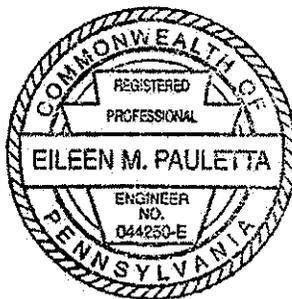


**TRAFFIC IMPACT ANALYSIS FOR  
CATEGORY 3 CASINO DEVELOPMENT  
AT HOLIDAY INN - WEST HARRISBURG  
Hampden Township, Cumberland County PA**

**Prepared for  
Penn Harris Gaming, L.P.**

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Prepared by  
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## EXECUTIVE SUMMARY

This study examines the potential traffic impact of a proposed casino development at the existing Holiday Inn-Harrisburg West site at 5401 Carlisle Pike in Hampden Township, Cumberland County PA. The following has been determined.

Penn Harris Gaming, LP proposes to develop a casino with up to 600 slot machines and 50 table games at the existing Holiday Inn site. The facility is currently a resort hotel with 239 rooms, banquet and meeting space, a restaurant, bar and nightclub, and outdoor recreational facilities including a swimming pool. In addition to the gaming facilities, Penn Harris Gaming, L.P. proposes to add 36 guest rooms, spa and hotel amenities, and additional dining and entertainment options. An RV park with capacity for 15 drive-in RV's will also be added at the rear of the property.

Patron access to the casino will be via the existing signalized driveway to Carlisle Pike opposite Van Patten Drive. A secondary access to the RV Park is provided via an unsignalized driveway to Carlisle Pike.

The scope of this study includes the site access intersections and the adjacent signalized intersections on Carlisle Pike at:

- Carlisle Pike, K-Mart Shopping Center Drive and Jeffrey Road
- Carlisle Pike, Route 581 ramps and Gateway Drive

The slots and table games result in a combined total of approximately 1,000 gaming positions. The gaming facilities are estimated to generate an additional 336 trips in the Friday PM peak hour and 424 trips during the Saturday peak hour. The expansion of the hotel and the RV Park will add approximately 30 additional trips in the PM and Saturday peak hours.

The analysis year chosen is 2013, the projected first stabilized year of operations for the Penn Harris Casino. The study determined levels of service for existing conditions, 2013 Base conditions, and 2013 conditions with development of the casino. A Level of Service summary matrix is shown in Table 8 at the end of this report. Queue analysis for the PM peak and Saturday peak hours is shown in the Appendix.

As a result of the study, the following improvements are recommended:

- Construct a 200-foot long right turn lane on westbound Carlisle Pike approaching Holiday Inn Drive
- Widen the Holiday Inn Drive to provide a second left turn exit lane
- Modify the traffic signal operation at the Carlisle Pike, Holiday inn Drive/Van Patten Road intersection.

With these improvements, all study intersections meet PennDOT level of service criteria for mitigation of development traffic impact.

The "Camp Hill/Lower Allen/Shiremanstown/Hampden Transportation Study" report completed for the Tri-County Regional Planning Commission in 2007 included the Carlisle Pike intersections with Holiday Inn Drive/Van Patten Drive and Route 581 ramps/Gateway Drive. That study proposed improvements to accommodate projected long range traffic volumes (10 – 20 years).

## INTRODUCTION

Penn Harris Gaming, L.P. proposes to develop a casino with up to 600 slot machines and 50 table games at the existing Holiday Inn- West Harrisburg site. The site is located in Hampden Township on the north side of Carlisle Pike (US Route 11) just west of the US Route 11 interchange with the Harrisburg Expressway (PA Route 581). The site's location within the region is shown in Figure 1. The site area and intersections included in this traffic study are shown on Figure 2. The projected first stabilized year of operations for the Penn Harris Casino is 2013.

The facility is currently a resort hotel with 239 rooms, banquet and meeting space, a restaurant, bar and nightclub, and outdoor recreational facilities including a swimming pool. In addition to the gaming facilities, Penn Harris Gaming, L.P. proposes to add 36 guest rooms, spa and hotel amenities, and additional dining and entertainment options. An RV park with capacity for 15 drive-in RV's will also be added at the rear of the property.

Patron access to the casino will be via the existing signalized driveway to Carlisle Pike opposite Van Patten Drive. A secondary access to the RV Park is provided via Crossgate Drive, an unsignalized driveway to Carlisle Pike.

Figure 3 illustrates the proposed site plan.

## EXISTING ROADWAY NETWORK

Carlisle Pike (US Route 11) is a north-south urban principal arterial which runs east-west in the vicinity of the proposed development in Hampden Township.

The roadway network provides excellent access to the Penn Harris Gaming casino from all directions via Interstate Highways and arterial roadways. Travelers using I-81, I-83, I-76 (Pennsylvania Turnpike) and US Route 15 can all reach the site via Harrisburg Expressway (PA Route 581), a limited access roadway that interchanges with Carlisle Pike just to the east of the Penn Harris site.

### Carlisle Pike Existing Conditions

US Route 11 in the study area generally provides two lanes westbound and two or three lanes eastbound with separate left turn lanes at intersections. The Average Daily Traffic volume is 35,000 vehicles. The posted speed limit is 40 miles per hour for both directions. On-street parking is not permitted on either side of Carlisle Pike. The study area of this report includes three signalized intersections on Carlisle Pike at (from east to west) PA Route 581 Ramp/Gateway Drive, Holiday Drive/Van Patten Drive, and Jeffrey Road/K-Mart Drive. The area along this section of Carlisle Pike contains a mix of commercial uses, big box retail and the US Naval Support Activities. The roadway type according to PennDOT's Smart Transportation guidelines is a Community Arterial and the land use context is a Suburban Corridor.

Local transit service is provided by the Cumberland-Dauphin-Harrisburg Transit Authority (a.k.a. Capital Area Transit or CAT). The Route C bus serving downtown Harrisburg, Lemoyne, Camp

Hill, Hogestown, New Kingstown, Middlesex, and Carlisle runs along Carlisle Pike and has a stop at VanPatten Drive/Holiday Drive, the Penn Harris site location. Service is provided Monday through Friday from about 6:00 am to 7:00 pm. Route C connects with several other routes on the CAT bus system.

Carlisle Pike & PA Route 581 Ramp/Gateway Drive

On Carlisle Pike, both directions provide separate left-turn and channelized right-turn lanes. The eastbound approach provides three through lanes and the westbound approach provides two through lanes. There are shoulders on Carlisle Pike except for the eastbound approach. US Route 11 joins Route 581 east of this intersection; Carlisle Pike east of Route 581 is SR 1010.

The southbound approach (PA Route 581 Ramp) of this signalized intersection provides four lanes: one separate left-turn lane, one shared through/left-turn lane, one through lane, and one channelized right-turn lane. The ramp approach serves the exit from both directions of PA Route 581 and the entry to Route 581 West. The northbound approach (Gateway Drive) of this intersection provides four lanes: one separate left-turn lane, one shared through/left-turn lane, one shared through/right-turn lane, and one right-turn lane. Gateway Drive provides access to a strip mall, several restaurants, and the gated access to US Naval Support Activities.

Carlisle Pike & Holiday Drive/Van Patten Drive

Both approaches on Carlisle Pike provide separate left-turn lanes. The eastbound approach provides three through lanes plus a separate right-turn lane for turns into Van Patten Drive. The westbound approach provides two through lanes with a shared right-turn. There are shoulders on Carlisle Pike except at the eastbound right turn lane. The southbound approach (Holiday Drive) of this signalized intersection provides two lanes: a separate left-turn lane, and a shared through/right-turn lane. This approach provides access to a Holiday Inn and the proposed casino development. The northbound approach (Van Patten Drive) of this intersection provides three lanes: two separate left-turn lanes, and one shared thru/right-turn lane. Van Patten Drive provides access to several restaurants, and the gated access to US Naval Support Activities.

Carlisle Pike & Jeffrey Road/K-Mart Drive

Both approaches on Carlisle Pike provide separate left-turn lanes. The westbound approach provides two through lanes with a shared right-turn. The eastbound approach provides two through lanes and channelized right-turn lane for turns into K-Mart Drive. The southbound approach (Jeffrey Road) of this signalized intersection provides one lane: a shared left, through, and right-turn lane. Jeffrey Road provides access to a residential neighborhood. The northbound approach (K-Mart Drive) of this intersection provides three lanes: one separate left-turn lane, one through lane, and a channelized right-turn lane. This approach provides access to a retail shopping center.

Carlisle Pike & Crossgate Drive

Crossgate Drive intersects Carlisle Pike at a stop controlled T-intersection located approximately 160 feet west of the signalized Holiday Inn /Van Patten Drive intersection. Crossgate Drive is a limited movement intersection with left turn exits from Crossgate Drive prohibited. Left turn entry can be made from a center turn lane on Carlisle Pike. Crossgate Drive provides access to an office building, a Denny's restaurant, and is a secondary access point to the rear of the Holiday Inn property and the proposed RV Park.

## **EXISTING TRAFFIC CONDITIONS**

### **Existing Traffic Volumes**

Intersection manual turning movement counts as well as Automatic Traffic Recorder (ATR) counts were conducted for the study. Manual turning movement counts were conducted at the three signalized intersections from 4:00 pm – 6:00 pm on Thursday, July 15, 2010 and from 1:00 pm – 4:00 pm on Saturday, July 17, 2010. Automatic Traffic Recorder (ATR) tubes were laid down Carlisle Pike approaching the Holiday Inn in both directions, and on Crossgate Drive to capture 24-hour traffic volumes for one week starting Thursday July 15.

The traffic count data reveal that on Carlisle Pike west of the SR 581 interchange, the average weekday traffic volume is about 21,000 vehicles on the eastbound approach and 24,000 vehicles on the westbound. During the weekend, Saturday traffic volume is similar to a weekday while Sunday volumes are lower. On Saturday, there were 20,000 vehicles traveling eastbound and 21,000 vehicles traveling westbound. On Sunday, there were 15,000 vehicles traveling eastbound and 16,000 vehicles traveling westbound. On Carlisle Pike, the highest recorded hourly volume in the eastbound direction occurred during the midday on Friday (1,650 vehicles). In the westbound direction, the highest recorded hourly volume occurred from 5:00pm – 6:00pm on Friday (1,950 vehicles).

The PM peak and Saturday peak hours for traffic analysis were determined from the manual intersection counts. The weekday evening traffic peak hour occurs from 4:00 – 5:00 pm for intersections of Jeffrey Road/K-Mart Drive and Van Patten Drive/Holliday Inn Drive. The weekday evening peak hour for the intersection of SR 581 Ramps occurs from 4:30 – 5:30pm. On Saturday, the midday peak hour of all three intersections occurs from 1:30 pm – 2:30pm. The peak hour vehicle turning movement counts are illustrated in Figures 4 and 5.

Crossgate Drive carries a 24-hour total volume of less than 200 vehicles on weekdays. On weekend days, the total daily volume is less than 100 vehicles. On a daily basis, there are fewer exiting vehicles compared with entering vehicles, possibly due to the prohibition of left turn exits from Crossgate Drive.

### **Existing Peak Hour Levels of Service**

While traffic volumes provide an important measure of activity on the area road system, evaluating how well that system accommodates those volumes is also important, i.e., a comparison of peak traffic volumes with available roadway capacity. By definition, capacity represents the maximum number of vehicles which can be accommodated given the constraints of roadway geometry, environment, traffic characteristics and controls.

Primarily, intersections control capacity in road networks. Congestion is most likely to occur at intersections because conflicts exist at these points between through, crossing and turning traffic. Therefore, intersections are studied most often when determining the quality of traffic flow.

When analyzing unsignalized intersections, major street through movements and right turns have the right-of-way over all side street traffic and left turns from the major street. Capacity of a movement depends on the gaps available after considering all other traffic that has right -of-way over that movement. At signalized intersections, factors that affect the various approach capacities include width of approach, number of lanes, signal 'green time', turning volumes, truck percentages, etc.

A descriptive concept has been developed called Level of Service. Level of Service relates volume, roadway and traffic control conditions to expected traffic delay. Delays cannot be related to capacity in a simple one-to-one fashion. It is possible to have delays in the Level of Service 'F' range without exceeding roadway capacity. The level of service definitions for unsignalized and signalized intersections are provided in Table 1.

**Table 1: Level of Service Definitions**

Level of Service (LOS)	Control Delay per Vehicle (seconds)	
	Stop Controlled Intersections	Signalized Intersections
A	≤ 10	≤ 10
B	> 10 and ≤ 15	> 10 and ≤ 20
C	> 15 and ≤ 25	> 20 and ≤ 35
D	> 25 and ≤ 35	> 35 and ≤ 55
E	> 35 and ≤ 50	> 55 and ≤ 80
F	> 50	> 80

Source: Highway Capacity Manual, Transportation Research Board, 2000.

Volume / capacity analysis was conducted on the three signalized intersections using Synchro Version 7 with the HCM methodologies. Existing signal timing plans were obtained from the PennDOT traffic signal permits, and the peak hour traffic volumes were compiled into the analysis models. The existing levels of service at the study intersections during the PM and Saturday peak hours are illustrated in Figures 6 and 7.

The analysis reveals that all three intersections are operating at overall LOS 'D' or better during weekday evening and Saturday midday peak hours. Some individual movements are operating at a lower service level at each of the intersections.

- At the intersections of Jeffrey Road /K-Mart Drive and Van Patten Drive/Holiday Drive, the side street movements are operating at LOS 'E' or 'F'. This is generally due to the long signal cycle length of the signal system on Carlisle Pike, combined with timings set to progress through traffic. Carlisle Pike through movements are at LOS 'A' or 'B'.
- At the intersection of SR 581 Ramps/Gateway Drive, both left turns on Carlisle Pike as well as the through movement coming out of Gateway Drive are operating at LOS 'F' during the PM peak hour. The westbound through movement on Carlisle Pike, northbound left turn on Gateway Drive, as well as southbound through and left turn movements off SR 581 Ramps are operating at LOS 'E' during the PM peak hour. During the Saturday midday peak hour, the westbound left turns on Carlisle Pike as well as all the side street movements, except for the southbound right turn off SR 581 Ramps, are operating at LOS 'E'.

## **YEAR 2013 CONDITIONS WITHOUT DEVELOPMENT**

Year 2013 is the projected first stabilized year of operations for the Penn Harris Casino. Conditions without development were determined as a base for measuring the traffic impact of the casino.

### **Background Growth**

Several sources were reviewed to determine background growth on Carlisle Pike. The Tri-County Regional Planning Commission (TCRPC) has a travel demand model that shows an annual growth rate of 3.1%. TCRPC serves as the metropolitan planning organization for the Harrisburg Metropolitan Area, including Dauphin, Cumberland and Perry Counties. PennDOT Bureau of Planning and Research growth rate data for this roadway type in Cumberland County is 3.2%. For purposes of this study, a background growth rate of 3.2% was used, resulting in a total growth of 10% over three years to Year 2013.

### **Other Area Development**

Hampden Township was contacted to determine whether other development is currently proposed in the vicinity. No other specific developments were identified.

### **Year 2013 Peak Hour Traffic Volumes without Development**

In order to obtain the Year 2013 traffic volumes without the proposed development, the 10% traffic background growth rate was applied to the through traffic on Carlisle Pike as well as the traffic from/to SR 581 ramps. The projected 2013 traffic volumes without development during the PM and Saturday peak hours are illustrated in Figures 8 and 9.

### **Year 2013 Peak Hour Levels of Service without Development**

Capacity analysis was conducted on the three signalized intersections with the projected peak hour traffic volumes. The signal timing splits and intersection offsets were optimized but the cycle lengths were kept the same as the existing conditions since the signals are part of a larger coordinated system. Roadway conditions were kept the same as existing conditions.

Overall, all the intersections would continue to operate at LOS 'D' or better during both peak hours. Generally, the aforementioned movements that experience LOS 'E' or 'F' today are going to experience longer delays in Year 2013 due to the increased traffic volume. At the intersection of Van Patten Drive/Holiday Inn Drive, the westbound left turn on Carlisle Pike will degrade from LOS 'E' to 'F' during the weekday evening peak hour. The same also will occur to the southbound left turn and through movements coming off SR 581 Ramps. The PM and Saturday peak hour levels of service for Year 2013 without development are illustrated in Figures 10 and 11.

### **Previously Proposed Road Improvements**

A transportation study of the Camp Hill/Lower Allen/Shiremanstown/Hampden area was completed for the Tri-County Regional Planning Commission by McCormick Taylor Engineers and Planners in 2007. The westernmost end of the study area included the intersections of

Carlisle Pike and Route 581 ramps/Gateway Drive and Carlisle Pike and Van Patten Drive/Holiday Drive. That study, known as the "CLASH Transportation Study", proposed intersection improvements to accommodate projected long range traffic volumes (10 – 20 years). The improvements recommended for Year 2020 include:

At Van Patten Drive/Holiday Drive:

- Add third westbound through lane on Carlisle Pike (extend from Rt. 581 ramp intersection through Van Patten Drive intersection)
- Add 200' long right turn lane on westbound Carlisle Pike for turns into Holiday Drive
- Right of way will be required on the north side of Carlisle Pike
- Update pedestrian signal phase lengths and install crosswalks/curb ramps conforming to ADA requirements

At Route 581 Ramps/Gateway Drive:

- Connect southbound right turn lane from Route 581 ramps to third westbound through lane on Carlisle Pike
- Update pedestrian signal phase lengths and install crosswalks/curb ramps conforming to ADA requirements

In addition, improvements recommended for Year 2030 are:

At Route 581 Ramps/Gateway Drive:

- Add two additional right turn lanes on Route 581 ramps (three right turn lanes total)
- Add a third through lane on westbound Carlisle Pike approaching the intersection

No immediate improvements were proposed for either intersection.

## **DEVELOPMENT DESCRIPTION**

Penn Harris Gaming, LP proposes to develop a casino with up to 600 slot machines and 50 table games at the existing Holiday Inn site. The facility is currently a resort hotel with 239 rooms, banquet and meeting space, a restaurant, bar and nightclub, and outdoor recreational facilities including a swimming pool. In addition to the gaming facilities, Penn Harris Gaming, LP proposes to add 36 guest rooms, spa and hotel amenities, and additional dining and entertainment options. An RV park with capacity for 15 drive-in RV's will also be added at the rear of the property.

Patron access to the facility is via the existing signalized driveway to Carlisle Pike opposite Van Patton Road. A secondary access to the RV park is provided via an unsignalized driveway to Carlisle Pike.

## Trip Generation

Development trips will be generated by three components: the casino, the added guest rooms, and the RV park.

In order to determine trips generated by the casino, ORA examined traffic count data collected by Traffic Planning and Design, Inc. in October 2009 at Penn National Hollywood Casino in East Hanover Township, PA. The counts were performed in conjunction with a traffic study for casino expansion. The counts provide the actual trip generation of the casino which had 2,377 slot machines at the time. A Friday PM peak hour trip rate of 0.336 trips per gaming position was derived. For the Saturday peak hour, the trip rate was 0.424 trips per gaming position. The trip data is shown in the appendix.

The number of gaming positions at the Penn Harris Casino for 600 slot machines and 50 table games is estimated to be as follows:

**Table 2: Penn Harris Casino Gaming Positions**

Game	Number	Seats/game	Total Gaming Positions
Slots	600	1	600
Craps, Poker	25	10	250
Black Jack, Other	25	6	150
Total Gaming Positions			1,000

Using the trip rates from the Penn National counts, the trip generation for 1,000 gaming positions is illustrated below.

**Table 3: Trip Generation of Casino**

	PM Peak Hour			Saturday Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Trip Rate per seat	0.151	0.185	0.336	0.250	0.174	0.424
Trips	151	185	336	250	174	424

Traffic generated by the additional guest rooms was based on peak hour manual counts at the driveway to Holiday Inn – Harrisburg West. The manager of the Holiday Inn indicated that only 8 rooms were available on the weekday of the count (over 90% occupied) and that on the Saturday of the count three weddings were scheduled.

**Table 4: Trip Generation of Hotel**

<b>PM Peak Hour</b>	IN	OUT	TOTAL
Existing Trips – 239 Rooms	92	48	140
Trip Rate per Room	0.385	0.201	0.586
New Trips – 36 Rooms	15	8	23
<b>Saturday Peak Hour</b>	IN	OUT	TOTAL
Existing Trips - 239 Rooms	73	45	118
Trip Rate per Room	0.305	0.188	0.494
New Trips – 36 Rooms	12	8	20

For the proposed 15-space RV park, Institute of Transportation Engineers trip generation rates were used. No data exists for Saturday; therefore the PM peak hour rates were assumed for both the PM peak and Saturday peak hours.

**Table 5: RV Park Trip Generation - 15 Spaces  
ITE Land Use Code 416**

	IN	OUT	TOTAL
Rate/space	0.255	0.115	0.370
Trips	4	2	6

The total resulting trips generated from the combined development is 365 trips during the PM peak hour and 449 trips during the Saturday peak hour, as shown in the table below.

**Table 6: New Trips Generated by Penn Harris Gaming Development**

<b>PM Peak Hour</b>			
Trips from:	IN	OUT	TOTAL
1,000 Gaming Positions	151	185	336
36 Permanent RV Guest Rooms	15	8	23
RV Park – 15 spaces	4	2	6
<b>Total PM peak Hour Trips</b>	<b>170</b>	<b>195</b>	<b>365</b>
<b>Saturday Peak Hour</b>			
Trips from:	IN	OUT	TOTAL
Gaming Positions	250	174	424
36 Permanent RV Guest Rooms	12	8	20
RV Park – 15 spaces	4	2	6
<b>Total Saturday Peak Hour Trips</b>	<b>266</b>	<b>183</b>	<b>449</b>

## Trip Distribution

The direction of approach to the development was determined based on information provided in the "Holiday Inn-Harrisburg West Gaming Market Assessment" by Gaming Market Advisors. This report provides an estimate of annual trips to the casino from six different market areas. The percentage of total trips that can be expected from each area therefore can be calculated. The approach routes from each area were identified and trips assigned. The market area nearest to (surrounding) the site, called Harrisburg West, extends from Carlisle to Harrisburg. Since this market area extends north, south, east and west of the site and because it is estimated to generate over 40% of casino trips, a more detailed distribution was performed for the Harrisburg West area. Gaming Market Advisors provided the trip breakdown for Harrisburg West by census block group and ORA developed the routing for each block group. The market area map, area trip estimates and trip distribution calculation are shown in the appendix.

The resulting distribution of trips to and from the Penn Harris Casino is:

<u>To/From</u>	<u>Percent of Trips</u>
US Route 11 west	10%
Route 581	70%
Carlisle Pike east	20%

This distribution pattern is illustrated in Figure 12 and the resultant new trips generated by the proposed development at each intersection in the PM and Saturday peak hours are illustrated in Figure 13.

## YEAR 2013 CONDITIONS WITH DEVELOPMENT

### Year 2013 Peak Hour Traffic Volumes

To obtain the year 2013 traffic volumes with development, the distributed new trips were added to the year 2013 traffic volumes without the development. At each intersection, the percentage of the new site trips over the total projected intersection traffic volumes was calculated and summarized in the table below:

**Table 7: Percentage of Intersection Total Trips Generated by Penn Harris Casino**

Intersection	PM Peak	SAT Peak
K-Mart/Jeffrey Rd	1.00%	1.22%
Holiday Inn Dr/Van Patton Dr	9.05%	10.55%
SR 581 Ramps/Gateway Dr	5.78%	8.37%

The new trips will to account for about 10% of the total intersection traffic volumes at the proposed site driveway during both peak hours in Year 2013. At the SR 581 ramps, the

development traffic will account for about 6% or 8% of the total intersection peak hour traffic volumes. The approaches that will experience most significant increase in traffic volumes are the right turn in and left turn out at Holiday Inn Drive, as well as the left turn in and right turn out of Route 581 Ramps. The Year 2013 traffic volumes with development are illustrated in Figures 14 and 15.

### **Year 2013 Peak Hour Levels of Service**

Capacity analysis was conducted on the three signalized intersections with the projected peak hour traffic volumes. Again, the signal timing splits and intersection offsets were optimized but the cycle lengths as well as the roadway configurations were kept the same as the existing conditions.

Since only a fraction of the newly generated trips are projected to go from/to west on Carlisle Pike, only minor changes in delays occur at the intersection of Jeffrey Road/K-Mart Drive with the proposed development in place in Year 2013. Intersection levels of service during both peak hours will be the same as those in Year 2013 without development.

At the proposed site driveway at the Holiday Inn Drive, PM peak hour level of service changes from overall LOS 'B' under the No-build condition to overall LOS 'D' with development. Several movements will experience longer delays. These movements are the eastbound left turn and the westbound movement on Carlisle Pike coming into the site, and the southbound left turn from Holiday Inn Drive exiting the site. During the Saturday peak hour, overall level of service remains unchanged at LOS 'C'.

At the intersection of SR 581 Ramps/Gateway Drive, the intersection will operate at the same overall level of service (LOS 'D') with or without the proposed development during the Saturday peak hour. During the PM peak hour, overall level of service changes from LOS 'D' to LOS 'E', however the increase in average vehicle delay is not more than 10 seconds.

The detailed levels of service and delay in Year 2013 with development are illustrated in Figures 16 and 17.

### **MITIGATION IDENTIFICATION AND RECOMMENDATIONS**

As a result of the study, the following improvements are recommended:

- Construct a 200-foot long right turn lane on westbound Carlisle Pike approaching Holiday Inn Drive
- Widen the Holiday Inn Drive to provide a second left turn exit lane
- Modify the traffic signal operation at the Carlisle Pike, Holiday inn Drive/Van Patten Road intersection to provide split phasing of the side street approaches.

With these improvements, the PM peak hour level of service at the Holiday Inn site access intersection improves from overall LOS 'D' to LOS 'C'. Compared with the No-build condition, the increase in average vehicle delay is 8 seconds.

The detailed levels of service and delay in Year 2013 with development and with the proposed improvements in place are illustrated in Figures 18 and 19. All study intersections meet PennDOT level of service criteria for mitigation of development traffic impact.

## **LEVEL OF SERVICE SUMMARY**

The levels of service at the study intersections under existing, Year 2013 No-Build, Year 2013 Build, and Year 2013 Build with Proposed Improvements are shown in Table 8 which follows. As indicated, with the proposed improvements, the PennDOT criteria for level of service are met. Overall intersection level of service remains the same at Jeffrey Road. At the Holiday Inn Drive, the overall level of service changes from 'B' to 'C', and at Route 581 the overall level of service changes from 'D' to 'E'. Overall intersection delay per vehicle after development is no more than 10 seconds greater than the no-build condition.

## **CONCLUSION**

The roadway network provides excellent access to the Penn Harris Gaming casino from all directions via Interstate Highways and arterial roadways. Travelers using I-81, I-83, I-76 (Pennsylvania Turnpike) and US Route 15 can all reach the site via Harrisburg Expressway (PA Route 581), a limited access roadway that interchanges with Carlisle Pike just to the east of the Penn Harris site.

Improvements recommended at the Holiday Drive intersection include construction of a separate right turn lane on Carlisle Pike, widening of Holiday Drive, and traffic signal changes. With these improvements, all study intersections meet PennDOT level of service criteria for mitigation of development traffic impact.

**TABLE 8: LEVEL OF SERVICE SUMMARY**  
Penn Harris Gaming, L.P.

PM PEAK HOUR						
Intersection	Direction	Movement	Existing	2013 No Build	2013 Build	2013 Build w/ Imp
Carlisle Pike & K-Mart Dr./Jeffrey Rd	EB	L	A(9)	B(12)	B(12)	B(12)
		TT	B(12)	B(14)	B(14)	B(14)
		R	A(7)	A(8)	A(8)	A(8)
	WB	L	B(14)	C(29)	D(38)	C(33)
		TTR	B(11)	A(6)	A(7)	A(3)
		L	F(93)	F(84)	F(84)	F(84)
	NB	T	E(62)	E(61)	E(61)	E(61)
		R	E(63)	E(63)	E(63)	E(63)
		LTR	E(66)	E(65)	E(65)	E(65)
	<b>Overall</b>			<b>B(18)</b>	<b>B(16)</b>	<b>B(17)</b>
Carlisle Pike & Holiday Inn Dr./Van Patten Dr.	EB	L	F(83)	E(78)	F(131)	F(91)
		TTT	A(8)	A(10)	B(15)	B(16)
		R	A(6)	A(6)	B(10)	B(14)
	WB	L	E(73)	F(80)	E(70)	F(82)
		TTR	B(11)	B(14)	D(41)	B(19)
		LL	E(71)	E(74)	E(70)	E(75)
	NB	TR	E(72)	E(72)	E(74)	E(74)
		L	E(73)	E(73)	F(125)	F(81)
		TR	E(77)	E(76)	E(64)	E(65)
	<b>Overall</b>			<b>B(16)</b>	<b>B(18)</b>	<b>D(40)</b>
Carlisle Pike & SR 581 Ramp/Gateway Drive	EB	L	F(96)	F(106)	F(116)	F(107)
		TTT	D(38)	D(49)	C(34)	D(38)
		R	A(0)	A(0)	A(0)	A(0)
	WB	L	F(81)	F(97)	F(97)	F(97)
		TT	E(57)	E(67)	F(97)	F(97)
		R	A(1)	A(1)	A(1)	A(1)
	NB	L	E(60)	E(57)	E(62)	E(62)
		LTTR	F(102)	F(83)	F(119)	F(119)
		R	D(53)	D(54)	E(58)	E(57)
	SB	L	E(77)	F(102)	F(150)	F(150)
LTT		E(70)	F(82)	F(117)	F(117)	
R		A(2)	A(2)	A(3)	A(3)	
<b>Overall</b>			<b>D(48)</b>	<b>D(51)</b>	<b>E(61)</b>	<b>E(61)</b>

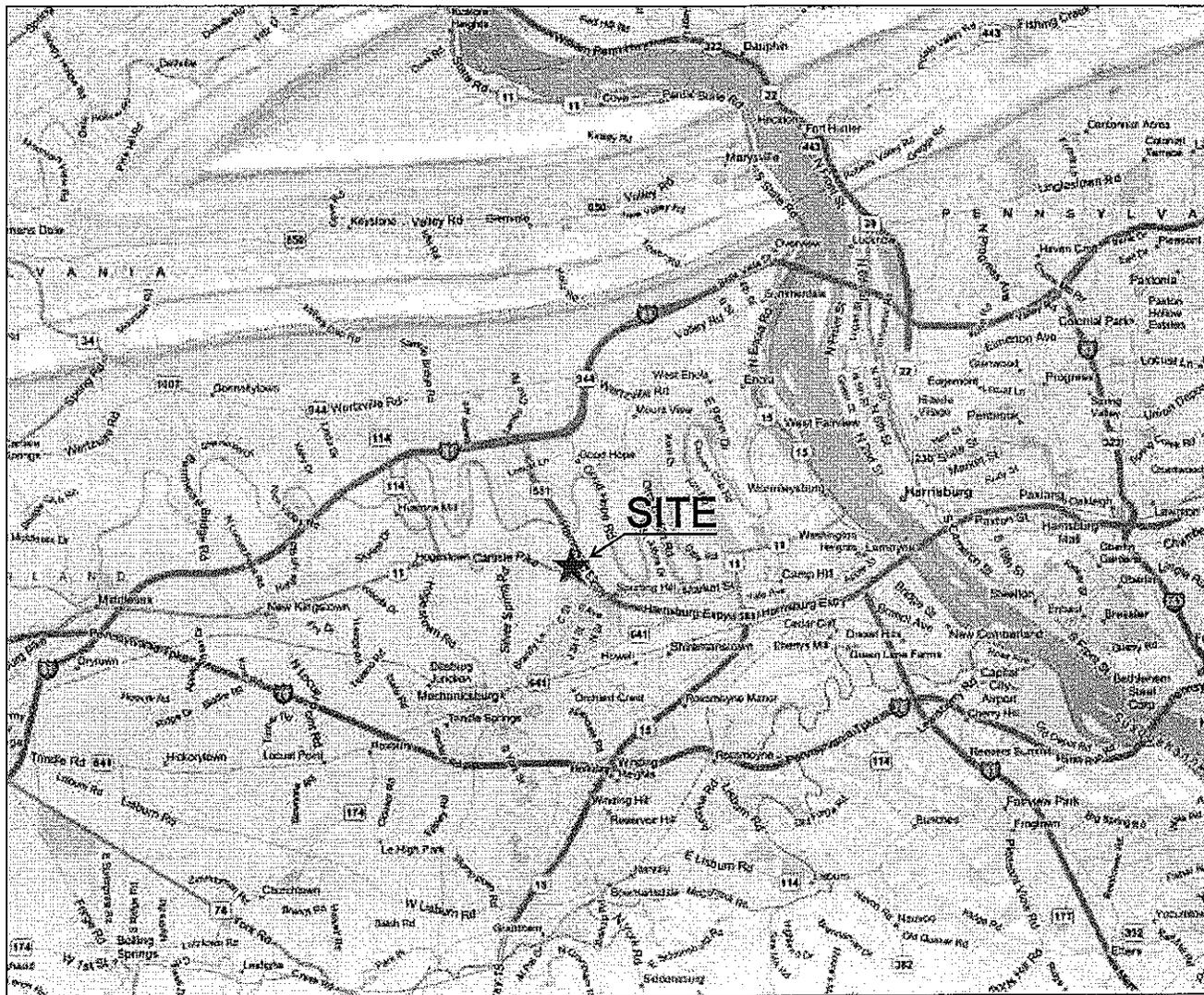
SATURDAY PEAK HOUR						
Intersection	Direction	Movement	Existing	2013 No Build	2013 Build	2013 Build w/ Imp
Carlisle Pike & K-Mart Dr./Jeffrey Rd	EB	L	B(10)	B(15)	B(15)	B(15)
		TT	B(17)	C(21)	C(24)	C(24)
		R	B(11)	B(12)	B(14)	B(14)
	WB	L	D(43)	D(47)	D(47)	D(49)
		TTR	A(6)	B(11)	B(19)	B(17)
		L	F(121)	E(73)	E(74)	E(74)
	NB	T	D(51)	D(47)	D(47)	D(47)
		R	E(56)	E(65)	D(54)	D(54)
		LTR	D(53)	D(48)	D(49)	D(49)
	<b>Overall</b>			<b>C(24)</b>	<b>C(25)</b>	<b>C(28)</b>
Carlisle Pike & Holiday Inn Dr./Van Patten Dr.	EB	L	E(71)	E(67)	F(167)	F(89)
		TTT	B(11)	B(14)	B(18)	B(14)
		R	A(5)	A(8)	A(6)	A(2)
	WB	L	E(62)	E(68)	E(77)	E(73)
		TTR	B(15)	B(13)	C(25)	B(13)
		LL	E(64)	E(66)	E(61)	E(63)
	NB	TR	E(62)	E(63)	E(63)	E(64)
		L	E(64)	E(63)	F(99)	E(75)
		TR	E(66)	E(65)	E(57)	E(58)
	<b>Overall</b>			<b>C(20)</b>	<b>C(21)</b>	<b>C(32)</b>
Carlisle Pike & SR 581 Ramp/Gateway Drive	EB	L	D(54)	F(87)	E(75)	F(82)
		TTT	D(45)	B(13)	B(19)	C(20)
		R	A(0)	A(0)	A(0)	A(0)
	WB	L	E(78)	E(71)	E(71)	E(71)
		TT	C(27)	C(29)	D(37)	D(38)
		R	A(0)	A(0)	A(0)	A(0)
	NB	L	E(66)	E(70)	E(78)	E(75)
		LTTR	E(59)	E(60)	E(61)	E(61)
		R	E(56)	E(57)	E(58)	E(58)
	SB	L	E(66)	E(69)	E(76)	E(72)
LTT		E(63)	E(64)	E(70)	E(67)	
R		A(1)	A(2)	A(3)	A(3)	
<b>Overall</b>			<b>C(34)</b>	<b>C(25)</b>	<b>C(30)</b>	<b>C(30)</b>



# Site Location Map

Penn Harris Gaming, LP

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA





# Study Intersections

Penn Harris Gaming, LP

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA



**LEGEND**

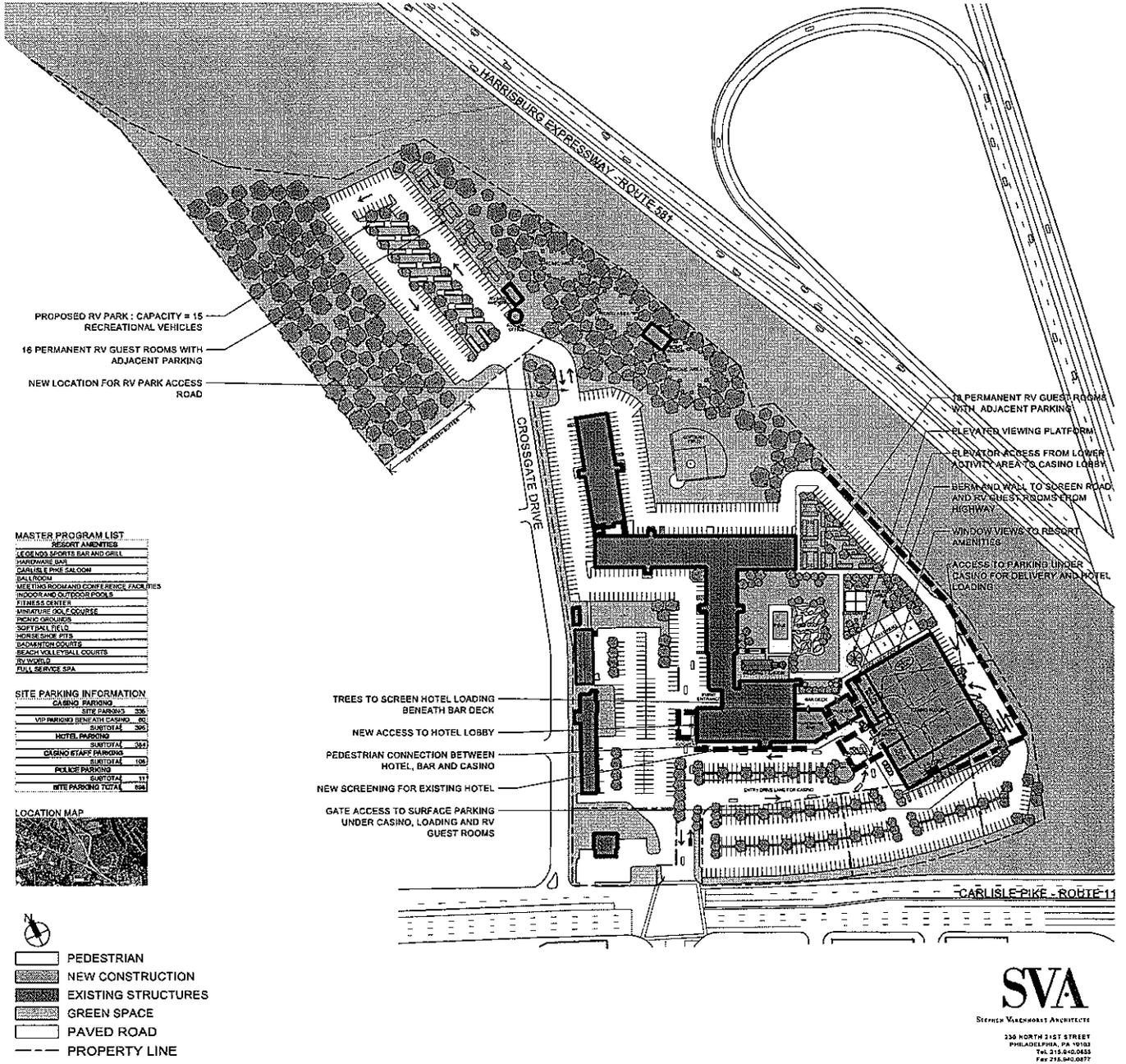
- SIGNALIZED INTERSECTION
- UNSIGNALIZED INTERSECTION



# Site Plan

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA



**PROPOSED CASINO - MECHANICSBURG, PA**

**SVA**  
STEVEN VARENHOUT ARCHITECTS  
330 NORTH 31ST STREET  
PHILADELPHIA, PA 19103  
TEL: 215.940.0455  
FAX: 215.940.0877

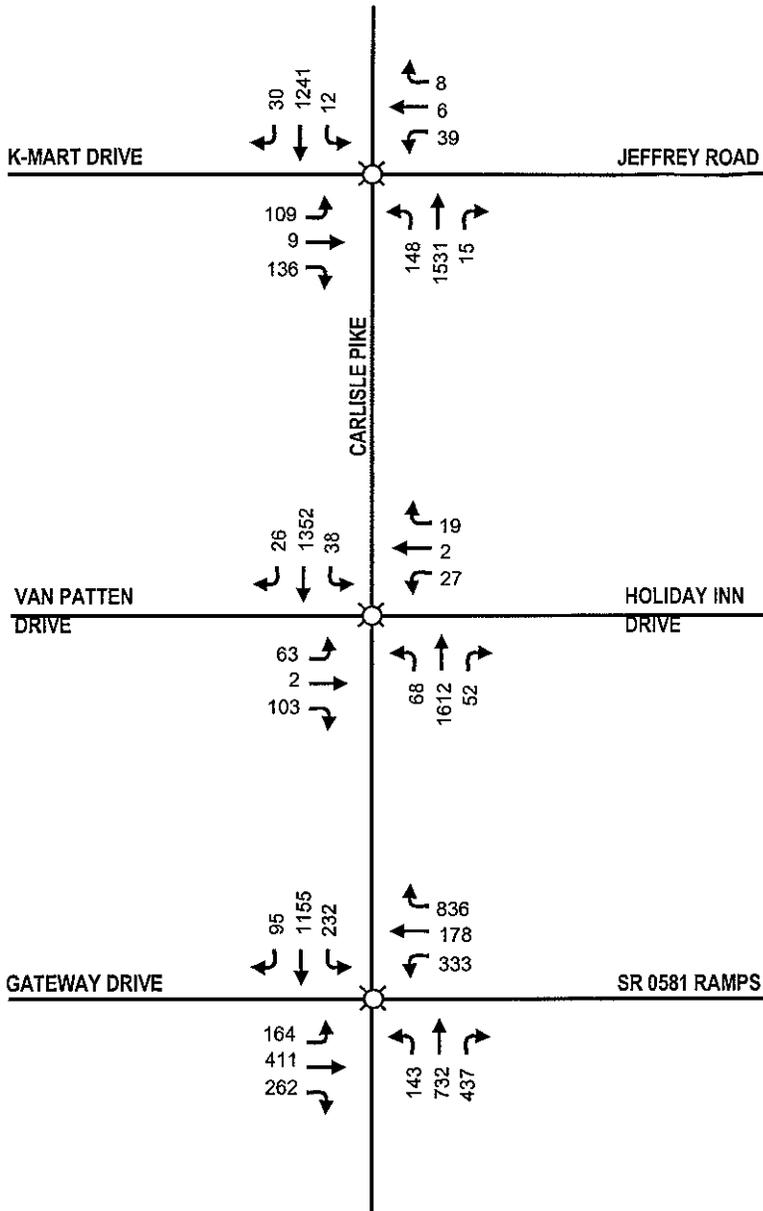
28 MAY 2010  
SCALE: 1/8" = 1'-0"

F:\2010\_128\_Casino\_TIS\Graphics\2010\_128\_Figs

# Existing 2010 PM Peak Hour Traffic Volumes

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

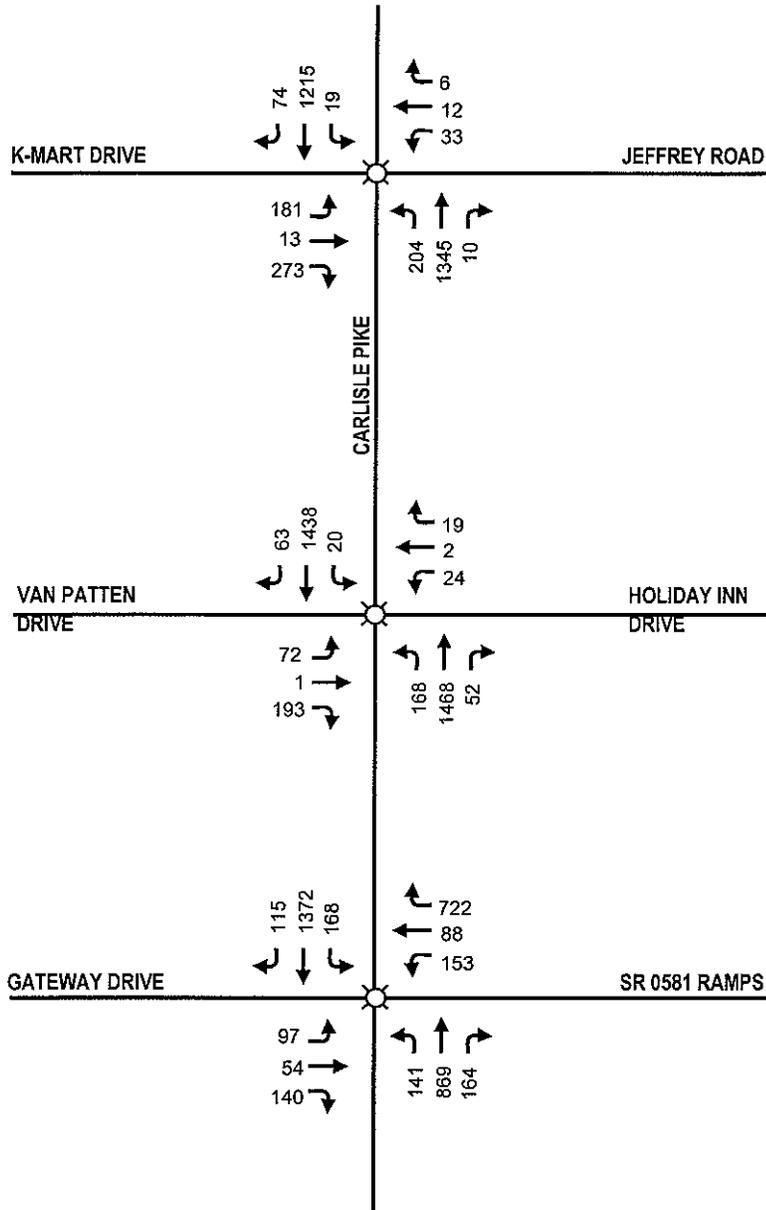


- Legend:**
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Existing 2010 Saturday Peak Hour Traffic Volumes

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

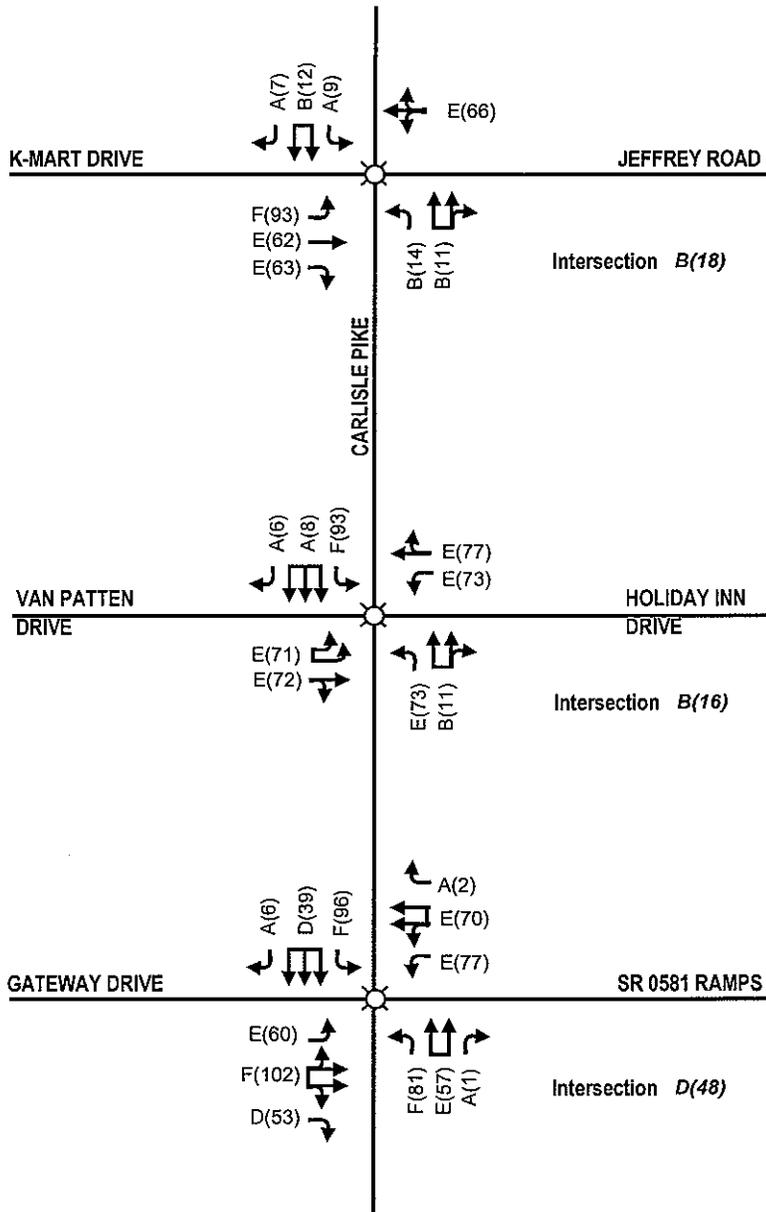


- Legend:
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Existing 2010 PM Peak Hour Level Of Service

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

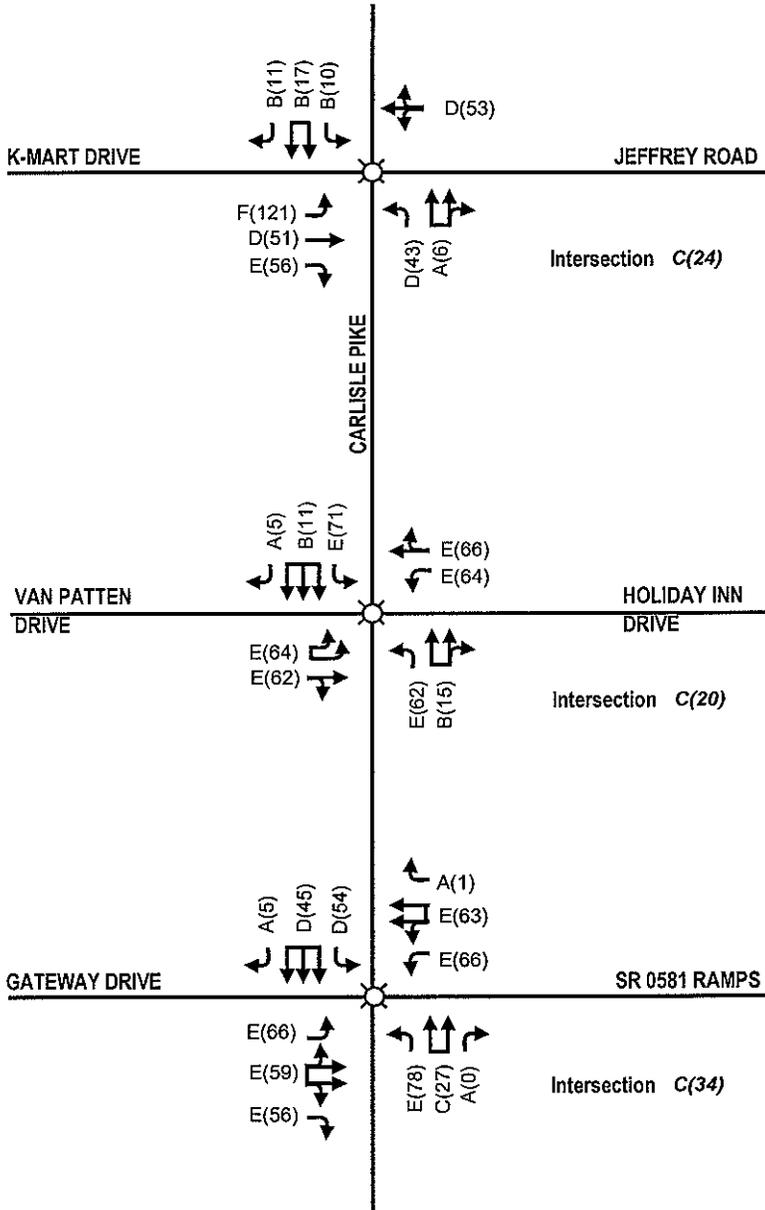


- Legend:
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Existing 2010 Saturday Peak Hour Level Of Service

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

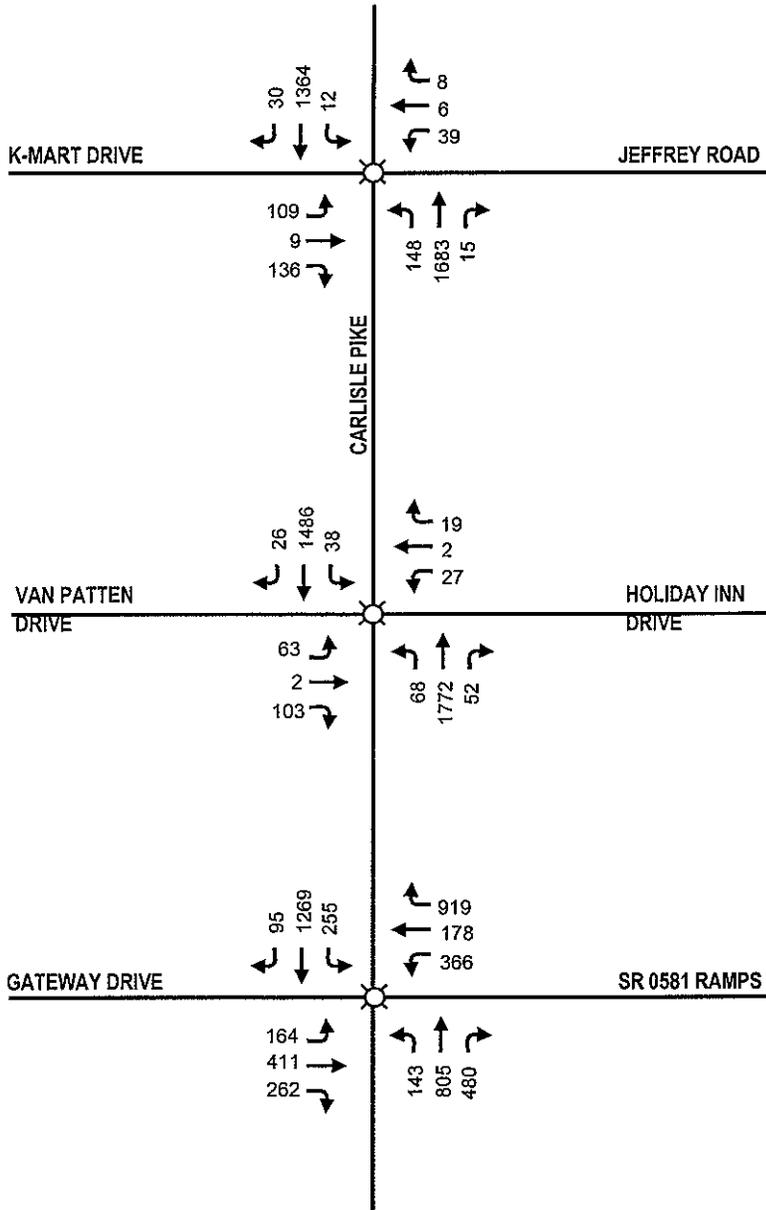


- Legend:
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# No-Build 2013 PM Peak Hour Traffic Volumes

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA



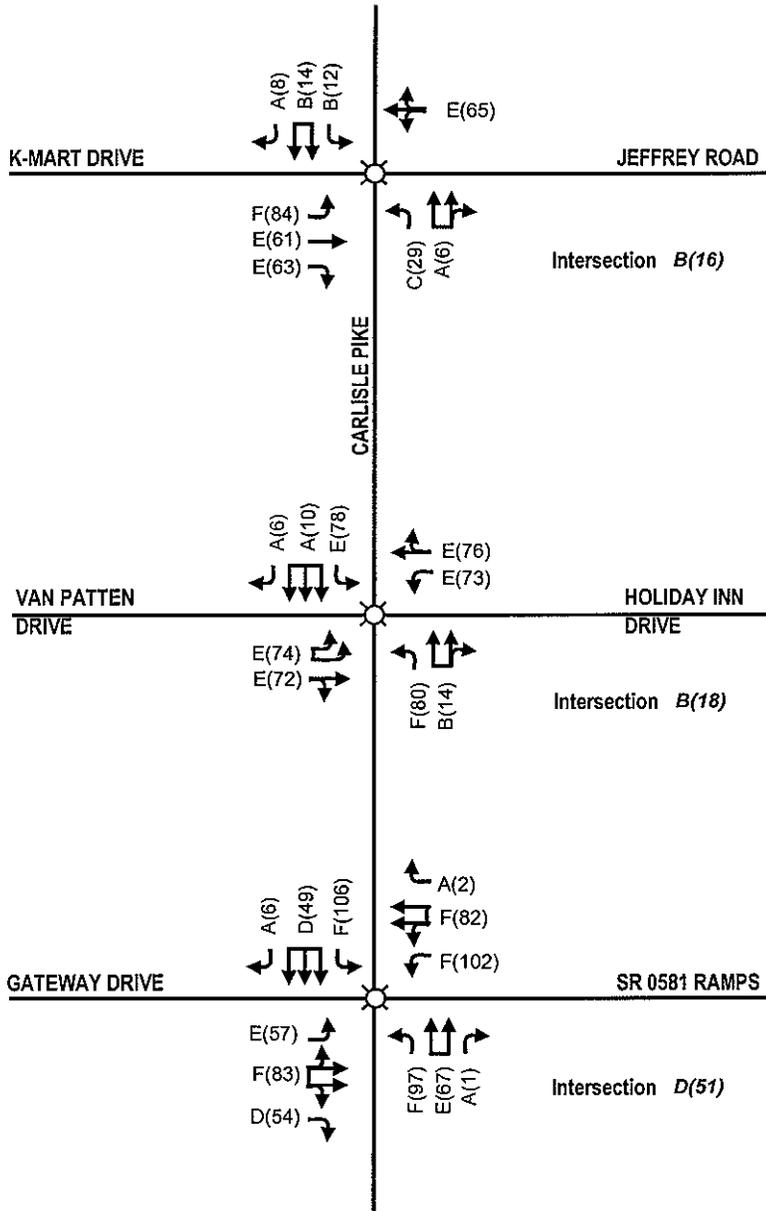
- Legend:**
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway



# Year 2012 PM Peak Hour Level Of Service w/o the Proposed Development

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

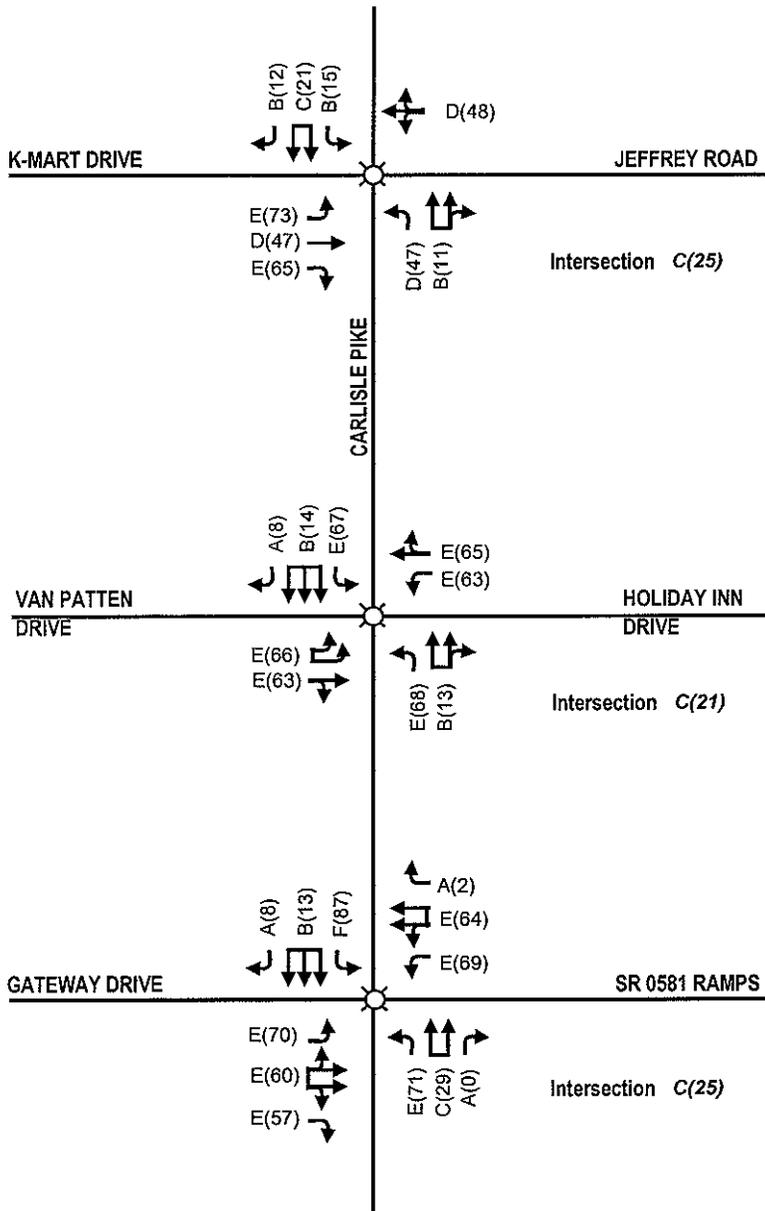


- Legend:
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Year 2013 Saturday Peak Hour Level Of Service w/o the Proposed Development

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

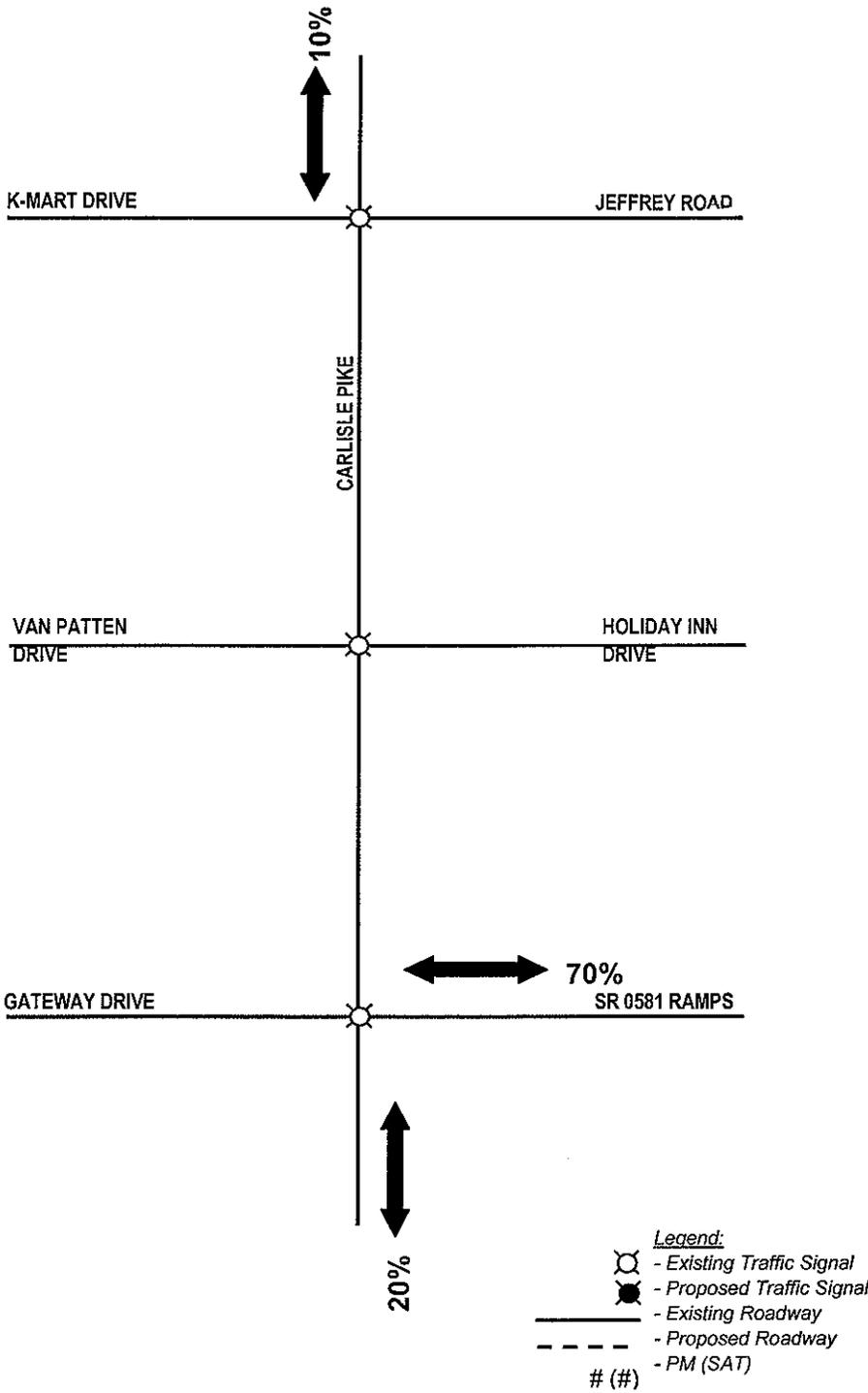


- Legend:**
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Directional Distribution of New Trips

**Penn Harris Gaming, LP**

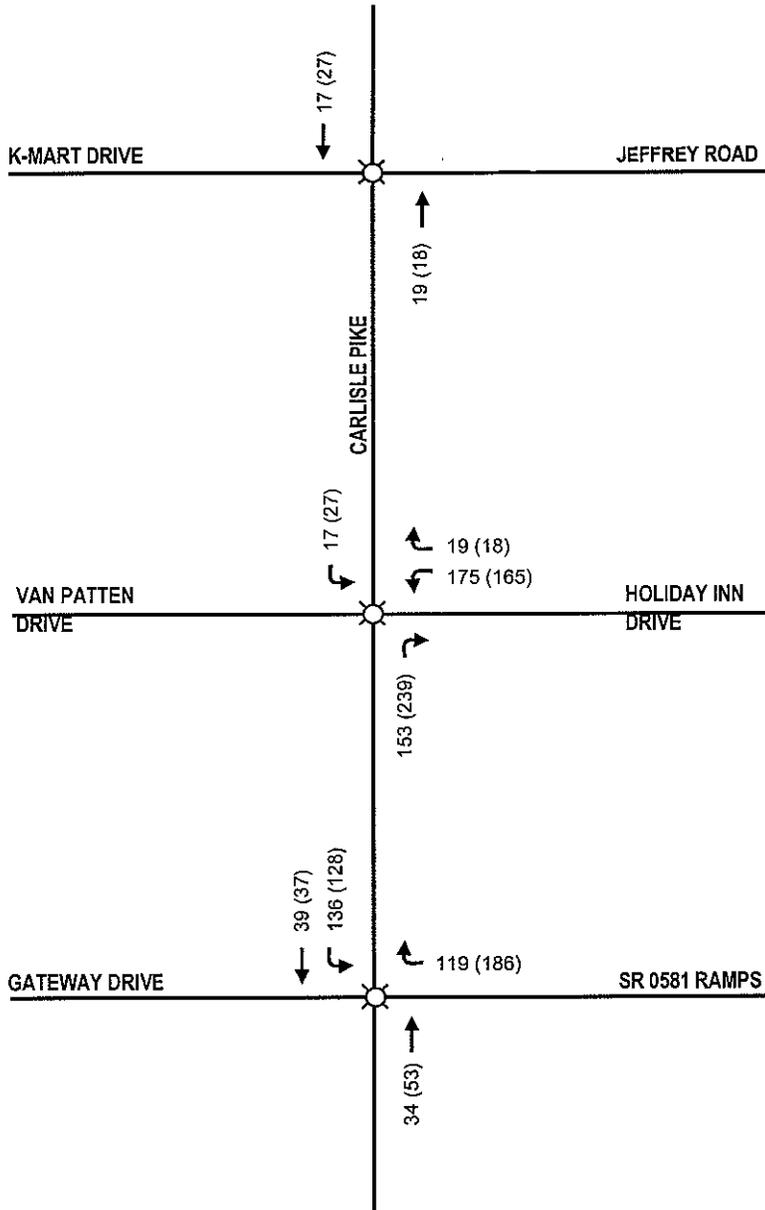
HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA



# Newly Generated Trips by the Proposed Development

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

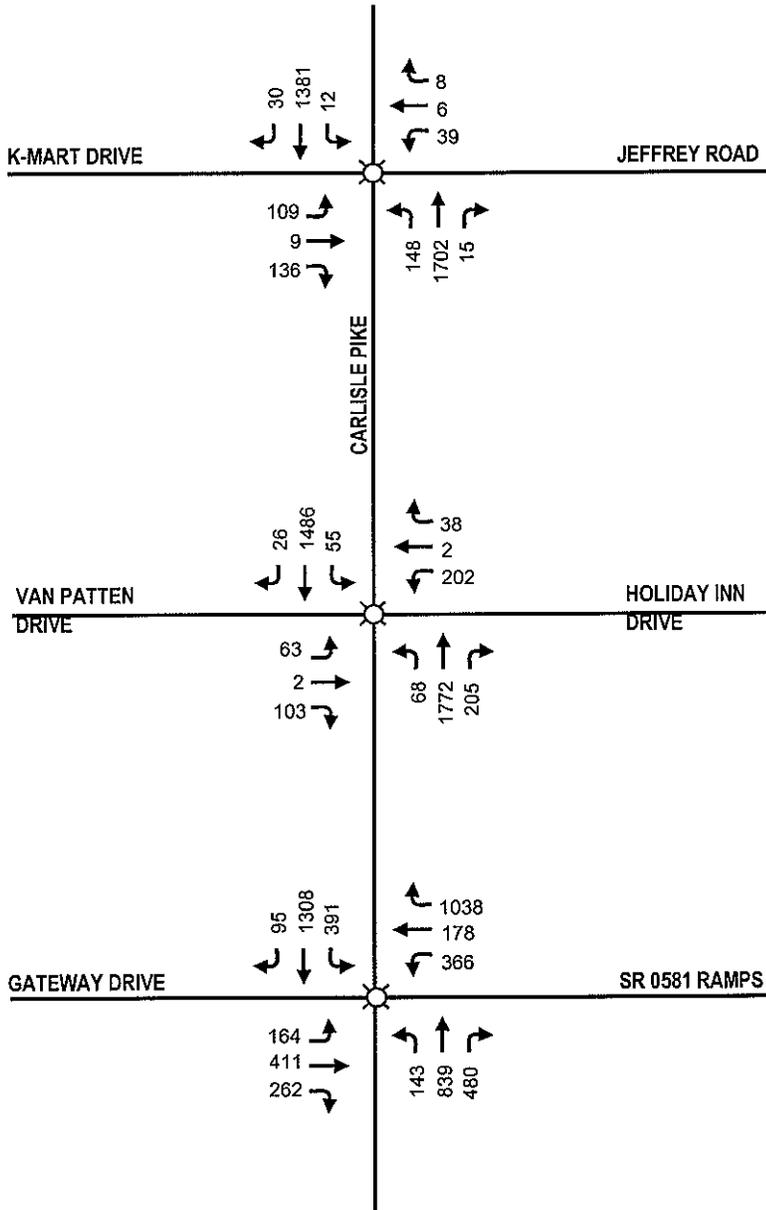


- Legend:
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway
  - # (#) - PM (SAT)

# Build 2013 PM Peak Hour Traffic Volumes

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

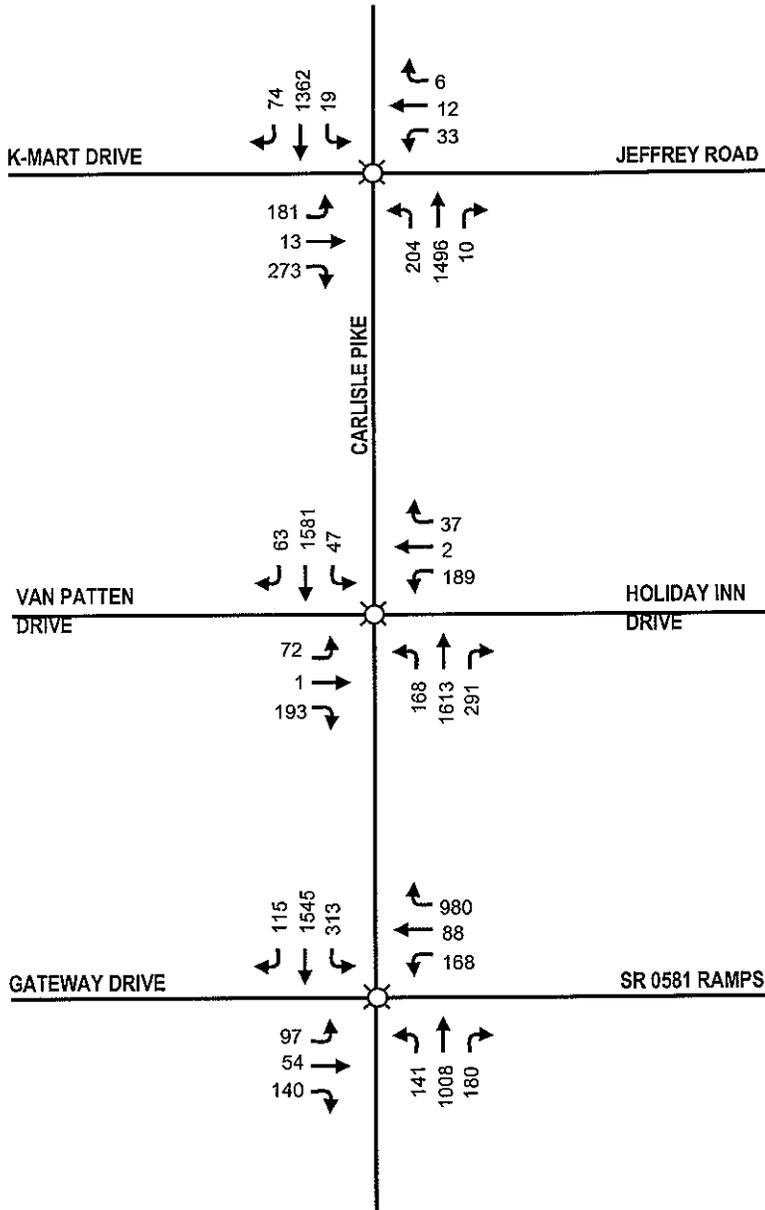


- Legend:
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Build 2013 Saturday Peak Hour Traffic Volumes

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

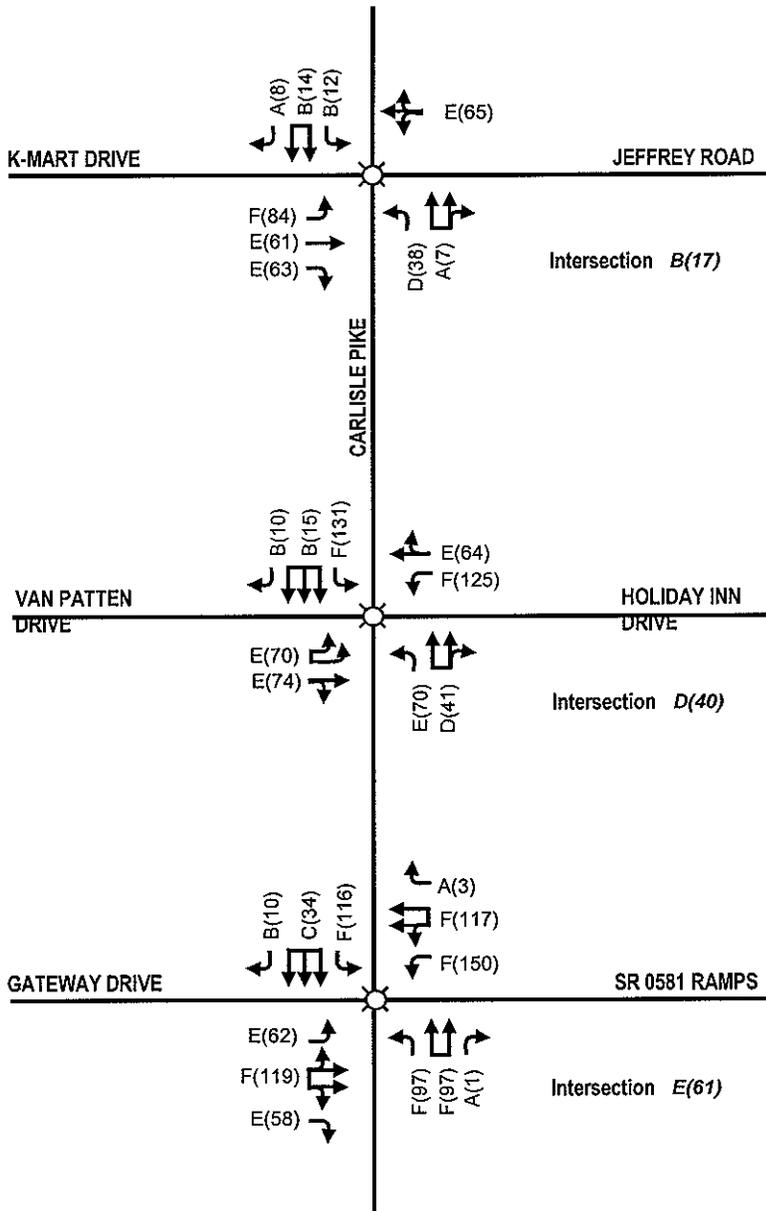


- Legend:**
-  - Existing Traffic Signal
  -  - Proposed Traffic Signal
  -  - Existing Roadway
  -  - Proposed Roadway

# Year 2013 PM Peak Hour Level Of Service w/ the Proposed Development

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

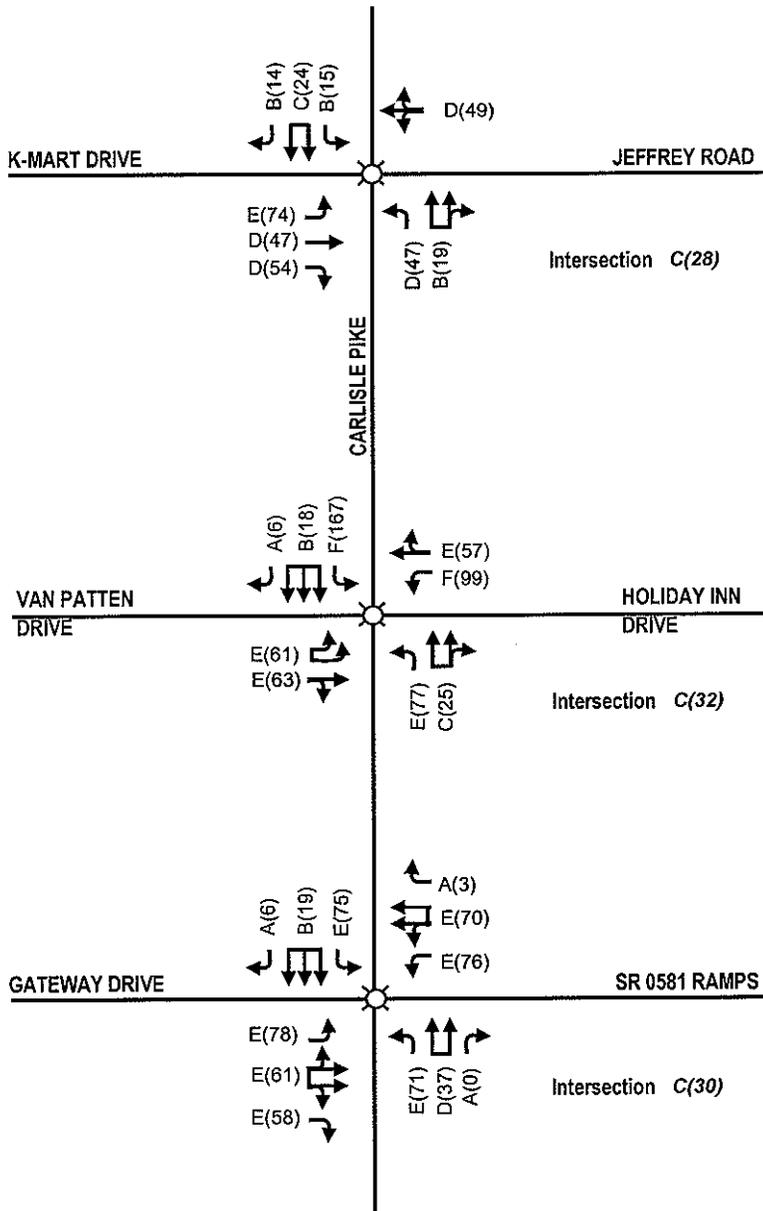


- Legend:**
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Year 2013 Saturday Peak Hour Level Of Service w/ the Proposed Development

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

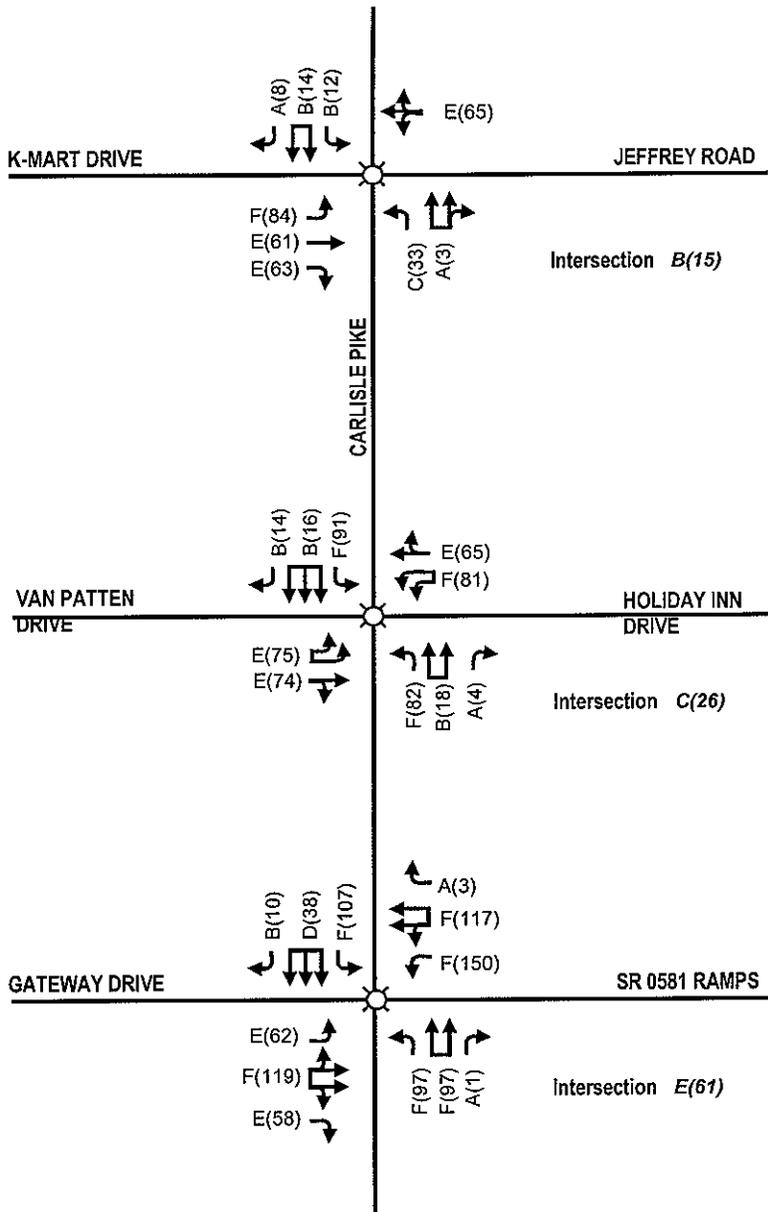


- Legend:
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

# Year 2013 PM Peak Hour Level Of Service with Development and Proposed Improvements

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA

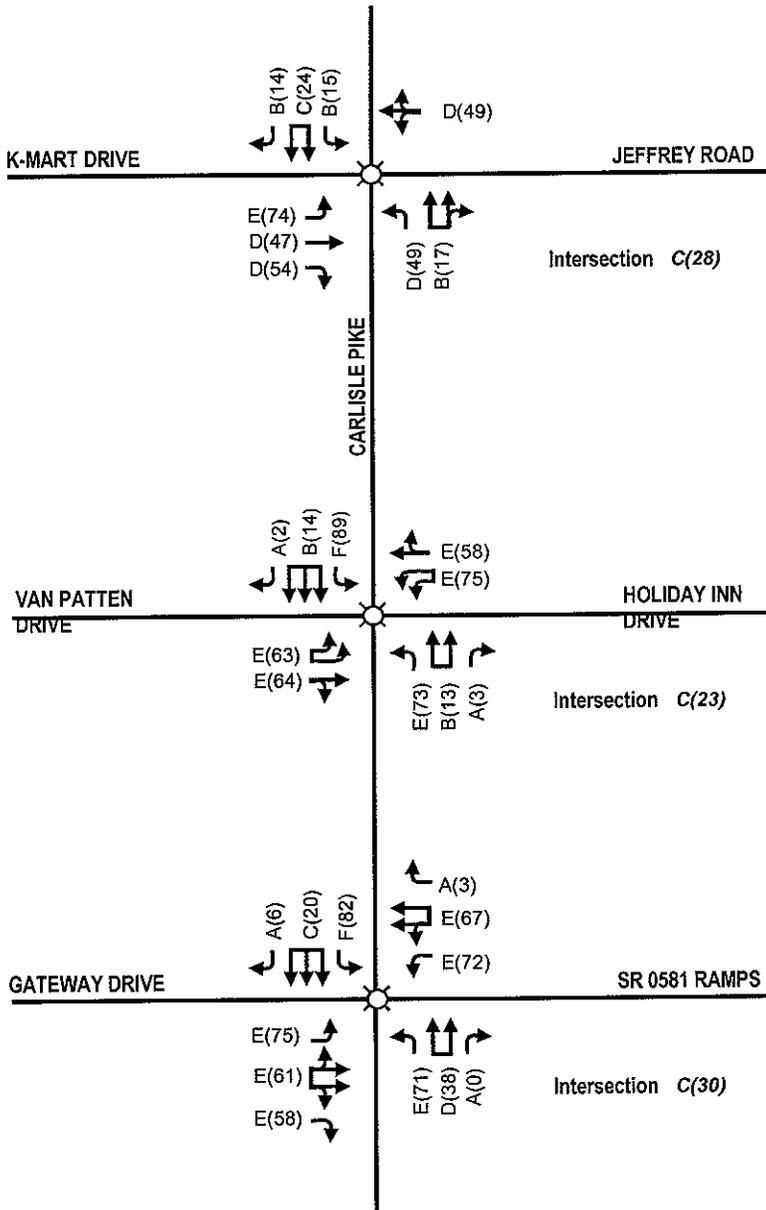


Legend:  
 - Existing Traffic Signal  
 - Proposed Traffic Signal  
 - Existing Roadway  
 - Proposed Roadway

# Year 2013 Saturday Peak Hour Level Of Service with Development and Proposed Improvements

**Penn Harris Gaming, LP**

HAMPDEN TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA



- Legend:**
- Existing Traffic Signal
  - Proposed Traffic Signal
  - Existing Roadway
  - Proposed Roadway

## APPENDIX

Manual Traffic Counts

Automatic Traffic Recorder Counts

Synchro HCM Reports

Queue Analysis

Traffic Signal Permits

Casino Trip Generation and Distribution

## ***Manual Traffic Counts***

Groups Printed- Unshifted - HV - RTOR

Start Time	Jeffrey Road From North					Carlisle Pike (SR 0011) From East					K-Mart Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:00 PM	6	2	3	0	11	32	386	2	0	420	21	4	53	1	79	2	301	9	0	312	822
04:15 PM	14	2	2	0	18	36	342	5	0	383	38	0	28	0	66	3	289	8	0	300	767
04:30 PM	9	0	2	0	11	43	345	4	0	392	30	4	31	0	65	2	291	4	0	297	765
04:45 PM	10	2	1	0	13	37	403	4	0	444	20	1	24	0	45	5	266	9	0	280	782
Total	39	6	8	0	53	148	1476	15	0	1639	109	9	136	1	255	12	1147	30	0	1189	3136
05:00 PM	10	1	2	0	13	29	333	3	0	365	35	4	49	2	90	2	286	8	0	296	764
05:15 PM	10	1	4	0	15	33	343	6	0	382	31	3	34	0	68	3	289	5	0	297	762
05:30 PM	8	1	3	0	12	40	396	7	0	443	27	0	32	0	59	3	275	15	0	293	807
05:45 PM	11	2	1	4	18	35	354	3	0	392	39	2	45	0	86	1	265	8	0	274	770
Total	39	5	10	4	58	137	1426	19	0	1582	132	9	160	2	303	9	1115	36	0	1160	3103
06:00 PM	12	1	2	0	15	35	311	3	0	349	24	2	44	0	70	3	299	8	0	310	744
06:15 PM	6	1	0	2	9	37	373	3	0	413	22	2	42	1	67	8	282	12	1	303	792
06:30 PM	9	1	2	0	12	23	321	3	0	347	27	1	36	0	64	3	251	7	0	261	684
06:45 PM	9	2	2	0	13	36	282	0	0	318	29	2	35	1	67	0	286	9	0	295	693
Total	36	5	6	2	49	131	1287	9	0	1427	102	7	157	2	268	14	1118	36	1	1169	2913
Grand Total	114	16	24	6	160	416	4189	43	0	4648	343	25	453	5	826	35	3380	102	1	3518	9152
Apprch %	71.2	10	15	3.8		9	90.1	0.9	0		41.5	3	54.8	0.6		1	96.1	2.9	0		
Total %	1.2	0.2	0.3	0.1	1.7	4.5	45.8	0.5	0	50.8	3.7	0.3	4.9	0.1	9	0.4	36.9	1.1	0	38.4	
Unshifted	113	16	24	6	159	415	4072	39	0	4526	338	25	160	4	527	35	3196	97	1	3329	8541
% Unshifted	99.1	100	100	100	99.4	99.8	97.2	90.7	0	97.4	98.5	100	35.3	80	63.8	100	94.6	95.1	100	94.6	93.3
HV	1	0	0	0	1	1	117	0	0	118	4	0	9	0	13	0	184	4	0	188	320
% HV	0.9	0	0	0	0.6	0.2	2.8	0	0	2.5	1.2	0	2	0	1.6	0	5.4	3.9	0	5.3	3.5
RTOR	0	0	0	0	0	0	0	4	0	4	1	0	284	1	286	0	0	1	0	1	291
% RTOR	0	0	0	0	0	0	0	9.3	0	0.1	0.3	0	62.7	20	34.6	0	0	1	0	0	3.2

Start Time	Jeffrey Road From North					Carlisle Pike (SR 0011) From East					K-Mart Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	6	2	3	0	11	32	386	2	0	420	21	4	53	1	79	2	301	9	0	312	822
04:15 PM	14	2	2	0	18	36	342	5	0	383	38	0	28	0	66	3	289	8	0	300	767
04:30 PM	9	0	2	0	11	43	345	4	0	392	30	4	31	0	65	2	291	4	0	297	765
04:45 PM	10	2	1	0	13	37	403	4	0	444	20	1	24	0	45	5	266	9	0	280	782
Total Volume	39	6	8	0	53	148	1476	15	0	1639	109	9	136	1	255	12	1147	30	0	1189	3136
% App. Total	73.6	11.3	15.1	0		9	90.1	0.9	0		42.7	3.5	53.3	0.4		1	96.5	2.5	0		
PHF	.696	.750	.667	.000	.736	.860	.916	.750	.000	.923	.717	.563	.642	.250	.807	.600	.953	.833	.000	.953	.954
Unshifted	39	6	8	0	53	148	1428									1098					
% Unshifted	100	100	100	0	100	100	96.7	93.3	0	97.0	99.1	100	44.9	100	70.2	100	95.7	96.7	0	95.8	94.4
HV	0	0	0	0	0	0	48	0	0	48	0	0	3	0	3	0	49	1	0	50	101
% HV	0	0	0	0	0	0	3.3	0	0	2.9	0	0	2.2	0	1.2	0	4.3	3.3	0	4.2	3.2
RTOR	0	0	0	0	0	0	0	1	0	1	1	0	72	0	73	0	0	0	0	0	74
% RTOR	0	0	0	0	0	0	0	6.7	0	0.1	0.9	0	52.9	0	28.6	0	0	0	0	0	2.4

Groups Printed- Unshifted - HV - RTOR

Start Time	Jeffrey Road From North					Carlisle Pike (SR 0011) From East					K-Mart Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
01:00 PM	7	1	1	0	9	39	244	6	0	289	54	4	80	3	141	1	209	15	0	225	664
01:15 PM	5	2	1	0	8	51	359	3	0	413	53	1	59	0	113	0	290	20	0	310	844
01:30 PM	5	0	0	0	5	44	311	4	0	359	45	1	71	0	117	2	245	21	0	268	749
01:45 PM	11	4	1	0	16	70	345	1	0	416	46	3	61	0	110	5	262	24	0	291	833
Total	28	7	3	0	38	204	1259	14	0	1477	198	9	271	3	481	8	1006	80	0	1094	3090
02:00 PM	2	1	4	0	7	42	345	4	0	391	45	2	73	0	120	6	289	22	0	317	835
02:15 PM	11	6	0	0	17	40	302	2	0	344	52	5	82	0	139	4	293	12	0	309	809
02:30 PM	9	1	1	0	11	52	332	3	0	387	38	3	57	0	98	4	291	16	0	311	807
02:45 PM	8	3	1	0	12	58	280	7	0	345	36	0	41	0	77	1	217	13	0	231	665
Total	30	11	6	0	47	192	1259	16	0	1467	171	10	253	0	434	15	1090	63	0	1168	3116
03:00 PM	8	3	1	0	12	53	288	4	0	345	47	5	57	1	110	2	261	16	0	279	746
03:15 PM	8	2	1	0	11	38	301	5	0	344	42	3	64	0	109	3	233	30	0	266	730
03:30 PM	4	1	3	0	8	45	258	2	0	305	51	1	77	0	129	3	259	18	0	280	722
03:45 PM	5	1	3	0	9	33	301	3	0	337	37	5	62	0	104	5	287	12	0	304	754
Total	25	7	8	0	40	169	1148	14	0	1331	177	14	260	1	452	13	1040	76	0	1129	2952
Grand Total	83	25	17	0	125	565	3666	44	0	4275	546	33	784	4	1367	36	3136	219	0	3391	9158
Apprch %	66.4	20	13.6	0		13.2	85.8	1	0		39.9	2.4	57.4	0.3		1.1	92.5	6.5	0		
Total %	0.9	0.3	0.2	0	1.4	6.2	40	0.5	0	46.7	6	0.4	8.6	0	14.9	0.4	34.2	2.4	0		37
Unshifted	83	25	16	0	124	565	3639	44	0	4248	546	33	195	1	775	36	3081	218	0	3335	8482
% Unshifted	100	100	94.1	0	99.2	100	99.3	100	0	99.4	100	100	24.9	25	56.7	100	98.2	99.5	0	98.3	92.6
HV	0	0	0	0	0	0	27	0	0	27	0	0	5	0	5	0	54	1	0	55	87
% HV	0	0	0	0	0	0	0.7	0	0	0.6	0	0	0.6	0	0.4	0	1.7	0.5	0	1.6	0.9
RTOR	0	0	1	0	1	0	0	0	0	0	0	0	584	3	587	0	1	0	0	1	589
% RTOR	0	0	5.9	0	0.8	0	0	0	0	0	0	0	74.5	75	42.9	0	0	0	0	0	6.4

Start Time	Jeffrey Road From North					Carlisle Pike (SR 0011) From East					K-Mart Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
01:45 PM	11	4	1	0	16	70	345	1	0	416	46	3	61	0	110	5	262	24	0	291	833
02:00 PM	2	1	4	0	7	42	345	4	0	391	45	2	73	0	120	6	289	22	0	317	835
02:15 PM	11	6	0	0	17	40	302	2	0	344	52	5	82	0	139	4	293	12	0	309	809
02:30 PM	9	1	1	0	11	52	332	3	0	387	38	3	57	0	98	4	291	16	0	311	807
Total Volume	33	12	6	0	51	204	1324	10	0	1538	181	13	273	0	467	19	1135	74	0	1228	3284
% App. Total	64.7	23.5	11.8	0		13.3	86.1	0.7	0		38.8	2.8	58.5	0		1.5	92.4	6	0		
PHF	.750	.500	.375	.000	.750	.729	.959	.625	.000	.924	.870	.650	.832	.000	.840	.792	.968	.771	.000	.968	.983
Unshifted	33	12	6	0	51	204	1313										1118				
% Unshifted	100	100	100	0	100	100	99.2	100	0	99.3	100	100	33.0	0	60.8	100	98.5	98.6	0	98.5	93.5
HV	0	0	0	0	0	0	11	0	0	11	0	0	2	0	2	0	16	1	0	17	30
% HV	0	0	0	0	0	0	0.8	0	0	0.7	0	0	0.7	0	0.4	0	1.4	1.4	0	1.4	0.9
RTOR	0	0	0	0	0	0	0	0	0	0	0	0	181	0	181	0	1	0	0	1	182
% RTOR	0	0	0	0	0	0	0	0	0	0	0	0	66.3	0	38.8	0	0.1	0	0	0.1	5.5

Peak Hour Analysis From 01:00 PM to 03:45 PM - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 01:45 PM

File Name : 02-Carlisle Pike & Holiday Inn\_Van Patten PM  
 Site Code : 00000000  
 Start Date : 7/15/2010  
 Page No : 1

Groups Printed- Unshifted - HV - RTOR

Start Time	Holiday Drive From North					Carlisle Drive (SR 0011) From East					Van Patten Drive From South					Carlisle Drive (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:00 PM	9	1	1	0	11	17	401	12	0	430	22	0	28	0	50	4	379	7	0	390	881
04:15 PM	2	0	5	0	7	14	387	12	0	413	16	1	19	0	36	5	346	4	0	355	811
04:30 PM	8	1	8	0	17	23	377	21	0	421	9	1	28	0	38	11	331	8	0	350	820
04:45 PM	8	0	5	0	13	14	416	7	0	437	16	0	28	0	44	18	290	7	0	321	815
Total	27	2	19	0	48	68	1581	52	0	1701	63	2	103	0	168	38	1352	26	0	1416	3333
05:00 PM	9	0	3	0	12	19	378	16	0	413	3	0	18	0	21	7	378	7	0	392	838
05:15 PM	4	1	6	2	13	33	377	13	0	423	10	0	20	0	30	8	344	16	0	368	834
05:30 PM	6	1	14	0	21	17	437	16	0	470	13	0	21	0	34	14	290	5	0	309	834
05:45 PM	4	1	7	1	13	30	353	10	0	393	13	3	17	0	33	10	328	12	0	350	789
Total	23	3	30	3	59	99	1545	55	0	1699	39	3	76	0	118	39	1340	40	0	1419	3295
06:00 PM	15	1	7	2	25	29	346	18	0	393	20	1	23	2	46	10	325	8	0	343	807
06:15 PM	16	0	17	0	33	33	357	5	0	395	15	1	27	0	43	6	320	8	0	334	805
06:30 PM	8	0	8	0	16	24	363	15	0	402	14	0	36	0	50	4	309	12	0	325	793
06:45 PM	5	0	5	0	10	32	305	18	0	355	13	0	31	2	46	7	294	11	0	312	723
Total	44	1	37	2	84	118	1371	56	0	1545	62	2	117	4	185	27	1248	39	0	1314	3128
Grand Total	94	6	86	5	191	285	4497	163	0	4945	164	7	296	4	471	104	3940	105	0	4149	9756
Apprch %	49.2	3.1	45	2.6		5.8	90.9	3.3	0		34.8	1.5	62.8	0.8		2.5	95	2.5	0		
Total %	1	0.1	0.9	0.1	2	2.9	48.1	1.7	0	50.7	1.7	0.1	3	0	4.8	1.1	40.4	1.1	0	42.5	
Unshifted	91	6	36	5	138	280	4296	141	0	4717	162	7	56	4	229	103	3774	79	0	3956	9040
% Unshifted	96.8	100	41.9	100	72.3	98.2	95.5	86.5	0	95.4	98.8	100	18.9	100	48.6	99	95.8	75.2	0	95.3	92.7
HV	3	0	1	0	4	5	200	13	0	218	1	0	2	0	3	1	166	0	0	167	392
% HV	3.2	0	1.2	0	2.1	1.8	4.4	8	0	4.4	0.6	0	0.7	0	0.6	1	4.2	0	0	4	4
RTOR	0	0	49	0	49	0	1	9	0	10	1	0	238	0	239	0	0	26	0	26	324
% RTOR	0	0	57	0	25.7	0	0	5.5	0	0.2	0.6	0	80.4	0	50.7	0	0	24.8	0	0.6	3.3

Start Time	Holiday Drive From North					Carlisle Drive (SR 0011) From East					Van Patten Drive From South					Carlisle Drive (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	9	1	1	0	11	17	401	12	0	430	22	0	28	0	50	4	379	7	0	390	881
04:15 PM	2	0	5	0	7	14	387	12	0	413	16	1	19	0	36	5	346	4	0	355	811
04:30 PM	8	1	8	0	17	23	377	21	0	421	9	1	28	0	38	11	331	8	0	350	826
04:45 PM	8	0	5	0	13	14	416	7	0	437	16	0	28	0	44	18	296	7	0	321	815
Total Volume	27	2	19	0	48	68	1581	52	0	1701	63	2	103	0	168	38	1352	26	0	1416	3333
% App. Total	56.2	4.2	39.6	0		4	92.9	3.1	0		37.5	1.2	61.3	0		2.7	95.5	1.8	0		
PHF	.750	.500	.594	.000	.706	.739	.950	.619	.000	.973	.716	.500	.920	.000	.840	.528	.892	.813	.000	.908	.946
Unshifted	27	2	7	0	36	67	1502									1308					
% Unshifted	100	100	36.8	0	75.0	98.5	95.0	86.5	0	94.9	100	100	19.4	0	50.6	100	96.7	76.9	0	96.5	93.0
HV	0	0	0	0	0	1	79	4	0	84	0	0	0	0	0	0	44	0	0	44	128
% HV	0	0	0	0	0	1.5	5.0	7.7	0	4.9	0	0	0	0	0	0	3.3	0	0	3.1	3.8
RTOR	0	0	12	0	12	0	0	3	0	3	0	0	83	0	83	0	0	6	0	6	104
% RTOR	0	0	63.2	0	25.0	0	0	5.8	0	0.2	0	0	80.6	0	49.4	0	0	23.1	0	0.4	3.1



Groups Printed- Unshifted - HV - RTOR

Start Time	Ramp ABC (SR 0581) From North					Carlisle Pike (SR 0011) From East					Gateway Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
04:00 PM	70	35	182	1	288	33	189	87	0	309	29	115	91	0	235	52	251	33	0	336	1168
04:15 PM	84	27	180	0	291	26	163	91	0	280	39	108	52	0	199	54	308	17	0	379	1149
04:30 PM	73	51	201	0	325	32	193	99	0	324	46	185	86	0	317	54	260	27	0	341	1307
04:45 PM	85	46	226	0	357	26	175	102	0	303	39	89	45	0	173	38	183	30	0	251	1084
Total	312	159	789	1	1261	117	720	379	0	1216	153	497	274	0	924	198	1002	107	0	1307	4708
05:00 PM	79	42	202	0	323	33	183	119	0	335	42	67	76	0	185	76	313	17	0	406	1249
05:15 PM	96	39	207	0	342	52	181	117	0	350	37	70	55	0	162	64	269	21	0	354	1208
05:30 PM	88	54	230	0	372	36	200	96	0	332	37	49	42	0	128	37	265	25	0	327	1159
05:45 PM	57	43	200	0	300	50	169	61	0	280	27	40	44	0	111	47	247	31	0	325	1016
Total	320	178	839	0	1337	171	733	393	0	1297	143	226	217	0	586	224	1094	94	0	1412	4632
06:00 PM	88	34	183	0	305	47	164	70	0	281	41	49	67	0	157	58	221	44	0	323	1066
06:15 PM	63	53	175	0	291	45	220	64	0	329	27	26	58	0	111	56	238	67	0	361	1092
06:30 PM	72	35	170	0	277	31	170	48	0	249	85	49	65	0	199	49	256	19	0	324	1049
06:45 PM	48	25	189	0	262	26	172	41	0	239	24	19	42	0	85	46	237	63	0	346	932
Total	271	147	717	0	1135	149	726	223	0	1098	177	143	232	0	552	209	952	193	0	1354	4139
Grand Total	903	484	2345	1	3733	437	2179	995	0	3611	473	866	723	0	2062	631	3048	394	0	4073	13479
Apprch %	24.2	13	62.8	0		12.1	60.3	27.6	0		22.9	42	35.1	0		15.5	74.8	9.7	0		
Total %	6.7	3.6	17.4	0	27.7	3.2	16.2	7.4	0	26.8	3.5	6.4	5.4	0	15.3	4.7	22.6	2.9	0	30.2	
Unshifted	858	472	2177	0	3507	435	2115	947	0	3497	471	861	695	0	2027	581	2895	384	0	3860	12891
% Unshifted	95	97.5	92.8	0	93.9	99.5	97.1	95.2	0	96.8	99.6	99.4	96.1	0	98.3	92.1	95	97.5	0	94.8	95.6
HV	45	12	168	1	226	2	64	48	0	114	2	5	12	0	19	50	153	10	0	213	572
% HV	5	2.5	7.2	100	6.1	0.5	2.9	4.8	0	3.2	0.4	0.6	1.7	0	0.9	7.9	5	2.5	0	5.2	4.2
RTOR	0	0	0	0	0	0	0	0	0	0	0	0	16	0	16	0	0	0	0	0	16
% RTOR	0	0	0	0	0	0	0	0	0	0	0	0	2.2	0	0.8	0	0	0	0	0	0.1

Start Time	Ramp ABC (SR 0581) From North					Carlisle Pike (SR 0011) From East					Gateway Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	73	51	201	0	325	32	193	99	0	324	46	185	86	0	317	54	260	27	0	341	1307
04:45 PM	85	46	226	0	357	26	175	102	0	303	39	89	45	0	173	38	183	30	0	251	1084
05:00 PM	79	42	202	0	323	33	183	119	0	335	42	67	76	0	185	76	313	17	0	406	1249
05:15 PM	96	39	207	0	342	52	181	117	0	350	37	70	55	0	162	64	269	21	0	354	1208
Total Volume	333	178	836	0	1347	143	732	437	0	1312	164	411	262	0	837	232	1025	95	0	1352	4848
% App. Total	24.7	13.2	62.1	0		10.9	55.8	33.3	0		19.6	49.1	31.3	0		17.2	75.8	7	0		
PHF	.867	.873	.925	.000	.943	.688	.948	.918	.000	.937	.891	.555	.762	.000	.660	.763	.819	.792	.000	.833	.927
Unshifted	318	173	777	0	1268	143	717	419	0	1279	164	410	247	0	821	216	978	94	0	1288	4656
% Unshifted																					
HV	15	5	59	0	79	0	15	18	0	33	0	1	4	0	5	16	47	1	0	64	181
% HV	4.5	2.8	7.1	0	5.9	0	2.0	4.1	0	2.5	0	0.2	1.5	0	0.6	6.9	4.6	1.1	0	4.7	3.7
RTOR	0	0	0	0	0	0	0	0	0	0	0	0	11	0	11	0	0	0	0	0	11
% RTOR	0	0	0	0	0	0	0	0	0	0	0	0	4.2	0	1.3	0	0	0	0	0	0.2

Groups Printed- Unshifted - HV - RTOR

Start Time	Ramp ABC (SR 0581) From North					Carlisle Pike (SR 0011) From East					Gateway Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
01:00 PM	68	38	161	0	267	39	162	44	3	248	28	14	28	0	70	48	287	32	0	367	952
01:15 PM	36	30	183	0	249	38	225	46	1	310	23	20	28	0	71	39	350	31	0	420	1050
01:30 PM	51	38	179	0	268	47	195	51	0	293	24	18	44	0	86	43	292	21	0	356	1003
01:45 PM	32	21	187	0	240	47	222	36	0	305	27	8	29	0	64	57	323	33	0	413	1022
Total	187	127	710	0	1024	171	804	177	4	1156	102	60	129	0	291	187	1252	117	0	1556	4027
02:00 PM	31	25	177	0	233	30	221	36	0	287	21	8	28	0	57	35	329	24	0	388	965
02:15 PM	53	26	199	0	278	37	169	36	0	242	30	25	52	0	107	41	350	29	1	421	1048
02:30 PM	37	16	159	0	212	27	228	56	0	311	19	13	31	0	63	35	365	29	0	429	1015
02:45 PM	66	41	181	0	288	31	144	41	0	216	18	16	32	0	66	44	275	19	1	339	909
Total	187	108	716	0	1011	125	762	169	0	1056	88	62	143	0	293	155	1319	101	2	1577	3937
03:00 PM	40	21	168	0	229	24	165	59	1	249	15	7	12	0	34	49	324	28	0	401	913
03:15 PM	43	25	180	0	248	21	161	53	0	235	20	12	33	0	65	48	297	35	0	380	928
03:30 PM	40	25	167	0	232	31	177	32	0	240	14	14	18	0	46	48	330	29	0	407	925
03:45 PM	0	0	0	0	0	21	168	39	1	229	20	20	25	0	65	0	0	0	0	0	294
Total	123	71	515	0	709	97	671	183	2	953	69	53	88	0	210	145	951	92	0	1188	3060
Grand Total	497	306	1941	0	2744	393	2237	529	6	3165	259	175	360	0	794	487	3522	310	2	4321	11024
Approch %	18.1	11.2	70.7	0		12.4	70.7	16.7	0.2		32.6	22	45.3	0		11.3	81.5	7.2	0		
Total %	4.5	2.8	17.6	0	24.9	3.6	20.3	4.8	0.1	28.7	2.3	1.6	3.3	0	7.2	4.4	31.9	2.8	0	39.2	
Unshifted	474	296	427	0	1197	392	2229	301	3	2925	259	175	337	0	771	466	3459	138	0	4063	8956
% Unshifted	95.4	96.7	22	0	43.6	99.7	99.6	56.9	50	92.4	100	100	93.6	0	97.1	95.7	98.2	44.5	0	94	81.2
HV	23	10	56	0	89	1	8	11	0	20	0	0	6	0	6	21	63	1	0	85	200
% HV	4.6	3.3	2.9	0	3.2	0.3	0.4	2.1	0	0.6	0	0	1.7	0	0.8	4.3	1.8	0.3	0	2	1.8
RTOR	0	0	1458	0	1458	0	0	217	3	220	0	0	17	0	17	0	0	171	2	173	1868
% RTOR	0	0	75.1	0	53.1	0	0	41	50	7	0	0	4.7	0	2.1	0	0	55.2	100	4	16.9

Start Time	Ramp ABC (SR 0581) From North					Carlisle Pike (SR 0011) From East					Gateway Drive From South					Carlisle Pike (SR 0011) From West					Int. Total
	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	
Peak Hour Analysis From 01:00 PM to 03:30 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 01:45 PM																					
01:45 PM	32	21	187	0	240	47	222	36	0	305	27	8	29	0	64	57	323	33	0	413	1022
02:00 PM	31	25	177	0	233	30	221	36	0	287	21	8	28	0	57	35	329	24	0	388	965
02:15 PM	53	26	199	0	278	37	169	36	0	242	30	25	52	0	107	41	350	29	1	421	1048
02:30 PM	37	16	159	0	212	27	228	56	0	311	19	13	31	0	63	35	365	29	0	429	1015
Total Volume	153	88	722	0	963	141	840	164	0	1145	97	54	140	0	291	168	1367	115	1	1651	4050
% App. Total	15.9	9.1	75	0		12.3	73.4	14.3	0		33.3	18.6	48.1	0		10.2	82.8	7	0.1		
PHF	.722	.846	.907	.000	.866	.750	.921	.732	.000	.920	.808	.540	.673	.000	.680	.737	.936	.871	.250	.962	.966
Unshifted	147	84	156	0	387	140	839	101	0	1080	97	54	130	0	281	162	1344				
% Unshifted	96.1	95.5	21.6	0	40.2	99.3	99.9	61.6	0	94.3	100	100	92.9	0	96.6	96.4	98.3	42.6	0	94.2	81.6
HV	6	4	26	0	36	1	1	3	0	5	0	0	3	0	3	6	23	0	0	29	73
% HV	3.9	4.5	3.6	0	3.7	0.7	0.1	1.8	0	0.4	0	0	2.1	0	1.0	3.6	1.7	0	0	1.8	1.8
RTOR	0	0	540	0	540	0	0	60	0	60	0	0	7	0	7	0	0	66	1	67	674
% RTOR	0	0	74.8	0	56.1	0	0	36.6	0	5.2	0	0	5.0	0	2.4	0	0	57.4	100	4.1	16.6

## ***Automatic Traffic Recorder Counts***

Start Time	Mon 12-Jul-10	Tue 13-Jul-10	Wed 14-Jul-10	Thu 15-Jul-10	Fri 16-Jul-10	Average Day	Sat 17-Jul-10	Sun 18-Jul-10	Week Average
12:00 AM	*	*	*	*	175	175	205	161	180
01:00	*	*	*	*	160	160	147	105	137
02:00	*	*	*	*	159	159	163	57	126
03:00	*	*	*	*	173	173	101	30	101
04:00	*	*	*	*	215	215	121	55	130
05:00	*	*	*	*	378	378	219	79	225
06:00	*	*	*	*	688	688	289	171	383
07:00	*	*	*	*	1132	1132	470	227	610
08:00	*	*	*	*	1089	1089	797	459	782
09:00	*	*	*	*	1130	1130	1020	627	926
10:00	*	*	*	*	1270	1270	1300	845	1138
11:00	*	*	*	*	1439	1439	1579	1108	1375
12:00 PM	*	*	*	*	1652	1652	1617	1260	1510
01:00	*	*	*	*	1485	1485	1459	1282	1409
02:00	*	*	*	1441	1489	1465	1499	1393	1456
03:00	*	*	*	1429	1528	1478	1426	1310	1423
04:00	*	*	*	1409	1488	1448	1300	1250	1362
05:00	*	*	*	1384	1385	1384	1331	1032	1283
06:00	*	*	*	1336	1445	1390	1197	934	1228
07:00	*	*	*	1208	1348	1278	1057	797	1102
08:00	*	*	*	1154	1212	1183	968	626	990
09:00	*	*	*	775	927	851	841	488	758
10:00	*	*	*	504	575	540	462	301	460
11:00	*	*	*	294	349	322	274	175	273
Day Total	0	0	0	10934	22891	22484	19842	14772	19367
% Avg. WKDay	0.0%	0.0%	0.0%	48.6%	101.8%	116.1%	102.5%	76.3%	
% Avg. Week	0.0%	0.0%	0.0%	56.5%	118.2%				
AM Peak Vol.				14:00 1441	11:00 1439	11:00 1439	11:00 1579	11:00 1108	11:00 1375
PM Peak Vol.				14:00 1441	12:00 1652	12:00 1652	12:00 1617	14:00 1393	12:00 1510

Start Time	Mon 19-Jul-10	Tue 20-Jul-10	Wed 21-Jul-10	Thu 22-Jul-10	Fri 23-Jul-10	Sat 24-Jul-10	Sun 25-Jul-10	Average Day	Week Average
12:00 AM	87	145	151	176	*	*	*	140	140
01:00	75	128	122	98	*	*	*	106	106
02:00	66	140	161	162	*	*	*	132	132
03:00	84	184	195	184	*	*	*	157	157
04:00	127	157	178	213	*	*	*	169	169
05:00	324	409	421	417	*	*	*	393	393
06:00	679	746	764	754	*	*	*	736	736
07:00	1170	1217	1231	1234	*	*	*	1213	1213
08:00	1069	1137	1161	1156	*	*	*	1131	1131
09:00	1053	1031	1141	1137	*	*	*	1090	1090
10:00	1123	1137	1216	1134	*	*	*	1152	1152
11:00	1345	1288	1385	1321	*	*	*	1335	1335
12:00 PM	1560	1479	1604	1577	*	*	*	1555	1555
01:00	1349	1387	1514	997	*	*	*	1312	1312
02:00	1377	1330	1477	*	*	*	*	1395	1395
03:00	1352	1429	1452	*	*	*	*	1411	1411
04:00	1422	1330	1357	*	*	*	*	1370	1370
05:00	1327	1391	1359	*	*	*	*	1359	1359
06:00	1122	1301	1208	*	*	*	*	1210	1210
07:00	1114	1150	1156	*	*	*	*	1140	1140
08:00	1044	1011	1110	*	*	*	*	1055	1055
09:00	721	732	715	*	*	*	*	723	723
10:00	404	419	439	*	*	*	*	421	421
11:00	260	273	276	*	*	*	*	270	270
Day Total	20254	20951	21793	10540	0	0	0	20975	20975
% Avg. WKDay	96.6%	99.9%	103.9%	50.3%	0.0%	0.0%	0.0%	100.0%	
% Avg. Week	96.6%	99.9%	103.9%	50.3%	0.0%	0.0%	0.0%		
AM Peak	11:00	11:00	11:00	11:00				11:00	11:00
Vol.	1345	1288	1385	1321				1335	1335
PM Peak	12:00	12:00	12:00	12:00				12:00	12:00
Vol.	1560	1479	1604	1577				1555	1555
Grand Total	20254	20951	21793	21474	22891	19842	14771	43459	40342

ADT

ADT 20,084

ADT 20,084

Start Time	Mon 12-Jul-10	Tue 13-Jul-10	Wed 14-Jul-10	Thu 15-Jul-10	Fri 16-Jul-10	Sat 17-Jul-10	Sun 18-Jul-10	Week Average
12:00 AM	*	*	*	*	263	275	203	247
01:00	*	*	*	*	142	154	121	139
02:00	*	*	*	*	147	134	90	124
03:00	*	*	*	*	148	107	57	104
04:00	*	*	*	*	181	119	63	121
05:00	*	*	*	*	363	195	92	217
06:00	*	*	*	*	691	301	148	380
07:00	*	*	*	*	1004	533	282	606
08:00	*	*	*	*	1131	856	472	820
09:00	*	*	*	*	1158	1236	633	1009
10:00	*	*	*	*	1469	1596	998	1354
11:00	*	*	*	*	<b>1798</b>	<b>1735</b>	<b>1290</b>	<b>1608</b>
12:00 PM	*	*	*	*	1786	1715	1477	1659
01:00	*	*	*	*	1676	<b>1731</b>	<b>1604</b>	<b>1670</b>
02:00	*	*	*	1475	1720	1703	1523	1605
03:00	*	*	*	1567	1655	1521	1279	1506
04:00	*	*	*	1762	1730	1445	1161	1524
05:00	*	*	*	<b>1778</b>	<b>1946</b>	1272	1066	1516
06:00	*	*	*	1608	1692	1295	952	1387
07:00	*	*	*	1276	1459	1150	748	1158
08:00	*	*	*	1110	1139	1036	581	966
09:00	*	*	*	781	866	723	439	702
10:00	*	*	*	496	628	468	310	476
11:00	*	*	*	364	385	348	237	334
Day Total	0	0	0	12217	25177	21648	15826	21232
% Avg. WKDay	0.0%	0.0%	0.0%	49.5%	102.0%			
% Avg. Week AM Peak Vol.	0.0%	0.0%	0.0%	57.5%	118.6%	102.0%	74.5%	11:00 11:00
PM Peak Vol.				17:00 1778	17:00 1946	13:00 1731	13:00 1604	13:00 1670
Average Day				1798	1786	1731	1604	1670
Average Day				1798	1786	1731	1604	1670

Start Time	Mon 19-Jul-10	Tue 20-Jul-10	Wed 21-Jul-10	Thu 22-Jul-10	Fri 23-Jul-10	Average Day	Sat 24-Jul-10	Sun 25-Jul-10	Week Average
12:00 AM	152	233	204	195	*	196	*	*	196
01:00	77	143	133	162	*	129	*	*	129
02:00	61	112	121	128	*	106	*	*	106
03:00	88	123	125	134	*	118	*	*	118
04:00	115	167	189	193	*	166	*	*	166
05:00	332	410	425	430	*	399	*	*	399
06:00	652	773	705	704	*	708	*	*	708
07:00	957	1019	1056	<b>1093</b>	*	1031	*	*	1031
08:00	1017	1136	1185	29	*	842	*	*	842
09:00	1172	1173	1204	0	*	887	*	*	887
10:00	1330	1337	1434	0	*	1025	*	*	1025
11:00	<b>1639</b>	<b>1595</b>	<b>1687</b>	0	*	<b>1230</b>	*	*	<b>1230</b>
12:00 PM	1616	1561	1729	0	*	1226	*	*	1226
01:00	1439	1519	1576	0	*	1134	*	*	1134
02:00	1595	1537	1670	*	*	1601	*	*	1601
03:00	1602	1561	1551	*	*	1571	*	*	1571
04:00	<b>1710</b>	1718	1634	*	*	1687	*	*	1687
05:00	1657	<b>1826</b>	<b>1789</b>	*	*	<b>1757</b>	*	*	<b>1757</b>
06:00	1454	1542	1664	*	*	1553	*	*	1553
07:00	1241	1352	1389	*	*	1327	*	*	1327
08:00	981	990	1101	*	*	1024	*	*	1024
09:00	629	642	716	*	*	662	*	*	662
10:00	405	435	449	*	*	430	*	*	430
11:00	274	270	266	*	*	270	*	*	270
Day Total	22195	23174	24002	3068	0	21079	0	0	21079
% Avg. WkDay	105.3%	109.9%	113.9%	14.6%	0.0%				
% Avg. Week	105.3%	109.9%	113.9%	14.6%	0.0%	100.0%	0.0%	0.0%	
AM Peak Vol.	11:00	11:00	11:00	07:00		11:00			11:00
	1639	1595	1687	1093		1230			1230
PM Peak Vol.	16:00	17:00	17:00			17:00			17:00
	1710	1826	1789			1757			1757
Grand Total	22195	23174	24002	15285	25177	45755	21648	15826	42311
ADT		ADT 22,004		ADT 22,004					

Station ID: Rt 11 Combined

Date Start: 15-Jul-10  
Date End: 22-Jul-10

Start Time	12-Jul-10 Mon	13-Jul-10 Tue	14-Jul-10 Wed	15-Jul-10 Thu	16-Jul-10 Fri	Weekday Average	17-Jul-10 Sat	18-Jul-10 Sun
12:00 AM	*	*	*	*	438	438	480	364
01:00	*	*	*	*	302	302	301	226
02:00	*	*	*	*	306	306	297	147
03:00	*	*	*	*	321	321	208	87
04:00	*	*	*	*	396	396	240	118
05:00	*	*	*	*	741	741	414	171
06:00	*	*	*	*	1379	1379	590	319
07:00	*	*	*	*	2136	2136	1003	509
08:00	*	*	*	*	2220	2220	1653	931
09:00	*	*	*	*	2288	2288	2256	1260
10:00	*	*	*	*	2739	2739	2896	1843
11:00	*	*	*	*	3237	3237	3314	2398
12:00 PM	*	*	*	*	3438	3438	3332	2737
01:00	*	*	*		3161	3161	3190	2886
02:00	*	*	*	2916	3209	3062	3202	2916
03:00	*	*	*	2996	3183	3090	2947	2589
04:00	*	*	*	3171	3218	3194	2745	2411
05:00	*	*	*	3162	3331	3246	2603	2098
06:00	*	*	*	2944	3137	3040	2492	1886
07:00	*	*	*	2484	2807	2646	2207	1545
08:00	*	*	*	2264	2351	2308	2004	1207
09:00	*	*	*	1556	1793	1674	1564	927
10:00	*	*	*	1000	1203	1102	930	611
11:00	*	*	*	658	734	696	622	412
Total	0	0	0	23151	48068		41490	30598
Percentage	0.0%	0.0%	0.0%	49.1%	101.9%		88.0%	64.9%
AM Peak Vol.					11:00 3237		11:00 3314	11:00 2398
PM Peak Vol.				16:00 3171	12:00 3438		12:00 3332	14:00 2916

Station ID: Rt 11 Combined  
 Start: 15-Jul-10  
 Date End: 22-Jul-10

Start Time	19-Jul-10 Mon	20-Jul-10 Tue	21-Jul-10 Wed	22-Jul-10 Thu	23-Jul-10 Fri	Weekday Average	24-Jul-10 Sat	25-Jul-10 Sun
12:00 AM	239	378	355	371	*	336	*	*
01:00	152	271	255	260	*	234	*	*
02:00	127	252	282	290	*	238	*	*
03:00	172	307	320	298	*	274	*	*
04:00	242	324	367	406	*	335	*	*
05:00	656	819	846	847	*	792	*	*
06:00	1331	1519	1469	1458	*	1444	*	*
07:00	2127	2236	2287	2327	*	2244	*	*
08:00	2086	2273	2346	1185	*	1972	*	*
09:00	2225	2204	2345	1137	*	1978	*	*
10:00	2453	2474	2650	1134	*	2178	*	*
11:00	2984	2883	3072	1321	*	2565	*	*
12:00 PM	3176	3040	3333	1577	*	2782	*	*
01:00	2738	2906	3090	997	*	2445	*	*
02:00	2972	2867	3147	*	*	2995	*	*
03:00	2954	2990	3003	*	*	2982	*	*
04:00	3132	3048	2991	*	*	3057	*	*
05:00	2984	3217	3148	*	*	3116	*	*
06:00	2576	2843	2872	*	*	2764	*	*
07:00	2355	2502	2545	*	*	2467	*	*
08:00	2025	2001	2211	*	*	2079	*	*
09:00	1350	1374	1431	*	*	1385	*	*
10:00	809	854	888	*	*	850	*	*
11:00	534	543	542	*	*	540	*	*
Total	42449	44125	45795	13608	0		0	0
Percentage	100.9%	104.9%	108.9%	32.4%	0.0%		0.0%	0.0%
AM Peak	11:00	11:00	11:00	07:00				
Vol.	2984	2883	3072	2327				
PM Peak	12:00	17:00	12:00	12:00				
Vol.	3176	3217	3333	1577				
Total		44125	45795					

Station ID: Crossgate Dr

Date Start: 15-Jul-10  
Date End: 22-Jul-10

Start Time	12-Jul-10		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out
12:00 AM	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
01:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
02:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
03:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
04:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
05:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
06:00	*	*	*	*	*	*	*	*	*	*	*	*	*	*	0	0
07:00	*	*	*	*	*	*	*	*	13	2	1	1	0	0	0	0
08:00	*	*	*	*	*	*	*	*	31	5	5	3	1	1	1	5
09:00	*	*	*	*	*	*	*	*	6	5	3	1	1	1	1	16
10:00	*	*	*	*	*	*	*	*	1	4	1	1	1	1	1	3
11:00	*	*	*	*	*	*	*	*	4	3	0	0	2	4	2	4
12:00 PM	*	*	*	*	*	*	*	*	11	15	4	4	0	4	5	8
01:00	*	*	*	*	*	*	*	*	8	5	0	2	1	0	3	2
02:00	*	*	*	*	*	*	*	*	3	4	1	1	0	2	1	2
03:00	*	*	*	*	*	*	*	*	5	4	0	0	0	0	2	2
04:00	*	*	*	*	*	*	*	*	6	9	0	1	1	0	4	6
05:00	*	*	*	*	*	*	*	*	2	18	0	0	0	0	1	8
06:00	*	*	*	*	*	*	*	*	0	3	2	2	0	0	1	1
07:00	*	*	*	*	*	*	*	*	1	2	0	0	1	1	1	2
08:00	*	*	*	*	*	*	*	*	0	1	0	0	0	0	1	4
09:00	*	*	*	*	*	*	*	*	5	2	0	0	2	0	2	0
10:00	*	*	*	*	*	*	*	*	2	3	1	1	1	0	1	1
11:00	*	*	*	*	*	*	*	*	1	2	0	0	0	0	0	1
Lane	0	0	0	0	0	0	0	0	102	88	31	60	26	15	50	51
Day	0	0	0	0	0	0	0	23	190	110	190	60	26	15	101	101
AM Peak									08:00	08:00	08:00	08:00	10:00	11:00	08:00	11:00
Vol.									31	6	17	4	2	4	16	4
PM Peak									12:00	17:00	12:00	12:00	21:00	12:00	12:00	12:00
Vol.									11	18	4	5	2	4	5	8

Station ID: Crossgate Dr

Date Start: 15-Jul-10  
Date End: 22-Jul-10

Start Time	19-Jul-10		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
	in	out	in	out	in	out	in	out	in	out	in	out	in	out	in	out
12:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
04:00	1	1	0	0	2	1	1	0	0	0	0	0	0	0	1	0
05:00	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0
06:00	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
07:00	10	0	12	1	9	0	18	3	0	0	0	0	0	0	12	1
08:00	15	7	29	6	30	7	17	2	0	0	0	0	0	0	23	6
09:00	4	0	5	4	4	0	5	1	0	0	0	0	0	0	4	1
10:00	6	7	4	4	9	5	3	3	0	0	0	0	0	0	6	5
11:00	22	4	15	6	10	4	25	9	0	0	0	0	0	0	18	6
12:00 PM	5	4	12	9	13	10	9	8	0	0	0	0	0	0	10	8
01:00	8	1	4	1	9	3	9	2	0	0	0	0	0	0	8	2
02:00	3	4	3	1	4	2	0	0	0	0	0	0	0	0	3	2
03:00	3	4	5	5	1	1	0	0	0	0	0	0	0	0	3	3
04:00	10	11	9	12	6	9	0	0	0	0	0	0	0	0	8	11
05:00	2	12	2	10	1	18	0	0	0	0	0	0	0	0	2	13
06:00	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
07:00	0	1	0	5	1	3	0	0	0	0	0	0	0	0	0	0
08:00	5	14	4	9	3	6	0	0	0	0	0	0	0	0	4	10
09:00	0	0	3	0	1	1	0	0	0	0	0	0	0	0	1	0
10:00	0	0	2	0	1	0	0	0	0	0	0	0	0	0	1	0
11:00	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Lane	96	71	113	76	105	70	87	30	0	0	0	0	0	0	105	71
Day	167	189	189	117	175	175	117	117	0	0	0	0	0	0	176	176
AM Peak	11:00	08:00	08:00	08:00	08:00	08:00	11:00	11:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00	08:00
Vol.	22	7	29	6	30	7	25	9	0	0	0	0	0	0	23	6
PM Peak	16:00	20:00	12:00	16:00	12:00	17:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	12:00	17:00
Vol.	10	14	12	12	13	18	9	8	0	0	0	0	0	0	10	13

Comb. Total 167 189 175 184 190 60 277

ADT ADT 134 ADT 134 AADT 134

***Synchro HCM Reports***

HCM Signalized Intersection Capacity Analysis  
 3: Carlisle Pike & Jeffrey Road

Existing PM Peak  
 7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	12	1241	30	148	1531	15	109	9	136	39	6	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	15	12	12	12	11	12	12	13	12
Grade (%)		1%			2%			1%			1%	
Total Lost time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.98	
Frt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1796	3569	1560	1966	3466		1796	1827	1575		1845	
Frt Permitted	0.11	1.00	1.00	0.16	1.00		0.73	1.00	1.00		0.78	
Satd. Flow (perm)	208	3569	1560	330	3466		1374	1827	1575		1485	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.81	0.81	0.81	0.74	0.74	0.74
Adj. Flow (vph)	13	1306	32	161	1664	16	135	11	168	53	8	11
RTOR Reduction (vph)	0	0	9	0	0	0	0	0	148	0	4	0
Lane Group Flow (vph)	13	1306	23	161	1680	0	135	11	20	0	68	0
Heavy Vehicles (%)	0%	4%	3%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	115.3	112.9	112.9	127.9	119.3		19.5	19.5	19.5		19.5	
Effective Green, g (s)	115.3	112.9	112.9	127.9	119.3		19.5	19.5	19.5		19.5	
Actuated g/C Ratio	0.72	0.71	0.71	0.80	0.75		0.12	0.12	0.12		0.12	
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	174	2518	1101	354	2584		167	223	192		181	
v/s Ratio Prot	0.00	0.37		c0.03	c0.48			0.01				
v/s Ratio Perm	0.05		0.01	0.34			c0.10		0.01		0.05	
v/c Ratio	0.07	0.52	0.02	0.45	0.65		0.81	0.05	0.11		0.37	
Uniform Delay, d1	8.6	10.9	7.0	7.7	10.0		68.4	62.1	62.5		64.6	
Progression Factor	1.00	1.00	1.00	1.76	1.03		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	0.8	0.0	0.7	1.0		24.2	0.1	0.2		1.3	
Delay (s)	8.8	11.7	7.1	14.3	11.3		92.6	62.2	62.7		65.9	
Level of Service	A	B	A	B	B		F	E	E		E	
Approach Delay (s)		11.6			11.5			75.6			65.9	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM Average Control Delay	18.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.68		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	71.4%	ICU Level of Service	C
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: Carlisle Pike & Holiday Inn Drive

Existing PM Peak  
7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑		↖↗	↑		↖	↑	
Volume (vph)	38	1352	26	68	1612	52	63	2	103	27	2	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	14	12	12	12	12	14	12	12	12	12
Grade (%)		1%			1%			0%				0%
Total Lost time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95		0.97	1.00		1.00	1.00	
Flt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	5011	1714	1761	3402		3502	1728		1805	1644	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.91	1.00	
Satd. Flow (perm)	1796	5011	1714	1761	3402		3502	1728		1727	1644	
Peak-hour factor, PHF	0.91	0.91	0.91	0.97	0.97	0.97	0.84	0.84	0.84	0.71	0.71	0.71
Adj. Flow (vph)	42	1486	29	70	1662	54	75	2	123	38	3	27
RTOR Reduction (vph)	0	0	10	0	1	0	0	116	0	0	26	0
Lane Group Flow (vph)	42	1486	19	70	1715	0	75	9	0	38	4	0
Heavy Vehicles (%)	0%	3%	0%	2%	5%	8%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Perm	Prot			Prot			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2							4		
Actuated Green, G (s)	6.2	106.0	106.0	11.8	111.6		11.4	9.5		10.7	4.4	
Effective Green, g (s)	6.2	106.0	106.0	11.8	111.6		11.4	9.5		10.7	4.4	
Actuated g/C Ratio	0.04	0.66	0.66	0.07	0.70		0.07	0.06		0.07	0.03	
Clearance Time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	70	3320	1136	130	2373		250	103		119	45	
v/s Ratio Prot	0.02	0.30		c0.04	c0.50		c0.02	c0.01		0.01	0.00	
v/s Ratio Perm			0.01							c0.01		
v/c Ratio	0.60	0.45	0.02	0.54	0.72		0.30	0.09		0.32	0.08	
Uniform Delay, d1	75.7	13.0	9.2	71.5	14.8		70.5	71.2		71.2	75.8	
Progression Factor	1.07	0.56	0.66	0.97	0.65		1.00	1.00		1.00	1.00	
Incremental Delay, d2	12.1	0.4	0.0	3.1	1.4		0.7	0.4		1.6	0.8	
Delay (s)	93.0	7.7	6.1	72.5	11.0		71.2	71.5		72.7	76.6	
Level of Service	F	A	A	E	B		E	E		E	E	
Approach Delay (s)		10.0			13.4			71.4			74.4	
Approach LOS		A			B			E			E	

Intersection Summary			
HCM Average Control Delay	16.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	32.9
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 9: Carlisle Pike & SR 581 Ramp

Existing PM Peak  
 7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑	↗	↘	↑↑	↗	↘	↑↑	↗
Volume (vph)	232	1155	95	143	732	437	164	411	262	333	178	836
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		2%			2%			-4%			1%	
Total Lost time (s)	4.0	7.0	4.0	4.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	1.00	0.91	0.86	0.91	0.91	0.91	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.98	1.00
Satd. Flow (prot)	1670	4891	1583	1787	3504	1537	1675	3266	1568	1557	3231	1502
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.98	1.00
Satd. Flow (perm)	1670	4891	1583	1787	3504	1537	1675	3266	1568	1557	3231	1502
Peak-hour factor, PHF	0.83	0.83	0.83	0.94	0.94	0.94	0.66	0.66	0.66	0.94	0.94	0.94
Adj. Flow (vph)	280	1392	114	152	779	465	248	623	397	354	189	889
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	229	0	0	0
Lane Group Flow (vph)	280	1392	114	152	779	465	223	722	89	177	366	889
Heavy Vehicles (%)	7%	5%	1%	0%	2%	4%	0%	0%	2%	5%	3%	7%
Turn Type	Prot		Free	Prot		Free	Split		Perm	Split		Free
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			Free			Free			8			Free
Actuated Green, G (s)	29.5	57.4	160.0	18.5	46.4	160.0	34.6	34.6	34.6	24.5	24.5	160.0
Effective Green, g (s)	29.5	57.4	160.0	18.5	46.4	160.0	34.6	34.6	34.6	24.5	24.5	160.0
Actuated g/C Ratio	0.18	0.36	1.00	0.12	0.29	1.00	0.22	0.22	0.22	0.15	0.15	1.00
Clearance Time (s)	4.0	7.0		4.0	7.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	6.0		3.0	6.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	308	1755	1583	207	1016	1537	362	706	339	238	495	1502
v/s Ratio Prot	c0.17	c0.28		0.09	0.22		0.13	c0.22		0.11	0.11	
v/s Ratio Perm			0.07			0.30			0.06			c0.59
v/c Ratio	0.91	0.79	0.07	0.73	0.77	0.30	0.62	1.02	0.26	0.74	0.74	0.59
Uniform Delay, d1	63.9	46.0	0.0	68.4	51.9	0.0	56.7	62.7	52.1	64.7	64.7	0.0
Progression Factor	1.06	0.77	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	27.6	3.6	0.1	12.6	5.5	0.5	3.1	39.5	0.4	11.9	5.7	1.7
Delay (s)	95.6	38.9	0.1	81.0	57.4	0.5	59.8	102.2	52.5	76.6	70.4	1.7
Level of Service	F	D	A	F	E	A	E	F	D	E	E	A
Approach Delay (s)		45.3			41.0			82.3			28.5	
Approach LOS		D			D			F			C	

Intersection Summary		
HCM Average Control Delay	48.2	HCM Level of Service D
HCM Volume to Capacity ratio	0.80	
Actuated Cycle Length (s)	160.0	Sum of lost time (s) 11.0
Intersection Capacity Utilization	76.3%	ICU Level of Service D
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
3: Carlisle Pike & Jeffrey Road

Existing SAT  
7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑↑	↗	↙	↑↑		↙	↑	↗		↕	
Volume (vph)	19	1215	74	204	1345	10	181	13	273	33	12	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	15	12	12	12	11	12	12	13	12
Grade (%)		1%			2%			1%			1%	
Total Lost time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1796	3675	1591	1966	3535		1796	1827	1591		1862	
Flt Permitted	0.14	1.00	1.00	0.15	1.00		0.74	1.00	1.00		0.80	
Satd. Flow (perm)	269	3675	1591	305	3535		1391	1827	1591		1531	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.84	0.84	0.84	0.75	0.75	0.75
Adj. Flow (vph)	20	1253	76	222	1462	11	215	15	325	44	16	8
RTOR Reduction (vph)	0	0	29	0	0	0	0	0	206	0	3	0
Lane Group Flow (vph)	20	1253	47	222	1473	0	215	15	119	0	65	0
Heavy Vehicles (%)	0%	1%	1%	0%	1%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt		Perm		Perm	Perm	Perm		
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6		8		8		4		
Actuated Green, G (s)	89.9	86.2	86.2	105.8	95.9		21.6	21.6	21.6		21.6	
Effective Green, g (s)	89.9	86.2	86.2	105.8	95.9		21.6	21.6	21.6		21.6	
Actuated g/C Ratio	0.64	0.62	0.62	0.76	0.68		0.15	0.15	0.15		0.15	
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	213	2263	980	389	2421		215	282	245		236	
v/s Ratio Prot	0.00	0.34		c0.05	c0.42			0.01				
v/s Ratio Perm	0.06		0.03	0.38			c0.15		0.07		0.04	
v/c Ratio	0.09	0.55	0.05	0.57	0.61		1.00	0.05	0.48		0.27	
Uniform Delay, d1	10.2	15.7	10.7	11.4	11.9		59.2	50.5	54.1		52.3	
Progression Factor	1.00	1.00	1.00	3.60	0.44		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.2	1.0	0.1	1.7	0.9		61.4	0.1	1.5		0.6	
Delay (s)	10.4	16.7	10.7	42.6	6.2		120.6	50.6	55.6		52.9	
Level of Service	B	B	B	D	A		F	D	E		D	
Approach Delay (s)		16.2			11.0			80.6			52.9	
Approach LOS		B			B			F			D	

Intersection Summary			
HCM Average Control Delay	24.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.69		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	74.6%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: Carlisle Pike & Holiday Inn Drive

Existing SAT  
7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑↑	↗	↘	↑↑		↗	↗		↘	↗	
Volume (vph)	20	1438	63	168	1468	52	72	1	193	24	2	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	14	12	12	12	12	14	12	12	12	12
Grade (%)		1%			1%			0%			0%	
Total Lost time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95		0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	0.99		1.00	0.85		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	5110	1680	1796	3539		3502	1724		1736	1646	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.83	1.00	
Satd. Flow (perm)	1796	5110	1680	1796	3539		3502	1724		1522	1646	
Peak-hour factor, PHF	0.91	0.91	0.91	0.96	0.96	0.96	0.84	0.84	0.84	0.75	0.75	0.75
Adj. Flow (vph)	22	1580	69	175	1529	54	86	1	230	32	3	25
RTOR Reduction (vph)	0	0	29	0	1	0	0	215	0	0	24	0
Lane Group Flow (vph)	22	1580	40	175	1582	0	86	16	0	32	4	0
Heavy Vehicles (%)	0%	1%	2%	0%	1%	0%	0%	0%	0%	4%	0%	0%
Turn Type	Prot		Perm	Prot			Prot			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2							4		
Actuated Green, G (s)	5.0	80.8	80.8	19.0	94.8		9.0	9.3		9.3	4.8	
Effective Green, g (s)	5.0	80.8	80.8	19.0	94.8		9.0	9.3		9.3	4.8	
Actuated g/C Ratio	0.04	0.58	0.58	0.14	0.68		0.06	0.07		0.07	0.03	
Clearance Time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	64	2949	970	244	2396		225	115		108	56	
v/s Ratio Prot	0.01	0.31		c0.10	c0.45		c0.02	c0.01		0.01	0.00	
v/s Ratio Perm			0.02							c0.01		
v/c Ratio	0.34	0.54	0.04	0.72	0.66		0.38	0.14		0.30	0.07	
Uniform Delay, d1	65.9	18.1	12.8	57.9	13.2		62.8	61.6		62.2	65.4	
Progression Factor	1.04	0.55	0.42	0.93	1.04		1.00	1.00		1.00	1.00	
Incremental Delay, d2	2.7	0.6	0.1	8.4	1.2		1.1	0.6		1.5	0.5	
Delay (s)	71.3	10.5	5.4	62.1	15.0		63.9	62.2		63.7	66.0	
Level of Service	E	B	A	E	B		E	E		E	E	
Approach Delay (s)		11.1			19.7			62.6			64.8	
Approach LOS		B			B			E			E	

Intersection Summary		
HCM Average Control Delay	20.2	HCM Level of Service C
HCM Volume to Capacity ratio	0.69	
Actuated Cycle Length (s)	140.0	Sum of lost time (s) 32.9
Intersection Capacity Utilization	82.1%	ICU Level of Service E
Analysis Period (min)	15	

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 9: Carlisle Pike & SR 581 Ramp

Existing SAT  
 7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↙	↑↑↑	↘	↙	↑↑	↘	↙	↑↓	↘	↙	↑↑	↘
Volume (vph)	168	1372	115	141	869	164	97	54	140	153	88	722
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		2%			2%			-4%			1%	
Total Lost time (s)	4.0	7.0	4.0	4.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	1.00	0.91	0.86	0.91	0.91	0.91	1.00
Flt Protected	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	0.85	1.00	1.00	0.85
Satd. Flow (prot)	1718	5034	1599	1769	3574	1567	1675	3040	1568	1571	3218	1545
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99	1.00	0.95	0.98	1.00
Satd. Flow (perm)	1718	5034	1599	1769	3574	1567	1675	3040	1568	1571	3218	1545
Peak-hour factor, PHF	0.96	0.96	0.96	0.92	0.92	0.92	0.68	0.68	0.68	0.87	0.87	0.87
Adj. Flow (vph)	175	1429	120	153	945	178	143	79	206	176	101	830
RTOR Reduction (vph)	0	0	0	0	0	0	0	92	92	0	0	0
Lane Group Flow (vph)	175	1429	120	153	945	178	112	121	11	92	185	830
Heavy Vehicles (%)	4%	2%	0%	1%	0%	2%	0%	0%	2%	4%	5%	4%
Turn Type	Prot		Free	Prot		Free	Split		Perm	Split		Free
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			Free			Free			8			Free
Actuated Green, G (s)	19.1	70.2	140.0	15.6	66.7	140.0	15.1	15.1	15.1	14.1	14.1	140.0
Effective Green, g (s)	19.1	70.2	140.0	15.6	66.7	140.0	15.1	15.1	15.1	14.1	14.1	140.0
Actuated g/C Ratio	0.14	0.50	1.00	0.11	0.48	1.00	0.11	0.11	0.11	0.10	0.10	1.00
Clearance Time (s)	4.0	7.0		4.0	7.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	6.0		3.0	6.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	234	2524	1599	197	1703	1567	181	328	169	158	324	1545
v/s Ratio Prot	c0.10	0.28		0.09	0.26		0.07	0.04		0.06	0.06	
v/s Ratio Perm			0.08			0.11			0.01			c0.54
v/c Ratio	0.75	0.57	0.08	0.78	0.55	0.11	0.62	0.37	0.07	0.58	0.57	0.54
Uniform Delay, d1	58.1	24.3	0.0	60.5	26.1	0.0	59.7	58.0	56.1	60.1	60.1	0.0
Progression Factor	0.74	1.81	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.9	0.8	0.1	17.3	1.3	0.1	6.2	0.7	0.2	5.4	2.4	1.3
Delay (s)	53.8	44.8	0.1	77.8	27.4	0.1	65.9	58.7	56.3	65.5	62.5	1.3
Level of Service	D	D	A	E	C	A	E	E	E	E	E	A
Approach Delay (s)		42.6			29.6			60.0			16.9	
Approach LOS		D			C			E			B	

Intersection Summary			
HCM Average Control Delay	34.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	60.2%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
3: Carlisle Pike & Jeffrey Road

2013 PM No Build  
7/29/2010



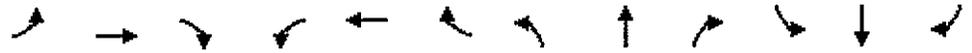
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Volume (vph)	12	1378	30	148	1691	15	109	9	136	39	6	8
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	15	12	12	12	11	12	12	13	12
Grade (%)		1%			2%			1%			1%	
Total Lost time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.96	
Satd. Flow (prot)	1796	3569	1560	1966	3466		1796	1827	1575		1845	
Flt Permitted	0.08	1.00	1.00	0.13	1.00		0.73	1.00	1.00		0.78	
Satd. Flow (perm)	154	3569	1560	260	3466		1372	1827	1575		1485	
Peak-hour factor, PHF	0.95	0.95	0.95	0.92	0.92	0.92	0.81	0.81	0.81	0.74	0.74	0.74
Adj. Flow (vph)	13	1451	32	161	1838	16	135	11	168	53	8	11
RTOR Reduction (vph)	0	0	10	0	0	0	0	0	120	0	4	0
Lane Group Flow (vph)	13	1451	22	161	1854	0	135	11	48	0	68	0
Heavy Vehicles (%)	0%	4%	3%	0%	3%	0%	0%	0%	2%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8				4
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	112.9	110.6	110.6	126.6	118.1		20.8	20.8	20.8		20.8	
Effective Green, g (s)	112.9	110.6	110.6	126.6	118.1		20.8	20.8	20.8		20.8	
Actuated g/C Ratio	0.71	0.69	0.69	0.79	0.74		0.13	0.13	0.13		0.13	
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	132	2467	1078	310	2558		178	238	205		193	
v/s Ratio Prot	0.00	0.41		c0.03	c0.53							
v/s Ratio Perm	0.07		0.01	0.38			c0.10		0.03		0.05	
v/c Ratio	0.10	0.59	0.02	0.52	0.72		0.76	0.05	0.23		0.35	
Uniform Delay, d1	11.3	12.9	7.7	11.0	11.8		67.2	60.9	62.5		63.4	
Progression Factor	1.00	1.00	1.00	2.51	0.38		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.3	1.0	0.0	1.0	1.3		16.8	0.1	0.6		1.1	
Delay (s)	11.6	13.9	7.8	28.7	5.8		84.0	61.0	63.0		64.5	
Level of Service	B	B	A	C	A		F	E	E		E	
Approach Delay (s)		13.7			7.6			72.0			64.5	
Approach LOS		B			A			E			E	

Intersection Summary			
HCM Average Control Delay	16.2	HCM Level of Service	B
HCM Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	75.9%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: Carlisle Pike & Holiday Inn Drive

2013 PM No Build  
7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑		↖↗	↗		↖	↗	
Volume (vph)	38	1489	26	68	1772	52	63	2	103	27	2	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	14	12	12	12	12	14	12	12	12	12
Grade (%)		1%			1%			0%			0%	
Total Lost time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95		0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.86	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	5011	1714	1761	3403		3502	1728		1805	1644	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.75	1.00	
Satd. Flow (perm)	1796	5011	1714	1761	3403		3502	1728		1434	1644	
Peak-hour factor, PHF	0.91	0.91	0.91	0.97	0.97	0.97	0.84	0.84	0.84	0.71	0.71	0.71
Adj. Flow (vph)	42	1636	29	70	1827	54	75	2	123	38	3	27
RTOR Reduction (vph)	0	0	9	0	1	0	0	116	0	0	26	0
Lane Group Flow (vph)	42	1636	20	70	1880	0	75	9	0	38	4	0
Heavy Vehicles (%)	0%	3%	0%	2%	5%	8%	0%	0%	0%	0%	0%	0%
Turn Type	Prot		Perm	Prot			Prot			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2							4		
Actuated Green, G (s)	6.5	108.3	108.3	11.1	112.9		8.9	9.0		10.5	5.3	
Effective Green, g (s)	6.5	108.3	108.3	11.1	112.9		8.9	9.0		10.5	5.3	
Actuated g/C Ratio	0.04	0.68	0.68	0.07	0.71		0.06	0.06		0.07	0.03	
Clearance Time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	73	3392	1160	122	2401		195	97		106	54	
v/s Ratio Prot	0.02	0.33		c0.04	c0.55		c0.02	c0.01				
v/s Ratio Perm			0.01							c0.01		
w/c Ratio	0.58	0.48	0.02	0.57	0.78		0.38	0.09		0.36	0.07	
Uniform Delay, d1	75.4	12.4	8.4	72.2	15.5		72.9	71.6		71.4	75.0	
Progression Factor	0.92	0.74	0.68	1.05	0.78		1.00	1.00		1.00	1.00	
Incremental Delay, d2	8.9	0.4	0.0	4.2	1.7		1.3	0.4		2.1	0.6	
Delay (s)	78.2	9.6	5.8	80.1	13.8		74.2	72.0		73.4	75.5	
Level of Service	E	A	A	F	B		E	E		E	E	
Approach Delay (s)		11.2			16.2			72.8			74.4	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM Average Control Delay	17.9	HCM Level of Service	B
HCM Volume to Capacity ratio	0.79		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	32.9
Intersection Capacity Utilization	76.0%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 9: Carlisle Pike & SR 581 Ramp

2013 PM No Build  
 7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↖↖	↖	↖	↖↖	↖	↖	↖↖	↖	↖	↖↖	↖
Volume (vph)	255	1269	95	143	809	480	164	411	262	366	178	919
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		2%			2%			-4%			1%	
Total Lost time (s)	4.0	7.0	4.0	4.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	1.00	0.91	0.86	0.91	0.91	0.91	1.00
Flt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.98	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.98	1.00
Satd. Flow (prot)	1670	4891	1583	1787	3504	1537	1675	3266	1568	1557	3226	1502
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.98	1.00
Satd. Flow (perm)	1670	4891	1583	1787	3504	1537	1675	3266	1568	1557	3226	1502
Peak-hour factor, PHF	0.83	0.83	0.83	0.94	0.94	0.94	0.66	0.66	0.66	0.94	0.94	0.94
Adj. Flow (vph)	307	1529	114	152	861	511	248	623	397	389	189	978
RTOR Reduction (vph)	0	0	0	0	0	0	0	5	158	0	0	0
Lane Group Flow (vph)	307	1529	114	152	861	511	223	722	160	194	384	978
Heavy Vehicles (%)	7%	5%	1%	0%	2%	4%	0%	0%	2%	5%	3%	7%
Turn Type	Prot		Free	Prot		Free	Split		Perm	Split		Free
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			Free			Free			8			Free
Actuated Green, G (s)	31.2	59.5	160.0	16.3	44.6	160.0	37.0	37.0	37.0	22.2	22.2	160.0
Effective Green, g (s)	31.2	59.5	160.0	16.3	44.6	160.0	37.0	37.0	37.0	22.2	22.2	160.0
Actuated g/C Ratio	0.20	0.37	1.00	0.10	0.28	1.00	0.23	0.23	0.23	0.14	0.14	1.00
Clearance Time (s)	4.0	7.0		4.0	7.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	6.0		3.0	6.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	326	1819	1583	182	977	1537	387	755	363	216	448	1502
v/s Ratio Prot	c0.18	c0.31		0.09	0.25		0.13	c0.22		c0.12	0.12	
v/s Ratio Perm			0.07			0.33			0.10			0.65
v/c Ratio	0.94	0.84	0.07	0.84	0.88	0.33	0.58	0.96	0.44	0.90	0.86	0.65
Uniform Delay, d1	63.5	45.9	0.0	70.5	55.2	0.0	54.5	60.7	52.6	67.8	67.3	0.0
Progression Factor	1.16	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	32.9	4.5	0.1	26.8	11.3	0.6	2.1	22.3	0.9	34.5	14.9	2.2
Delay (s)	106.4	48.6	0.1	97.3	66.5	0.6	56.6	83.0	53.5	102.3	82.2	2.2
Level of Service	F	D	A	F	E	A	E	F	D	F	F	A
Approach Delay (s)		54.8			47.4			71.0			34.4	
Approach LOS		D			D			E			C	

Intersection Summary			
HCM Average Control Delay	51.3	HCM Level of Service	D
HCM Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	160.0	Sum of lost time (s)	18.0
Intersection Capacity Utilization	80.3%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
3: Carlisle Pike & Jeffrey Road

2013 SAT No Build  
7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↑↑	↗	↘	↑↗		↘	↑	↗		↔	
Volume (vph)	19	1368	74	204	1503	10	181	13	273	33	12	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	13	12	15	12	12	12	11	12	12	13	12
Grade (%)		1%			2%			1%			1%	
Total Lost time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95		1.00	1.00	1.00		1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	1.00	0.85		0.98	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00		0.97	
Satd. Flow (prot)	1796	3675	1591	1966	3535		1796	1827	1591		1862	
Flt Permitted	0.10	1.00	1.00	0.10	1.00		0.74	1.00	1.00		0.81	
Satd. Flow (perm)	180	3675	1591	213	3535		1390	1827	1591		1552	
Peak-hour factor, PHF	0.97	0.97	0.97	0.92	0.92	0.92	0.84	0.84	0.84	0.75	0.75	0.75
Adj. Flow (vph)	20	1410	76	222	1634	11	215	15	325	44	16	8
RTOR Reduction (vph)	0	0	31	0	0	0	0	0	95	0	4	0
Lane Group Flow (vph)	20	1410	45	222	1645	0	215	15	230	0	64	0
Heavy Vehicles (%)	0%	1%	1%	0%	1%	0%	0%	0%	1%	0%	0%	0%
Turn Type	pm+pt		Perm	pm+pt			Perm		Perm	Perm		
Protected Phases	5	2		1	6			8			4	
Permitted Phases	2		2	6			8		8	4		
Actuated Green, G (s)	85.7	82.2	82.2	101.0	91.3		26.4	26.4	26.4		26.4	
Effective Green, g (s)	85.7	82.2	82.2	101.0	91.3		26.4	26.4	26.4		26.4	
Actuated g/C Ratio	0.61	0.59	0.59	0.72	0.65		0.19	0.19	0.19		0.19	
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2		6.4	6.4	6.4		6.4	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0	3.0		3.0	
Lane Grp Cap (vph)	151	2158	934	311	2305		262	345	300		293	
v/s Ratio Prot	0.00	0.38		c0.06	c0.47							
v/s Ratio Perm	0.08		0.03	0.45			c0.15		0.14		0.04	
v/c Ratio	0.13	0.65	0.05	0.71	0.71		0.82	0.04	0.77		0.22	
Uniform Delay, d1	14.1	19.4	12.3	20.7	15.8		54.5	46.5	53.9		48.1	
Progression Factor	1.00	1.00	1.00	1.97	0.58		1.00	1.00	1.00		1.00	
Incremental Delay, d2	0.4	1.6	0.1	5.9	1.5		18.3	0.1	11.1		0.4	
Delay (s)	14.5	20.9	12.4	46.7	10.7		72.8	46.5	65.0		48.4	
Level of Service	B	C	B	D	B		E	D	E		D	
Approach Delay (s)		20.4			15.0			67.5			48.4	
Approach LOS		C			B			E			D	

Intersection Summary			
HCM Average Control Delay	24.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	18.8
Intersection Capacity Utilization	78.8%	ICU Level of Service	D
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
6: Carlisle Pike & Holiday Inn Drive

2013 SAT No Build  
7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	20	1591	63	168	1626	52	72	1	193	24	2	19
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	14	12	12	12	12	14	12	12	12	12
Grade (%)		1%			1%			0%				0%
Total Lost time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95		0.97	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00		1.00	0.85		1.00	0.87	
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1796	5110	1680	1796	3541		3502	1724		1736	1646	
Flt Permitted	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.67	1.00	
Satd. Flow (perm)	1796	5110	1680	1796	3541		3502	1724		1218	1646	
Peak-hour factor, PHF	0.91	0.91	0.91	0.96	0.96	0.96	0.84	0.84	0.84	0.75	0.75	0.75
Adj. Flow (vph)	22	1748	69	175	1694	54	86	1	230	32	3	25
RTOR Reduction (vph)	0	0	29	0	1	0	0	216	0	0	24	0
Lane Group Flow (vph)	22	1748	40	175	1747	0	86	15	0	32	4	0
Heavy Vehicles (%)	0%	1%	2%	0%	1%	0%	0%	0%	0%	4%	0%	0%
Turn Type	Prot		Perm	Prot			Prot			pm+pt		
Protected Phases	5	2		1	6		3	8		7	4	
Permitted Phases			2							4		
Actuated Green, G (s)	3.5	81.8	81.8	18.5	96.8		7.3	8.8		10.5	6.0	
Effective Green, g (s)	3.5	81.8	81.8	18.5	96.8		7.3	8.8		10.5	6.0	
Actuated g/C Ratio	0.02	0.58	0.58	0.13	0.69		0.05	0.06		0.08	0.04	
Clearance Time (s)	6.7	6.7	6.7	6.7	6.7		6.5	6.5		6.5	6.5	
Vehicle Extension (s)	3.0	6.0	6.0	3.0	6.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	45	2986	982	237	2448		183	108		108	71	
v/s Ratio Prot	0.01	0.34		c0.10	c0.49		c0.02	c0.01		0.01	0.00	
v/s Ratio Perm			0.02							c0.01		
v/c Ratio	0.49	0.59	0.04	0.74	0.71		0.47	0.14		0.30	0.06	
Uniform Delay, d1	67.4	18.4	12.4	58.4	13.2		64.5	62.0		61.0	64.3	
Progression Factor	0.90	0.72	0.67	1.01	0.86		1.00	1.00		1.00	1.00	
Incremental Delay, d2	6.2	0.6	0.1	9.3	1.5		1.9	0.6		1.5	0.3	
Delay (s)	66.6	13.9	8.4	68.3	12.8		66.4	62.6		62.6	64.6	
Level of Service	E	B	A	E	B		E	E		E	E	
Approach Delay (s)		14.3			17.9			63.7			63.5	
Approach LOS		B			B			E			E	

Intersection Summary			
HCM Average Control Delay	20.5	HCM Level of Service	C
HCM Volume to Capacity ratio	0.75		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	32.9
Intersection Capacity Utilization	86.5%	ICU Level of Service	E
Analysis Period (min)	15		

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis  
 9: Carlisle Pike & SR 581 Ramp

2013 SAT No Build  
 7/29/2010



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↑↑↑	↗	↖	↑↑	↗	↖	↑↑	↗	↖	↑↑	↗
Volume (vph)	185	1508	115	141	955	180	97	54	140	168	88	794
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	14	12	12	12
Grade (%)		2%			2%			-4%			1%	
Total Lost time (s)	4.0	7.0	4.0	4.0	7.0	4.0	7.0	7.0	7.0	7.0	7.0	4.0
Lane Util. Factor	1.00	0.91	1.00	1.00	0.95	1.00	0.91	0.86	0.91	0.91	0.91	1.00
Flt Protected	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.93	0.85	1.00	1.00	0.85
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	0.99	1.00	0.95	0.98	1.00
Satd. Flow (prot)	1718	5034	1599	1769	3574	1567	1675	3040	1569	1571	3214	1545
Satd. Flow (perm)	1718	5034	1599	1769	3574	1567	1675	3040	1568	1571	3214	1545
Peak-hour factor, PHF	0.96	0.96	0.96	0.92	0.92	0.92	0.68	0.68	0.68	0.87	0.87	0.87
Adj. Flow (vph)	193	1571	120	153	1038	196	143	79	206	193	101	913
RTOR Reduction (vph)	0	0	0	0	0	0	0	93	93	0	0	0
Lane Group Flow (vph)	193	1571	120	153	1038	196	112	120	10	96	198	913
Heavy Vehicles (%)	4%	2%	0%	1%	0%	2%	0%	0%	2%	4%	5%	4%
Turn Type	Prot		Free	Prot		Free	Split		Perm	Split		Free
Protected Phases	5	2		1	6		8	8		4	4	
Permitted Phases			Free			Free			8			Free
Actuated Green, G (s)	20.6	70.3	140.0	16.8	66.5	140.0	14.1	14.1	14.1	13.8	13.8	140.0
Effective Green, g (s)	20.6	70.3	140.0	16.8	66.5	140.0	14.1	14.1	14.1	13.8	13.8	140.0
Actuated g/C Ratio	0.15	0.50	1.00	0.12	0.48	1.00	0.10	0.10	0.10	0.10	0.10	1.00
Clearance Time (s)	4.0	7.0		4.0	7.0		7.0	7.0	7.0	7.0	7.0	
Vehicle Extension (s)	3.0	6.0		3.0	6.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	253	2528	1599	212	1698	1567	169	306	158	155	317	1545
v/s Ratio Prot	c0.11	0.31		0.09	0.29		0.07	0.04		0.06	0.06	
v/s Ratio Perm			0.08			0.13			0.01			c0.59
v/c Ratio	0.76	0.62	0.08	0.72	0.61	0.13	0.66	0.39	0.07	0.62	0.62	0.59
Uniform Delay, d1	57.4	25.2	0.0	59.3	27.2	0.0	60.7	58.9	57.0	60.6	60.6	0.0
Progression Factor	1.33	0.46	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	10.8	1.0	0.1	11.5	1.7	0.2	9.4	0.8	0.2	7.2	3.8	1.7
Delay (s)	87.0	12.5	0.1	70.8	28.8	0.2	70.0	59.8	57.2	67.8	64.4	1.7
Level of Service	F	B	A	E	C	A	E	E	E	E	E	A
Approach Delay (s)		19.3			29.4			61.8				17.2
Approach LOS		B			C			E				B

Intersection Summary			
HCM Average Control Delay	25.4	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	4.0
Intersection Capacity Utilization	63.3%	ICU Level of Service	B
Analysis Period (min)	15		

c Critical Lane Group