Stop/Veh	1.00	1.00	1.00	1.00	1.00	0.50	0.00	0.00	0.44	0.00	0.00	0.14
Travel Dist (mi)	5.9	0.7	2.4	0.3	0.7	1.8	106.7	3.0	7.4	17.4	0.4	146.7
Travel Time (hr)	0.3	0.0	0.1	0.0	0.0	0.0	2.7	0.1	0.3	0.5	0.0	4.0
Avg Speed (mph)	21	22	27	19	26	41	40	37	26	37	34	36

## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #3 7:30

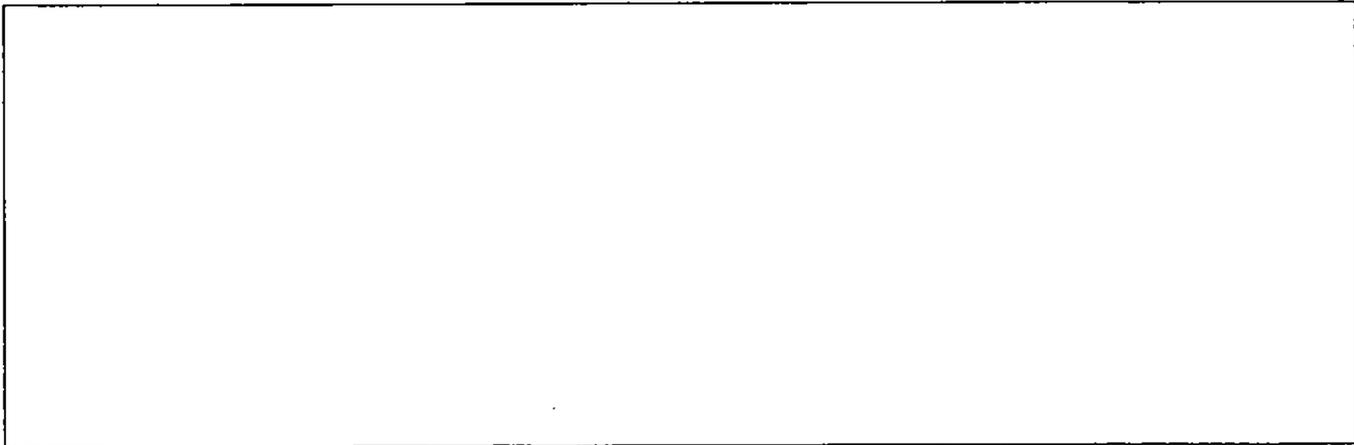
Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.3
Delay / Veh (s)	14.3	15.0	3.2		1.4	4.4	4.5	4.3	4.6	1.6	0.5	4.0
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	12.0	9.6	2.7		1.5	1.5	0.1	0.2	2.2	0.1	0.1	1.0
Total Stops	12	2	6	0	0	0	0	0	15	0	0	35
Stop/Veh	1.00	2.00	1.00		0.00	0.00	0.00	0.00	0.44	0.00	0.00	0.13
Travel Dist (mi)	5.3	0.7	2.8	0.0	0.2	1.6	88.5	2.2	6.1	14.5	0.6	122.5
Travel Time (hr)	0.2	0.0	0.1	0.0	0.0	0.0	2.2	0.1	0.2	0.4	0.0	3.3
Avg Speed (mph)	22	26	26	21	25	39	40	37	27	38	34	37

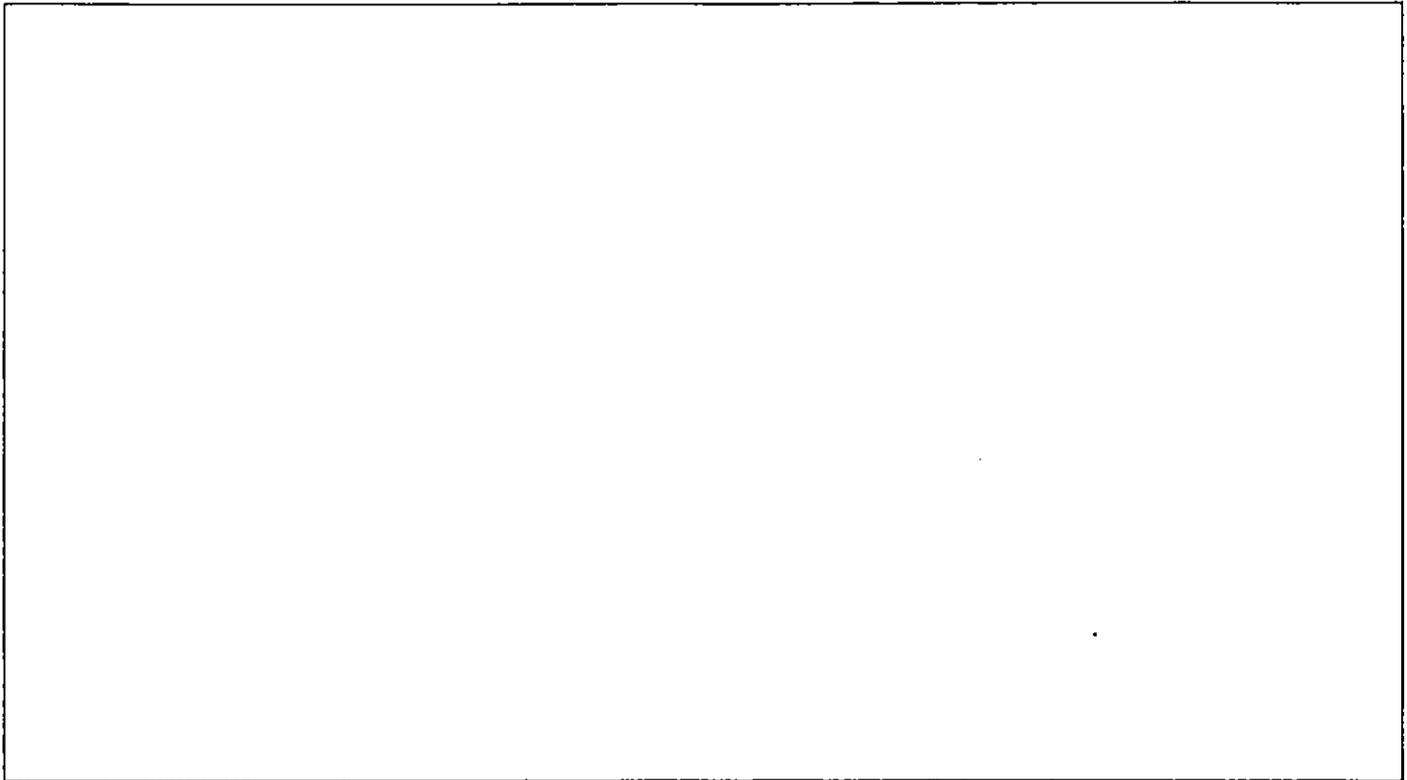
5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

Movement	EBL	EBT	EBR	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.3
Delay / Veh (s)	14.7	14.2	2.9	2.4	3.1	4.6	4.6	4.9	1.6	0.4	4.1
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	12.7	10.9	2.4	2.5	0.9	0.1	0.0	2.3	0.1	0.1	1.0
Total Stops	12	2	5	1	1	0	0	15	0	0	36
Stop/Veh	1.00	1.00	0.83	1.00	0.33	0.00	0.00	0.42	0.00	0.00	0.13
Travel Dist (mi)	5.1	0.9	2.5	0.4	2.2	96.3	1.7	6.4	15.5	0.6	131.5
Travel Time (hr)	0.2	0.0	0.1	0.0	0.1	2.4	0.0	0.2	0.4	0.0	3.5
Avg Speed (mph)	23	23	27	27	38	40	39	27	38	36	37

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.2	0.2	0.0	1.3
Delay / Veh (s)	16.4	14.1	3.1	16.5	3.1	3.4	4.9	4.2	4.8	1.6	0.4	4.3
Stop Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4
St Del/Veh (s)	14.2	10.6	2.7	15.3	3.2	1.0	0.1	0.1	2.3	0.1	0.1	1.1
Total Stops	48	6	23	1	4	3	0	0	61	0	0	146
Stop/Veh	1.00	1.00	1.00	1.00	1.00	0.30	0.00	0.00	0.41	0.00	0.00	0.13
Travel Dist (mi)	21.3	2.6	10.4	0.3	1.6	7.5	382.3	9.0	25.9	61.9	2.3	524.9
Travel Time (hr)	1.0	0.1	0.4	0.0	0.1	0.2	9.5	0.2	1.0	1.7	0.1	14.2
Avg Speed (mph)	22	23	26	19	26	39	40	38	27	37	34	37





## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #1 7:00

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.4
Delay / Veh (s)	18.8	13.0	4.0		3.5	8.5	4.3	5.1	4.3	3.0	0.9	4.0
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	16.8	10.9	3.6		3.0	4.4	0.1	0.1	1.8	0.2	0.1	0.8
Total Stops	6	1	6	0	8	6	0	0	12	1	0	40
Stop/Veh	1.00	1.00	1.00		1.00	0.60	0.00	0.00	0.40	0.01	0.00	0.10
Travel Dist (mi)	2.9	0.3	2.7	0.2	3.0	7.5	104.9	0.8	5.3	28.4	2.1	158.0
Travel Time (hr)	0.1	0.0	0.1	0.0	0.1	0.2	2.6	0.0	0.2	0.8	0.1	4.3
Avg Speed (mph)	22	21	26	21	25	36	40	37	27	34	33	36

5: Bob Johnson & Venetucci Performance by movement Interval #2 7:15

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.1	0.2	0.0	0.7
Delay / Veh (s)	28.3	24.8	3.9	17.3	3.7	8.0	6.0		6.4	3.3	1.1	5.1
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
St Del/Veh (s)	26.5	21.2	3.5	16.2	3.1	3.9	0.1		3.4	0.3	0.2	1.2
Total Stops	7	1	7	1	21	8	0	0	19	2	0	66
Stop/Veh	1.00	1.00	1.00	1.00	1.00	0.62	0.00		0.48	0.01	0.00	0.14
Travel Dist (mi)	3.3	0.4	3.1	0.3	7.9	10.1	128.9	0.4	6.7	31.9	2.5	195.7
Travel Time (hr)	0.2	0.0	0.1	0.0	0.3	0.3	3.3	0.0	0.3	1.0	0.1	5.5
Avg Speed (mph)	19	21	26	19	26	37	39	36	24	33	31	35

5: Bob Johnson & Venetucci Performance by movement Interval #3 7:30

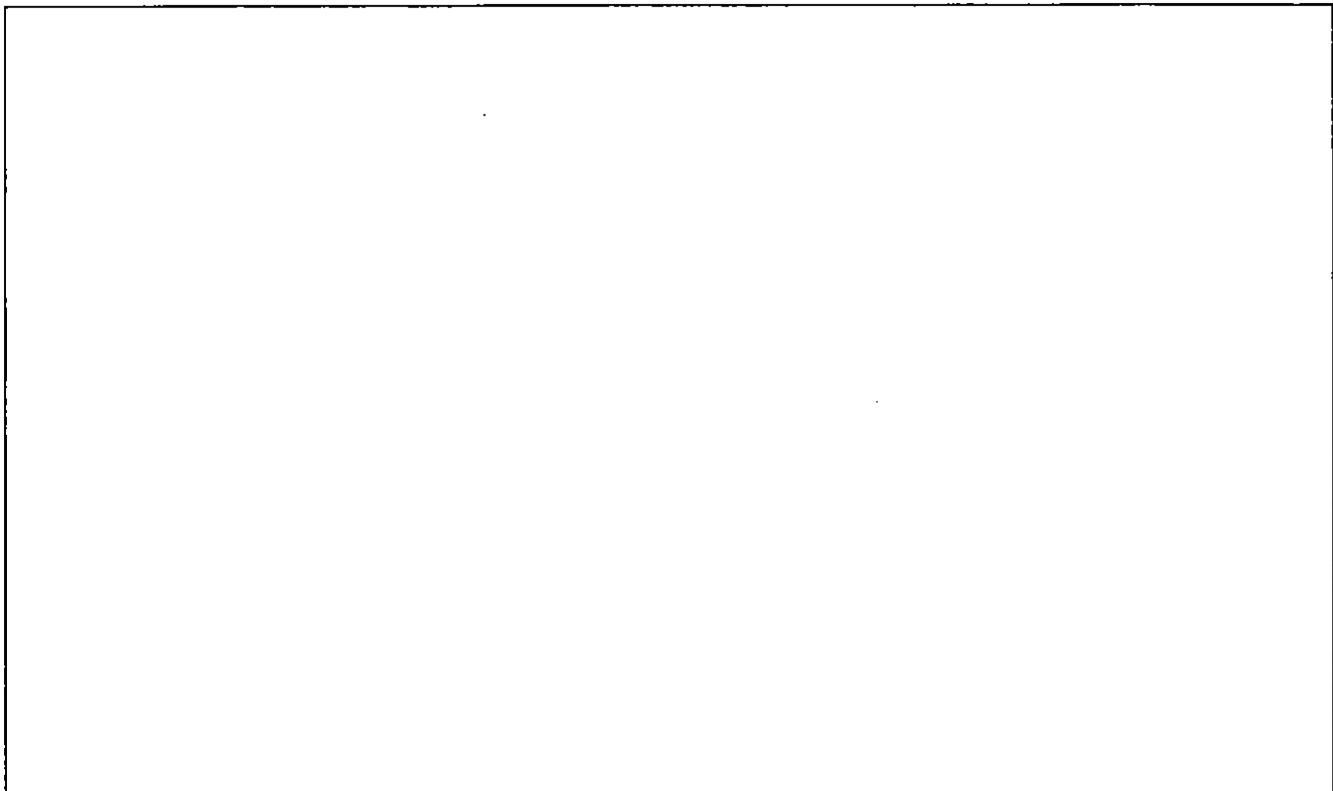
Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.5
Delay / Veh (s)	21.3	22.0	3.9		3.4	6.5	4.8		5.3	3.0	0.8	4.3
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	19.4	17.8	3.7		3.2	2.5	0.1		2.5	0.2	0.2	0.9
Total Stops	6	1	8	1	8	5	0	0	14	2	0	45
Stop/Veh	1.00	1.00	1.14		1.00	0.50	0.00		0.44	0.01	0.00	0.11
Travel Dist (mi)	2.7	0.5	3.4	0.2	2.7	8.3	112.9	0.3	5.6	27.1	2.3	166.1
Travel Time (hr)	0.1	0.0	0.1	0.0	0.1	0.2	2.9	0.0	0.2	0.8	0.1	4.6
Avg Speed (mph)	21	24	27	15	25	37	39	35	26	34	32	36

5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.5
Delay / Veh (s)	22.3	21.8	4.9	13.1	3.0	6.9	4.8		4.9	3.0	0.9	4.3
Stop Delay (hr)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
St Del/Veh (s)	20.4	18.2	4.6	12.4	2.9	3.0	0.1		2.3	0.2	0.1	0.9
Total Stops	6	1	7	1	9	5	0	0	15	2	0	46
Stop/Veh	0.86	1.00	1.00	1.00	1.00	0.50	0.00		0.48	0.01	0.00	0.11
Travel Dist (mi)	3.0	0.4	3.3	0.3	3.3	8.0	115.1	0.3	5.5	28.4	2.3	169.9
Travel Time (hr)	0.1	0.0	0.1	0.0	0.1	0.2	2.9	0.0	0.2	0.8	0.1	4.7
Avg Speed (mph)	21	21	26	20	26	37	39	40	26	34	32	36

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.2	0.6	0.0	2.1
Delay / Veh (s)	22.9	20.4	4.0	19.6	3.5	7.5	5.0	6.1	5.3	3.1	0.9	4.5
Stop Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4
St Del/Veh (s)	21.0	17.0	3.7	18.7	3.1	3.5	0.1	0.2	2.5	0.2	0.2	1.0
Total Stops	26	4	28	3	47	24	0	0	60	8	0	200
Stop/Veh	1.00	1.00	1.00	1.00	1.02	0.56	0.00	0.00	0.45	0.01	0.00	0.12
Travel Dist (mi)	11.8	1.7	12.5	1.0	17.0	34.0	461.9	1.8	23.2	115.8	9.2	689.7
Travel Time (hr)	0.6	0.1	0.5	0.1	0.7	0.9	11.7	0.0	0.9	3.4	0.3	19.2
Avg Speed (mph)	21	21	26	18	26	37	39	37	26	34	32	36



## SimTraffic Performance Report

Baseline

## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #1 7:00

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.0	0.5
Delay / Veh (s)	27.3	55.1	10.2		4.1	3.6	3.4	1.9	6.7	2.6	0.5	4.5
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
St Del/Veh (s)	25.4	50.9	9.9		4.2	2.8	0.3	0.3	3.9	0.1	0.1	1.8
Total Stops	13	1	10	0	1	1	0	0	24	0	0	50
Stop/Veh	1.00	1.00	1.00		1.00	0.50	0.00	0.00	0.57	0.00	0.00	0.13
Travel Dist (mi)	6.0	0.6	4.7	0.0	0.4	0.9	63.9	1.6	7.4	27.6	0.4	113.4
Travel Time (hr)	0.3	0.0	0.2	0.0	0.0	0.0	1.6	0.0	0.3	0.8	0.0	3.4
Avg Speed (mph)	19	16	24	21	26	38	40	37	25	35	33	34

## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #2 7:15

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.2	0.0	0.8
Delay / Veh (s)	61.9	36.3	8.4	24.0	3.2	4.8	4.0	2.6	10.4	3.1	0.8	6.0
Stop Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4
St Del/Veh (s)	60.5	33.1	8.0	23.0	3.2	3.6	0.3	0.2	7.0	0.2	0.2	2.9
Total Stops	12	1	11	1	2	2	0	0	32	1	0	62
Stop/Veh	1.00	1.00	1.00	1.00	1.00	0.50	0.00	0.00	0.70	0.01	0.00	0.14
Travel Dist (mi)	5.2	0.5	4.8	0.3	0.7	1.5	77.5	1.5	7.8	29.9	0.6	130.3
Travel Time (hr)	0.4	0.0	0.2	0.0	0.0	0.0	2.0	0.0	0.4	0.9	0.0	4.0
Avg Speed (mph)	13	18	24	17	26	35	39	37	21	34	33	33

## 5: Bob Johnson &amp; Venetucci Performance by movement Interval #3 7:30

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.5
Delay / Veh (s)	32.1	28.7	5.9		3.9	6.7	3.2	2.1	7.5	2.8	0.3	4.5
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
St Del/Veh (s)	30.0	24.5	5.7		4.1	5.6	0.2	0.5	4.4	0.1	0.1	1.8
Total Stops	11	1	10	0	1	1	0	0	24	1	0	49
Stop/Veh	1.00	1.00	1.00		1.00	0.50	0.00	0.00	0.57	0.01	0.00	0.13
Travel Dist (mi)	5.0	0.6	4.4	0.0	0.3	1.0	61.3	1.8	7.3	26.6	0.5	108.8
Travel Time (hr)	0.3	0.0	0.2	0.0	0.0	0.0	1.6	0.0	0.3	0.8	0.0	3.2
Avg Speed (mph)	18	20	25	20	25	35	40	36	24	35	34	34

5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

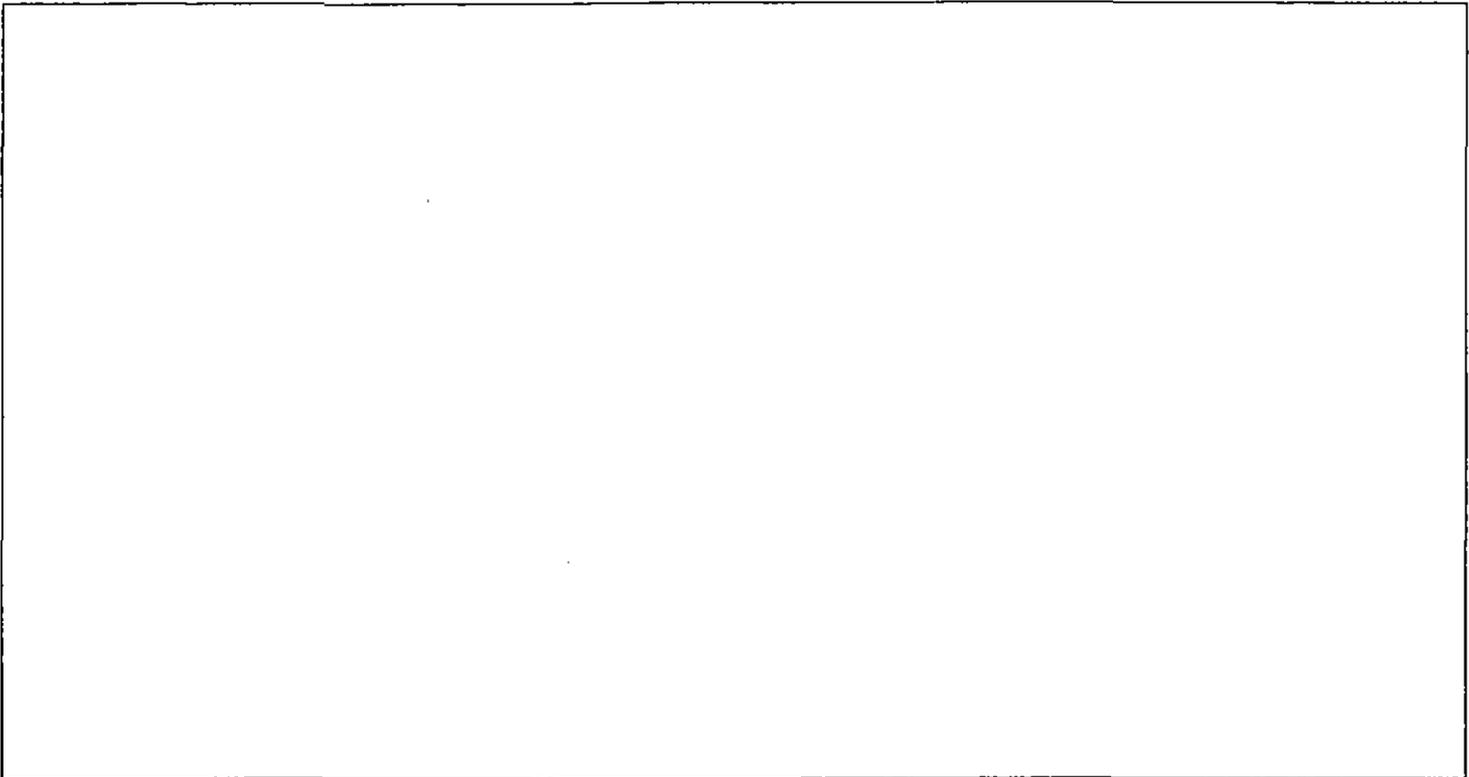
Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.5
Delay / Veh (s)	44.5	17.3	6.2		3.3	4.8	3.2	2.1	7.3	2.7	0.8	5.0
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
St Del/Veh (s)	42.5	14.2	5.7		3.3	3.9	0.2	0.3	4.2	0.1	0.2	2.3
Total Stops	12	1	13	0	1	1	0	0	29	1	0	58
Stop/Veh	1.00	0.50	1.00		1.00	0.50	0.00	0.00	0.64	0.01	0.00	0.15
Travel Dist (mi)	5.4	0.7	5.6	0.0	0.3	0.9	63.7	1.3	7.9	26.0	0.5	112.3
Travel Time (hr)	0.3	0.0	0.2	0.0	0.0	0.0	1.6	0.0	0.3	0.7	0.0	3.4
Avg Speed (mph)	16	22	25	4	24	36	40	36	24	35	32	33

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.6	0.0	0.1	0.0	0.0	0.0	0.7	0.0	0.4	0.5	0.0	2.3
Delay / Veh (s)	41.4	30.9	7.8	50.9	3.6	4.5	3.5	2.2	8.1	2.8	0.6	5.0
Stop Delay (hr)	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	1.0
St Del/Veh (s)	39.5	27.4	7.4	49.9	3.6	3.6	0.3	0.3	5.0	0.1	0.1	2.2
Total Stops	48	5	43	1	5	6	1	0	109	3	0	221
Stop/Veh	1.00	1.00	1.00	1.00	1.00	0.55	0.00	0.00	0.63	0.00	0.00	0.14
Travel Dist (mi)	21.6	2.3	19.5	0.4	1.7	4.2	266.4	6.2	30.3	110.2	2.0	464.8
Travel Time (hr)	1.3	0.1	0.8	0.0	0.1	0.1	6.8	0.2	1.3	3.2	0.1	14.0
Avg Speed (mph)	16	19	24	14	25	36	39	37	23	35	33	33

Total Network Performance By Interval

Interval Start	7:00	7:15	7:30	7:45	All
Total Delay (hr)	1.4	1.8	1.3	1.5	6.0
Delay / Veh (s)	11.8	13.9	11.8	12.8	12.7
Stop Delay (hr)	0.5	0.7	0.5	0.6	2.2
St Del/Veh (s)	4.2	5.3	4.1	5.0	4.7
Total Stops	126	151	120	140	543
Stop/Veh	0.30	0.32	0.30	0.34	0.32
Travel Dist (mi)	426.4	469.7	410.4	420.9	1727.5
Travel Time (hr)	12.3	13.9	11.9	12.3	50.4
Avg Speed (mph)	35	34	35	34	34



5: Bob Johnson & Venetucci Performance by movement Interval #1 7:00

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.4	0.0	0.8
Delay / Veh (s)	40.0	40.3	13.5		4.3	11.9	3.4	2.0	8.9	5.5	1.5	5.7
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2
St Del/Veh (s)	38.3	38.2	13.6		4.0	10.6	0.3	0.3	5.1	0.3	0.1	1.7
Total Stops	6	1	6	0	10	7	0	0	23	8	0	61
Stop/Veh	1.00	1.00	1.00		1.00	0.64	0.00	0.00	0.62	0.03	0.00	0.12
Travel Dist (mi)	2.7	0.4	2.6	0.1	3.5	4.1	67.4	0.7	6.5	42.2	2.2	132.4
Travel Time (hr)	0.2	0.0	0.1	0.0	0.1	0.1	1.7	0.0	0.3	1.4	0.1	4.1
Avg Speed (mph)	17	15	23	13	25	30	40	36	23	30	32	33

5: Bob Johnson & Venetucci Performance by movement Interval #2 7:15

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.5	0.0	1.1
Delay / Veh (s)	91.6	42.6	22.7	59.6	4.9	15.3	3.5	2.5	9.0	6.4	1.3	7.0
Stop Delay (hr)	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.4
St Del/Veh (s)	90.1	40.7	22.9	58.3	4.2	14.0	0.3	0.2	4.6	0.3	0.1	2.6
Total Stops	7	1	7	1	28	9	0	0	26	10	0	89
Stop/Veh	1.00	1.00	1.00	1.00	0.97	0.82	0.00	0.00	0.65	0.04	0.00	0.16
Travel Dist (mi)	3.2	0.3	3.2	0.4	10.6	4.3	70.7	0.5	7.0	47.2	2.3	149.7
Travel Time (hr)	0.3	0.0	0.2	0.0	0.4	0.2	1.8	0.0	0.3	1.6	0.1	4.9
Avg Speed (mph)	11	13	20	13	25	28	39	38	22	29	32	30

5: Bob Johnson & Venetucci Performance by movement Interval #3 7:30

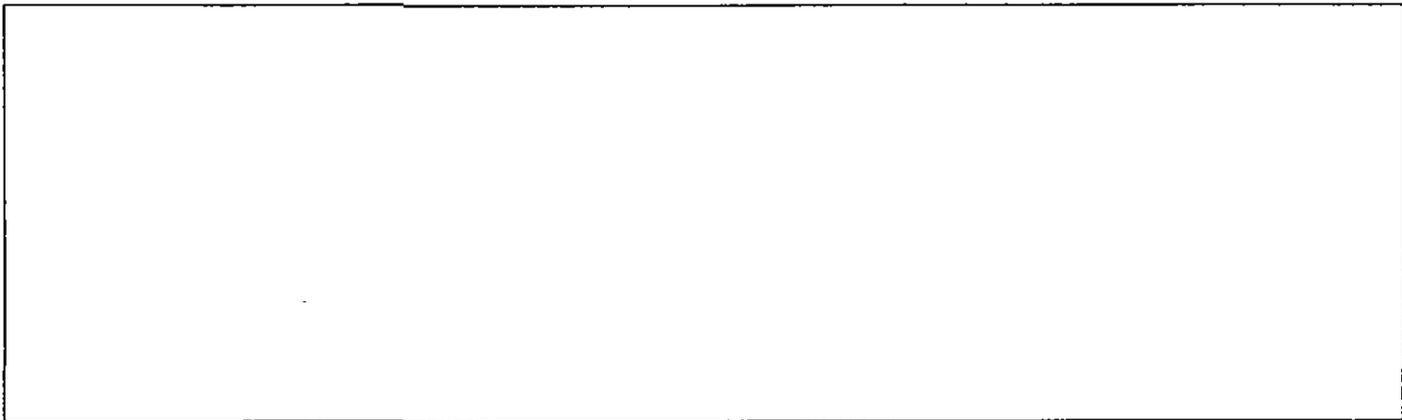
Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1	0.4	0.0	0.8
Delay / Veh (s)	66.9	57.0	11.6		3.8	11.9	3.3	2.8	8.5	5.5	1.4	5.9
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
St Del/Veh (s)	64.4	55.2	11.7		3.3	10.6	0.2	0.4	4.5	0.2	0.1	1.9
Total Stops	7	1	5	0	13	8	0	0	23	7	0	64
Stop/Veh	1.17	1.00	1.00		1.08	0.67	0.00	0.00	0.59	0.03	0.00	0.12
Travel Dist (mi)	3.2	0.3	2.5	0.0	4.5	4.4	67.1	0.5	6.9	43.8	2.2	135.4
Travel Time (hr)	0.2	0.0	0.1	0.0	0.2	0.2	1.7	0.0	0.3	1.4	0.1	4.2
Avg Speed (mph)	14	11	23	4	25	29	40	37	23	30	32	32

5: Bob Johnson & Venetucci Performance by movement Interval #4 7:45

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.4	0.0	0.7
Delay / Veh (s)	61.6	49.5	9.2		3.8	12.3	2.9	0.4	7.5	5.2	1.2	5.5
Stop Delay (hr)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
St Del/Veh (s)	59.8	44.6	9.4		3.7	10.6	0.2	0.2	3.3	0.2	0.1	1.7
Total Stops	6	1	7	0	10	8	0	0	20	7	0	59
Stop/Veh	1.00	1.00	1.00		1.00	0.73	0.00	0.00	0.54	0.03	0.00	0.12
Travel Dist (mi)	2.6	0.6	3.1	0.0	3.4	4.5	63.8	0.3	6.5	42.2	2.1	129.2
Travel Time (hr)	0.2	0.0	0.1	0.0	0.1	0.2	1.6	0.0	0.3	1.4	0.1	4.0
Avg Speed (mph)	14	17	24	17	25	30	40	38	24	30	31	32

5: Bob Johnson & Venetucci Performance by movement Entire Run

Movement	EBL	EBT	EBR	WBL	WBR	NBL	NBT	NBR	SBL	SBT	SBR	All
Total Delay (hr)	0.5	0.1	0.1	0.0	0.1	0.2	0.6	0.0	0.4	1.6	0.0	3.5
Delay / Veh (s)	63.5	63.1	14.5	52.1	4.4	13.1	3.3	2.0	8.5	5.7	1.3	6.1
Stop Delay (hr)	0.4	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.0	1.1
St Del/Veh (s)	61.8	59.6	14.7	51.4	3.9	11.7	0.3	0.3	4.4	0.3	0.1	2.0
Total Stops	26	3	25	2	61	32	1	0	92	32	0	274
Stop/Veh	1.00	1.00	1.00	1.00	1.00	0.73	0.00	0.00	0.60	0.03	0.00	0.13
Travel Dist (mi)	11.7	1.4	11.4	0.6	22.0	17.3	269.0	2.0	26.9	175.5	8.8	546.6
Travel Time (hr)	0.9	0.1	0.5	0.0	0.9	0.6	6.8	0.1	1.2	5.9	0.3	17.2
Avg Speed (mph)	13	14	22	11	25	29	40	37	23	30	32	32

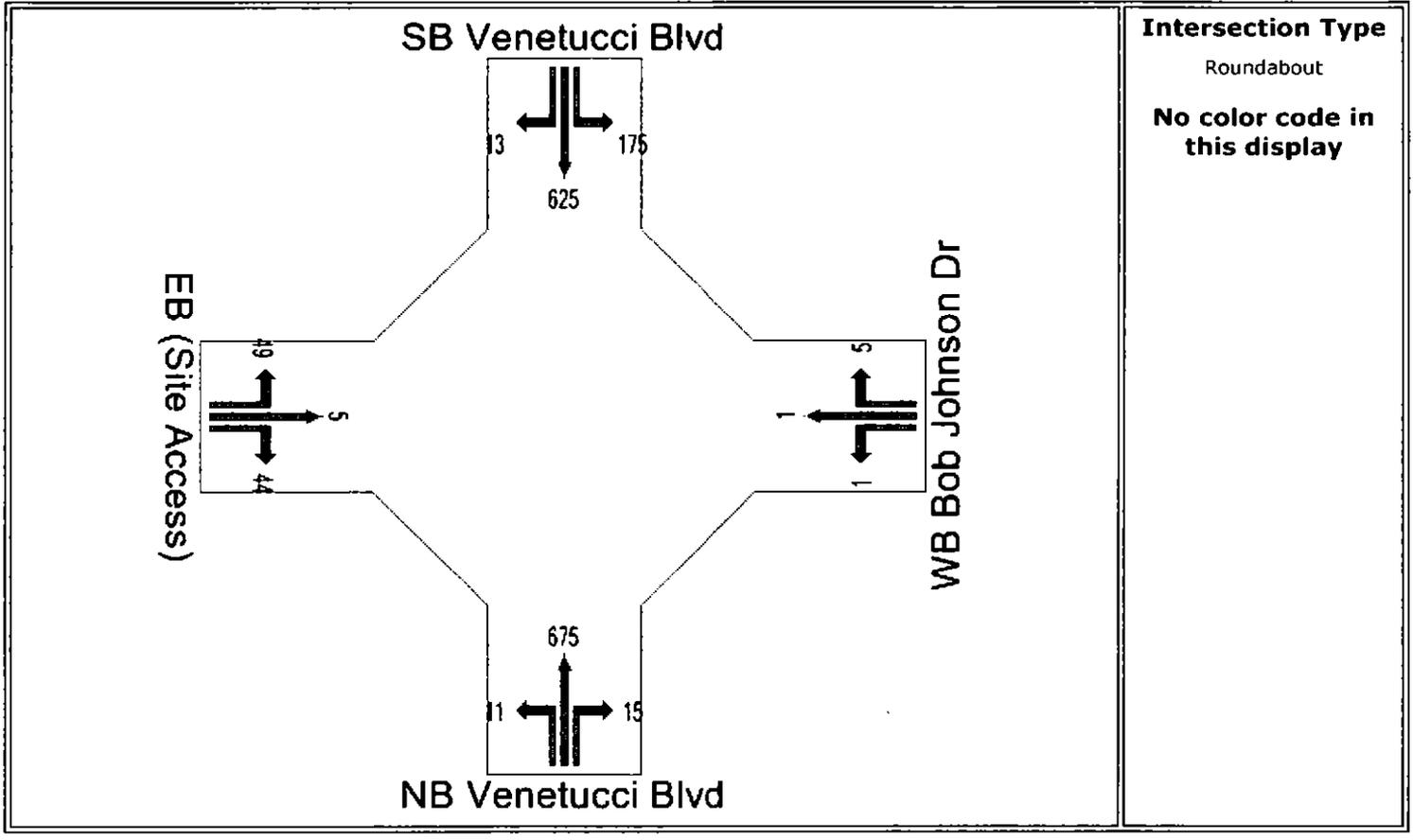


# Input Volumes

Total flow rates as given by the user (veh/60 min)

## Venetucci Boulevard - Bob Johnson Drive

2035 AM Total



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Site: 2035 AM Total  
E:\LSC\Projects\2010\104740\SIDRA\2010-12-13\Bob Johnson Dr - Venetucci Blvd.aap  
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# Output Tables

## Venetucci Boulevard - Bob Johnson Drive

### 2035 AM Total

#### Run Information

\* Basic Parameters:  
 Intersection Type: Roundabout  
 Driving on the right-hand side of the road  
 Input data specified in US units  
 Model Defaults: US HCM (US)  
 Peak Flow Period (for performance): 15 minutes  
 Unit time (for volumes): 60 minutes.  
 Delay definition: Control delay  
                   Geometric delay included  
 HCM Delay Model option selected  
 HCM Queue Model option selected  
 Level of Service based on: Delay (HCM method)  
 Queue definition: Back of queue, 95th Percentile

**Table S.12A - Fuel Consumption, Emissions and Cost (TOTAL)**

Venetucci Boulevard - Bob Johnson Drive  
 2035 AM Total  
 Intersection ID: 1  
 Roundabout

Mov ID	Fuel Total gal/h	Cost Total \$/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h
<b>West: EB (Site Access)</b>						
5L L	0.7	11.42	0.011	0.34	0.011	7.0
2T T	0.1	1.13	0.001	0.03	0.001	0.7
2R R	0.6	8.53	0.009	0.27	0.009	5.4
	1.4	21.09	0.021	0.64	0.022	13.1
<b>South: NB Venetucci Blvd</b>						
3L L	0.2	2.75	0.003	0.08	0.003	1.7
8T T	9.1	136.57	0.137	4.34	0.145	86.6
8R R	0.2	2.97	0.003	0.10	0.003	1.9
	9.5	142.30	0.143	4.52	0.151	90.3
<b>East: WB Bob Johnson Dr</b>						
1L L	0.0	0.43	0.000	0.01	0.000	0.3
6T T	0.0	0.38	0.000	0.01	0.000	0.2
6R R	0.1	1.07	0.001	0.03	0.001	0.7
	0.1	1.88	0.002	0.06	0.002	1.2
<b>North: SB Venetucci Blvd</b>						
7L L	2.4	37.49	0.034	0.91	0.034	22.8
4T T	7.7	119.66	0.109	2.75	0.106	73.1
4R R	0.2	2.38	0.002	0.05	0.002	1.5
	10.3	159.53	0.146	3.71	0.142	97.3
<b>INTERSECTION:</b>	<b>21.3</b>	<b>324.80</b>	<b>0.311</b>	<b>8.93</b>	<b>0.317</b>	<b>201.9</b>

PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel (\$/US gal)	=	2.400
Fuel resource cost factor	=	0.70
Ratio of running cost to fuel cost	=	3.0
Average income (\$/h)	=	19.00
Time value factor	=	0.40
Light vehicle mass (1000 lb)	=	3.1
Heavy vehicle mass (1000 lb)	=	24.0
Light vehicle idle fuel rate (US gal/h)	=	0.360
Heavy vehicle idle fuel rate (US gal/h)	=	0.530

**Table D.2 - Lane Stops**

Venetucci Boulevard - Bob Johnson Drive  
 2035 AM Total  
 Intersection ID: 1  
 Roundabout

Lane No.	Deg. Satn x	Effective Stop		Rate		Prop. Queued pg	Queue
		nel	he2	Geom. hig	Overall h		Move-up Rate hqm
West: EB (Site Access)							
1	LTR 0.164	0.59	0.00	0.12	0.71	0.656	0.00
South: NB Venetucci Blvd							
1	LTR 0.702	0.53	0.05	0.09	0.67	0.692	0.07
East: WB Bob Johnson Dr							
1	LTR 0.023	0.50	0.00	0.10	0.60	0.673	0.00
North: SB Venetucci Blvd							
1	LTR 0.572	0.03	0.00	0.28	0.31	0.116	0.00

hig is the average value for all movements in a shared lane  
 hqm is average queue move-up rate for all vehicles queued and unqueued

**Table D.3A - Lane Queues (veh)**

Venetucci Boulevard - Bob Johnson Drive  
 2035 AM Total  
 Intersection ID: 1  
 Roundabout

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (veh)			Percentile (veh)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB (Site Access)											
1	LTR 0.164	0.0	0.3	0.0	0.3	0.6	0.7	0.8	1.0	1.2	0.02
South: NB Venetucci Blvd											
1	LTR 0.702	0.2	2.4	0.5	2.9	4.9	6.0	6.9	8.6	10.1	0.14
East: WB Bob Johnson Dr											
1	LTR 0.023	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.00
North: SB Venetucci Blvd											
1	LTR 0.572	0.0	1.8	0.0	1.8	3.1	3.9	4.4	5.5	6.4	0.09

Values printed in this table are back of queue (vehicles).

**Table D.3B - Lane Queues (feet)**

Venetucci Boulevard - Bob Johnson Drive  
 2035 AM Total  
 Intersection ID: 1  
 Roundabout

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (feet)			Percentile (feet)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB (Site Access)											
1	LTR 0.164	0.0	8.1	0.0	8.1	15.1	18.3	20.7	25.6	29.6	0.02
South: NB Venetucci Blvd											
1	LTR 0.702	6.2	62.0	11.7	73.6	124.3	153.7	175.8	220.0	256.8	0.14
East: WB Bob Johnson Dr											
1	LTR 0.023	0.0	1.3	0.0	1.3	2.4	2.9	3.3	4.1	4.7	0.00
North: SB Venetucci Blvd											
1	LTR 0.572	0.0	45.4	0.0	45.4	79.9	98.1	111.7	138.9	161.6	0.09

Values printed in this table are back of queue (feet).

**Table D.4 - Movement Speeds (mph) and Geometric Delay**

Venetucci Boulevard - Bob Johnson Drive  
 2035 AM Total  
 Intersection ID: 1  
 Roundabout

Mov ID	App. Speeds		Exit Speeds		Queue Move-up		Av. Section Spd Running	Geom Delay (sec)
	Cruise	Negn	Negn	Cruise	1st Grn	2nd Grn		
West: EB (Site Access)								
5L L	30.0	18.5	18.5	20.0			24.2	23.6
2T T	30.0	20.0	20.0	20.0			25.3	24.6
2R R	30.0	20.0	20.0	20.0			25.7	24.9
South: NB Venetucci Blvd								
3L L	30.0	18.5	18.5	20.0	17.4		24.1	24.1
8T T	30.0	20.0	20.0	20.0	17.6		25.2	25.2
8R R	30.0	20.0	20.0	20.0	17.5		25.5	25.5
East: WB Bob Johnson Dr								
1L L	30.0	19.3	19.3	20.0			24.3	23.8
6T T	30.0	20.0	20.0	20.0			25.1	24.5
6R R	30.0	20.0	20.0	20.0			25.6	24.9
North: SB Venetucci Blvd								
7L L	30.0	18.5	18.5	20.0			25.6	25.6
4T T	30.0	20.0	20.0	20.0			26.9	26.8
4R R	30.0	20.0	20.0	20.0			27.6	27.6

"Running Speed" is the average speed excluding stopped periods.



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Site: 2035 AM Total  
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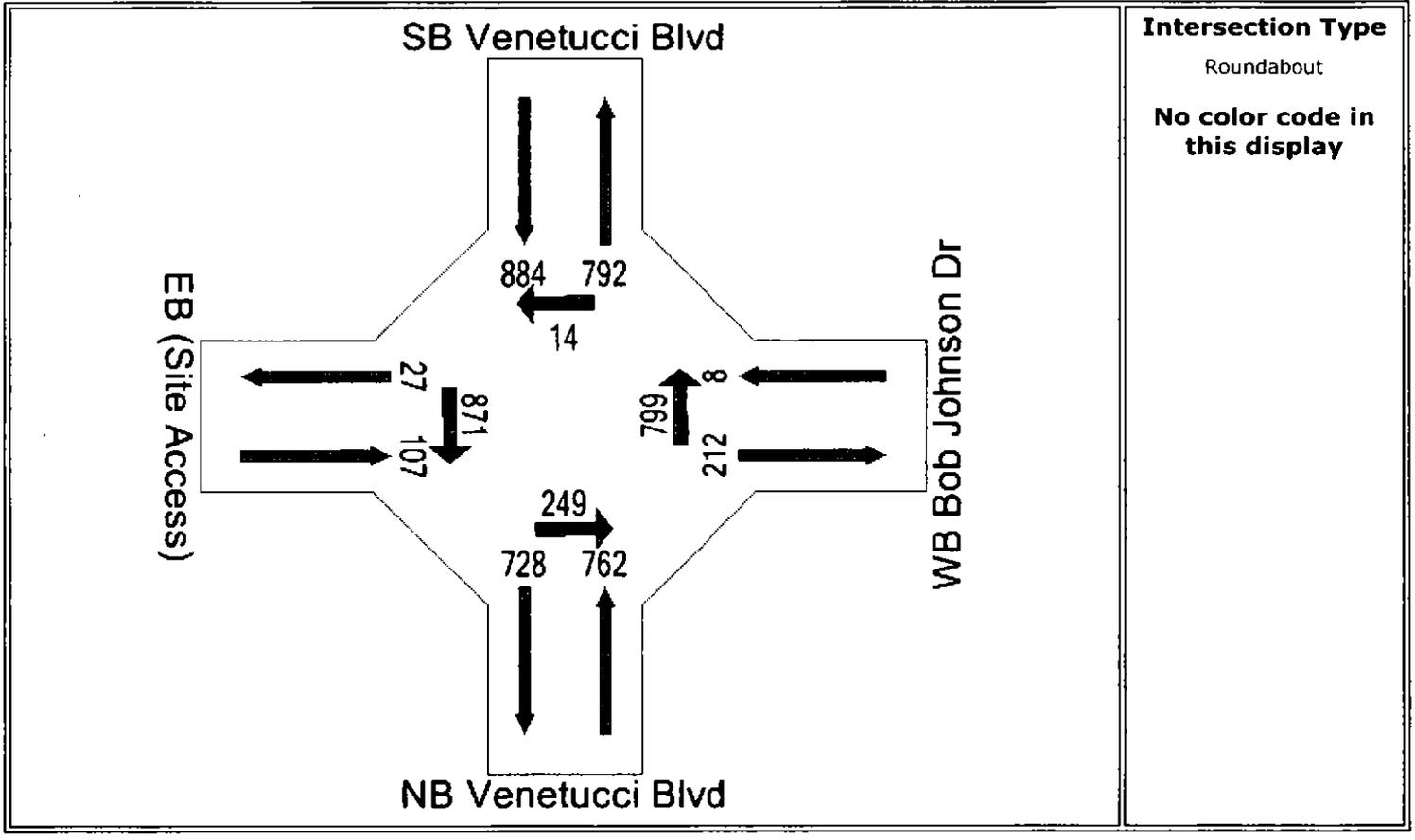
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# Approach, Circulating and Exiting Flows

Approach, circulating and exiting flow rates as used by the program (veh/h)

## Venetucci Boulevard - Bob Johnson Drive

2035 AM Total



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Site: 2035 AM Total  
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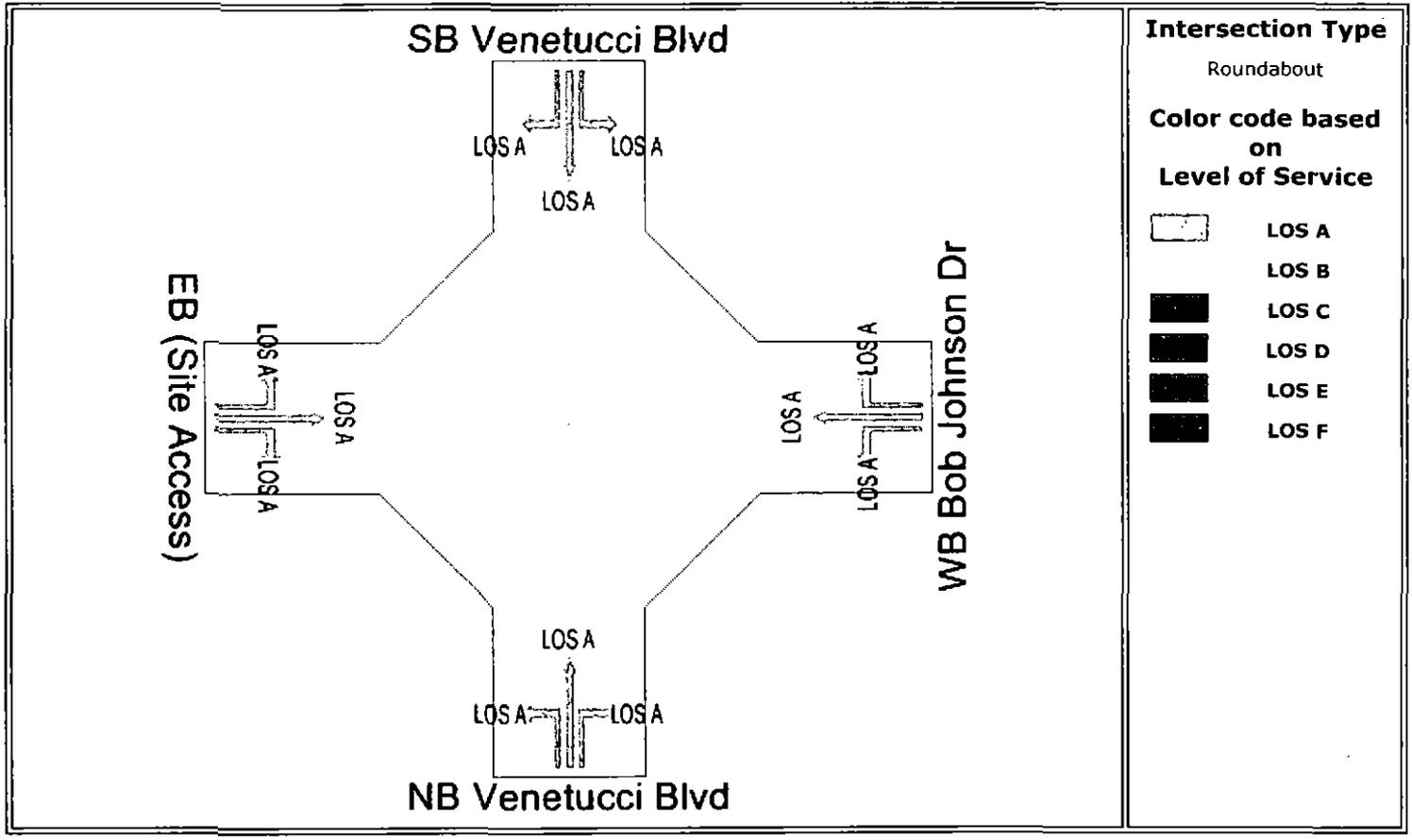
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# Level of Service

Based on Delay (HCM method)

## Venetucci Boulevard - Bob Johnson Drive

2035 AM Total



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Site: 2035 AM Total  
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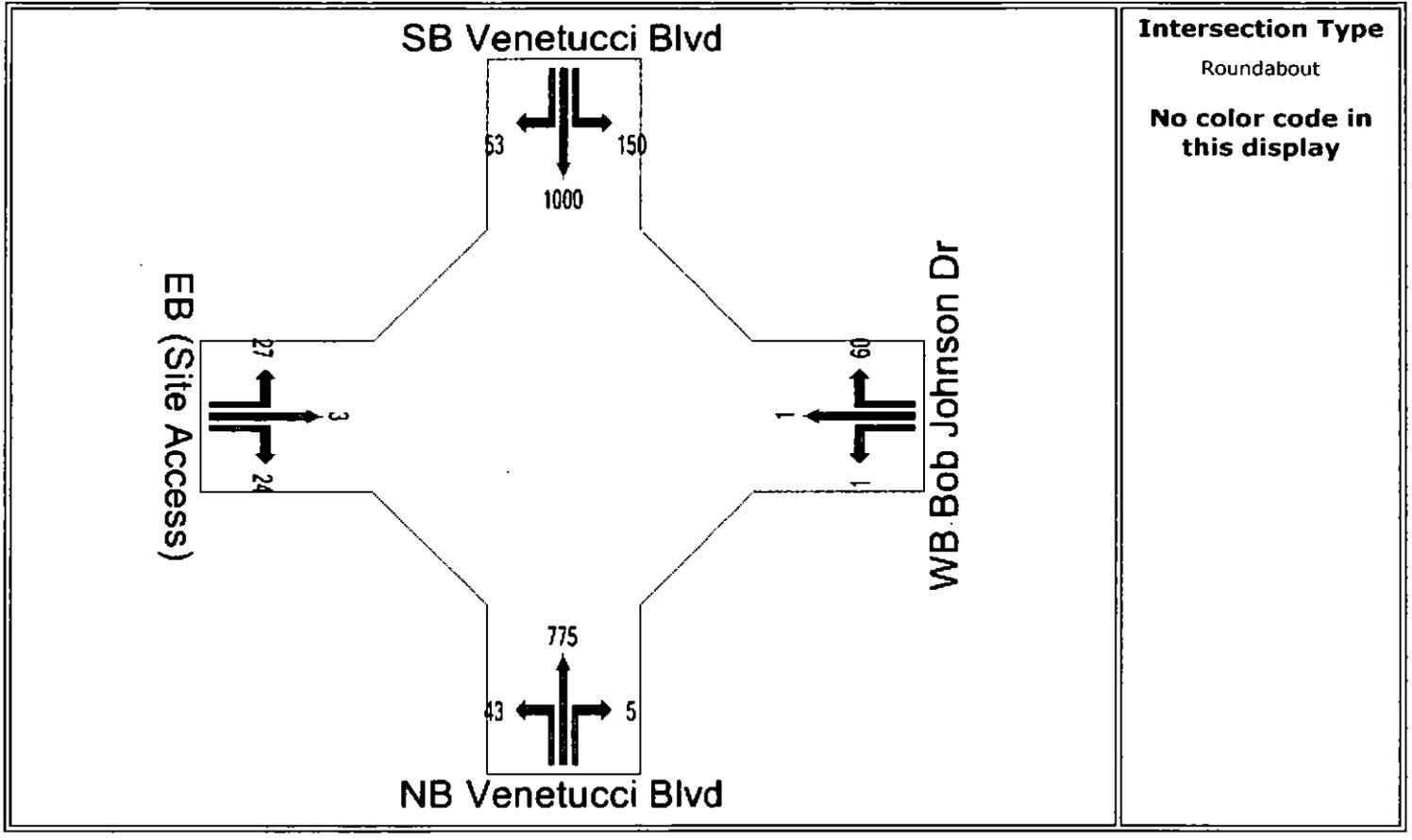
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# Input Volumes

Total flow rates as given by the user (veh/60 min)

## Venetucci Boulevard - Bob Johnson Drive

2035 PM Total



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Site: 2035 PM Total  
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# Output Tables

## Venetucci Boulevard - Bob Johnson Drive

### 2035 PM Total

#### Run Information

Basic Parameters:  
 Intersection Type: Roundabout  
 Driving on the right-hand side of the road  
 Input data specified in US units  
 Model Defaults: US HCM (US)  
 Peak Flow Period (for performance): 15 minutes  
 Unit time (for volumes): 60 minutes.  
 Delay definition: Control delay  
                     Geometric delay included  
 HCM Delay Model option selected  
 HCM Queue Model option selected  
 Level of Service based on: Delay (HCM method)  
 Queue definition: Back of queue, 95th Percentile

**Table S.12A - Fuel Consumption, Emissions and Cost (TOTAL)**

Venetucci Boulevard - Bob Johnson Drive  
 2035 PM Total  
 Intersection ID: 1  
 Roundabout

Mov ID	Fuel Total gal/h	Cost Total \$/h	HC Total kg/h	CO Total kg/h	NOX Total kg/h	CO2 Total kg/h
West: EB (Site Access)						
5L L	0.5	7.21	0.007	0.22	0.007	4.3
2T T	0.1	0.85	0.001	0.03	0.001	0.5
2R R	0.4	5.48	0.006	0.18	0.006	3.4
	0.9	13.54	0.013	0.42	0.014	8.2
South: NB Venetucci Blvd						
3L L	0.7	10.08	0.010	0.32	0.011	6.3
8T T	10.7	159.44	0.162	5.31	0.174	101.8
8R R	0.1	1.07	0.001	0.04	0.001	0.7
	11.5	170.59	0.174	5.67	0.186	108.7
East: WB Bob Johnson Dr						
1L L	0.0	0.44	0.000	0.01	0.000	0.3
6T T	0.0	0.39	0.000	0.01	0.000	0.2
6R R	0.8	11.75	0.012	0.39	0.013	7.5
	0.8	12.57	0.013	0.42	0.014	8.0
North: SB Venetucci Blvd						
7L L	2.3	34.73	0.034	1.08	0.036	21.7
4T T	14.1	210.10	0.211	6.77	0.224	133.1
4R R	0.7	10.04	0.010	0.33	0.011	6.5
	17.0	254.87	0.256	8.19	0.271	161.2
INTERSECTION:	30.2	451.57	0.456	14.70	0.484	286.2

#### PARAMETERS USED IN COST CALCULATIONS

Pump price of fuel (\$/US gal)	=	2.400
Fuel resource cost factor	=	0.70
Ratio of running cost to fuel cost	=	3.0
Average income (\$/h)	=	19.00
Time value factor	=	0.40
Light vehicle mass (1000 lb)	=	3.1
Heavy vehicle mass (1000 lb)	=	24.0
Light vehicle idle fuel rate (US gal/h)	=	0.350
Heavy vehicle idle fuel rate (US gal/h)	=	0.530

**Table D.2 - Lane Stops**

Venetucci Boulevard - Bob Johnson Drive  
 2035 PM Total  
 Intersection ID: 1  
 Roundabout

Lane No.	Deg. Satn x	Effective Stop Rate		Geom. Overall Rate		Prop. Queued pq	Queue Move-up Rate hqm
		he1	he2	hig	h		
West: EB (Site Access)							
1	LTR 0.215	0.87	0.00	0.02	0.89	0.939	0.00
South: NB Venetucci Blvd							
1	LTR 0.787	0.57	0.05	0.06	0.68	0.803	0.07
East: WB Bob Johnson Dr							
1	LTR 0.148	0.65	0.00	0.06	0.71	0.798	0.00
North: SB Venetucci Blvd							
1	LTR 0.911	0.32	0.00	0.08	0.40	0.746	0.00

hig is the average value for all movements in a shared lane  
 hqm is average queue move-up rate for all vehicles queued and unqueued

**Table D.3A - Lane Queues (veh)**

Venetucci Boulevard - Bob Johnson Drive  
 2035 PM Total  
 Intersection ID: 1  
 Roundabout

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (veh)			Percentile (veh)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB (Site Access)											
1	LTR 0.215	0.0	0.5	0.0	0.5	1.0	1.2	1.4	1.7	2.0	0.03
South: NB Venetucci Blvd											
1	LTR 0.787	0.3	3.6	0.7	4.3	7.0	8.7	10.0	12.6	14.8	0.20
East: WB Bob Johnson Dr											
1	LTR 0.148	0.0	0.3	0.0	0.3	0.6	0.8	0.9	1.1	1.2	0.02
North: SB Venetucci Blvd											
1	LTR 0.911	0.0	9.6	0.0	9.6	13.6	17.4	20.3	26.1	30.9	0.41

Values printed in this table are back of queue (vehicles).

**Table D.3B - Lane Queues (feet)**

Venetucci Boulevard - Bob Johnson Drive  
 2035 PM Total  
 Intersection ID: 1  
 Roundabout

Lane No.	Deg. Satn x	Ovrfl. Queue No	Average (feet)			Percentile (feet)					Queue Stor. Ratio
			Nb1	Nb2	Nb	70%	85%	90%	95%	98%	
West: EB (Site Access)											
1	LTR 0.215	0.0	14.1	0.0	14.1	26.2	31.9	36.1	44.6	51.7	0.03
South: NB Venetucci Blvd											
1	LTR 0.787	8.6	92.2	18.0	110.2	177.1	221.2	254.3	320.4	375.5	0.20
East: WB Bob Johnson Dr											
1	LTR 0.148	0.0	8.7	0.0	8.7	16.4	19.9	22.5	27.7	32.1	0.02
North: SB Venetucci Blvd											
1	LTR 0.911	0.0	244.2	0.0	244.2	344.4	442.1	515.4	661.9	784.0	0.41

Values printed in this table are back of queue (feet).

**Table D.4 - Movement Speeds (mph) and Geometric Delay**

Venetucci Boulevard - Bob Johnson Drive  
 2035 PM Total  
 Intersection ID: 1  
 Roundabout

Mov ID	App. Speeds		Exit Speeds		Queue Move-up		Av. Section Spd		Geom Delay (sec)
	Cruise	Negn	Negn	Cruise	1st Grn	2nd Grn	Running	Overall	
West: EB (Site Access)									
5L L	30.0	18.5	18.5	20.0			23.6	20.9	3.8
2T T	30.0	20.0	20.0	20.0			24.5	21.4	2.5
2R R	30.0	20.0	20.0	20.0			24.8	21.5	2.5
South: NB Venetucci Blvd									
3L L	30.0	18.5	18.5	20.0	19.6		23.9	23.9	3.8
8T T	30.0	20.0	20.0	20.0	19.6		24.8	24.8	2.5
8R R	30.0	20.0	20.0	20.0	18.6		25.2	25.2	2.5
East: WB Bob Johnson Dr									
1L L	30.0	19.3	19.3	20.0			24.0	23.6	3.1
6T T	30.0	20.0	20.0	20.0			24.7	24.2	2.5
6R R	30.0	20.0	20.0	20.0			25.2	24.7	2.5
North: SB Venetucci Blvd									
7L L	30.0	18.5	18.5	20.0			24.0	24.0	3.8
4T T	30.0	20.0	20.0	20.0			24.9	24.9	2.5
4R R	30.0	20.0	20.0	20.0			25.4	25.4	2.5

"Running Speed" is the average speed excluding stopped periods.



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Site: 2035 PM Total  
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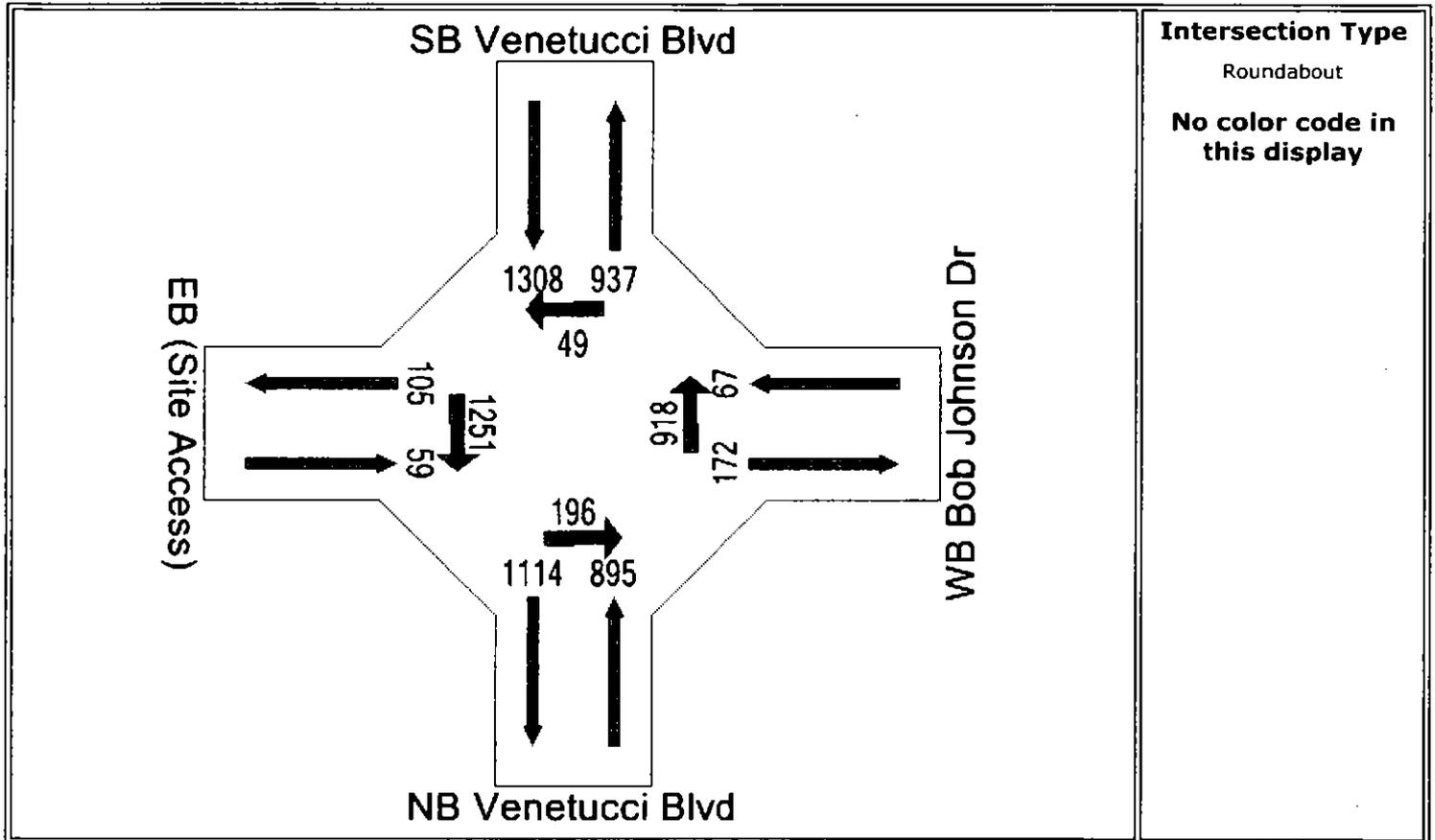
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# Approach, Circulating and Exiting Flows

Approach, circulating and exiting flow rates as used by the program (veh/h)

## Venetucci Boulevard - Bob Johnson Drive

2035 PM Total

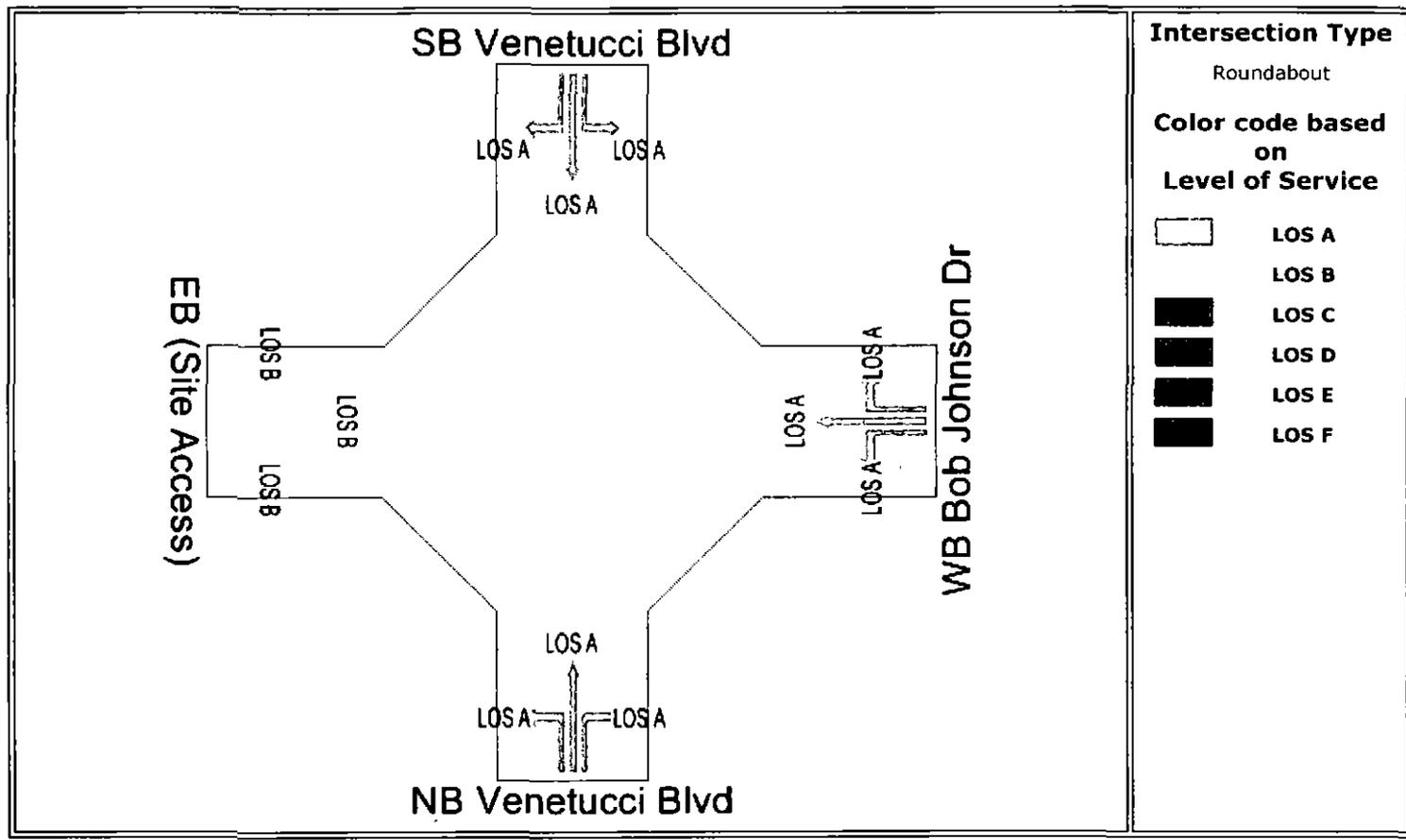


# Level of Service

Based on Delay (HCM method)

## Venetucci Boulevard - Bob Johnson Drive

2035 PM Total



Site: 2035 PM Total  
E:\LSC\Projects\2010\104740\SIDRA\2010-12-13\Bob Johnson Dr - Venetucci Blvd.aap  
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