New Gaming Facility Location Board
Response to Request for Applications to Develop and Operate a
Gaming Facility in New York State

TIOGA DOWNS RACETRACK, LLC

Exhibit VIII.C.17.d.

Traffic Impact Study

Please also see Exhibit IX.A.3.

TIOGA DOWNS RACINO EXPANSION
TRAFFIC IMPACT STUDY

LARSON DESIGN GROUP / TOWN OF NICHOLS
2384 West River Road Nichols, NY / April 2012

28 East Main Street // 200 First Federal Plaza // Rochester, NY 14614-1909

www.bergmannpc.com

Table of Contents

I. Purpose and Scope 2

II. Existing Roadway System 5

III. Existing Traffic Conditions 6

A. Existing Traffic Volumes 6
B. Existing Levels of Service 7
C. Traffic Accident History 11

IV. Trip Generation 12

V. Trip Distribution 13

VI. Future Traffic Evaluation 16

A. 2014 No Build Conditions 16
B. 2014 Build Traffic 16
C. Signal Warrant Analysis 18
D. 2014 Build Levels of Service 19
E. Sight Distance 22

VII. Summary and Conclusions 23

A. Existing Conditions 23
B. 2014 No Build Conditions 24
C. 2014 Build Conditions 24

VIII. Recommendations 24

List of Tables

Table 1 ……..Level of Service Ranges for Signalized Intersections
Table 2 ……..Level of Service Ranges for Unsignalized Intersections
Table 3 ……..Existing Level of Service
Table 4 ……..Trip Generation
Table 5 ……..2014 Build Traffic Signal Warrant Results
Table 6 ……..2014 No Build and Build Level of Service
Table 7 …….. Build Peak Hour SimTraffic Level of Service
Table 8 …….. Stopping Sight Distances
Table 9 ……..Intersection Sight Distances

List of Figures

Figure 1 ……Regional Location Map
Figure 2 ……Site Location Map
Figure 3 ……Existing Peak Hour Turning Movements
Figure 4 ……Primary Trip Distribution (Percentages)
Figure 5 ……Primary Trip Assignment
Figure 6 ……2014 Build Peak Hour Turning Movements

List of Appendices

Appendix A ……Site Plan
Appendix B ……Turning Movement Count Data
Appendix C ……Detailed Level of Service Analysis Results – Existing Conditions
Appendix D ……Detailed Traffic Accident Study
Appendix E ……2014 Signal Warrant Analysis at Route 282 and Route 17 WB Ramp
Appendix F ……Detailed Level of Service Analysis Results – 2014 Build Conditions
Appendix G ……Detailed SimTraffic Analysis Results – 2014 Build Conditions

I. Purpose and Scope

The subject of this Traffic Impact Study (TIS) is the proposed expansion of the Tioga Downs Casino in Tioga County and the Town of Nichols. The expansion includes approximately 17,000 square feet (SF) of new casino gaming space and a 6 story hotel. A regional project location map is shown in Figure 1. See Figure 2 on the next page for the site location. The purpose of the TIS is to document the existing traffic conditions of the study area and to evaluate the estimated future traffic conditions and impacts as a result of the proposed development. Appendix A contains the site plan and the target year of project completion is 2014.

The proposed hotel is expected to offer a capacity of approximately 136 guest rooms with approximately 16 rooms on the lower level and 24 rooms per floor for the floors above. It is anticipated that the hotel will also include a 7,200 SF multi-purpose room/convention center expected to seat 400 persons, and a 2,266 SF restaurant/bistro. Therefore, additional non-hotel guest trips will be attracted to the site.

The remaining expansion of Tioga Downs Casino will include new casino gaming space (approximately 16,700 SF), related office space and a new waterslide. A proposed parking garage is expected to provide an additional 308 parking spaces that will not impact any of the existing parking lot areas.

The traffic study area includes West River Road and the intersections with Route 17 eastbound off-ramp, Route 282 and the Tioga Downs Entrance/Exit. The intersection with Route 282 and the Route 17 westbound off-ramp is also included in the study area.

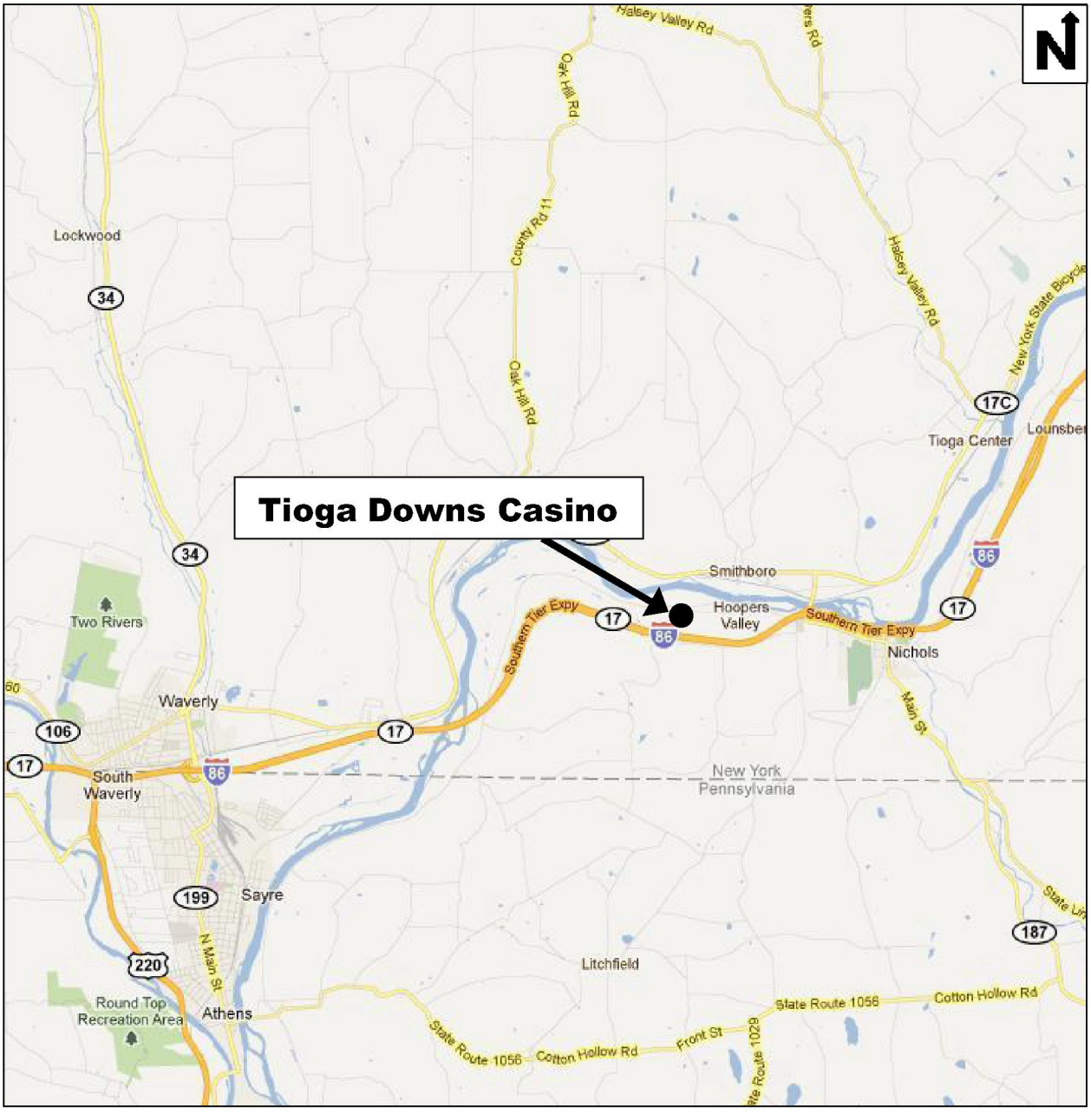


Figure 1 - Regional Location Map

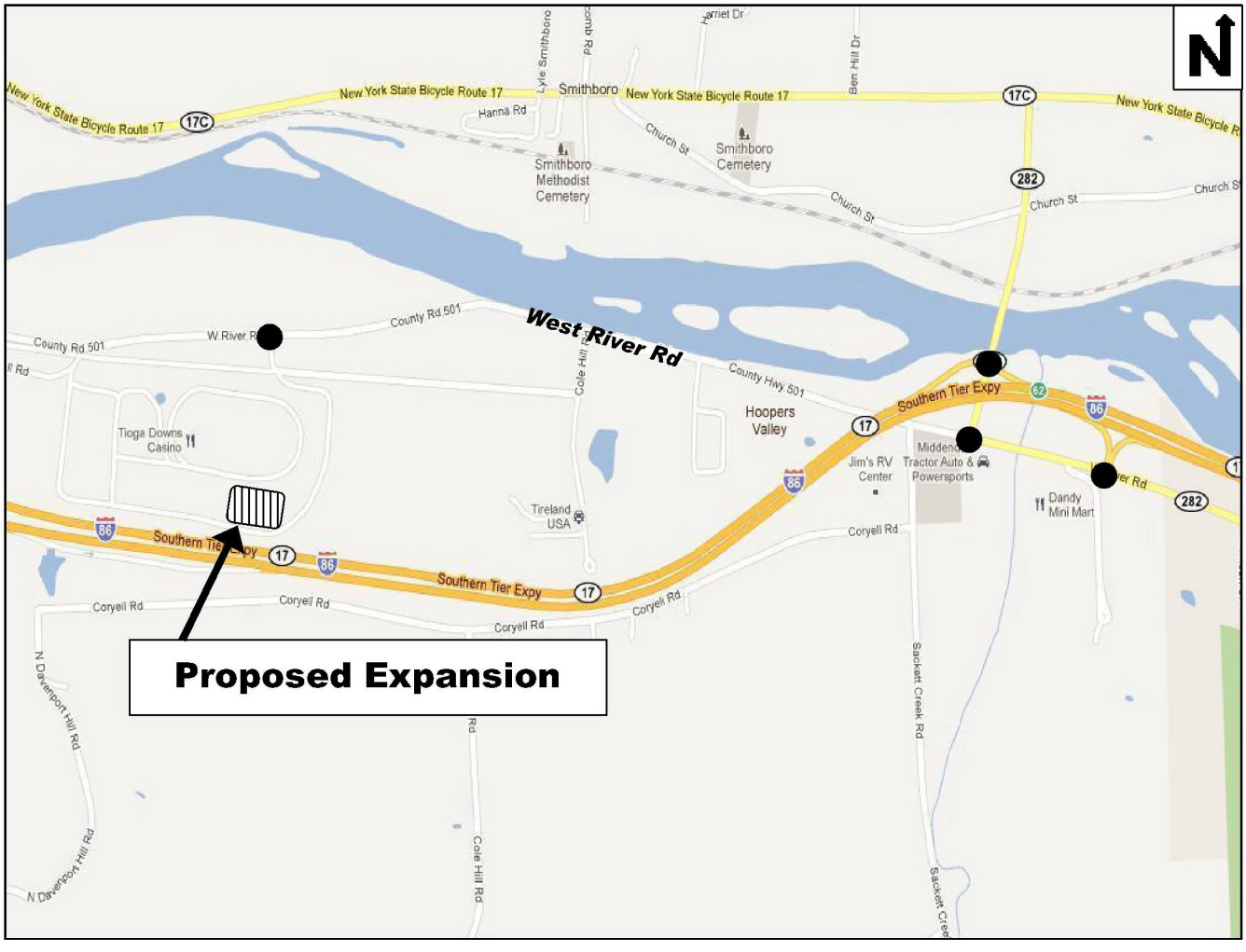


Figure 2 - Site Location Map

The following systematic procedure was used:

1. Conduct site visit to obtain roadway geometrics, speed limits, and observe traffic operations.

2. Perform manual turning movement counts at four intersections:
   - West River Road and Route 17 eastbound ramps
   - West River Road and State Route 282
   - West River Road and Route 17 westbound ramps
   - West River Road and the Tioga Downs Entrance

   The intersections are shown in Figure 2 signified with a black dot. The counts were conducted on Friday August 26, 2011 between 3:00 and 9:00 PM and on Saturday August 27, 2011 between 11:00 AM and 1:00 PM and 5:00 PM and 9:00 PM.

3. Determine the existing Friday PM peak hour and Saturday mid-day peak hour turning movements at the subject intersections.

4. Define trips generated and distributed by the new development for the 2014 Build scenario.

5. Estimate projected traffic at the subject intersections.

6. Evaluate traffic operations at the subject intersections under:
   - Existing conditions
   - Future (2014) No-Build conditions
   - Future (2014) Build conditions (with development traffic)

The analyses and evaluations in this report have been performed using standard traffic engineering methodologies in accordance with the ITE Trip Generation Handbook 2nd Edition. Data used in this impact assessment has been collected from field investigations, field visits (including vehicular traffic counts), developer plans, and the New York State Department of Transportation (NYSDOT), including the NYSDOT Traffic Data Report for New York State.

II. Existing Roadway System

West River Road (Co Road 501 & Route 282)

West River Road is an east-west rural major collector to the east of the Route 282 intersections and a rural minor collector to the west of the Route 282 intersection in the vicinity of the site. The Annual Average Daily Traffic (AADT) on West River Road in this area is approximately 5,800 vehicles per day (vpd).

West River Road is a two-lane rural road that provides two-way traffic flow with one lane in each direction with varying shoulder width. West River Road is level and the alignment of the road is generally straight near the development with a horizontal curve located approximately 2000 feet east of the Tioga Downs entrance. The posted speed limit is 45 mph.

The intersection of West River Road with the Route 17 eastbound ramps is controlled by stop sign at the off-ramp while eastbound and westbound West River Road is free flow. West River

Road provides two-way traffic flow with one through lane in each direction and one left turn storage lane in the eastbound direction and one right turn storage lane in the westbound direction. The left turn lane is approximately 300 feet long and the right turn lane is approximately 250 feet long.

The intersection of West River Road with Route 282 is controlled by a stop sign on the Route 282 approach while eastbound and westbound through traffic on West River Road is free flowing. Both West River Road and Route 282 are two lanes wide at the intersection.

Traffic on the Tioga Downs site driveway is controlled by a stop sign at the exit and traffic on West River Road is free flowing. West River Road provides two-way traffic flow with one through lane in each direction. The Tioga Downs approach provides one left turn and one right turn lane for egress. The storage length for the two egress lanes are approximately 290 feet in length until where the roadway reduces to one lane. The speed limit for the Tioga Downs entrance is posted at 10 mph.

Route 282

Route 282 is classified as a north-south rural major collector north of West River Road. The speed limit is 55 mph and the alignment is straight and the profile is on a slight grade.

The intersection of Route 282 with the Route 17 westbound ramps is controlled by stop sign at the off-ramp while northbound and southbound Route 282 is free flowing. Route 282 provides two-way traffic flow with one through lane in each direction.

III. Existing Traffic Conditions

A. Existing Traffic Volumes

Bergmann Associates conducted manual turning movement counts in August 2011 at the four intersections listed below. Figure 2 depicts the location of the intersections.

- West River Road and Route 17 eastbound ramps
- West River Road and State Route 282
- West River Road and Route 17 westbound ramps
- West River Road and the Tioga Downs Entrance

The traffic count time periods were chosen because the combined traffic of the nearby developments generally peak during these time periods. The traffic counts were recorded by 15-minute increments to enable identification of specific peak hours and traffic peaking characteristics within the peak hour. Detailed count data are contained in Appendix B.

The August 2011 traffic counts indicate the overall study area peak hours occurred between 4:45 and 5:45 p.m. on Friday and on Saturday between 11:30 a.m. and 12:30 p.m. and also between 5:45 p.m. and 6:45 p.m. Figure 3 contains the peak hour traffic volumes at the subject intersections.

The traffic volumes were not adjusted for season of the year because August is the peak month of the year for traffic in the area.

B. Existing Levels of Service

Level of Service (LOS) analysis is a means of determining the ability of an intersection to accommodate traffic volumes. The analysis is based on intersection street geometrics, traffic controls and traffic maneuvers. The analysis produces an indication of the Level of Service at which an intersection is functioning or is expected to function for future conditions.

The Level of Service procedures are provided in the Highway Capacity Manual (HCM) published by the Transportation Research Board, 2000. Version 7.0 of Synchro was utilized to determine the LOS for the subject intersections. Synchro implements the methods of the HCM for signalized and unsignalized intersection analyses.

Level of Service is defined by letter characters that range from A to F, with A representing the best traffic operating conditions that have little or no delay and F characterizing the worst conditions that have significant delay. LOS A through D are usually considered acceptable and LOS E is usually considered representative of conditions where improvements are needed. LOS F operating conditions are typically unacceptable, and improvements are needed in the form of traffic control, geometric changes or a combination of both.

Levels of service for signalized and unsignalized intersections are identified by the average control delay experienced by vehicles in seconds/vehicle. LOS for signalized intersections is determined for each traffic movement and the total intersection. The range of seconds of delay defining level of service is different for signalized and unsignalized intersections, so the LOS results should not be compared to one another. Full definitions of levels of service for signalized and unsignalized intersections are included in Appendix C. Table 1 shows the range of delay defining LOS for signalized intersections. Table 2 shows the range of delay defining LOS for unsignalized intersections.

TABLE 1. Level of Service Ranges for Signalized Intersections

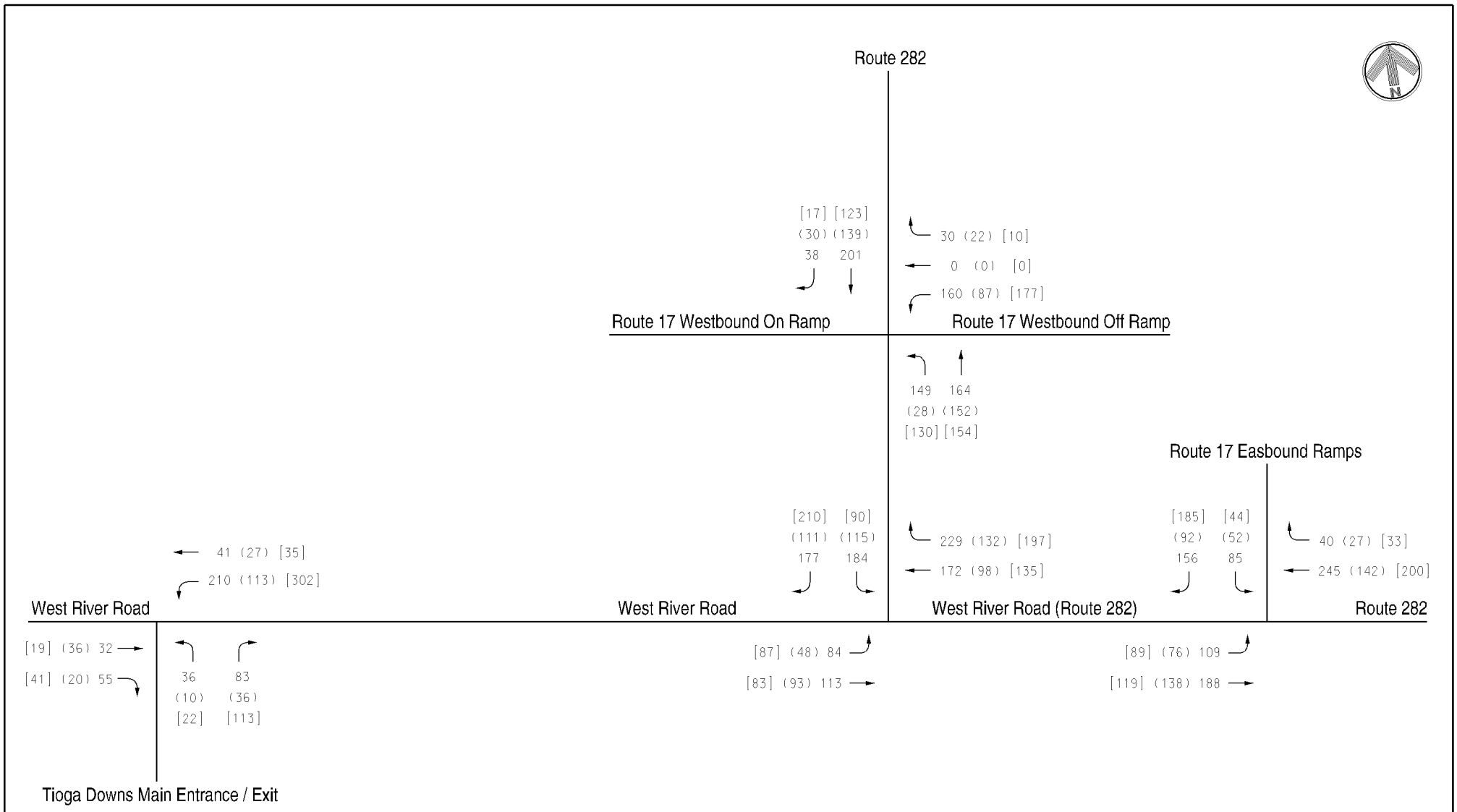
LOS	CONTROL DELAY PER VEHICLE (sec)
A	Less than or equal to 10.0
B	Greater than 10.0 to no more than 20.0
C	Greater than 20.0 to no more than 35.0
D	Greater than 35.0 to no more than 55.0
E	Greater than 55.0 to no more than 80.0
F	Greater than 80.0

TABLE 2. Level of Service for Ranges Unsignalized Intersections

LOS	CONTROL DELAY PER VEHICLE (sec)
A	Less than or equal to 10.0
B	Greater than 10.0 to no more than 15.0
C	Greater than 15.0 to no more than 25.0
D	Greater than 25.0 to no more than 35.0
E	Greater than 35.0 to no more than 50.0
F	Greater than 50.0

Existing Traffic Operations

The existing traffic operations during the peak hours at the subject intersections range from LOS A to C for all traffic movements according to Synchro except at the intersection of Route 282 at Route 17 westbound ramps. The LOS ranges from D to E for movements at this intersection. Level of service analysis results for the intersections are provided in Table 3 and described below. Detailed Synchro level of service analysis results are contained in Appendix C.



LEGEND:

XXX - Friday PM Peak Hour Traffic 4:45pm - 5:45pm
(XXX) - Saturday Mid-Day Peak Hour Traffic 11:30am - 12:30pm
[XXX] - Saturday PM Peak Hour Traffic 5:45pm - 6:45pm

Tioga Downs Expansion
Traffic Impact Study
West River Road, Nichols, NY

2011 Existing
Peak Hour Turning Movements

FIGURE NO.	SCALE	DATE	
3	No Scale	11/11	Bergmann associates

TABLE 3. EXISTING SYNCHRO LEVEL OF SERVICE RESULTS

Intersection	Approach			2011 Existing					
				Friday 4:45 PM - 5:45 PM		Saturday 11:30 AM - 12:30 PM		Saturday 5:45 PM - 6:45 PM	
				LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)
West River Road at	W. River Rd	Eastbound	TR	A	0.0	A	0.0	A	0.0
Tioga Downs Main	W. River Rd	Westbound	LT	A	6.9	A	6.3	A	7.4
Entrance/Exit	Downs Exit	Northbound	L	C	16.3	B	11.6	C	19.8
	Downs Exit	Northbound	R	A	9.0	A	8.8	A	9.2
stop sign on main exit	Downs Exit	Northbound	App	B	11.2	A	9.4	B	11.0
Route 282 at **Route 17**	WB exit ramp	Westbound	LTR	E	37.6	B	13.8	D	30.4
Westbound Ramps	Route 282	Northbound	LT	A	4.6	A	1.4	A	4.1
stop sign on exit ramp	Route 282	Southbound	TR	A	0.0	A	0.0	A	0.0
West River Road at	W. River Rd	Eastbound	LT	A	4.2	A	3.0	A	4.7
Route 282	W. River Rd	Westbound	T	A	0.0	A	0.0	A	0.0
(stop sign control on	W. River Rd	Westbound	R	A	0.0	A	0.0	A	0.0
southbound approach)	Route 282	Southbound	LR	C	21.0	B	13.4	C	15.0
West River Road at	W. River Rd	Eastbound	L	A	8.3	A	7.8	A	8.1
Route 17	W. River Rd	Eastbound	T	A	0.0	A	0.0	A	0.0
Eastbound Ramps	W. River Rd	Eastbound	App	A	3.1	A	2.8	A	3.4
	W. River Rd	Westbound	T	A	0.0	A	0.0	A	0.0
	W. River Rd	Westbound	R	A	0.0	A	0.0	A	0.0
	W. River Rd	Westbound	App	A	0.0	A	0.0	A	0.0
stop sign on exit ramp	EB exit ramp	Southbound	LR	C	18.3	B	11.8	B	13.9

LR: Shared Left and Right TR: Shared Through and Right
LT: Shared Left and Through LTR: Shared Left, Through, and Right

The intersection of West River Road with Tioga Downs Main Entrance/Exit free flow eastbound and westbound approaches operate at LOS A during the Friday and Saturday peak hours according to Synchro. The stop sign controlled Downs Exit northbound approach overall operates at LOS B or better during the Friday and Saturday peak hours. The left turn exit operates acceptably at LOS C or better during the peak hours.

The intersection of Route 282 with Route 17 westbound ramps stop sign westbound approach operates at LOS E and LOS D during the Friday PM and Saturday PM peak hour, respectively. This approach operates at LOS B during the Saturday Mid-day peak hour. The Route 282 free flow northbound and southbound approaches operate at LOS A during the peak hours.

The intersection of West River Road at Route 282 eastbound and westbound approaches operate at LOS A during the peak hours. The southbound approach operates at LOS C during the Friday PM and Saturday PM peak hours and LOS B during the Saturday Mid-day peak hour.

The West River Road eastbound and westbound approaches to the intersection with the Route 17 eastbound ramps operate at LOS A during the Friday and Saturday peak hours. The Route 17 eastbound exit ramp approach to West River Road operates at LOS C during the Friday peak hour and LOS B during the Saturday peak hours.

C. Traffic Accident History

The New York State Department of Transportation and the Tioga County Sheriff's Department provided a three year accident history for the study area. The accident information includes location, date, day of the week, time, severity of accident, road condition, manner of collision and causal factors. A summary of the traffic accident history is provided below and the detailed accident history is contained in Appendix D. Appendix D summarizes the accident data at subject intersections from January 1, 2008 through February 28, 2011.

Intersection of West River Road with Tioga Downs Main Entrance/Exit

According to the accident history, no accidents were reported at the intersection of West River Road with Tioga Downs Main Entrance/Exit.

Intersection of Route 282 with Route 17 Westbound Ramps

According to the accident history, one (1) accident was reported at the intersection of West River Road with the Route 17 westbound ramps. This was a 2010 rear end type accident resulting in property damage only. No accidents were reported in 2008 or 2009.

Intersection of West River Road with Route 282

According to the accident history, there were four (4) accidents at the intersection of West River Road and Route 282 - two property damage only and two non-reportable type accidents. Three (3) of the accidents were rear end and one (1) was unknown. One (1) of the accidents occurred in 2008, two (2) in 2009 and one (1) in 2010. No cluster or grouping of accidents occurred during the recent three year history.

Intersection of West River Road with Route 17 Eastbound Ramps

According to the accident history, One (1) accident was reported at the intersection of West River Road with the Route 17 eastbound ramps. The accident was property damage only and involved a rear end type accident.

West River Road between Tioga Downs Entrance/Exit and Route 17 Eastbound Ramps

Seventeen (17) accidents were reported to occur on West River Road between the Tioga Downs Main Entrance and Route 17 eastbound ramps. Seven (7) of the accidents were fixed object type, 2 rear end type, 2 overtaking, 2 sideswipes, 1 overturn, 1 right angle type, 1 unknown and 1 pedestrian type accident. All except four (4) of the accidents involved property damage only or personal injury. The type of accidents on West River Road varied and the locations of accidents varied. Of the seven (7) fixed object type accidents, three (3) of the

accidents were tree collisions, two (2) utility pole collisions, one (1) building collision, and one (1) sign post collision. The fixed object type accident locations varied with exception of two accidents that happened in the same relative location 200 m West of N Cole Hill Road. No cluster of accidents occurred that would point to a specific correctable pattern of accidents.

West River Road between Route 282 and Route 17C

According to the accident history, One (1) accident was reported to occur on Route 282 between West River Road and Route 17C. The accident was property damage only and involved a fixed object type accident.

Overall Accident History

The accidents were generally spread out across the study area at different locations and the type of accidents varied although fixed object type occurred most frequently. No significant, clearly defined, cluster of accidents occurred during the three year history that would point to a specific correctable pattern of accidents.

IV. Trip Generation

The latest edition (8th) of ITE Trip Generation was used to determine the trip estimate for the proposed 136 room hotel and 2,266 square foot restaurant. The ITE trip data for land use 310 Hotel includes lodging "and supporting facilities such as restaurants; and meeting and banquet rooms or convention facilities". As such, land use 310 Hotel trip rates were used to estimate the combined generation of 136 rooms for lodging and the restaurant. Although the ITE land use Hotel includes meeting/banquet/convention center uses, a more conservative approach was used to represent the worst case scenario.

A separate and additional trip estimate was performed for the 16,700 SF casino gaming expansion, related office space, new waterslide and 7,200 SF multi-purpose room / convention center. The casino gaming area trip estimate was based on the trip rates provided in the December 2006 Revised April 2007 Traffic Impact Study – Supplemental Report for the Cowlitz Indian Tribe Casino Project. The trip rates utilized in the Cowlitz Tribe study were based on similar small to medium sized casinos that are not part of a cluster of casinos. The gross floor area expansion used for estimating new casino gaming trips for Tioga Downs was 19,000 SF. The extra 2,300 SF was used to account for additional trips from related new office space and the new waterslide, as the office space is related to casino operations and the waterslide would mainly be used by hotel guests, so the additional trip generation would be minor. The trip estimate for the multi-purpose room/convention center was based on an 85% utilization rate, a seating capacity of 400 persons and a vehicle occupancy rate of 2.5 persons/vehicle to account for a banquet or reception event in this room. A summary of trip generation is shown in Table 4.

Trips generated by the new development will consist of shared trips, primary trips and pass-by trips. Shared trips will patronize two or more land uses on-site (Racing, Casino, Restaurants, Hotel, Multi-Purpose Room / Convention Center, Waterslide) and do not represent an increase to traffic on the surrounding street system. Tioga Downs is a destination that draws significant out-of-town vehicle trips, where the long distance trips inherently provide demand for lodging. Due to the nature of the trips expected for the new hotel, gaming center and multi-purpose

room/convention center and Tioga Downs as a whole, a shared trip percentage of 40% was applied to the new site trips. There are already a substantial number of trips generated by the Tioga Downs site, providing a significant potential for trip sharing, and add to this sharing between the hotel, gaming center and multi-purpose room/convention center as evidenced in the ITE Hotel trip rate definition that includes "meeting and banquet rooms or convention facilities".

Primary trips are a direct result of the development and represent new traffic to the surrounding traffic system. Pass-by trips do not represent new traffic to the surrounding street system. The source of pass-by trips is traffic that is projected to exist on West River Road without regard to the development. Pass-by trips represent an increment to traffic entering and exiting the new development and not an increase to traffic on the surrounding street system. The number of pass-by trips is expected to be low. Therefore the trip generation estimate conservatively assumes zero pass-by trips for each peak hour.

TABLE 4. TRIP GENERATION

Tioga Downs Expansion Trip Generation

Weekday PM peak hour								LESS SHARED TRIPS (40%)			PASS BY TRIPS			PRIMARY TRIPS		
LU Code	Description	Rate/KSF	Size	Trips	% In	In	Out	Trips	In	Out	Trips	In	Out	Trips	In	Out
310	Hotel	0.59	136 Rooms	81	53	43	38	49	26	23	0	0	0	49	26	23
	Gaming Expansion	9.2	19.0 Ksf	175	60	105	70	105	63	42	0	0	0	105	63	42
	Convention Center	0.34	400 Seats	138	60	83	55	83	50	33	0	0	0	83	50	33
TOTALS:				394		231	163	237	139	98	0	0	0	237	139	98

Saturday Mid-day peak hour								LESS SHARED TRIPS (40%)			PASS BY TRIPS			PRIMARY TRIPS		
LU Code	Description	Rate/KSF	Size	Trips	% In	In	Out	Trips	In	Out	Trips	In	Out	Trips	In	Out
310	Hotel	equation	136 Rooms	98	56	55	43	59	33	26	0	0	0	59	33	26
	Gaming Expansion	15.5	19.0 Ksf	295	60	177	118	177	106	71	0	0	0	177	106	71
	Convention Center	0.34	400 Seats	138	60	83	55	83	50	33	0	0	0	83	50	33
TOTALS:				531		315	216	319	189	130	0	0	0	319	189	130

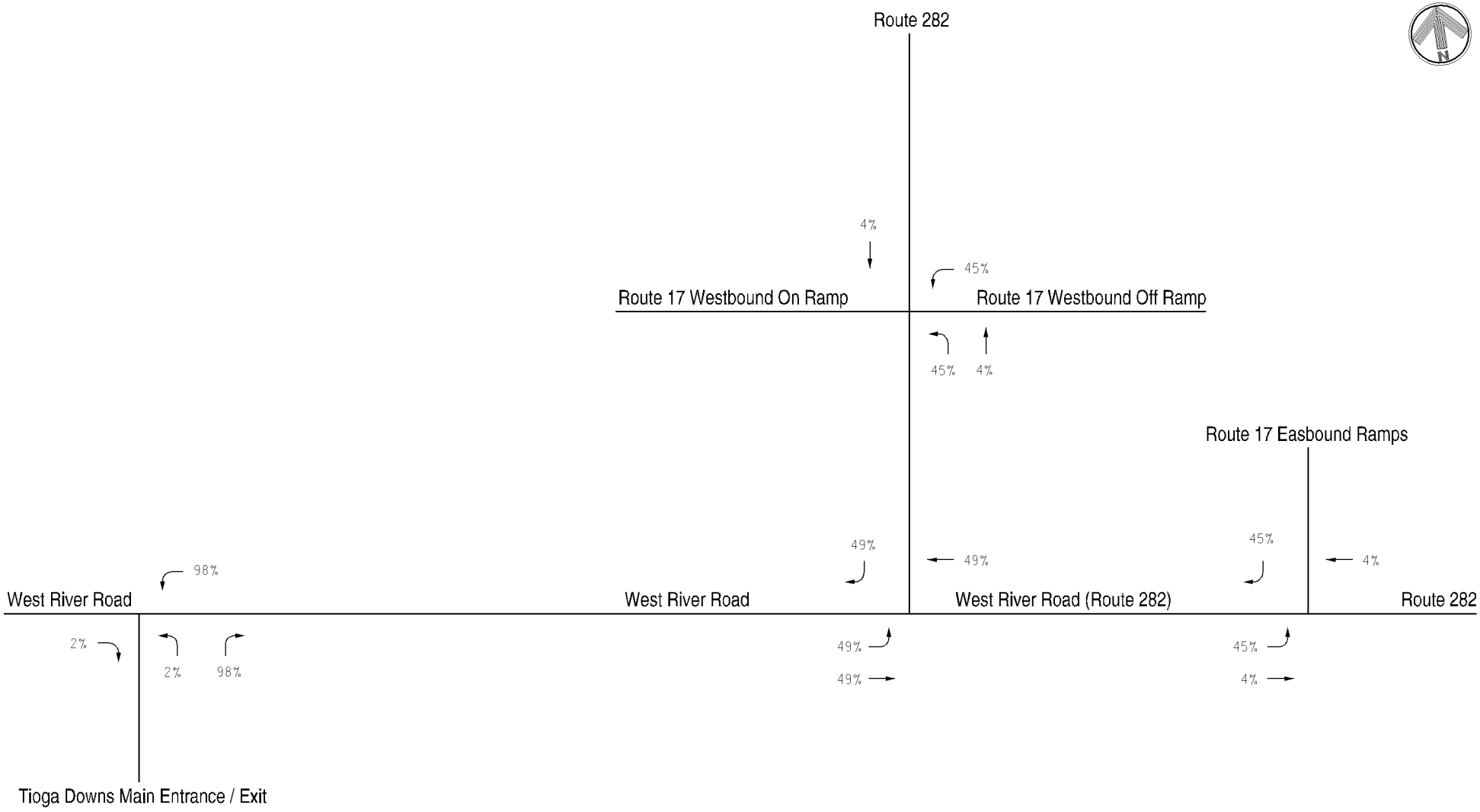
Saturday PM peak hour								LESS SHARED TRIPS (40%)			PASS BY TRIPS			PRIMARY TRIPS		
LU Code	Description	Rate/KSF	Size	Trips	% In	In	Out	Trips	In	Out	Trips	In	Out	Trips	In	Out
310	Hotel	equation	136 Rooms	98	56	55	43	59	33	26	0	0	0	59	33	26
	Gaming Expansion	15.5	19.0 Ksf	295	60	177	118	177	106	71	0	0	0	177	106	71
	Convention Center	0.34	400 Seats	138	60	83	55	83	50	33	0	0	0	83	50	33
TOTALS:				531		315	216	319	189	130	0	0	0	319	189	130

V. Trip Distribution

This phase of the traffic analysis involved distribution of the projected peak hour traffic generated by the development to the surrounding roadway system. The projected traffic volumes calculated during the trip generation phase were distributed onto the roadway system based on population statistics in the area of draw and existing traffic patterns.

The percent distribution of the development generated primary traffic is shown in Figure 4. The percentage of new traffic traveling on West River Road to the east is 98%. To the west, 2% is expected to use West River Road. West River Road, east of Route 282 is expected to carry 45% of the new traffic with 4% east of the Route 17 eastbound ramps. Route 282 north of West River Road is also expected to carry 45%, with 4% north of the Route 17 westbound ramps. Figure 5 shows the assignment of the vehicle trips based on the distribution percentages.

It is assumed that no pass-by traffic will be generated at the site as the majority of trips for the development will be primary trips.



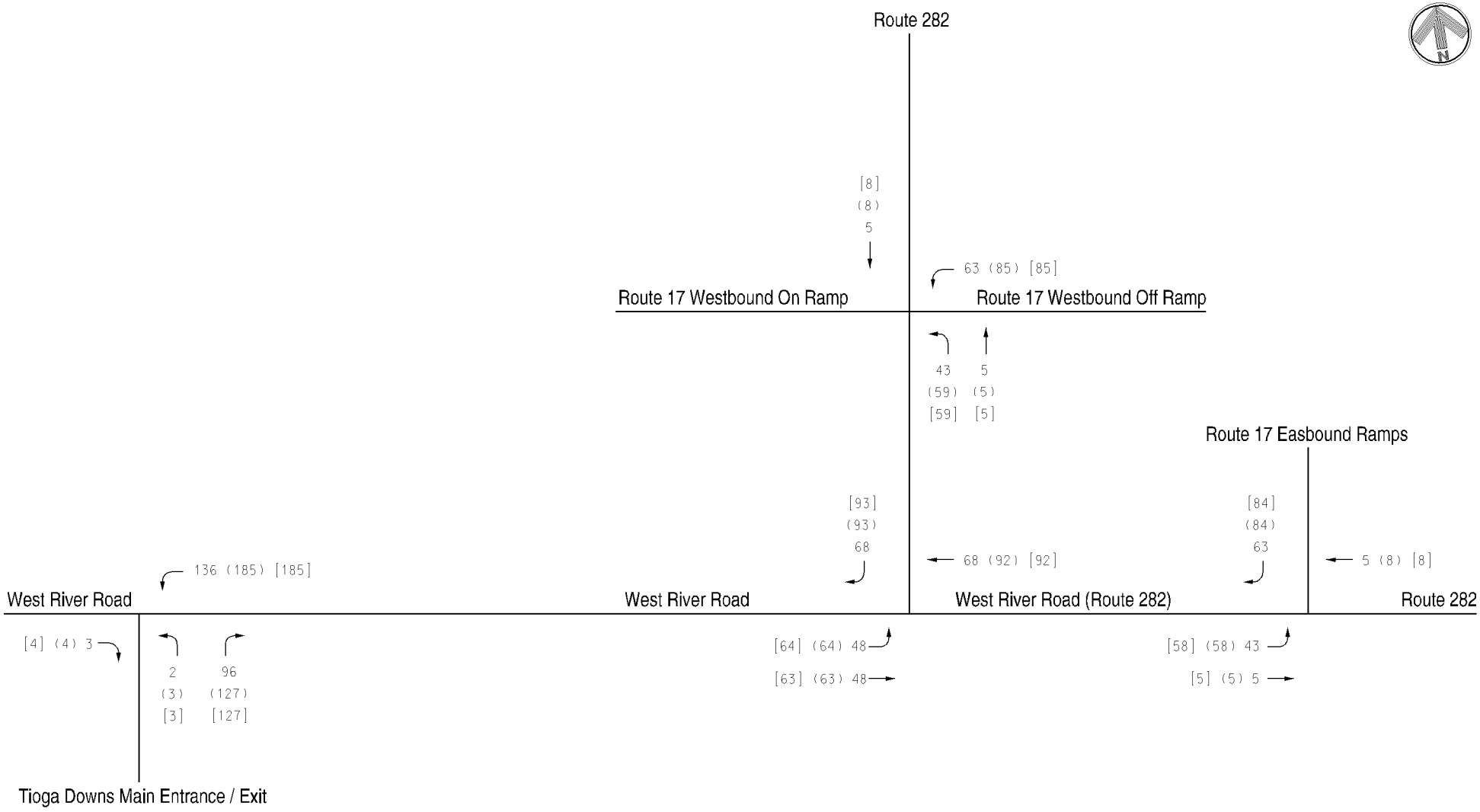
LEGEND:

XXX - Friday PM Peak Hour Traffic 4:45pm - 5:45pm
(XXX) - Saturday Mid-Day Peak Hour Traffic 11:30am - 12:30pm
[XXX] - Saturday PM Peak Hour Traffic 5:45pm - 6:45pm

Tioga Downs Expansion
Traffic Impact Study
West River Road, Nichols, NY

Primary Trip Distribution (Percentages)
Peak Hour Turning Movements

FIGURE NO.	SCALE	DATE	
4	No Scale	11/11	Bergmann associates



LEGEND:

XXX - Friday PM Peak Hour Traffic 4:45pm - 5:45pm
(XXX) - Saturday Mid-Day Peak Hour Traffic 11:30am - 12:30pm
[XXX] - Saturday PM Peak Hour Traffic 5:45pm - 6:45pm

Tioga Downs Expansion
Traffic Impact Study
West River Road, Nichols, NY

Primary Trip Assignment
Peak Hour Turning Movements

FIGURE NO.	SCALE	DATE	
5	No Scale	04/12	Bergmann associates

VI. Future Traffic Evaluation

A. 2014 No Build Conditions

The 2014 No Build conditions are expected to be the same or very similar to existing conditions. A background traffic growth rate was not applied because similar traffic patterns are expected to remain with somewhat stagnant overall traffic volume growth. Project occupancy is expected to take place before year 2104 and no major expansions/new facilities that would affect background traffic are known to be in development or construction in the vicinity of the project.

The No Build LOS results are described below and summarized in Table 6 in Section VI.D. 2014 Build Levels of Service where Table 6 provides both No Build and Build LOS results for comparison. Detailed Synchro level of service analysis results are contained in Appendix C Detailed LOS Analysis Results – Existing Conditions, as No Build traffic is expected to be the same or very similar to current conditions.

The intersection of West River Road with Tioga Downs Main Entrance/Exit free flow eastbound and westbound approaches are expected to operate at LOS A during the Friday and Saturday peak hours according to Synchro. The stop sign controlled Downs Exit northbound approach overall is expected to operate at LOS B or better during the Friday and Saturday peak hours. The left turn exit is expected to operate acceptably at LOS C or better during the peak hours.

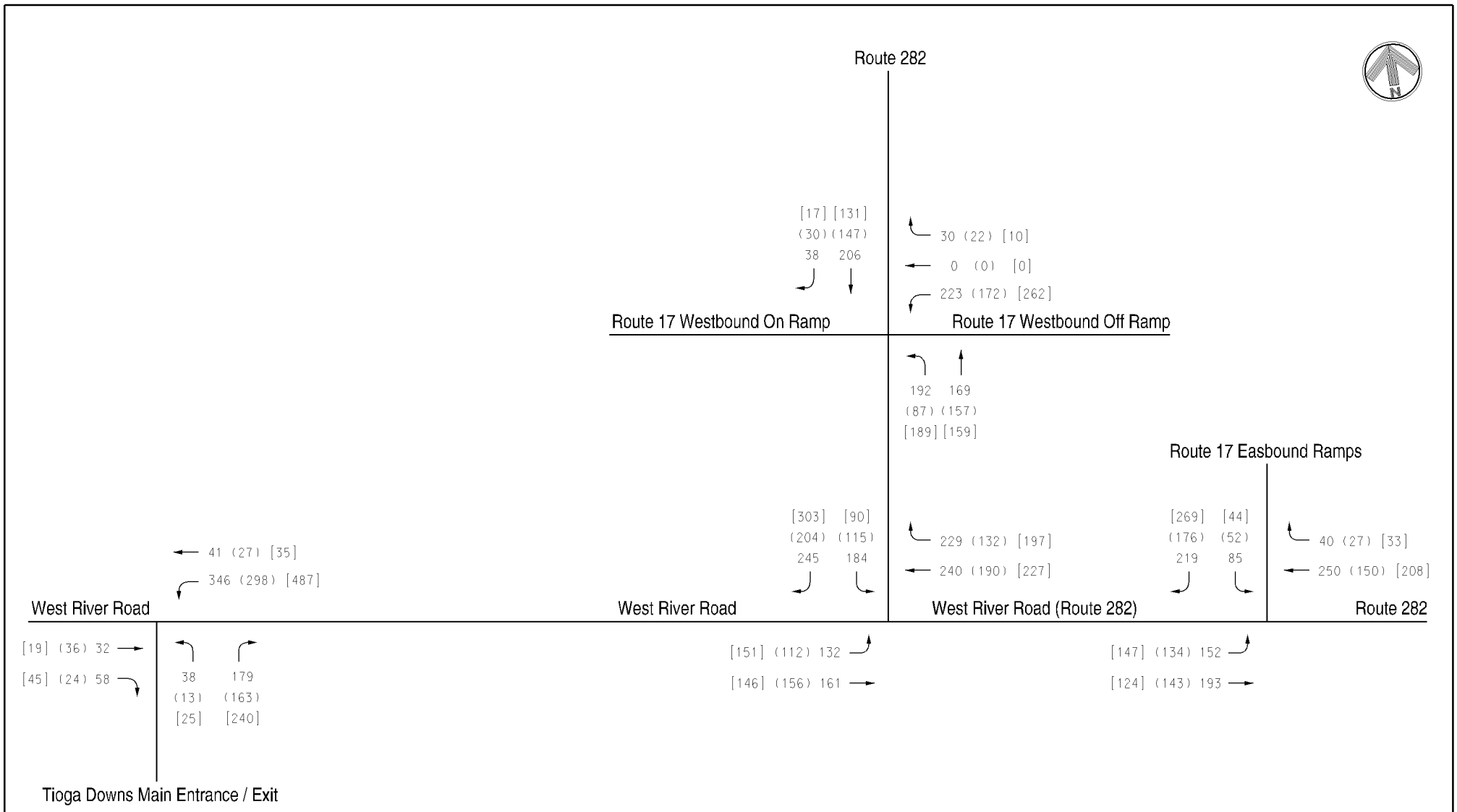
The intersection of Route 282 with Route 17 westbound ramps stop sign westbound approach is expected to operate at LOS E and LOS D during the Friday PM and Saturday PM peak hour, respectively. This approach is expected to operate at LOS B during the Saturday Mid-day peak hour. The Route 282 free flow northbound and southbound approaches are expected to operate at LOS A during the peak hours.

The intersection of West River Road at Route 282 eastbound and westbound approaches are expected to operate at LOS A during the peak hours. The southbound approach is expected to operate at LOS C during the Friday PM and Saturday PM peak hours and LOS B during the Saturday Mid-day peak hour.

The West River Road eastbound and westbound approaches to the intersection with the Route 17 eastbound ramps are expected to operate at LOS A during the Friday and Saturday peak hours. The Route 17 eastbound exit ramp approach to West River Road is expected to operate at LOS C during the Friday peak hour and LOS B during the Saturday peak hours.

B. 2014 Build Traffic

The total projected build traffic volumes (Figure 6 – 2014 Build Peak Hour Turning Movements) are the sum of 2011 existing traffic (Figure 3 – Existing Peak Hour Turning Movements) and the projected development traffic shown in Figure 5.



LEGEND:

XXX - Friday PM Peak Hour Traffic 4:45pm - 5:45pm
(XXX) - Saturday Mid-Day Peak Hour Traffic 11:30am - 12:30pm
[XXX] - Saturday PM Peak Hour Traffic 5:45pm - 6:45pm

Tioga Downs Expansion
Traffic Impact Study
West River Road, Nichols, NY

2014 Build
Peak Hour Turning Movements

FIGURE NO.	SCALE	DATE	
6	No Scale	04/12	Bergmann associates

C. Signal Warrant Analysis

A traffic signal is not warranted at the intersection of Route 282 with the Route 17 westbound ramps because the traffic signal warrants 1 and 4 are not expected to be met with the proposed expansion constructed and open in 2014. The National MUTCD and the New York State (NYS) Supplement warrants studied here are as follows:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour Volume
- Warrant 4, Pedestrian Volume

Year 2014 hourly traffic volumes on Route 282 were determined using local machine traffic counts obtained from the NYSDOT and manual traffic counts conducted by Bergmann Associates. Hourly traffic volumes projected at this intersection in 2014 were determined using the projected peak hour volume shown in Figure 6 and hourly variations in generated trips. Detailed results, broken down by hour, are located in Appendix E.

Warrant 1 - is projected to be met for 4 hours on a weekday. Since traffic volume threshold values are not met for the major or minor road in Condition A and Condition B, the combination of Conditions A and B shall be the basis of application. For any one hour to satisfy this warrant the volume of traffic on the major road must exceed 280 vehicles and the minor road approach must exceed 84 vehicles for Condition A, and the major road must exceed 420 vehicles and the minor road approach must exceed 42 vehicles for Condition B.

During the weekday time period between 7:00 AM and 9:00 PM, the volume of the traffic on the major and minor roads only exceeds the thresholds for four hours. The combination of Condition A and Condition B, is not met for eight hours. Therefore Warrant 1 is not met.

Warrant 2 - the Four-Hour Vehicular Volume warrant is projected to be met in 2014 with the proposed development. The lower threshold of 60 vph on the minor approach applies here because the operating speeds are above 40 mph on Route 282 and the major and minor street are only one lane. The intersection volumes exceed the thresholds during the 3:00 PM to 8:00 PM weekday time period, and therefore warrant 2 is met the minimum four hours.

Warrant 3 - the Peak Hour warrant is projected to be met. The lower threshold of 75 vph on the driveway applies here because the operating speeds are above 40 mph on Route 282 and the major and minor street are only one lane. The intersection volumes exceed the thresholds during the 4:00 PM to 7:00 PM weekday time period, and therefore warrant 3 is met for the minimum one hour.

Warrant 4 – the Pedestrian Volume warrant is not satisfied due to minimal pedestrian volume within the project study area.

Table 5 contains the results for each of the four warrants for the intersection of Route 282 with the Route 17 westbound ramps.

TABLE 5. 2014 BUILD TRAFFIC SIGNAL WARRANT RESULTS
Route 282 @ Route 17 Westbound Ramps

NYS MUTCD Warrant	Hours Required	Warrant Met on Average Weekday?
Warrant 1 – Eight-Hour Vehicular Volume	8	No
Warrant 2 – Four-Hour Vehicular Volume	4	Yes
Warrant 3 – Peak Hour Vehicular Volume	1	Yes
Warrant 4 – Pedestrian Volume	1	No

Installation of a traffic signal is not recommended at the intersection of Route 282 with Route 17 westbound ramps because warrants 1 and 4 are not satisfied under projected 2014 Build conditions.

Another reason a traffic signal is not recommended here is the impact to vehicle delay for Route 282 traffic with the signalized scenario. If this intersection is under signalized control it would have a negative impact not only to the flow of Route 282 traffic but can also increase overall delay, number of vehicle stops, fuel consumption and emissions.

D. 2014 Build Levels of Service

The Build Condition takes into account new traffic (trips) generated by the proposed development. One trip is counted each time a vehicle enters and each time a vehicle exits the development. Traffic volume is forecasted by referencing historical data published in the 8th Edition of ITE Trip Generation. The Build Condition analysis is based on full impact of the proposed Tioga Downs Expansion.

The 2014 Build traffic operations during the peak hours with no traffic mitigation at the subject intersections are projected to continue to range from LOS A to E for all traffic movements according to Synchro except on the Route 17 westbound ramp approach to Route 282. The initial LOS determined using Synchro is projected to be F on the westbound exit ramp stop at Route 282 during the Friday and Saturday PM peak hours. Synchro Level of service analysis results for the intersections are provided in Table 6 and described below. Detailed Build Synchro level of service results are contained in Appendix F.

Analysis of intersection operations using SimTraffic was also performed where congestion was initially indicated by LOS F. SimTraffic offers a microscopic simulation of traffic flow considering interaction between driver and vehicle characteristics, geometry, and traffic control. Analysis using SimTraffic offers a method of assessing vehicle delay at stop sign controlled approaches where traffic flow is based on driver behavior and gaps in traffic. SimTraffic Level of Service analysis results are provided in Table 7 and described below. Detailed Build SimTraffic level of service results are contained in Appendix G.

The intersection of West River Road with Tioga Downs Main Entrance/Exit free flow eastbound and westbound approaches operate at LOS A during the Friday and Saturday peak hours according to Synchro. The stop sign controlled Downs Exit northbound approach overall is expected to operate at LOS D during the Friday PM peak, LOS C during the Saturday Midday peak hour and LOS E during the Saturday PM peak hour. SimTraffic results at this intersection indicate that the stop sign northbound approach will operate acceptably under build conditions at a level of service C or better during the peak hours.

Analysis of intersection operations using SimTraffic was also performed for the intersection of Route 282 with Route 17 westbound ramps. SimTraffic offers a microscopic simulation of traffic flow considering interaction between driver and vehicle characteristics, geometry, and traffic control. Analysis using SimTraffic offers an alternative method of assessing vehicle delay at stop sign controlled approaches.

Route 282 is free flow at the intersection with the Route 17 westbound ramps and operates at LOS A during the peak hours at this intersection. The stop sign controlled westbound approach operates at LOS F during the Friday PM and Saturday PM peak hour according to the initial analysis using Synchro. The Highway Capacity Manual 2000 explains in Chapter 17 on page 24 that: the average control delay for any particular minor movement is a function of the capacity of the approach and the degree of saturation (volume to capacity ratio). The analytical model used to estimate control delay assumes that the demand is less than capacity for the period of analysis. If the degree of saturation is greater than about 0.9, average control delay is significantly affected by the length of the analysis period. In most cases, the recommended analysis period is 15 minutes. If demand exceeds capacity during a 15-minute period, the delay results calculated by the procedure may not be accurate. In this case, the period of analysis should be lengthened to include the period of oversaturation.

The degree of saturation is expected to be greater than 0.9 on the westbound Route 17 ramp stop sign controlled approach to Route 282. Therefore a supplemental analysis was performed using Synchro for a 60 minute analysis period and the LOS was determined to be F with control delay of 76.6 seconds and 58.2 seconds for the Friday PM and Saturday PM peak hours respectively. This supplemental analysis indicates that the projected traffic operations will be poor during conference/convention events at the proposed Tioga Downs expansion. SimTraffic results based on simulation of driver behavior at this intersection indicate that the stop sign controlled westbound approach will operate acceptably under build conditions at a level of service C during the same peak hours. Results at this intersection are contained in Appendix G.

TABLE 6. 2014 NO BUILD AND BUILD PEAK HOUR SYNCHRO LEVEL OF SERVICE RESULTS

Intersection	Approach			2014 No Build						2014 Build					
				Fri PM Peak Hour		Sat Midday Pk Hr		Sat PM Pk Hr		Fri PM Peak Hour		Sat Midday Pk Hr		Sat PM Pk Hr	
				LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)	LOS	Control Delay (sec/veh)
West River Road at	W. River Rd	Eastbound	TR	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
Tioga Downs Main	W. River Rd	Westbound	LT	A	6.9	A	6.3	A	7.4	A	7.8	A	7.7	A	8.4
Entrance/Exit	Downs Exit	Northbound	L	C	16.3	B	11.6	C	19.8	D	28.0	C	20.8	E	43.8
	Downs Exit	Northbound	R	A	9.0	A	8.8	A	9.2	A	9.6	A	9.6	B	10.3
stop sign on main exit	Downs Exit	Northbound	App	B	11.2	A	9.4	B	11.0	B	12.8	B	10.4	B	13.5
Route 282 & **Route 17**	WB exit ramp	Westbound	LTR	E	37.6	B	13.8	D	30.4	F*	76.6	D	25.4	F*	58.2
Westbound Ramps	Route 282	Northbound	LT	A	4.6	A	1.4	A	4.1	A	5.2	A	3.4	A	4.8
stop sign on exit ramp	Route 282	Southbound	TR	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
West River Road at	W. River Rd	Eastbound	LT	A	4.2	A	3.0	A	4.7	A	4.8	A	4.2	A	5.5
Route 282	W. River Rd	Westbound	T	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
(stop sign control on	W. River Rd	Westbound	R	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
southbound Approach)	Route 282	Southbound	LR	C	21.0	B	13.4	C	15.0	E*	40.4	D	30.7	E	38.7
West River Road at	W. River Rd	Eastbound	L	A	8.3	A	7.8	A	8.1	A	8.5	A	8.0	A	8.3
Route 17	W. River Rd	Eastbound	T	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
Eastbound Ramps	W. River Rd	Eastbound	App	A	3.1	A	2.8	A	3.4	A	3.8	A	3.9	A	4.5
	W. River Rd	Westbound	T	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
	W. River Rd	Westbound	R	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
	W. River Rd	Westbound	App	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0	A	0.0
stop sign on exit ramp	EB exit ramp	Southbound	LR	C	18.3	B	11.8	B	13.9	C	24.1	B	13.5	C	17.9

* Peak 15-minute duration used initially for the capacity analysis per Chapter 17 of the Highway Capacity Manual (HCM) 2000. Per Chapter 17 of the HCM the period of analysis was lengthened to one hour to include the 15 minute period of oversaturation.

TABLE 7. 2014 BUILD PEAK HOUR SIMTRAFFIC LEVEL OF SERVICE RESULTS

Intersection Peak Hour	Approach	2014 Build	
		LOS	Control Delay (sec/veh)
West River Road at Tioga Downs Main Entrance/Exit Saturday PM	Northbound L	C	18.3
Route 282 at Route 17 Westbound Ramps Friday PM	Westbound L	C	24.2
Route 282 at Route 17 Westbound Ramps Saturday PM	Westbound L	C	21.3
Route 282 at West River Road Friday PM	Southbound L	D	33.3
Route 282 at West River Road Saturday PM	Southbound L	C	18.9

The intersection of West River Road at Route 282 eastbound and westbound approaches operate at LOS A during the peak hours. The southbound approach is expected to operate at LOS E during the Friday PM peak hour, LOS D during the Saturday Mid-day peak hour, and LOS E during the Saturday PM peak hour according to Synchro. SimTraffic results at this intersection indicate that the stop sign southbound approach will operate adequately under build conditions at a level of service D or better during the Friday PM and Saturday PM peak hours.

The intersection of West River Road with Route 17 eastbound ramps eastbound and westbound approaches operate at LOS A during the Friday and Saturday peak hours. The eastbound ramps southbound approach overall is projected to operate at LOS C or better during the Friday and Saturday peak hours.

E. Sight Distance

Stopping sight distances are adequate for vehicles approaching the Tioga Downs Main Entrance on West River Road from both directions according to AASHTO recommendations. West River Road is straight and level such that sufficient sight distance is available to see vehicles at the driveway location, providing adequate distance for stopping. The available and AASHTO recommended Stopping Sight Distances (SSD's) are summarized in Table 8.

TABLE 8. STOPPING SIGHT DISTANCES

Intersection	Approach	Available SSD	AASHTO Recommended SSD for Speed Limit
West River Road @ Tioga Downs Main Entrance (Speed Limit = 45 mph)	Eastbound	>1000 ft	360 ft
	Westbound	>600 ft	360 ft

Motorists stopped on the exit approach at the Tioga Downs Main exit will have adequate sight distance to view vehicles approaching from the east and west on West River Road according to AASHTO recommendations as shown in Table 9.

The available and the AASHTO recommended intersection sight distances (ISD) are summarized in Table 9. The intersection sight distance based upon field investigation for vehicles exiting Tioga Downs along West River Road is greater than 1000 feet to the left and greater than 600 feet to the right, with the location of the driver eye estimated to be 14.5' from edge of pavement of West River Road and 3.5' above the driveway pavement elevation.

TABLE 9. INTERSECTION SIGHT DISTANCES

Major Roadway	Approach	Available ISD to the Left	Available ISD to the Right	AASHTO Recommended
West River Road (Speed Limit = 45 mph)	Tioga Downs Main Entrance/Exit	>1000 feet	>600 ft	500 feet[1]

[1] AASHTO recommended intersection sight distance for passenger car to turn left from a minor road to a two lane major road for the speed limit of 45 mph along the major roadway.

VII. Summary and Conclusions

The subject of this Traffic Impact Study (TIS) is the proposed Tioga Downs Expansion. The expansion includes approximately 17,000 square feet (SF) of new casino gaming space and a 6 story hotel. The proposed hotel is expected to offer a capacity of 136 guest rooms with 16 rooms on the lower level and 24 rooms per floor for the floors above. It is anticipated that the expansion will include 19,000 SF of casino gaming and related space, a 7,200 SF multi-purpose room/convention center expected to seat 400 persons, and a 2,266 SF restaurant/bistro. The target year of project completion is 2014.

A. Existing Conditions

Turning movement count data was obtained for the intersections listed below.

- West River Road and Route 17 eastbound ramps
- West River Road and State Route 282
- West River Road and Route 17 westbound ramps
- West River Road and the Tioga Downs Entrance

The August 2011 traffic counts indicate that the overall study area peak hours occurred between 4:45 and 5:45 p.m. on Friday and on Saturday between 11:30 a.m. and 12:30 p.m. and between 5:45 p.m. and 6:45 p.m.

The existing traffic operations during the peak hours at the subject intersections range from LOS A to C for all traffic movements according to Synchro except at the Route 17 westbound ramp approach to Route 282. The peak hour LOS ranges from B to E for this approach.

Accident History

The New York State Department of Transportation and the Tioga County Sheriff's Department provided a three year accident history for the study area. The accident information includes location, date, day of the week, time, severity of accident, road condition, manner of collision and causal factors. The accidents were generally spread out across the study area at different locations and the type of accidents varied although fixed object type occurred most frequently. No significant, clearly defined, cluster of accidents occurred during the three year history that would point to a specific correctable pattern of accidents.

B. 2014 No Build Conditions

The 2014 No Build conditions are expected to be the same or very similar to existing conditions. A background traffic growth rate was not applied because similar traffic patterns are expected to remain with somewhat stagnant overall traffic volume growth. Project occupancy is expected to take place before year 2104 and no major expansions/new facilities that would affect background traffic are known to be in development or construction in the vicinity of the project.

C. 2014 Build Conditions

The proposed development traffic is expected to be accommodated by the existing capacity of the study area and the signal warrant analysis does not indicate the need for a traffic signal. Overall levels of service and vehicle delays at subject intersections are expected to be acceptable based on the comprehensive analysis using Synchro software (macroscopic traffic model) and SimTraffic software (microscopic traffic model). The Synchro results show levels of service ranging from LOS A to LOS F. The SimTraffic results indicate levels of service ranging from LOS A to LOS D (less than 35 seconds of delay). Both Synchro and SimTraffic consider geometry and traffic control. SimTraffic offers an alternative method of assessing traffic operations using a microscopic simulation of traffic flow considering the interaction between driver and vehicle characteristics, geometry, and traffic control.

VIII. Recommendations

All Intersections under the 2014 Build Conditions are considered to have acceptable operating conditions with the potential exception of the intersection at the Route 282 with the Route 17 Westbound Ramp, which is expected to be addressed in the NYS Route 17 improvement project to meet interstate standards. The 2014 Build conditions do not indicate or warrant any improvements in the form of traffic control, geometric changes or combination of improvements.

TIOGA DOWNS RACINO EXPANSION
TRAFFIC IMPACT STUDY
APPENDICES

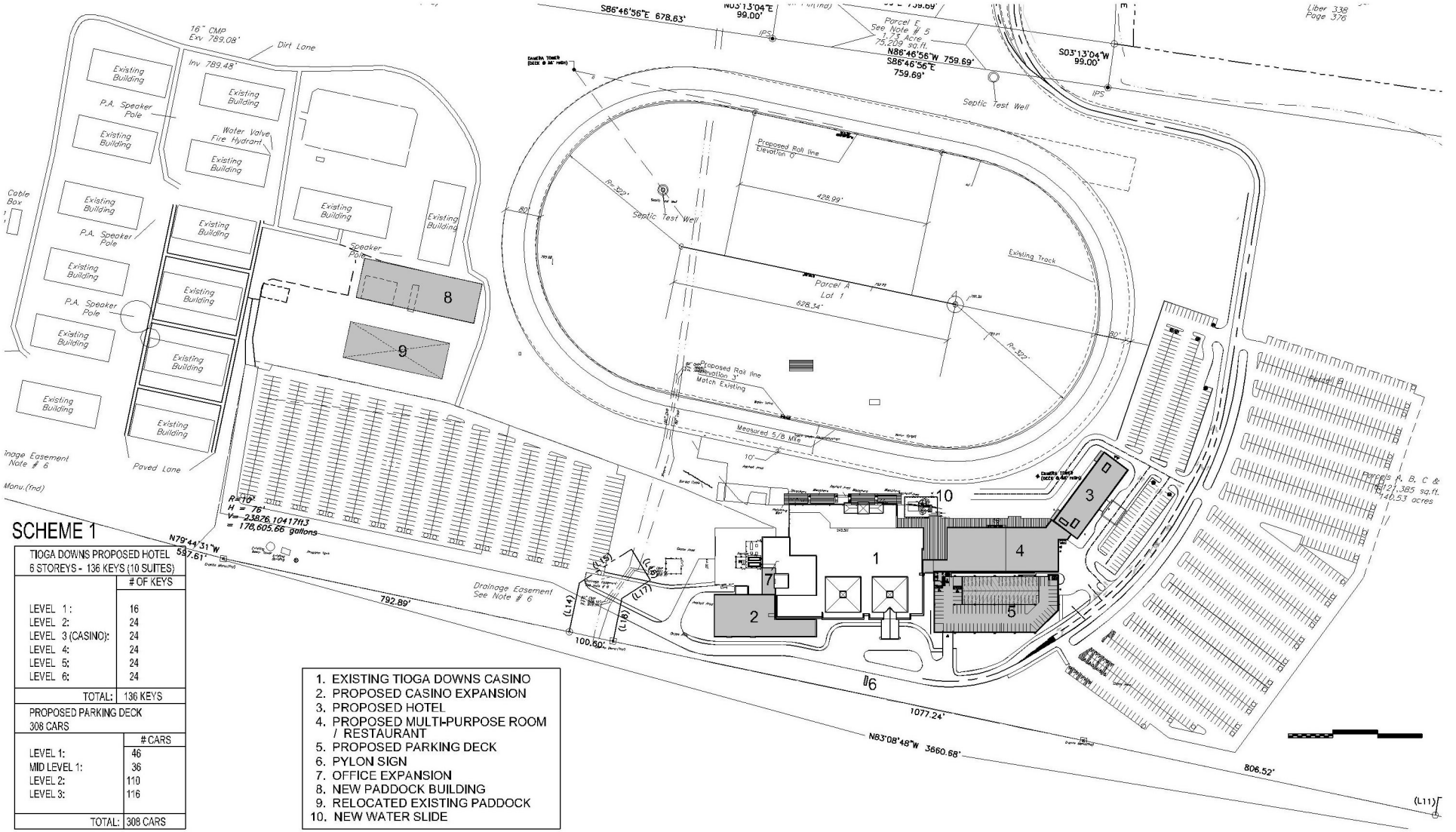
LARSON DESIGN GROUP / TOWN OF NICHOLS
2384 West River Road Nichols, NY / April 2012

Appendix A

Site Plan

April 2012

Bergmann associates



SCHEME 1

TIOGA DOWNS PROPOSED HOTEL 6 STOREYS - 136 KEYS (10 SUITES)	
	# OF KEYS
LEVEL 1:	16
LEVEL 2:	24
LEVEL 3 (CASINO):	24
LEVEL 4:	24
LEVEL 5:	24
LEVEL 6:	24
TOTAL:	136 KEYS

PROPOSED PARKING DECK 308 CARS	
	# CARS
LEVEL 1:	46
MID LEVEL 1:	36
LEVEL 2:	110
LEVEL 3:	116
TOTAL:	308 CARS

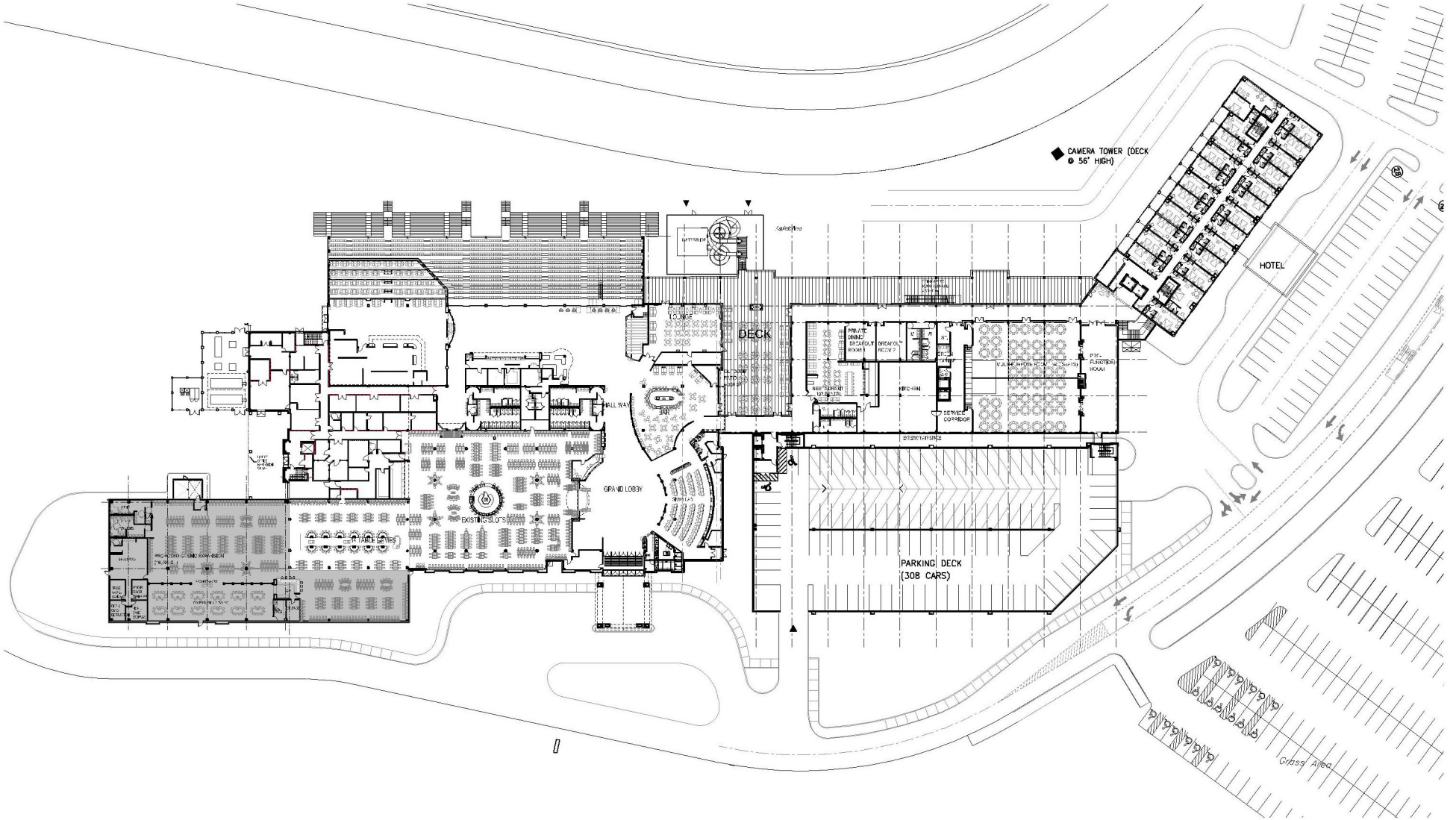
1. EXISTING TIOGA DOWNS CASINO
2. PROPOSED CASINO EXPANSION
3. PROPOSED HOTEL
4. PROPOSED MULTI-PURPOSE ROOM / RESTAURANT
5. PROPOSED PARKING DECK
6. PYLON SIGN
7. OFFICE EXPANSION
8. NEW PADDOCK BUILDING
9. RELOCATED EXISTING PADDOCK
10. NEW WATER SLIDE

SCHEME 1
SITE CONTEXT PLAN

CGL
CUMMINS GREEN LIANG architects inc

TIOGA DOWNS CASINO, HOTEL AND RELATED AMENITIES EXPANSION
NICHOLS, NEW YORK
APRIL 03, 2012

TIOGA DOWNS Casino Racing & Entertainment



CASINO LEVEL FLOOR PLAN (HOTEL LEVEL 3 - 824' F.F.E.)
SCHEME 1

CGL
CLIMANS GREEN LIANG
architects inc

TIOGA DOWNS CASINO, HOTEL AND RELATED AMENITIES EXPANSION
NICHOLS, NEW YORK
APRIL 03, 2012

TIOGA DOWNS
Casino
Racing & Entertainment

Appendix B

Turning Movement Count Data

2011 Existing Conditions

Bergmann associates

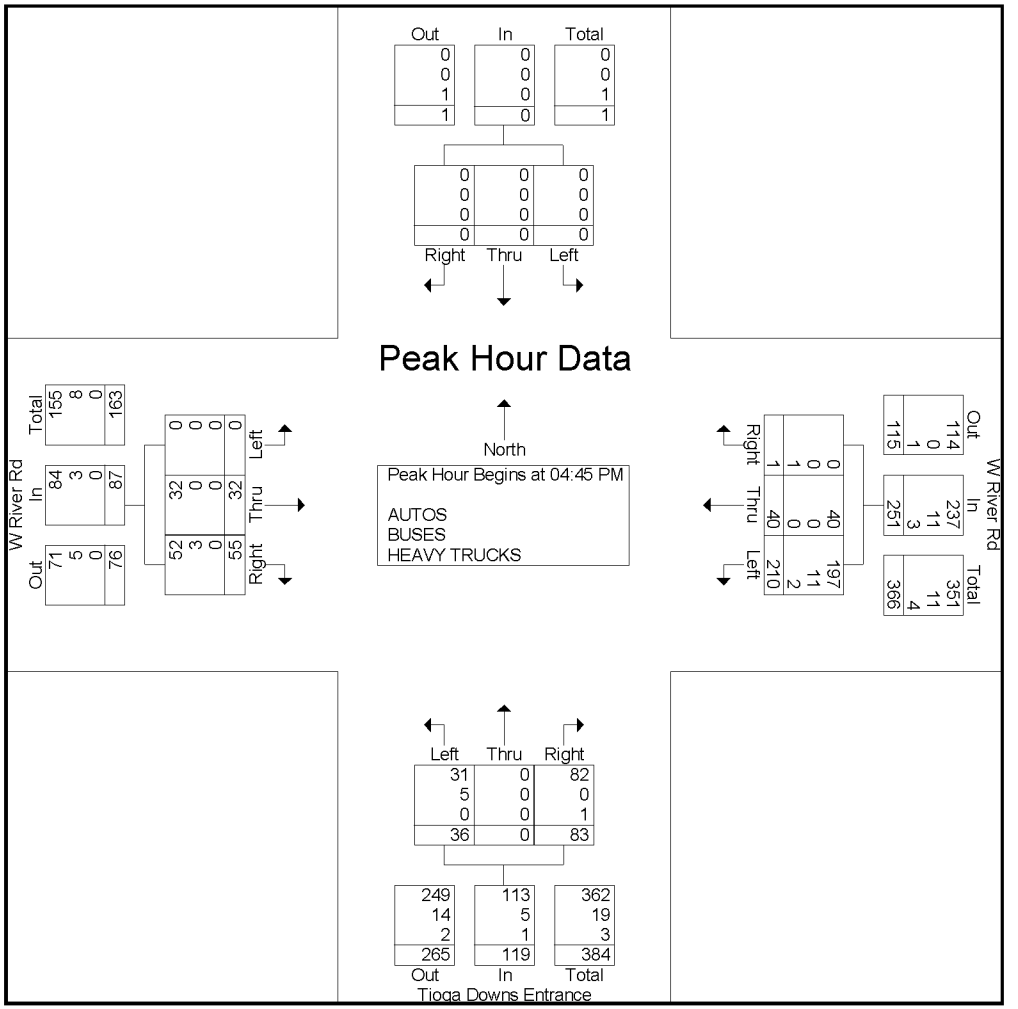
Tioga Downs Hotel Traffic Study
Tioga Downs Entrance
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 1 Tioga Downs Entrance - 3pm-9pm FRI
Site Code : 00000001
Start Date : 8/26/2011
Page No : 3

	W River Rd Eastbound				W River Rd Westbound				Tioga Downs Entrance Northbound				Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:45 PM to 05:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	**12**	13	**25**	45	**15**	0	60	5	0	19	24	0	0	0	0	109
05:00 PM	0	6	16	22	43	7	0	50	**11**	0	20	31	0	0	0	0	103
05:15 PM	0	8	7	15	57	9	0	66	10	0	**24**	**34**	0	0	0	0	115
05:30 PM	0	6	**19**	25	**65**	9	**1**	**75**	10	0	20	30	0	0	0	0	**130**
Total Volume	0	32	55	87	210	40	1	251	36	0	83	119	0	0	0	0	457
% App. Total	0	36.8	63.2		83.7	15.9	0.4		30.3	0	69.7		0	0	0		
PHF	.000	.667	.724	.870	.808	.667	.250	.837	.818	.000	.865	.875	.000	.000	.000	.000	.879
AUTOS	0	32	52	84	197	40	0	237	31	0	82	113	0	0	0	0	434
% AUTOS	0	100	94.5	96.6	93.8	100	0	94.4	86.1	0	98.8	95.0	0	0	0	0	95.0
BUSES	0	0	3	3	11	0	0	11	5	0	0	5	0	0	0	0	19
% BUSES	0	0	5.5	3.4	5.2	0	0	4.4	13.9	0	0	4.2	0	0	0	0	4.2
HEAVY TRUCKS	0	0	0	0	2	0	1	3	0	0	1	1	0	0	0	0	4
% HEAVY TRUCKS	0	0	0	0	1.0	0	100	1.2	0	0	1.2	0.8	0	0	0	0	0.9

Tioga Downs Hotel Traffic Study
Tioga Downs Entrance
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 1 Tioga Downs Entrance - 3pm-9pm FRI
Site Code : 00000001
Start Date : 8/26/2011
Page No : 4



Tioga Downs Hotel Traffic Study
Tioga Downs Entrance
Saturday August 27, 2011
11:00 AM - 1:00PM & 5:00 PM - 9:00 PM

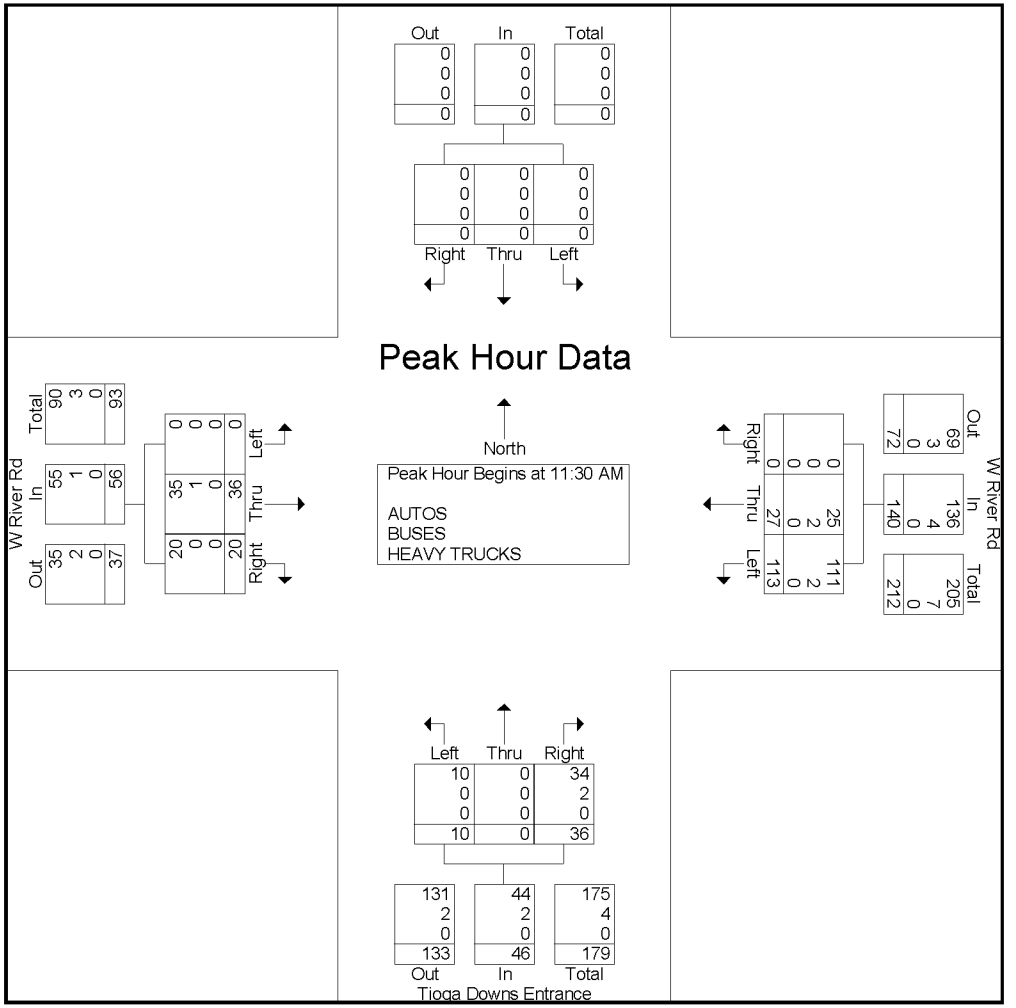
File Name : 1 Tioga Downs Entrance - 11am-1pm & 5pm-9pm SAT
Site Code : 00000001
Start Date : 8/27/2011

	W River Rd Eastbound				W River Rd Westbound				Tioga Downs Entrance Northbound				Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:30 AM																	
11:30 AM	0	**13**	5	**18**	**37**	8	0	**45**	1	0	4	5	0	0	0	0	68
11:45 AM	0	6	3	9	24	3	0	27	2	0	9	11	0	0	0	0	47
12:00 PM	0	7	**8**	15	33	**9**	0	42	2	0	**13**	**15**	0	0	0	0	**72**
12:15 PM	0	10	4	14	19	7	0	26	**5**	0	10	15	0	0	0	0	55
Total Volume	0	36	20	56	113	27	0	140	10	0	36	46	0	0	0	0	242
% App. Total	0	64.3	35.7		80.7	19.3	0		21.7	0	78.3		0	0	0		
PHF	.000	.692	.625	.778	.764	.750	.000	.778	.500	.000	.692	.767	.000	.000	.000	.000	.840
AUTOS	0	35	20	55	111	25	0	136	10	0	34	44	0	0	0	0	235
% AUTOS	0	97.2	100	98.2	98.2	92.6	0	97.1	100	0	94.4	95.7	0	0	0	0	97.1
BUSES	0	1	0	1	2	2	0	4	0	0	2	2	0	0	0	0	7
% BUSES	0	2.8	0	1.8	1.8	7.4	0	2.9	0	0	5.6	4.3	0	0	0	0	2.9
HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BERGMANN ASSOCIATES

Tioga Downs Hotel Traffic Study
Tioga Downs Entrance
Saturday August 27, 2011
11:00 AM - 1:00PM & 5:00 PM - 9:00 PM

File Name : 1 Tioga Downs Entrance - 11am-1pm & 5pm-9pm SAT
Site Code : 00000001
Start Date : 8/27/2011
Page No : 4



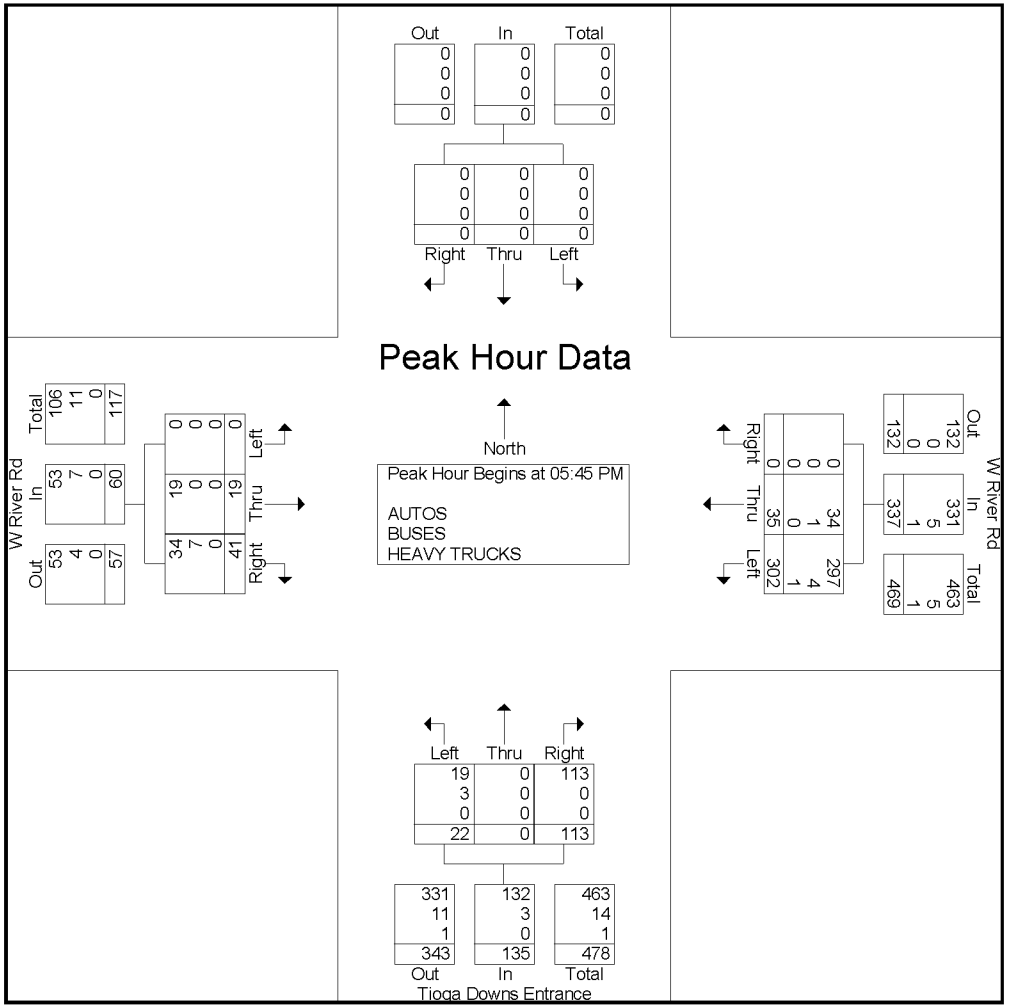
Tioga Downs Hotel Traffic Study
Tioga Downs Entrance
Saturday August 27, 2011
11:00 AM - 1:00PM & 5:00 PM - 9:00 PM

File Name : 1 Tioga Downs Entrance - 11am-1pm & 5pm-9pm SAT
Site Code : 00000001
Start Date : 8/27/2011

	W River Rd Eastbound				W River Rd Westbound				Tioga Downs Entrance Northbound				Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:45 PM to 06:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:45 PM																	
05:45 PM	0	1	10	11	70	**11**	0	81	8	0	29	37	0	0	0	0	129
06:00 PM	0	5	12	17	75	8	0	83	3	0	27	30	0	0	0	0	130
06:15 PM	0	2	6	8	70	9	0	79	2	0	21	23	0	0	0	0	110
06:30 PM	0	**11**	**13**	**24**	**87**	7	0	**94**	**9**	0	**36**	**45**	0	0	0	0	**163**
Total Volume	0	19	41	60	302	35	0	337	22	0	113	135	0	0	0	0	532
% App. Total	0	31.7	68.3		89.6	10.4	0		16.3	0	83.7		0	0	0		
PHF	.000	.432	.788	.625	.868	.795	.000	.896	.611	.000	.785	.750	.000	.000	.000	.000	.816
AUTOS	0	19	34	53	297	34	0	331	19	0	113	132	0	0	0	0	516
% AUTOS	0	100	82.9	88.3	98.3	97.1	0	98.2	86.4	0	100	97.8	0	0	0	0	97.0
BUSES	0	0	7	7	4	1	0	5	3	0	0	3	0	0	0	0	15
% BUSES	0	0	17.1	11.7	1.3	2.9	0	1.5	13.6	0	0	2.2	0	0	0	0	2.8
HEAVY TRUCKS	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
% HEAVY TRUCKS	0	0	0	0	0.3	0	0	0.3	0	0	0	0	0	0	0	0	0.2

Tioga Downs Hotel Traffic Study
Tioga Downs Entrance
Saturday August 27, 2011
11:00 AM - 1:00PM & 5:00 PM - 9:00 PM

File Name : 1 Tioga Downs Entrance - 11am-1pm & 5pm-9pm SAT
Site Code : 00000001
Start Date : 8/27/2011
Page No : 6



BERGMANN ASSOCIATES

Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Friday August 26, 2011
3:00 PM - 9:00 PM

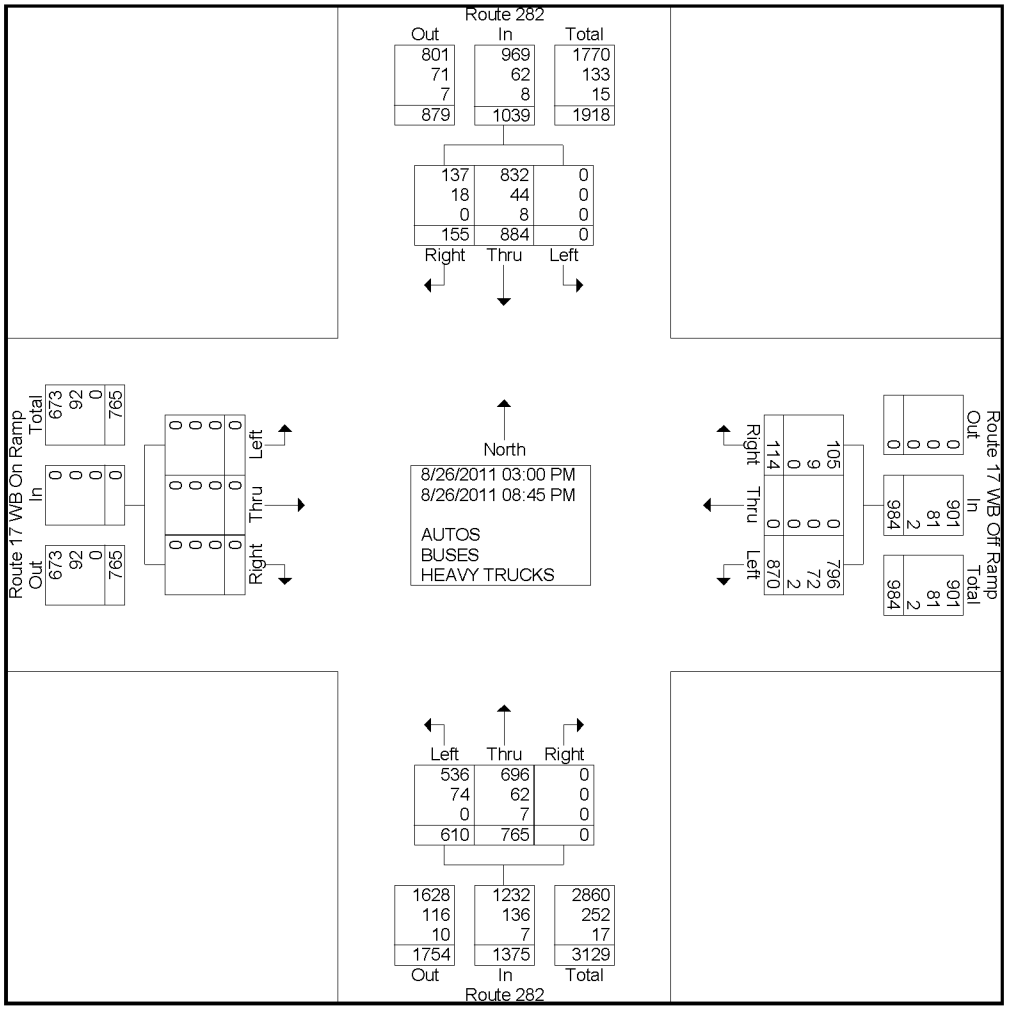
File Name : 2 RT 17 WB_RT 282 - 3pm-9pm FRI
Site Code : 00000003
Start Date : 8/26/2011
Page No : 1

Groups Printed- AUTOS - BUSES - HEAVY TRUCKS

	Route 17 WB On Ramp Eastbound					Route 17 WB Off Ramp Westbound					Route 282 Northbound					Route 282 Southbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	0	0	0	0	0	37	0	6	0	43	18	27	0	0	45	0	37	4	0	41	0	129	129
03:15 PM	0	0	0	0	0	25	0	5	0	30	29	33	0	0	62	0	34	5	0	39	0	131	131
03:30 PM	0	0	0	0	0	41	0	7	0	48	29	38	0	0	67	0	42	5	0	47	0	162	162
03:45 PM	0	0	0	0	0	42	0	4	0	46	30	24	0	0	54	0	47	3	0	50	0	150	150
Total	0	0	0	0	0	145	0	22	0	167	106	122	0	0	228	0	160	17	0	177	0	572	572
04:00 PM	0	0	0	0	0	37	0	2	0	39	30	41	0	0	71	0	47	6	0	53	0	163	163
04:15 PM	0	0	0	0	0	24	0	8	0	32	26	29	0	0	55	0	39	11	0	50	0	137	137
04:30 PM	0	0	0	0	0	49	0	4	0	53	15	37	0	0	52	0	28	15	0	43	0	148	148
04:45 PM	0	0	0	0	0	46	0	10	0	56	41	45	0	0	86	0	45	7	0	52	0	194	194
Total	0	0	0	0	0	156	0	24	0	180	112	152	0	0	264	0	159	39	0	198	0	642	642
05:00 PM	0	0	0	0	0	31	0	10	0	41	38	41	0	0	79	0	48	10	0	58	0	178	178
05:15 PM	0	0	0	0	0	43	0	5	0	48	37	40	0	0	77	0	54	10	0	64	0	189	189
05:30 PM	0	0	0	0	0	40	0	5	0	45	33	38	0	0	71	0	54	11	0	65	0	181	181
05:45 PM	0	0	0	0	0	41	0	9	0	50	25	42	0	0	67	0	52	8	0	60	0	177	177
Total	0	0	0	0	0	155	0	29	0	184	133	161	0	0	294	0	208	39	0	247	0	725	725
06:00 PM	0	0	0	0	0	34	0	7	0	41	37	35	0	0	72	0	45	6	0	51	0	164	164
06:15 PM	0	0	0	0	0	47	0	3	0	50	21	29	0	0	50	0	49	8	0	57	0	157	157
06:30 PM	0	0	0	0	0	47	0	2	0	49	31	24	0	0	55	0	30	5	0	35	0	139	139
06:45 PM	0	0	0	0	0	57	0	1	0	58	21	21	0	0	42	0	33	7	0	40	0	140	140
Total	0	0	0	0	0	185	0	13	0	198	110	109	0	0	219	0	157	26	0	183	0	600	600
07:00 PM	0	0	0	0	0	34	0	7	0	41	20	36	0	0	56	0	30	2	0	32	0	129	129
07:15 PM	0	0	0	0	0	43	0	3	0	46	13	19	0	0	32	0	22	2	0	24	0	102	102
07:30 PM	0	0	0	0	0	38	0	5	0	43	26	27	0	0	53	0	25	2	0	27	0	123	123
07:45 PM	0	0	0	0	0	26	0	7	0	33	25	34	0	0	59	0	29	5	0	34	0	126	126
Total	0	0	0	0	0	141	0	22	0	163	84	116	0	0	200	0	106	11	0	117	0	480	480
08:00 PM	0	0	0	0	0	27	0	2	0	29	22	32	0	0	54	0	39	5	0	44	0	127	127
08:15 PM	0	0	0	0	0	22	0	0	0	22	14	31	0	0	45	0	17	8	0	25	0	92	92
08:30 PM	0	0	0	0	0	21	0	1	0	22	15	24	0	0	39	0	19	5	0	24	0	85	85
08:45 PM	0	0	0	0	0	18	0	1	0	19	14	18	0	0	32	0	19	5	0	24	0	75	75
Total	0	0	0	0	0	88	0	4	0	92	65	105	0	0	170	0	94	23	0	117	0	379	379
Grand Total	0	0	0	0	0	870	0	114	0	984	610	765	0	0	1375	0	884	155	0	1039	0	3398	3398
Apprch %	0	0	0			88.4	0	11.6			44.4	55.6	0			0	85.1	14.9					
Total %	0	0	0		0	25.6	0	3.4		29	18	22.5	0		40.5	0	26	4.6		30.6	0	100	
AUTOS	0	0	0		0	796	0	105		901	536	696	0		1232	0	832	137		969	0	0	3102
% AUTOS	0	0	0	0	0	91.5	0	92.1	0	91.6	87.9	91	0	0	89.6	0	94.1	88.4	0	93.3	0	0	91.3
BUSES	0	0	0		0	72	0	9		81	74	62	0		136	0	44	18		62	0	0	279
% BUSES	0	0	0	0	0	8.3	0	7.9	0	8.2	12.1	8.1	0	0	9.9	0	5	11.6	0	6	0	0	8.2
HEAVY TRUCKS	0	0	0		0	2	0	0		2	0	7	0		7	0	8	0		8	0	0	17
% HEAVY TRUCKS	0	0	0	0	0	0.2	0	0	0	0.2	0	0.9	0	0	0.5	0	0.9	0	0	0.8	0	0	0.5

Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 3pm-9pm FRI
Site Code : 00000003
Start Date : 8/26/2011
Page No : 2



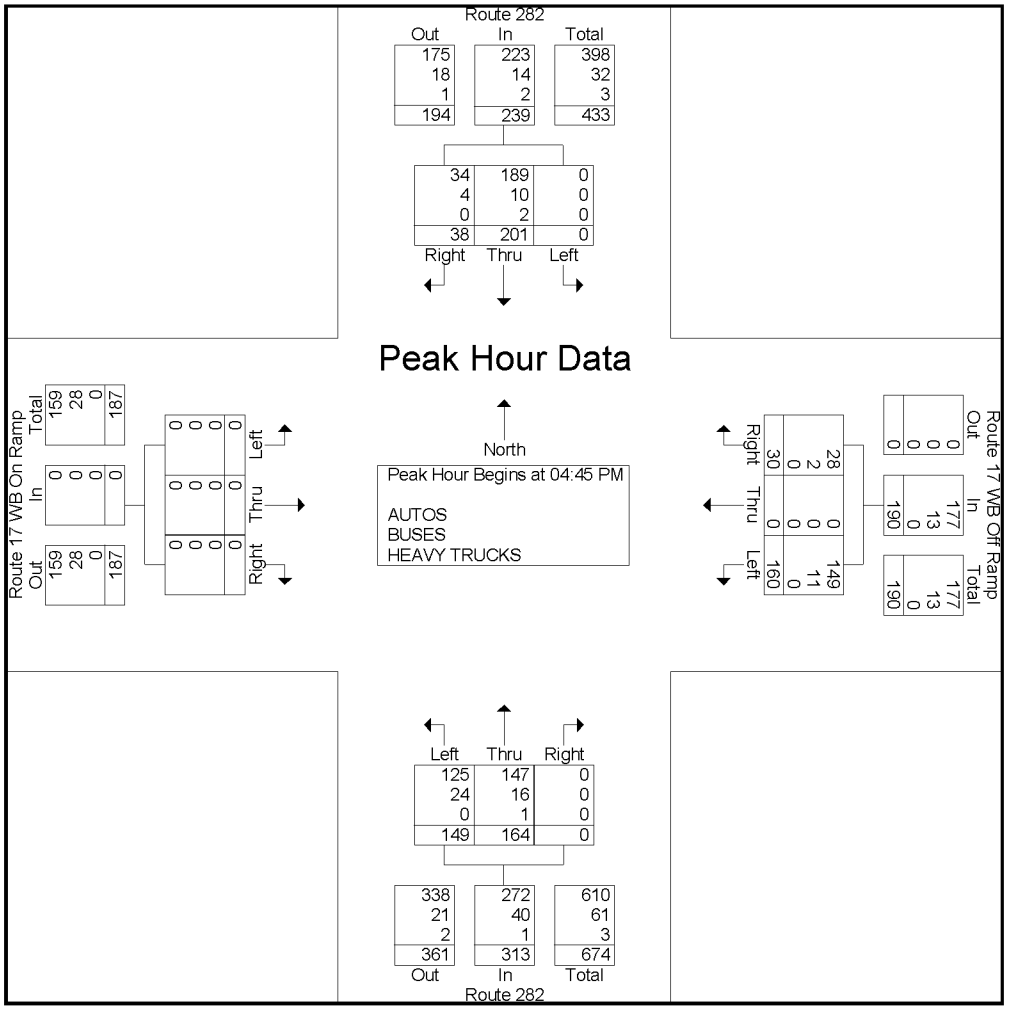
Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 3pm-9pm FRI
Site Code : 00000003
Start Date : 8/26/2011
Page No : 3

	Route 17 WB On Ramp Eastbound				Route 17 WB Off Ramp Westbound				Route 282 Northbound				Route 282 Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 08:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	0	0	0	0	**46**	0	**10**	**56**	**41**	**45**	0	**86**	0	45	7	52	**194**
05:00 PM	0	0	0	0	31	0	10	41	38	41	0	79	0	48	10	58	178
05:15 PM	0	0	0	0	43	0	5	48	37	40	0	77	0	**54**	10	64	189
05:30 PM	0	0	0	0	40	0	5	45	33	38	0	71	0	54	**11**	**65**	181
Total Volume	0	0	0	0	160	0	30	190	149	164	0	313	0	201	38	239	742
% App. Total	0	0	0		84.2	0	15.8		47.6	52.4	0		0	84.1	15.9		
PHF	.000	.000	.000	.000	.870	.000	.750	.848	.909	.911	.000	.910	.000	.931	.864	.919	.956
AUTOS	0	0	0	0	149	0	28	177	125	147	0	272	0	189	34	223	672
% AUTOS	0	0	0	0	93.1	0	93.3	93.2	83.9	89.6	0	86.9	0	94.0	89.5	93.3	90.6
BUSES	0	0	0	0	11	0	2	13	24	16	0	40	0	10	4	14	67
% BUSES	0	0	0	0	6.9	0	6.7	6.8	16.1	9.8	0	12.8	0	5.0	10.5	5.9	9.0
HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	2	3
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0.6	0	0.3	0	1.0	0	0.8	0.4

Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 3pm-9pm FRI
Site Code : 00000003
Start Date : 8/26/2011
Page No : 4



BERGMANN ASSOCIATES

Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Saturday August 27, 2011
11:00 AM- 1:00 PM and 5:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000002
Start Date : 8/27/2011
Page No : 1

Groups Printed- AUTOS - BUSES - HEAVY TRUCKS

	Route 17 WB On Ramp Eastbound					Route 17 WB Off Ramp Westbound					Route 282 Northbound					Route 282 Southbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
11:00 AM	0	0	0	0	0	15	0	1	0	16	16	31	0	1	47	0	28	4	0	32	1	95	96
11:15 AM	0	0	0	0	0	26	0	5	0	31	15	28	0	0	43	0	32	2	0	34	0	108	108
11:30 AM	0	0	0	0	0	23	0	8	0	31	19	30	0	2	49	0	52	10	0	62	2	142	144
11:45 AM	0	0	0	0	0	22	0	7	0	29	17	22	0	0	39	0	24	5	2	29	2	97	99
Total	0	0	0	0	0	86	0	21	0	107	67	111	0	3	178	0	136	21	2	157	5	442	447
12:00 PM	0	0	0	0	0	20	0	4	0	24	18	23	0	0	41	0	36	7	0	43	0	108	108
12:15 PM	0	0	0	0	0	22	0	3	0	25	27	26	0	0	53	0	27	8	1	35	1	113	114
12:30 PM	0	0	0	0	0	21	0	1	0	22	16	26	0	0	42	0	30	7	0	37	0	101	101
12:45 PM	0	0	0	0	0	25	0	6	0	31	26	19	0	0	45	0	26	4	0	30	0	106	106
Total	0	0	0	0	0	88	0	14	0	102	87	94	0	0	181	0	119	26	1	145	1	428	429
*** BREAK ***																							
05:00 PM	0	0	0	0	0	19	0	2	0	21	24	22	0	0	46	0	35	9	0	44	0	111	111
05:15 PM	0	0	0	0	0	36	0	2	0	38	27	29	0	0	56	0	36	5	0	41	0	135	135
05:30 PM	0	0	0	0	0	43	0	0	0	43	22	24	0	0	46	0	32	9	0	41	0	130	130
05:45 PM	0	0	0	0	0	57	0	2	0	59	29	49	0	0	78	0	36	6	0	42	0	179	179
Total	0	0	0	0	0	155	0	6	0	161	102	124	0	0	226	0	139	29	0	168	0	555	555
06:00 PM	0	0	0	0	0	34	0	1	0	35	33	36	0	0	69	0	30	5	0	35	0	139	139
06:15 PM	0	0	0	0	0	49	0	4	0	53	28	28	0	0	56	0	28	4	0	32	0	141	141
06:30 PM	0	0	0	0	0	37	0	3	0	40	40	41	0	0	81	0	29	2	0	31	0	152	152
06:45 PM	0	0	0	0	0	45	0	4	0	49	17	29	0	0	46	0	33	2	0	35	0	130	130
Total	0	0	0	0	0	165	0	12	0	177	118	134	0	0	252	0	120	13	0	133	0	562	562
07:00 PM	0	0	0	0	0	37	0	1	0	38	22	33	0	0	55	0	24	1	0	25	0	118	118
07:15 PM	0	0	0	0	0	30	0	1	0	31	14	23	0	0	37	0	29	3	0	32	0	100	100
07:30 PM	0	0	0	0	0	33	0	5	0	38	9	20	0	0	29	0	22	4	0	26	0	93	93
07:45 PM	0	0	0	0	0	22	0	2	0	24	33	19	0	0	52	0	32	6	0	38	0	114	114
Total	0	0	0	0	0	122	0	9	0	131	78	95	0	0	173	0	107	14	0	121	0	425	425
08:00 PM	0	0	0	0	0	23	0	4	0	27	17	39	0	0	56	0	21	2	0	23	0	106	106
08:15 PM	0	0	0	0	0	16	0	3	0	19	26	23	0	0	49	0	43	42	0	85	0	153	153
08:30 PM	0	0	0	0	0	35	0	6	0	41	20	18	0	0	38	0	11	2	0	13	0	92	92
08:45 PM	0	0	0	0	0	21	0	0	0	21	28	20	0	0	48	0	18	0	0	18	0	87	87
Total	0	0	0	0	0	95	0	13	0	108	91	100	0	0	191	0	93	46	0	139	0	438	438
Grand Total	0	0	0	0	0	711	0	75	0	786	543	658	0	3	1201	0	714	149	3	863	6	2850	2856
Apprch %	0	0	0			90.5	0	9.5			45.2	54.8	0			0	82.7	17.3					
Total %	0	0	0		0	24.9	0	2.6		27.6	19.1	23.1	0		42.1	0	25.1	5.2		30.3	0.2	99.8	
AUTOS	0	0	0		0	682	0	71		753	509	615	0		1127	0	688	138		829	0	0	2709
% AUTOS	0	0	0	0	0	95.9	0	94.7	0	95.8	93.7	93.5	0	100	93.6	0	96.4	92.6	100	95.7	0	0	94.9
BUSES	0	0	0		0	28	0	4		32	33	43	0		76	0	26	11		37	0	0	145
% BUSES	0	0	0	0	0	3.9	0	5.3	0	4.1	6.1	6.5	0	0	6.3	0	3.6	7.4	0	4.3	0	0	5.1
HEAVY TRUCKS	0	0	0		0	1	0	0		1	1	0	0		1	0	0	0		0	0	0	2
% HEAVY TRUCKS	0	0	0	0	0	0.1	0	0	0	0.1	0.2	0	0	0	0.1	0	0	0	0	0	0	0	0.1

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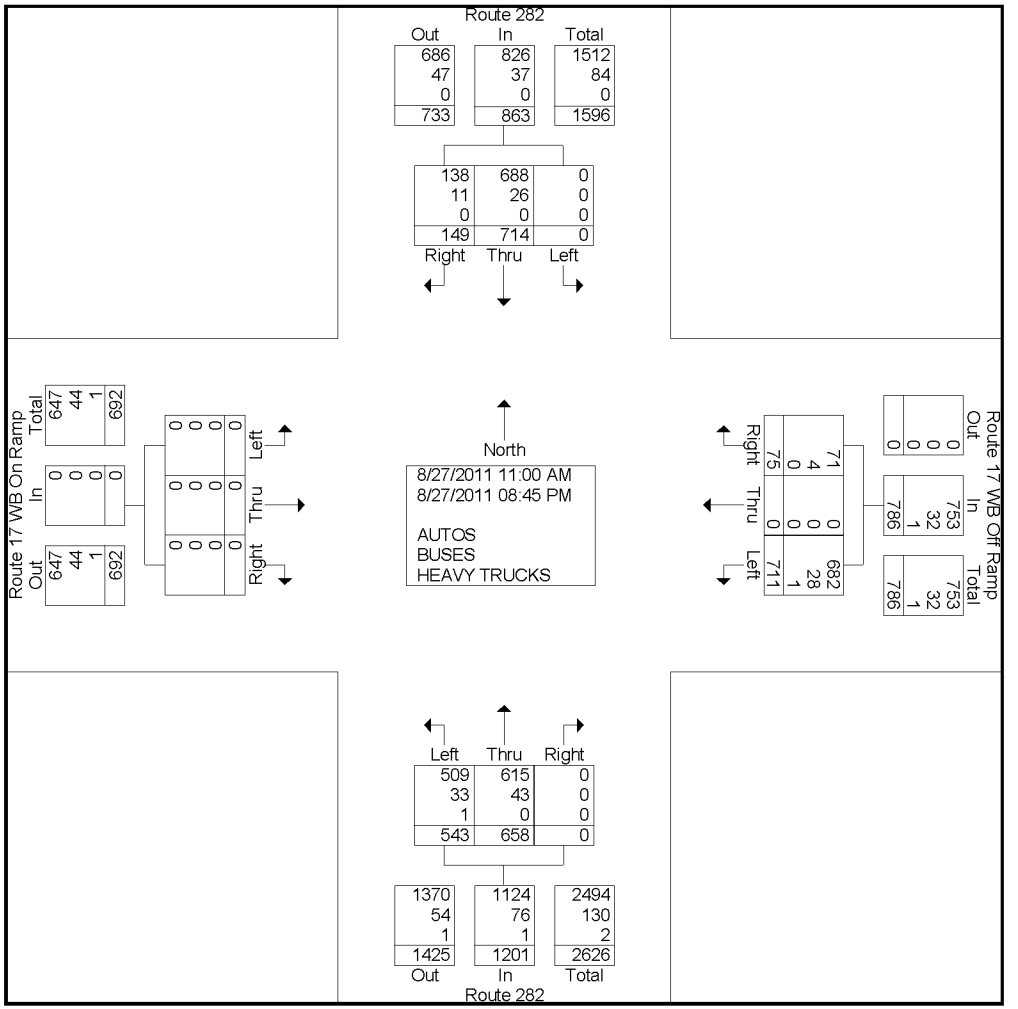


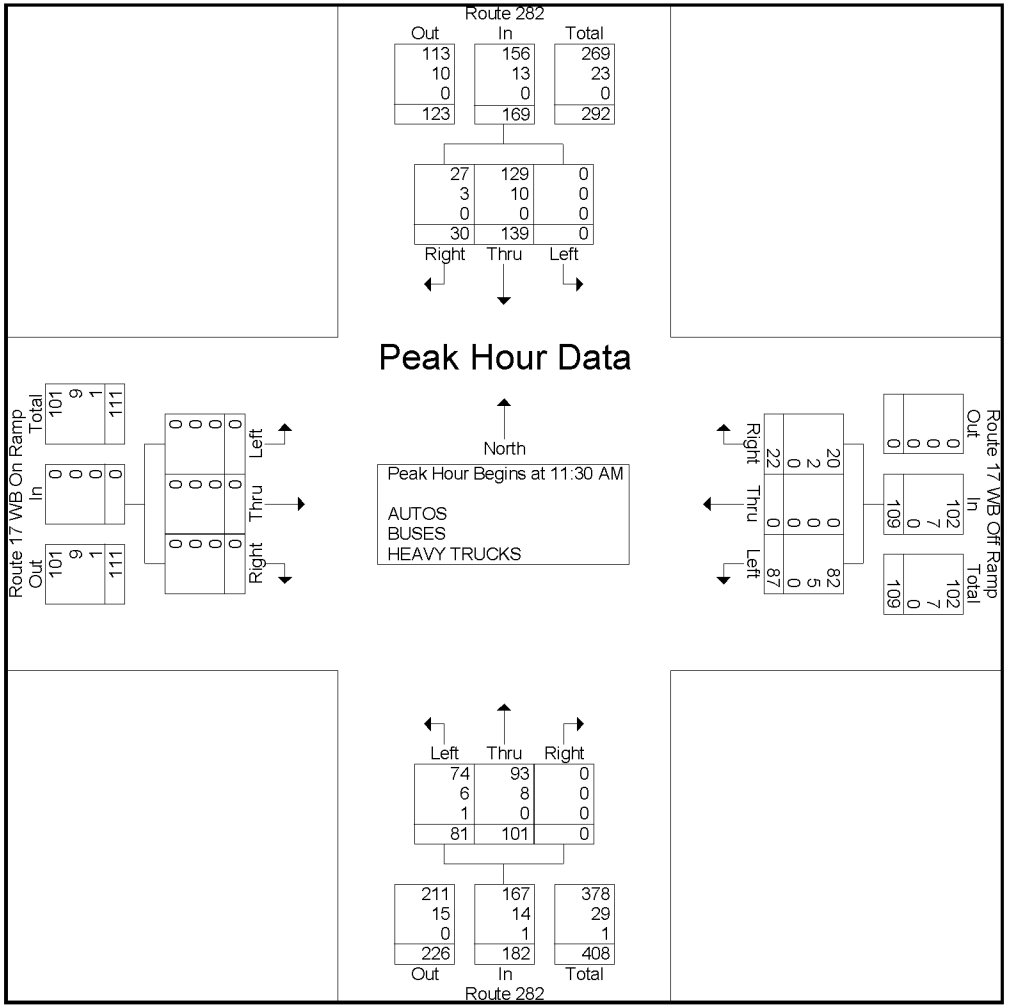
Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Saturday August 27, 2011
11:00 AM- 1:00 PM and 5:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000002
Start Date : 8/27/2011

	Route 17 WB On Ramp Eastbound				Route 17 WB Off Ramp Westbound				Route 282 Northbound				Route 282 Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:30 AM																	
11:30 AM	0	0	0	0	**23**	0	**8**	**31**	19	**30**	0	49	0	**52**	**10**	**62**	**142**
11:45 AM	0	0	0	0	22	0	7	29	17	22	0	39	0	24	5	29	97
12:00 PM	0	0	0	0	20	0	4	24	18	23	0	41	0	36	7	43	108
12:15 PM	0	0	0	0	22	0	3	25	**27**	26	0	**53**	0	27	8	35	113
Total Volume	0	0	0	0	87	0	22	109	81	101	0	182	0	139	30	169	460
% App. Total	0	0	0		79.8	0	20.2		44.5	55.5	0		0	82.2	17.8		
PHF	.000	.000	.000	.000	.946	.000	.688	.879	.750	.842	.000	.858	.000	.668	.750	.681	.810
AUTOS	0	0	0	0	82	0	20	102	74	93	0	167	0	129	27	156	425
% AUTOS	0	0	0	0	94.3	0	90.9	93.6	91.4	92.1	0	91.8	0	92.8	90.0	92.3	92.4
BUSES	0	0	0	0	5	0	2	7	6	8	0	14	0	10	3	13	34
% BUSES	0	0	0	0	5.7	0	9.1	6.4	7.4	7.9	0	7.7	0	7.2	10.0	7.7	7.4
HEAVY TRUCKS	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	1.2	0	0	0.5	0	0	0	0	0.2

Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Saturday August 27, 2011
11:00 AM- 1:00 PM and 5:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000002
Start Date : 8/27/2011
Page No : 4



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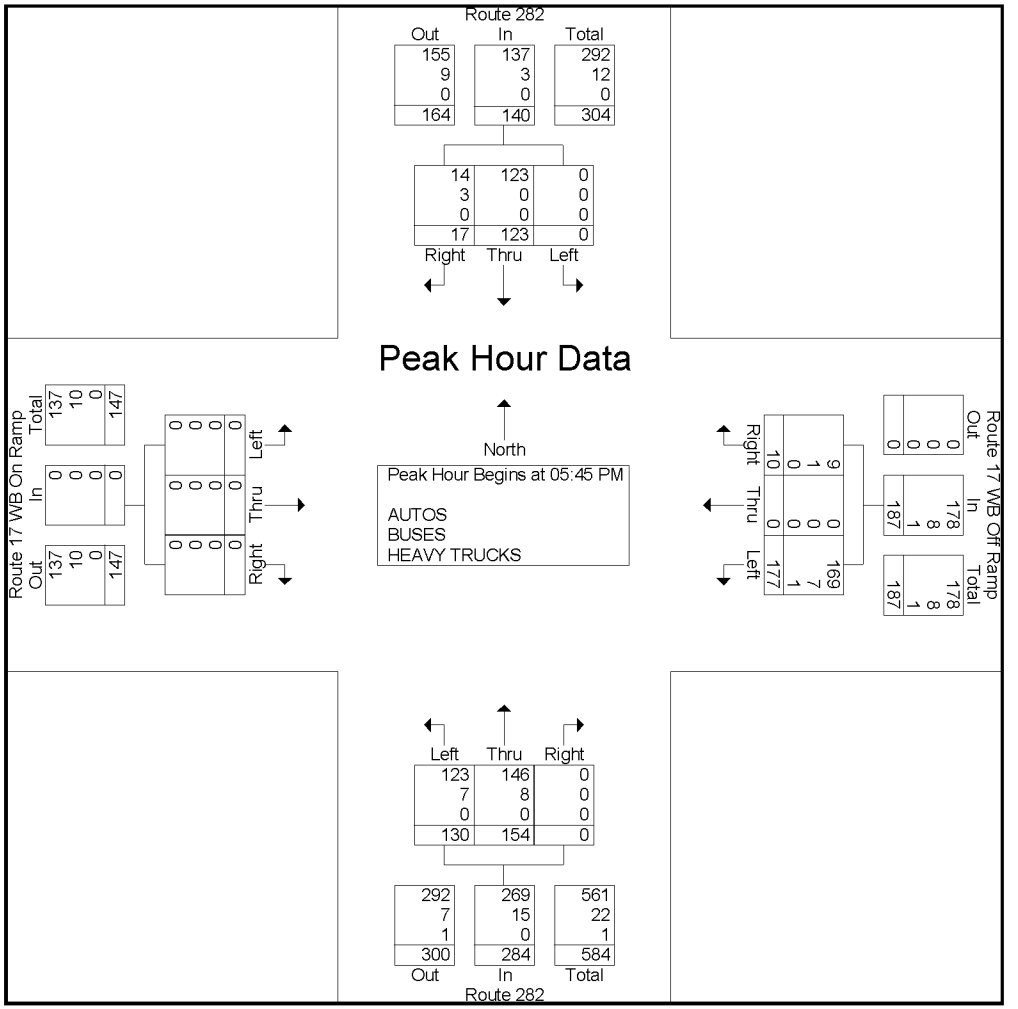
Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Saturday August 27, 2011
11:00 AM- 1:00 PM and 5:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000002
Start Date : 8/27/2011
Page No : 5

	Route 17 WB On Ramp Eastbound				Route 17 WB Off Ramp Westbound				Route 282 Northbound				Route 282 Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 08:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:45 PM																	
05:45 PM	0	0	0	0	**57**	0	2	**59**	29	**49**	0	78	0	**36**	**6**	**42**	**179**
06:00 PM	0	0	0	0	34	0	1	35	33	36	0	69	0	30	5	35	139
06:15 PM	0	0	0	0	49	0	**4**	53	28	28	0	56	0	28	4	32	141
06:30 PM	0	0	0	0	37	0	3	40	**40**	41	0	**81**	0	29	2	31	152
Total Volume	0	0	0	0	177	0	10	187	130	154	0	284	0	123	17	140	611
% App. Total	0	0	0		94.7	0	5.3		45.8	54.2	0		0	87.9	12.1		
PHF	.000	.000	.000	.000	.776	.000	.625	.792	.813	.786	.000	.877	.000	.854	.708	.833	.853
AUTOS	0	0	0	0	169	0	9	178	123	146	0	269	0	123	14	137	584
% AUTOS	0	0	0	0	95.5	0	90.0	95.2	94.6	94.8	0	94.7	0	100	82.4	97.9	95.6
BUSES	0	0	0	0	7	0	1	8	7	8	0	15	0	0	3	3	26
% BUSES	0	0	0	0	4.0	0	10.0	4.3	5.4	5.2	0	5.3	0	0	17.6	2.1	4.3
HEAVY TRUCKS	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1
% HEAVY TRUCKS	0	0	0	0	0.6	0	0	0.5	0	0	0	0	0	0	0	0	0.2

Tioga Downs Hotel Traffic Study
Route 17 WB Ramp at Route 282
Saturday August 27, 2011
11:00 AM- 1:00 PM and 5:00 PM - 9:00 PM

File Name : 2 RT 17 WB_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000002
Start Date : 8/27/2011
Page No : 6



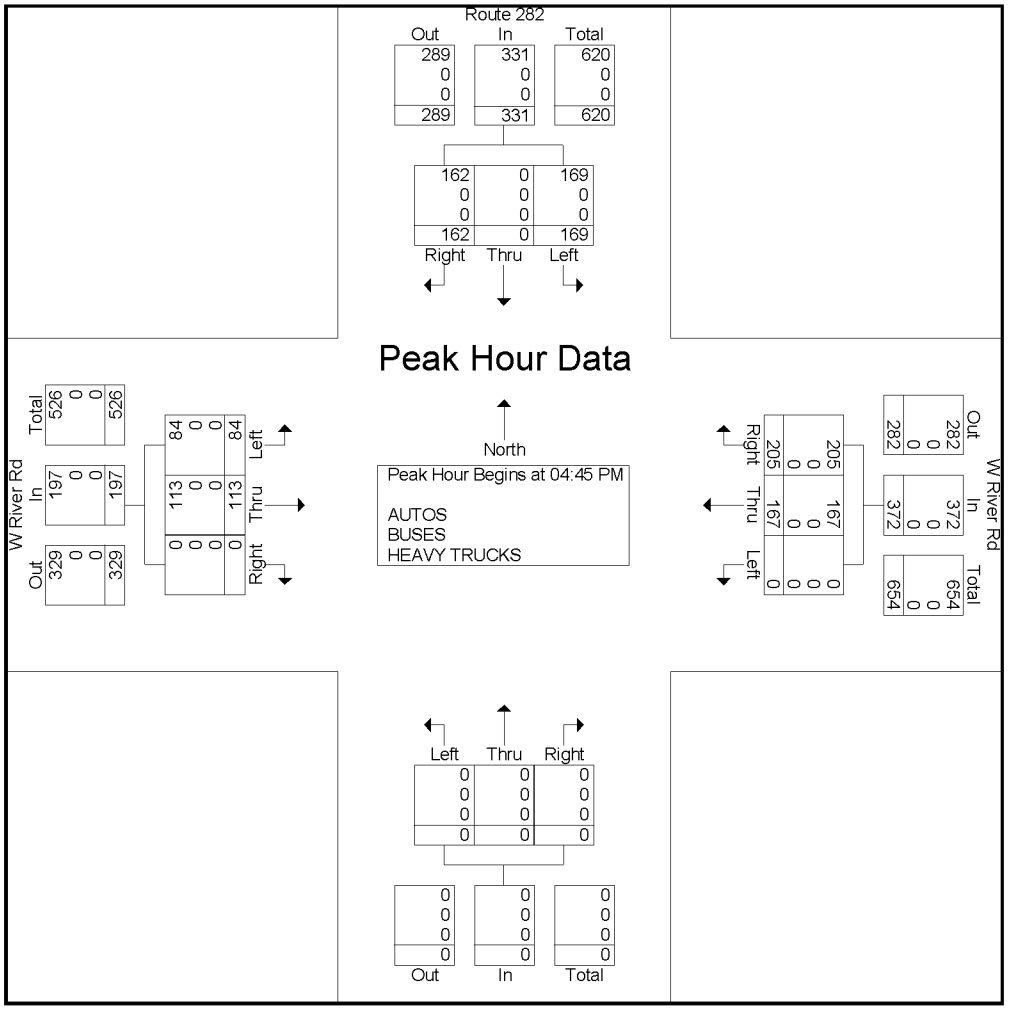
Tioga Downs Hotel Traffic Study
W River Rd at Route 282
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 3 W River Rd_RT 282 - 3pm-9pm FRI
Site Code : 00000002
Start Date : 8/26/2011
Page No : 3

	W River Rd Eastbound				W River Rd Westbound				Northbound				Route 282 Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 04:45 PM to 05:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	22	28	0	50	0	39	**54**	93	0	0	0	0	42	0	36	78	221
05:00 PM	**23**	**29**	0	**52**	0	34	53	87	0	0	0	0	44	0	31	75	214
05:15 PM	19	27	0	46	0	43	47	90	0	0	0	0	**46**	0	45	**91**	227
05:30 PM	20	29	0	49	0	**51**	51	**102**	0	0	0	0	37	0	**50**	87	**238**
Total Volume	84	113	0	197	0	167	205	372	0	0	0	0	169	0	162	331	900
% App. Total	42.6	57.4	0		0	44.9	55.1		0	0	0		51.1	0	48.9		
PHF	.913	.974	.000	.947	.000	.819	.949	.912	.000	.000	.000	.000	.918	.000	.810	.909	.945
AUTOS	84	113	0	197	0	167	205	372	0	0	0	0	169	0	162	331	900
% AUTOS	100	100	0	100	0	100	100	100	0	0	0	0	100	0	100	100	100
BUSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% BUSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Tioga Downs Hotel Traffic Study
W River Rd at Route 282
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 3 W River Rd_RT 282 - 3pm-9pm FRI
Site Code : 00000002
Start Date : 8/26/2011
Page No : 4



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Tioga Downs Hotel Traffic Study
W River Rd at Route 282
Saturday August 27, 2011
11:00 AM - 1:00 PM & 5:00 PM - 9:00 PM

File Name : 3 W River Rd_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000003
Start Date : 8/27/2011
Page No : 1

Groups Printed- AUTOS - BUSES - HEAVY TRUCKS

	W River Rd Eastbound					W River Rd Westbound					Northbound					Route 282 Southbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
11:00 AM	9	21	0	0	30	0	21	38	1	59	0	0	0	0	0	20	0	17	0	37	1	126	127
11:15 AM	3	20	0	0	23	0	17	39	0	56	0	0	0	0	0	25	0	30	0	55	0	134	134
11:30 AM	11	16	0	0	27	0	26	39	2	65	0	0	0	0	0	33	0	40	0	73	2	165	167
11:45 AM	10	19	0	0	29	0	23	26	0	49	0	0	0	0	0	19	0	22	0	41	0	119	119
Total	33	76	0	0	109	0	87	142	3	229	0	0	0	0	0	97	0	109	0	206	3	544	547
12:00 PM	12	31	0	0	43	0	30	29	0	59	0	0	0	0	0	30	0	24	0	54	0	156	156
12:15 PM	15	27	0	0	42	0	19	38	0	57	0	0	0	0	0	26	0	19	1	45	1	144	145
12:30 PM	14	22	0	0	36	0	13	24	0	37	0	0	0	0	0	21	0	28	1	49	1	122	123
12:45 PM	13	19	0	1	32	0	15	31	1	46	0	0	0	0	0	21	0	27	0	48	2	126	128
Total	54	99	0	1	153	0	77	122	1	199	0	0	0	0	0	98	0	98	2	196	4	548	552
*** BREAK ***																							
05:00 PM	17	24	0	0	41	0	23	26	0	49	0	0	0	0	0	21	0	28	0	49	0	139	139
05:15 PM	19	23	0	0	42	0	35	33	0	68	0	0	0	0	0	25	0	32	0	57	0	167	167
05:30 PM	17	21	0	0	38	0	32	24	0	56	0	0	0	0	0	33	0	43	0	76	0	170	170
05:45 PM	15	21	0	0	36	0	29	45	0	74	0	0	0	0	0	27	0	52	0	79	0	189	189
Total	68	89	0	0	157	0	119	128	0	247	0	0	0	0	0	106	0	155	0	261	0	665	665
06:00 PM	13	14	0	0	27	0	45	38	0	83	0	0	0	0	0	24	1	37	0	62	0	172	172
06:15 PM	19	25	0	0	44	0	36	38	0	74	0	0	0	0	0	18	0	52	0	70	0	188	188
06:30 PM	30	23	0	0	53	0	25	46	0	71	0	0	0	0	0	10	0	44	0	54	0	178	178
06:45 PM	10	26	0	0	36	0	46	31	0	77	0	0	0	0	0	26	0	47	0	73	0	186	186
Total	72	88	0	0	160	0	152	153	0	305	0	0	0	0	0	78	1	180	0	259	0	724	724
07:00 PM	18	26	0	0	44	0	36	35	0	71	0	0	0	0	0	12	0	40	0	52	0	167	167
07:15 PM	8	21	0	0	29	0	25	31	0	56	0	0	0	0	0	20	0	38	0	58	0	143	143
07:30 PM	12	13	0	0	25	0	30	16	0	46	0	0	0	0	0	26	0	28	0	54	0	125	125
07:45 PM	27	23	0	0	50	0	20	24	0	44	0	0	0	0	0	26	0	26	0	52	0	146	146
Total	65	83	0	0	148	0	111	106	0	217	0	0	0	0	0	84	0	132	0	216	0	581	581
08:00 PM	21	31	0	0	52	0	22	27	0	49	0	0	0	0	0	15	0	26	0	41	0	142	142
08:15 PM	22	44	0	0	66	0	21	24	0	45	0	0	0	0	0	28	0	28	0	56	0	167	167
08:30 PM	8	26	0	0	34	0	27	24	0	51	0	0	0	0	0	10	0	26	0	36	0	121	121
08:45 PM	14	20	0	0	34	0	17	31	0	48	0	0	0	0	0	15	0	20	0	35	0	117	117
Total	65	121	0	0	186	0	87	106	0	193	0	0	0	0	0	68	0	100	0	168	0	547	547
Grand Total	357	556	0	1	913	0	633	757	4	1390	0	0	0	0	0	531	1	774	2	1306	7	3609	3616
Apprch %	39.1	60.9	0			0	45.5	54.5			0	0	0			40.7	0.1	59.3					
Total %	9.9	15.4	0		25.3	0	17.5	21		38.5	0	0	0		0	14.7	0	21.4		36.2	0.2	99.8	
AUTOS	357	556	0		914	0	633	757		1394	0	0	0		0	531	1	774		1308	0	0	3616
% AUTOS	100	100	0	100	100	0	100	100	100	100	0	0	0	0	0	100	100	100	100	100	0	0	100
BUSES	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0
% BUSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEAVY TRUCKS	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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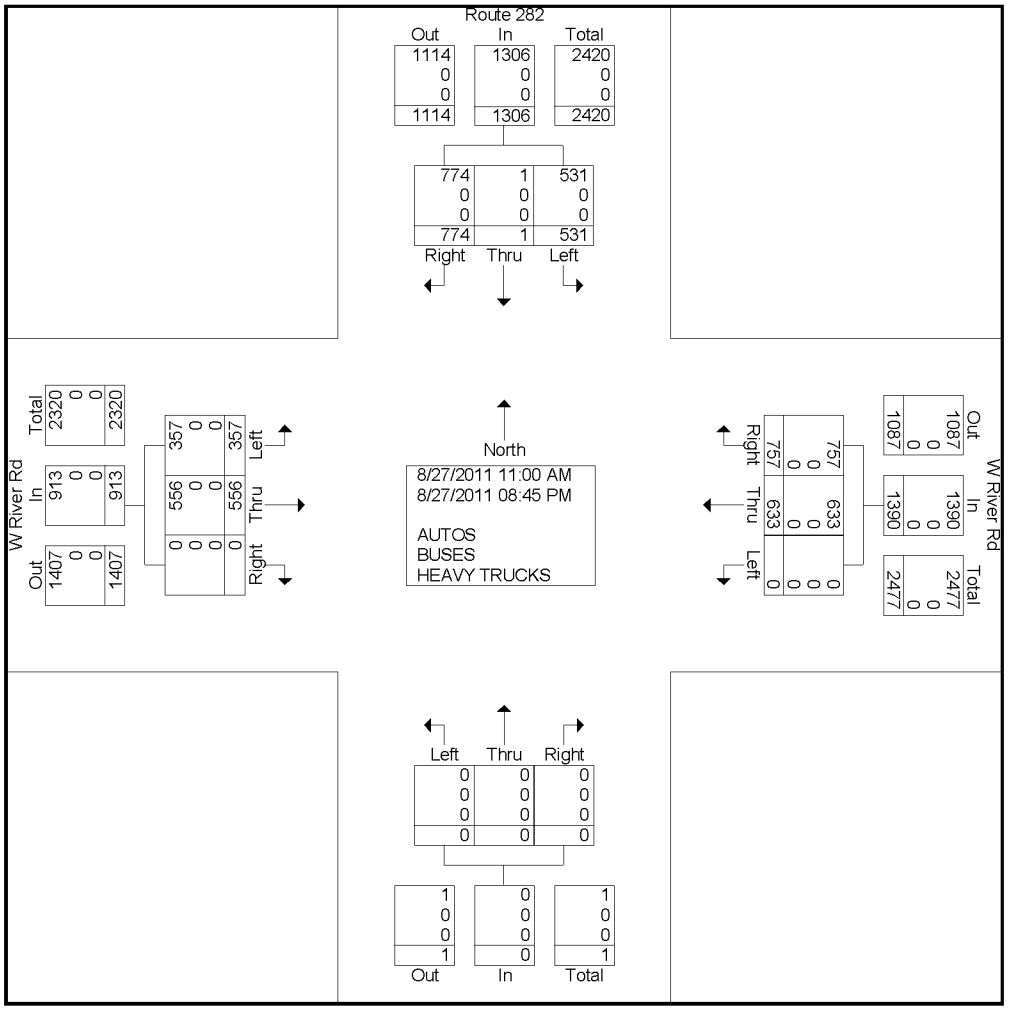


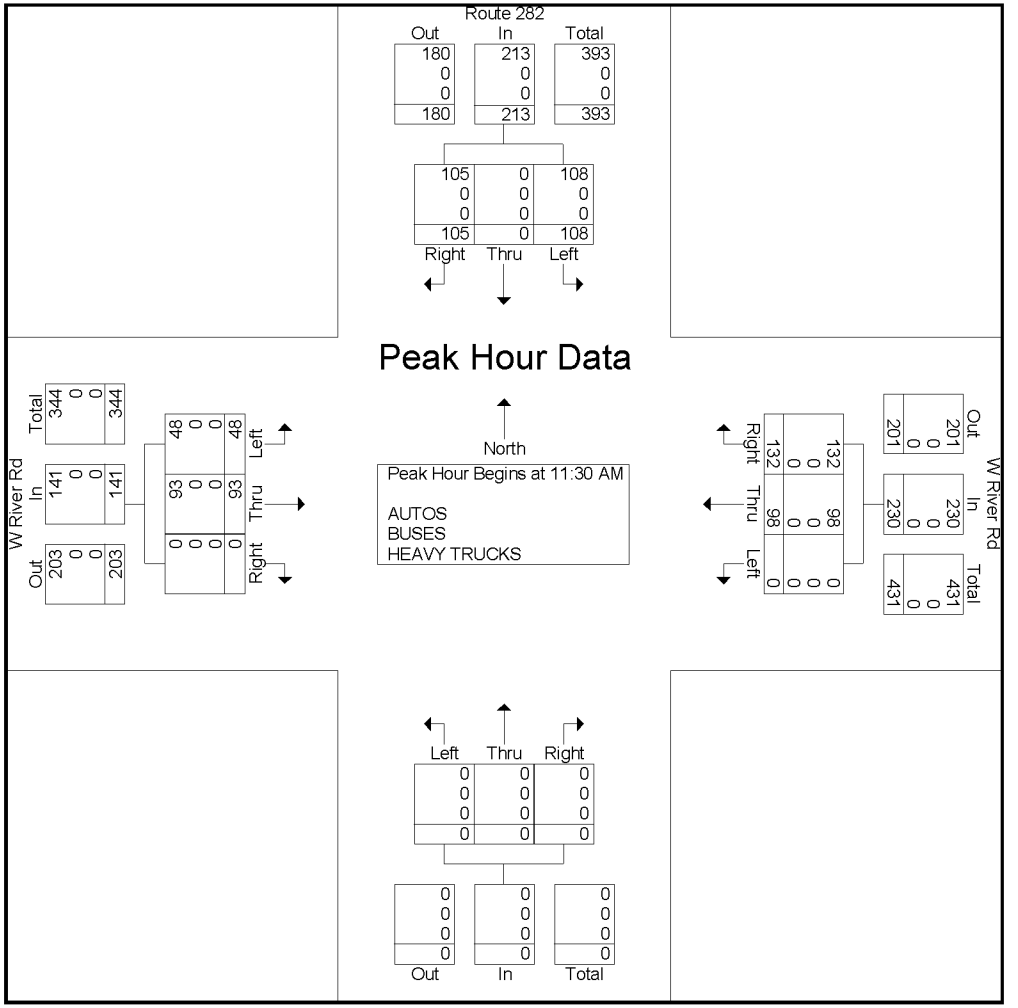
Tioga Downs Hotel Traffic Study
W River Rd at Route 282
Saturday August 27, 2011
11:00 AM - 1:00 PM & 5:00 PM - 9:00 PM

File Name : 3 W River Rd_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000003
Start Date : 8/27/2011
Page No : 3

	W River Rd Eastbound				W River Rd Westbound				Northbound				Route 282 Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:00 AM to 12:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:30 AM																	
11:30 AM	11	16	0	27	0	26	**39**	**65**	0	0	0	0	**33**	0	**40**	**73**	**165**
11:45 AM	10	19	0	29	0	23	26	49	0	0	0	0	19	0	22	41	119
12:00 PM	12	**31**	0	**43**	0	**30**	29	59	0	0	0	0	30	0	24	54	156
12:15 PM	**15**	27	0	42	0	19	38	57	0	0	0	0	26	0	19	45	144
Total Volume	48	93	0	141	0	98	132	230	0	0	0	0	108	0	105	213	584
% App. Total	34	66	0		0	42.6	57.4		0	0	0		50.7	0	49.3		
PHF	.800	.750	.000	.820	.000	.817	.846	.885	.000	.000	.000	.000	.818	.000	.656	.729	.885
AUTOS	48	93	0	141	0	98	132	230	0	0	0	0	108	0	105	213	584
% AUTOS	100	100	0	100	0	100	100	100	0	0	0	0	100	0	100	100	100
BUSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% BUSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Tioga Downs Hotel Traffic Study
W River Rd at Route 282
Saturday August 27, 2011
11:00 AM - 1:00 PM & 5:00 PM - 9:00 PM

File Name : 3 W River Rd_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000003
Start Date : 8/27/2011
Page No : 4



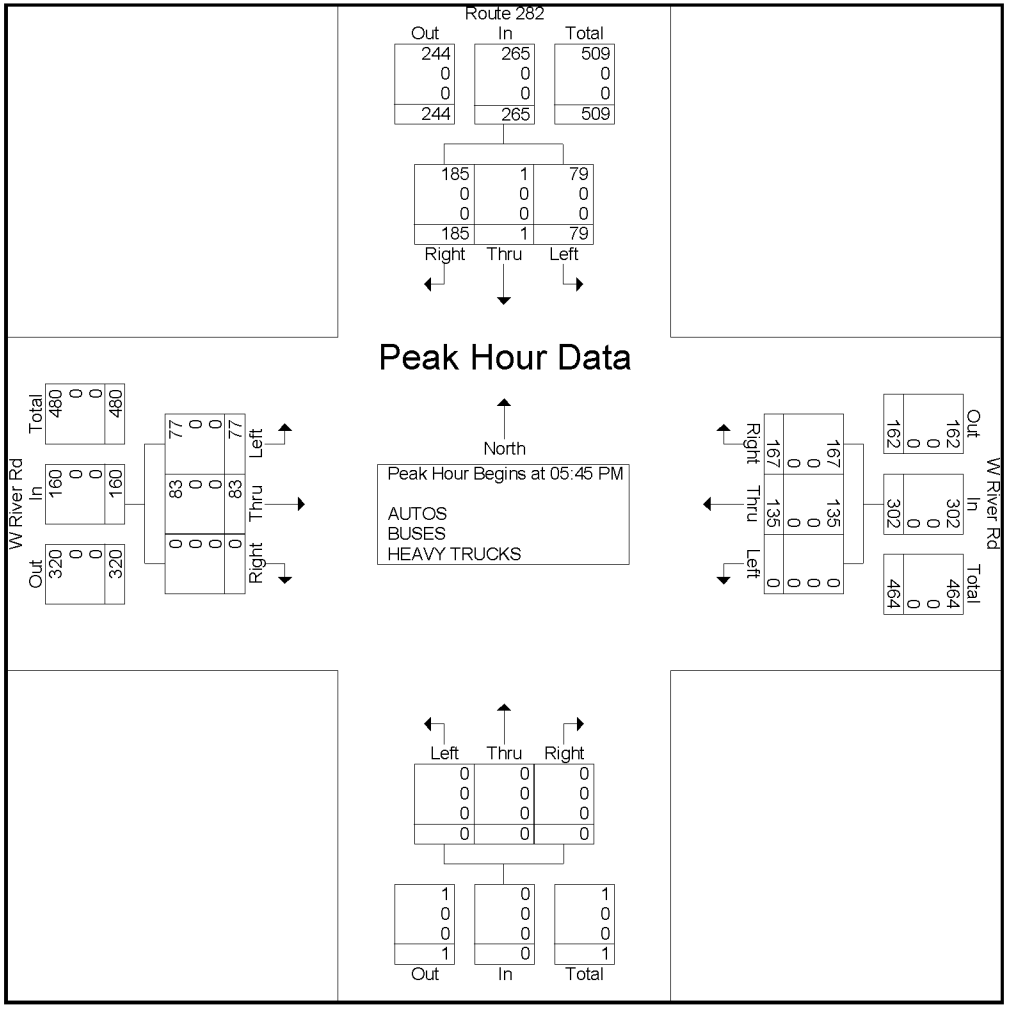
Tioga Downs Hotel Traffic Study
W River Rd at Route 282
Saturday August 27, 2011
11:00 AM - 1:00 PM & 5:00 PM - 9:00 PM

File Name : 3 W River Rd_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000003
Start Date : 8/27/2011

	W River Rd Eastbound				W River Rd Westbound				Northbound				Route 282 Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:00 PM to 08:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:45 PM																	
05:45 PM	15	21	0	36	0	29	45	74	0	0	0	0	**27**	0	**52**	**79**	**189**
06:00 PM	13	14	0	27	0	**45**	38	**83**	0	0	0	0	24	**1**	37	62	172
06:15 PM	19	**25**	0	44	0	36	38	74	0	0	0	0	18	0	52	70	188
06:30 PM	**30**	23	0	**53**	0	25	**46**	71	0	0	0	0	10	0	44	54	178
Total Volume	77	83	0	160	0	135	167	302	0	0	0	0	79	1	185	265	727
% App. Total	48.1	51.9	0		0	44.7	55.3		0	0	0		29.8	0.4	69.8		
PHF	.642	.830	.000	.755	.000	.750	.908	.910	.000	.000	.000	.000	.731	.250	.889	.839	.962
AUTOS	77	83	0	160	0	135	167	302	0	0	0	0	79	1	185	265	727
% AUTOS	100	100	0	100	0	100	100	100	0	0	0	0	100	100	100	100	100
BUSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% BUSES	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Tioga Downs Hotel Traffic Study
W River Rd at Route 282
Saturday August 27, 2011
11:00 AM - 1:00 PM & 5:00 PM - 9:00 PM

File Name : 3 W River Rd_RT 282 - 11am-1pm & 5pm-9pm SAT
Site Code : 00000003
Start Date : 8/27/2011
Page No : 6



BERGMANN ASSOCIATES

Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Friday August 26, 2011
3:00 PM - 9:00 PM

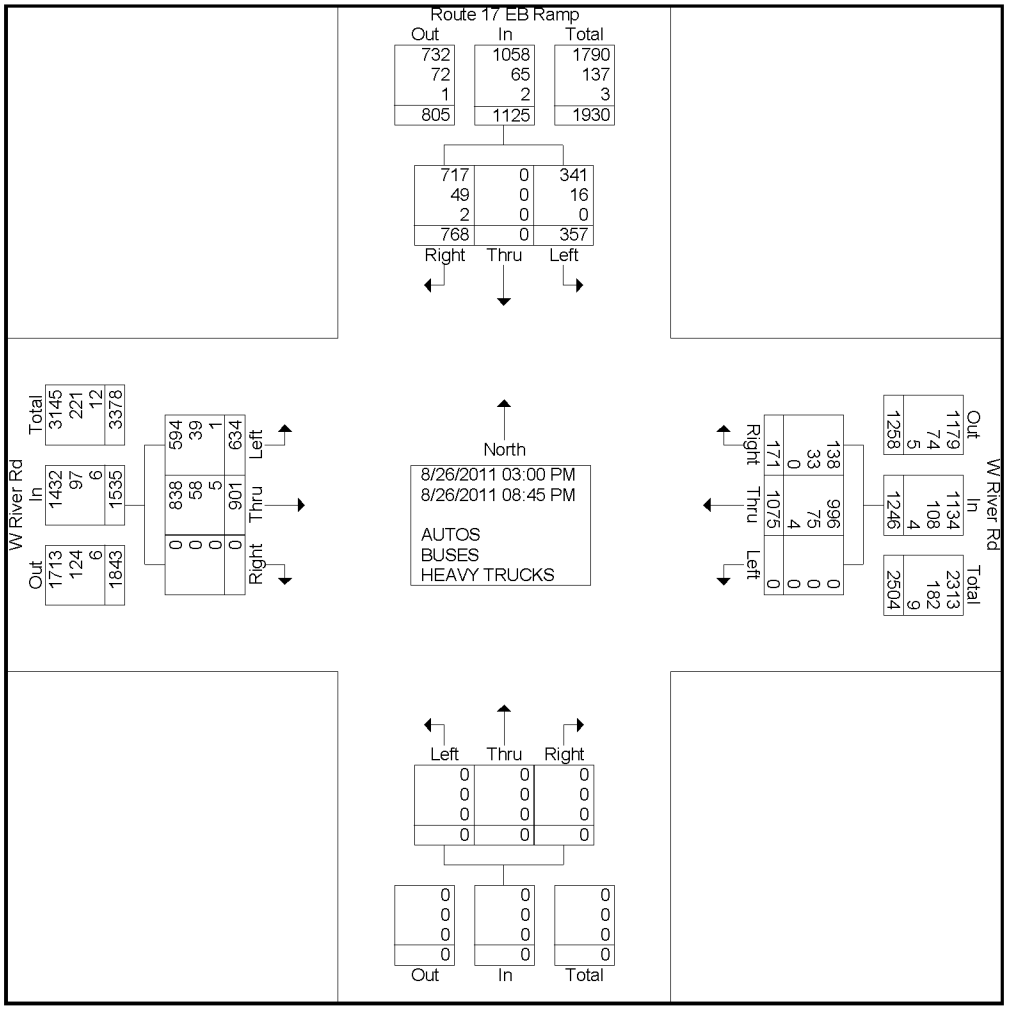
File Name : 4 RT 17 EB_W River Rd - 3pm-9pm FRI
Site Code : 00000004
Start Date : 8/26/2011
Page No : 1

Groups Printed- AUTOS - BUSES - HEAVY TRUCKS

	W River Rd Eastbound					W River Rd Westbound					Northbound					Route 17 EB Ramp Southbound							
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Exclu. Total	Inclu. Total	Int. Total
03:00 PM	26	48	0	0	74	0	36	6	0	42	0	0	0	0	0	11	0	22	0	33	0	149	149
03:15 PM	29	30	0	0	59	0	54	8	0	62	0	0	0	0	0	13	0	20	0	33	0	154	154
03:30 PM	35	31	0	0	66	0	46	13	1	59	0	0	0	0	0	18	0	35	0	53	1	178	179
03:45 PM	31	53	0	0	84	0	31	4	0	35	0	0	0	0	0	13	0	24	0	37	0	156	156
Total	121	162	0	0	283	0	167	31	1	198	0	0	0	0	0	55	0	101	0	156	1	637	638
04:00 PM	27	56	0	0	83	0	46	8	0	54	0	0	0	0	0	21	0	26	0	47	0	184	184
04:15 PM	26	46	0	0	72	0	49	9	0	58	0	0	0	0	0	18	0	44	0	62	0	192	192
04:30 PM	23	42	0	0	65	0	49	7	0	56	0	0	0	0	0	19	0	31	1	50	1	171	172
04:45 PM	28	59	0	0	87	0	66	11	0	77	0	0	0	0	0	20	0	33	0	53	0	217	217
Total	104	203	0	0	307	0	210	35	0	245	0	0	0	0	0	78	0	134	1	212	1	764	765
05:00 PM	23	46	0	0	69	0	61	6	0	67	0	0	0	0	0	26	0	36	0	62	0	198	198
05:15 PM	33	45	0	0	78	0	55	11	0	66	0	0	0	0	0	21	0	40	0	61	0	205	205
05:30 PM	25	38	0	0	63	0	63	12	1	75	0	0	0	0	0	18	0	47	0	65	1	203	204
05:45 PM	26	46	0	0	72	0	41	8	0	49	0	0	0	0	0	19	0	34	0	53	0	174	174
Total	107	175	0	0	282	0	220	37	1	257	0	0	0	0	0	84	0	157	0	241	1	780	781
06:00 PM	22	42	0	0	64	0	49	8	0	57	0	0	0	0	0	18	0	38	0	56	0	177	177
06:15 PM	35	36	0	0	71	0	47	11	0	58	0	0	0	0	0	19	0	40	0	59	0	188	188
06:30 PM	26	29	0	0	55	0	53	5	0	58	0	0	0	0	0	14	0	46	0	60	0	173	173
06:45 PM	26	29	0	0	55	0	41	7	0	48	0	0	0	0	0	10	0	30	0	40	0	143	143
Total	109	136	0	0	245	0	190	31	0	221	0	0	0	0	0	61	0	154	0	215	0	681	681
07:00 PM	23	22	0	0	45	0	46	2	0	48	0	0	0	0	0	12	0	26	0	38	0	131	131
07:15 PM	11	23	0	0	34	0	30	3	0	33	0	0	0	0	0	2	0	33	0	35	0	102	102
07:30 PM	23	34	0	0	57	0	46	7	0	53	0	0	0	0	0	11	0	37	0	48	0	158	158
07:45 PM	30	30	0	0	60	0	36	4	0	40	0	0	0	0	0	9	0	23	1	32	1	132	133
Total	87	109	0	0	196	0	158	16	0	174	0	0	0	0	0	34	0	119	1	153	1	523	524
08:00 PM	21	41	0	0	62	0	47	10	0	57	0	0	0	0	0	12	0	28	0	40	0	159	159
08:15 PM	23	29	0	0	52	0	35	1	0	36	0	0	0	0	0	13	0	27	1	40	1	128	129
08:30 PM	25	20	0	0	45	0	28	7	0	35	0	0	0	0	0	10	0	18	0	28	0	108	108
08:45 PM	37	26	0	0	63	0	20	3	0	23	0	0	0	0	0	10	0	30	0	40	0	126	126
Total	106	116	0	0	222	0	130	21	0	151	0	0	0	0	0	45	0	103	1	148	1	521	522
Grand Total	634	901	0	0	1535	0	1075	171	2	1246	0	0	0	0	0	357	0	768	3	1125	5	3906	3911
Apprch %	41.3	58.7	0			0	86.3	13.7			0	0	0			31.7	0	68.3					
Total %	16.2	23.1	0		39.3	0	27.5	4.4		31.9	0	0	0		0	9.1	0	19.7		28.8	0.1	99.9	
AUTOS	594	838	0		1432	0	996	138		1136	0	0	0		0	341	0	717		1060	0	0	3628
% AUTOS	93.7	93	0	0	93.3	0	92.7	80.7	100	91	0	0	0	0	0	95.5	0	93.4	66.7	94	0	0	92.8
BUSES	39	58	0		97	0	75	33		108	0	0	0		0	16	0	49		66	0	0	271
% BUSES	6.2	6.4	0	0	6.3	0	7	19.3	0	8.7	0	0	0	0	0	4.5	0	6.4	33.3	5.9	0	0	6.9
HEAVY TRUCKS	1	5	0		6	0	4	0		4	0	0	0		0	0	0	2		2	0	0	12
% HEAVY TRUCKS	0.2	0.6	0	0	0.4	0	0.4	0	0	0.3	0	0	0	0	0	0	0	0.3	0	0.2	0	0	0.3

Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 4 RT 17 EB_W River Rd - 3pm-9pm FRI
Site Code : 00000004
Start Date : 8/26/2011
Page No : 2



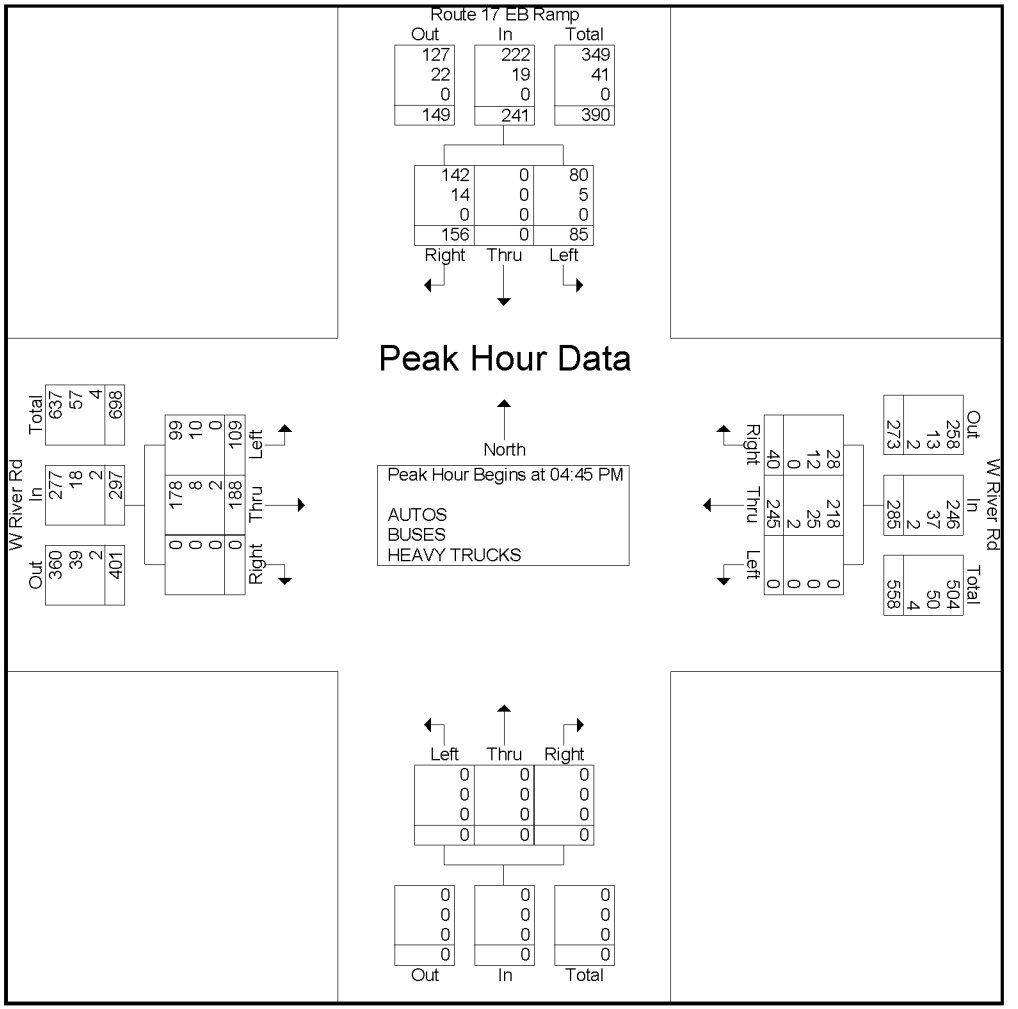
Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 4 RT 17 EB_W River Rd - 3pm-9pm FRI
Site Code : 00000004
Start Date : 8/26/2011
Page No : 3

	W River Rd Eastbound				W River Rd Westbound				Northbound				Route 17 EB Ramp Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 03:00 PM to 08:45 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 04:45 PM																	
04:45 PM	28	**59**	0	**87**	0	**66**	11	**77**	0	0	0	0	20	0	33	53	**217**
05:00 PM	23	46	0	69	0	61	6	67	0	0	0	0	**26**	0	36	62	198
05:15 PM	**33**	45	0	78	0	55	11	66	0	0	0	0	21	0	40	61	205
05:30 PM	25	38	0	63	0	63	**12**	75	0	0	0	0	18	0	**47**	**65**	203
Total Volume	109	188	0	297	0	245	40	285	0	0	0	0	85	0	156	241	823
% App. Total	36.7	63.3	0		0	86	14		0	0	0		35.3	0	64.7		
PHF	.826	.797	.000	.853	.000	.928	.833	.925	.000	.000	.000	.000	.817	.000	.830	.927	.948
AUTOS	99	178	0	277	0	218	28	246	0	0	0	0	80	0	142	222	745
% AUTOS	90.8	94.7	0	93.3	0	89.0	70.0	86.3	0	0	0	0	94.1	0	91.0	92.1	90.5
BUSES	10	8	0	18	0	25	12	37	0	0	0	0	5	0	14	19	74
% BUSES	9.2	4.3	0	6.1	0	10.2	30.0	13.0	0	0	0	0	5.9	0	9.0	7.9	9.0
HEAVY TRUCKS	0	2	0	2	0	2	0	2	0	0	0	0	0	0	0	0	4
% HEAVY TRUCKS	0	1.1	0	0.7	0	0.8	0	0.7	0	0	0	0	0	0	0	0	0.5

Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Friday August 26, 2011
3:00 PM - 9:00 PM

File Name : 4 RT 17 EB_W River Rd - 3pm-9pm FRI
Site Code : 00000004
Start Date : 8/26/2011
Page No : 4



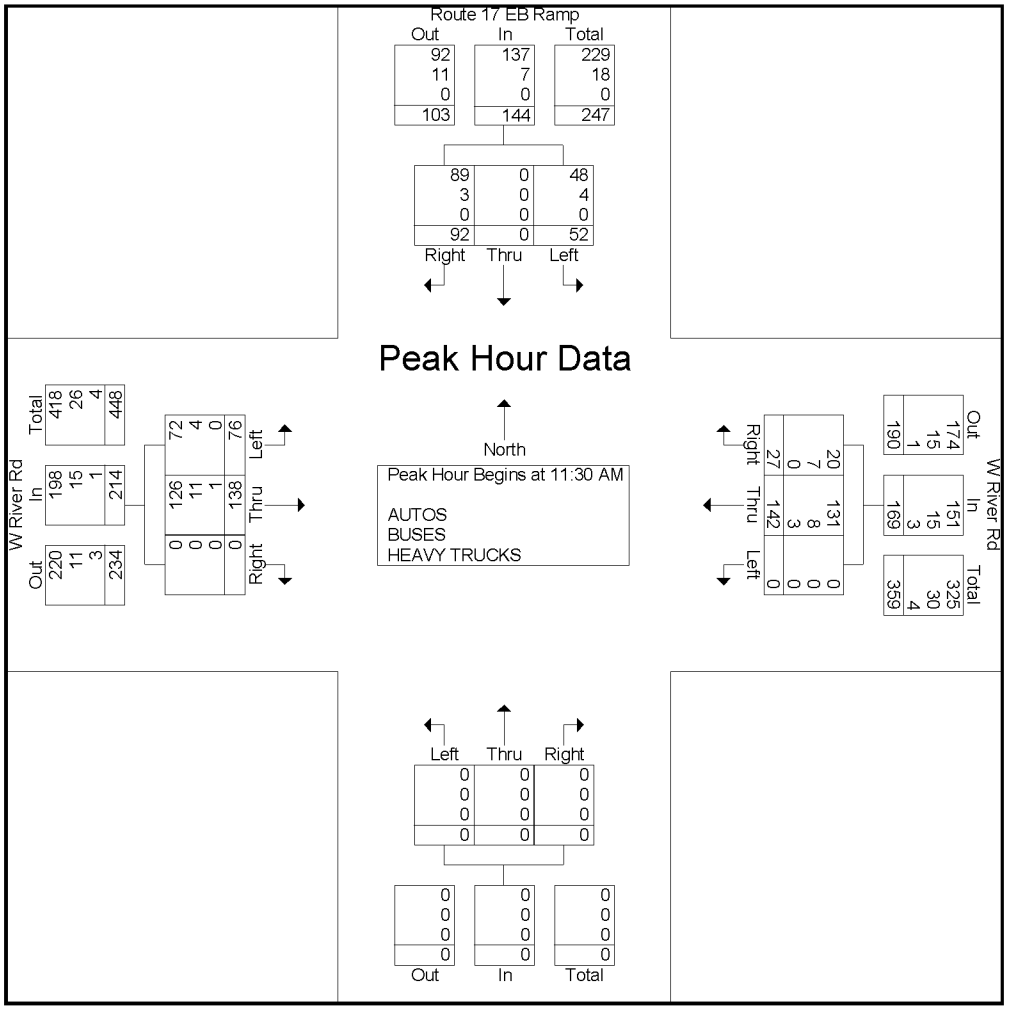
Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Saturday August 27, 2011
11:00 AM - 1:00 PM and 5:00 PM - 9:00 PM

File Name : 4 RT 17 EB_W River Rd - 11am-1pm & 5pm-9pm SAT
Site Code : 00000004
Start Date : 8/27/2011

	W River Rd Eastbound				W River Rd Westbound				Northbound				Route 17 EB Ramp Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 11:30 AM to 12:15 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 11:30 AM																	
11:30 AM	19	33	0	52	0	36	5	41	0	0	0	0	10	0	**28**	38	131
11:45 AM	11	33	0	44	0	28	**10**	38	0	0	0	0	7	0	25	32	114
12:00 PM	**23**	**39**	0	**62**	0	38	5	43	0	0	0	0	**18**	0	22	**40**	**145**
12:15 PM	23	33	0	56	0	**40**	7	**47**	0	0	0	0	17	0	17	34	137
Total Volume	76	138	0	214	0	142	27	169	0	0	0	0	52	0	92	144	527
% App. Total	35.5	64.5	0		0	84	16		0	0	0		36.1	0	63.9		
PHF	.826	.885	.000	.863	.000	.888	.675	.899	.000	.000	.000	.000	.722	.000	.821	.900	.909
AUTOS	72	126	0	198	0	131	20	151	0	0	0	0	48	0	89	137	486
% AUTOS	94.7	91.3	0	92.5	0	92.3	74.1	89.3	0	0	0	0	92.3	0	96.7	95.1	92.2
BUSES	4	11	0	15	0	8	7	15	0	0	0	0	4	0	3	7	37
% BUSES	5.3	8.0	0	7.0	0	5.6	25.9	8.9	0	0	0	0	7.7	0	3.3	4.9	7.0
HEAVY TRUCKS	0	1	0	1	0	3	0	3	0	0	0	0	0	0	0	0	4
% HEAVY TRUCKS	0	0.7	0	0.5	0	2.1	0	1.8	0	0	0	0	0	0	0	0	0.8

Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Saturday August 27, 2011
11:00 AM - 1:00 PM and 5:00 PM - 9:00 PM

File Name : 4 RT 17 EB_W River Rd - 11am-1pm & 5pm-9pm SAT
Site Code : 00000004
Start Date : 8/27/2011
Page No : 4



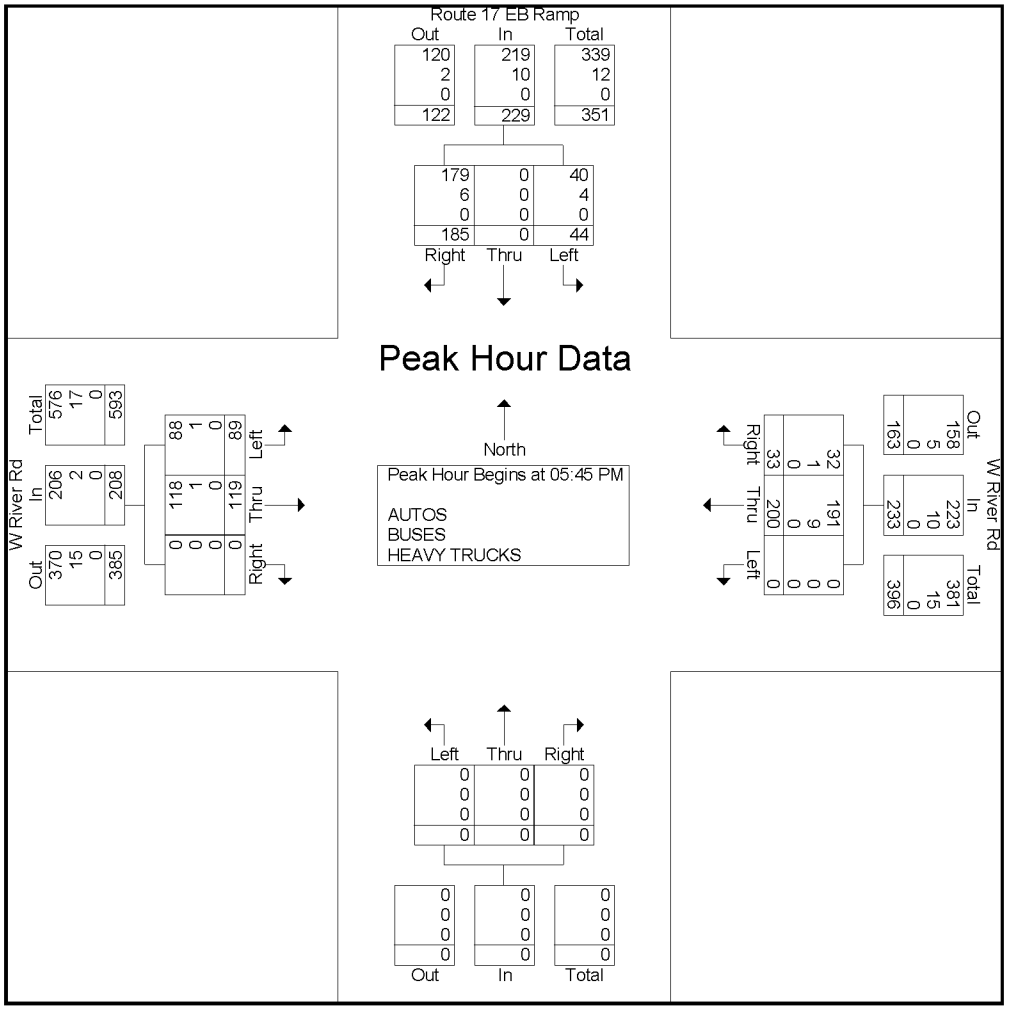
Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Saturday August 27, 2011
11:00 AM - 1:00 PM and 5:00 PM - 9:00 PM

File Name : 4 RT 17 EB_W River Rd - 11am-1pm & 5pm-9pm SAT
Site Code : 00000004
Start Date : 8/27/2011

	W River Rd Eastbound				W River Rd Westbound				Northbound				Route 17 EB Ramp Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 05:45 PM to 06:30 PM - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 05:45 PM																	
05:45 PM	24	**38**	0	**62**	0	**60**	9	**69**	0	0	0	0	4	0	45	49	180
06:00 PM	**27**	34	0	61	0	51	**14**	65	0	0	0	0	**15**	0	45	60	**186**
06:15 PM	21	25	0	46	0	38	4	42	0	0	0	0	10	0	40	50	138
06:30 PM	17	22	0	39	0	51	6	57	0	0	0	0	15	0	**55**	**70**	166
Total Volume	89	119	0	208	0	200	33	233	0	0	0	0	44	0	185	229	670
% App. Total	42.8	57.2	0		0	85.8	14.2		0	0	0		19.2	0	80.8		
PHF	.824	.783	.000	.839	.000	.833	.589	.844	.000	.000	.000	.000	.733	.000	.841	.818	.901
AUTOS	88	118	0	206	0	191	32	223	0	0	0	0	40	0	179	219	648
% AUTOS	98.9	99.2	0	99.0	0	95.5	97.0	95.7	0	0	0	0	90.9	0	96.8	95.6	96.7
BUSES	1	1	0	2	0	9	1	10	0	0	0	0	4	0	6	10	22
% BUSES	1.1	0.8	0	1.0	0	4.5	3.0	4.3	0	0	0	0	9.1	0	3.2	4.4	3.3
HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% HEAVY TRUCKS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Tioga Downs Hotel Traffic Study
Route 17 EB Ramp at W River Rd
Saturday August 27, 2011
11:00 AM - 1:00 PM and 5:00 PM - 9:00 PM

File Name : 4 RT 17 EB_W River Rd - 11am-1pm & 5pm-9pm SAT
Site Code : 00000004
Start Date : 8/27/2011
Page No : 6



Appendix C

Detailed Level of Service Analysis Results

- **2011 Existing Conditions**

Bergmann associates

DEFINITION OF LEVEL OF SERVICE FOR

SIGNALIZED INTERSECTIONS

Level of service for signalized intersections is defined in terms of delay, which is a measure of driver discomfort, frustration, fuel consumption, and lost travel time. The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during ideal conditions: in the absence of traffic control, in the absence of geometric delay, in the absence of any incidents and when there are no other vehicles on the road. Only the portion of total delay attributed to the control facility is quantified. This delay is called *control delay.* Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

Specifically, LOS criteria for traffic signals are stated in terms of the average control delay per vehicle, typically for a 15-minute analysis period. The criteria are given in the following table. Delay is a complex measure and is dependent on a number of variables, including the quality of progression, the cycle length, the green ratio, and the v/c ratio for the lane group in question.

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (sec)
A	Less than or equal to 10.0
B	Greater than 10.0 to no more than 20.0
C	Greater than 20.0 to no more than 35.0
D	Greater than 35.0 to no more than 55.0
E	Greater than 55.0 to no more than 80.0
F	Greater than 80.0

Level Of Service A describes operations with very low control delay, up to 10 seconds per vehicle. This level of service occurs when progression is extremely favorable and most vehicles arrive during the green phase. Most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.

Level Of Service B describes operations with control delay greater than 10 and up to 20 seconds per vehicle. This level generally occurs with good progression, short cycle lengths, or both. More vehicles stop than with LOS A, causing higher levels of average delay.

Level Of Service C describes operations with control delay greater than 20 and up to 35 seconds per vehicle. These higher delays may result form fair progression, longer cycle lengths, or both. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, though many still pass through the intersection without stopping.

Level Of Service D describes operations with control delay greater than 35 and up to 55 seconds per vehicle. At level D, the influence of congestion becomes more noticeable. Longer delays may result form some combination of unfavorable progression, long cycle lengths, or high *v/c* ratios. Many vehicles stop, and the proportion of vehicles not stopping declines. Individual cycle failures are noticeable.

Level Of Service E describes operations with control delay greater than 55 and up to 80 seconds per vehicle. This level is considered by many agencies to be the limit of acceptable delay. These high delay values generally indicate poor progression, long cycle lengths, and high v/c ratios. Individual cycle failures are frequent occurrences.

Level Of Service F describes operations with control delay in excess of 80 seconds per vehicle. This level, considered to be unacceptable to most drivers, often occurs with oversaturation, that is, when arrival flow rates exceed the capacity of the intersection. It may also occur at high v/c ratios below 1.0 with many individual cycle failures. Poor progression and long cycle lengths may also be major contributing factors to such delay levels.

DEFINITION OF LEVEL OF SERVICE FOR

UNSIGNALIZED INTERSECTIONS

The level of service for a Two-Way-Stop-Control (TWSC) intersection is determined by the computed or measured control delay and is defined for each minor movement. Level of service is not defined for the intersection as a whole. LOS criteria are given in the accompanying table.

LEVEL OF SERVICE	CONTROL DELAY PER VEHICLE (sec)
A	Less than or equal to 10.0
B	Greater than 10.0 to no more than 15.0
C	Greater than 15.0 to no more than 25.0
D	Greater than 25.0 to no more than 35.0
E	Greater than 35.0 to no more than 50.0
F	Greater than 50.0

The LOS criteria for TWSC intersections are somewhat different than the criteria used for signalized intersections. The primary reason for this difference is that drivers expect different levels of performance from different kinds of transportation facilities. The expectation is that a signalized intersection would be designed to carry higher traffic volumes than an unsignalized intersection. In addition, a number of driver behavior considerations combine to make delays at signalized intersections less onerous than delays at unsignalized intersections. Also, there is often much more variability in the amount of delay experienced by individual drivers at an unsignalized intersection versus that at signalized intersections. For these reasons, it is considered that the control delay threshold for any given level of service would be less for an unsignalized intersection than it would be for a signalized intersection.

The delay experienced by a motorist is made up of a number of factors that relate to control, geometrics, traffic, and incidents. Total delay is the difference between the travel time actually experienced and the reference travel time that would result during conditions with ideal geometrics and in the absence of incidents, control and traffic. This delay is called *control delay*. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

In the performance evaluation of TWSC intersections, it is important to consider other measures of effectiveness (MOE's) in addition to delay, such as v/c ratios for individual movements, average queue lengths, and 95th percentile queue lengths. By focusing on a single MOE for the worst movement only, such as delay for the minor-street left turn, inappropriate traffic control decisions may be made.

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	32	55	210	41	36	83
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.84	0.84	0.88	0.88
Hourly flow rate (vph)	37	63	250	49	41	94
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			100		617	68
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			100		617	68
tC, single (s)			4.2		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.3
p0 queue free %			83		89	91
cM capacity (veh/h)			1468		360	995

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	100	299	41	94
Volume Left	0	250	41	0
Volume Right	63	0	0	94
cSH	1700	1468	360	995
Volume to Capacity	0.06	0.17	0.11	0.09
Queue Length 95th (ft)	0	15	10	8
Control Delay (s)	0.0	6.9	16.3	9.0
Lane LOS		A	C	A
Approach Delay (s)	0.0	6.9	11.2	
Approach LOS			B	

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	30.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	32	55	210	41	36	83
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.84	0.84	0.88	0.88
Hourly flow rate (vph)	37	63	250	49	41	94
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			100		617	68
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			100		617	68
tC, single (s)			4.2		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.3
p0 queue free %			83		89	91
cM capacity (veh/h)			1468		360	995

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	100	299	135
Volume Left	0	250	41
Volume Right	63	0	94
cSH	1700	1468	1192
Volume to Capacity	0.06	0.17	0.11
Queue Length 95th (ft)	0	15	10
Control Delay (s)	0.0	6.9	11.2
Lane LOS		A	B
Approach Delay (s)	0.0	6.9	11.2
Approach LOS			B

Intersection Summary			
Average Delay	6.7		
Intersection Capacity Utilization	30.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	36	20	113	27	10	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.77	0.77
Hourly flow rate (vph)	46	26	145	35	13	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			72		383	59
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			72		383	59
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			91		98	95
cM capacity (veh/h)			1528		561	996

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	72	179	13	47
Volume Left	0	145	13	0
Volume Right	26	0	0	47
cSH	1700	1528	561	996
Volume to Capacity	0.04	0.09	0.02	0.05
Queue Length 95th (ft)	0	8	2	4
Control Delay (s)	0.0	6.3	11.6	8.8
Lane LOS		A	B	A
Approach Delay (s)	0.0	6.3	9.4	
Approach LOS			A	

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	36	20	113	27	10	36
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.77	0.77
Hourly flow rate (vph)	46	26	145	35	13	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			72		383	59
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			72		383	59
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			91		98	95
cM capacity (veh/h)			1528		561	996

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	72	179	60
Volume Left	0	145	13
Volume Right	26	0	47
cSH	1700	1528	1272
Volume to Capacity	0.04	0.09	0.05
Queue Length 95th (ft)	0	8	4
Control Delay (s)	0.0	6.3	9.4
Lane LOS		A	A
Approach Delay (s)	0.0	6.3	9.4
Approach LOS			A

Intersection Summary			
Average Delay	5.4		
Intersection Capacity Utilization	24.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	19	41	302	35	22	113
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	30	65	336	39	29	151
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			95		773	63
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			95		773	63
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			78		89	85
cM capacity (veh/h)			1499		272	1002

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	95	374	29	151
Volume Left	0	336	29	0
Volume Right	65	0	0	151
cSH	1700	1499	272	1002
Volume to Capacity	0.06	0.22	0.11	0.15
Queue Length 95th (ft)	0	22	9	13
Control Delay (s)	0.0	7.4	19.8	9.2
Lane LOS		A	C	A
Approach Delay (s)	0.0	7.4	11.0	
Approach LOS			B	

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	19	41	302	35	22	113
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	30	65	336	39	29	151
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			95		773	63
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			95		773	63
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			78		89	85
cM capacity (veh/h)			1499		272	1002

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	95	374	180
Volume Left	0	336	29
Volume Right	65	0	151
cSH	1700	1499	1197
Volume to Capacity	0.06	0.22	0.15
Queue Length 95th (ft)	0	22	13
Control Delay (s)	0.0	7.4	11.0
Lane LOS		A	B
Approach Delay (s)	0.0	7.4	11.0
Approach LOS			B

Intersection Summary			
Average Delay	7.3		
Intersection Capacity Utilization	35.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	160	0	30	149	164	0	0	201	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.91	0.91	0.91	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	188	0	35	164	180	0	0	218	41
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	782	747	239	747	767	180	260			180		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	782	747	239	747	767	180	260			180		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	35	100	96	87			100		
cM capacity (veh/h)	268	296	800	290	288	850	1228			1395		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	224	344	260
Volume Left	188	164	0
Volume Right	35	0	41
cSH	324	1228	1700
Volume to Capacity	0.69	0.13	0.15
Queue Length 95th (ft)	121	12	0
Control Delay (s)	37.6	4.6	0.0
Lane LOS	E	A	
Approach Delay (s)	37.6	4.6	0.0
Approach LOS	E		

Intersection Summary			
Average Delay	12.1		
Intersection Capacity Utilization	50.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	87	0	22	28	152	0	0	139	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.88	0.88	0.88	0.86	0.86	0.86	0.68	0.68	0.68
Hourly flow rate (vph)	0	0	0	99	0	25	33	177	0	0	204	44
Pedestrians								2			3	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								4.0			4.0	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	496	468	228	470	490	180	249			177		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	496	468	228	470	490	180	249			177		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	80	100	97	97			100		
cM capacity (veh/h)	459	480	809	486	466	843	1277			1399		

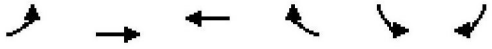
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	124	209	249
Volume Left	99	33	0
Volume Right	25	0	44
cSH	532	1277	1700
Volume to Capacity	0.23	0.03	0.15
Queue Length 95th (ft)	22	2	0
Control Delay (s)	13.8	1.4	0.0
Lane LOS	B	A	
Approach Delay (s)	13.8	1.4	0.0
Approach LOS	B		

Intersection Summary			
Average Delay		3.5	
Intersection Capacity Utilization		41.6%	ICU Level of Service A
Analysis Period (min)		15	

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	177	0	10	130	154	0	0	123	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.79	0.79	0.79	0.88	0.88	0.88	0.83	0.83	0.83
Hourly flow rate (vph)	0	0	0	224	0	13	148	175	0	0	148	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	642	629	158	629	639	175	169			175		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	642	629	158	629	639	175	169			175		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	38	100	99	89			100		
cM capacity (veh/h)	350	357	887	359	352	848	1391			1401		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	237	323	169
Volume Left	224	148	0
Volume Right	13	0	20
cSH	370	1391	1700
Volume to Capacity	0.64	0.11	0.10
Queue Length 95th (ft)	106	9	0
Control Delay (s)	30.4	4.1	0.0
Lane LOS	D	A	
Approach Delay (s)	30.4	4.1	0.0
Approach LOS	D		

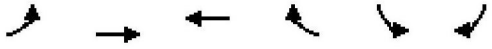
Intersection Summary			
Average Delay	11.7		
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	84	113	172	229	184	177
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	88	119	189	252	202	195
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	441				485	189
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	441				485	189
tC, single (s)	4.3				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.4				3.6	3.4
p0 queue free %	91				58	77
cM capacity (veh/h)	1030				487	840

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	207	189	252	397
Volume Left	88	0	0	202
Volume Right	0	0	252	195
cSH	1030	1700	1700	613
Volume to Capacity	0.09	0.11	0.15	0.65
Queue Length 95th (ft)	7	0	0	117
Control Delay (s)	4.2	0.0	0.0	21.0
Lane LOS	A			C
Approach Delay (s)	4.2	0.0		21.0
Approach LOS				C

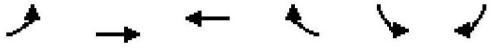
Intersection Summary			
Average Delay	8.8		
Intersection Capacity Utilization	50.7%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	48	93	98	132	115	111
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.82	0.89	0.89	0.73	0.73
Hourly flow rate (vph)	59	113	110	148	158	152
Pedestrians			2		1	
Lane Width (ft)			11.5		12.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	259				344	111
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	259				344	111
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	95				74	84
cM capacity (veh/h)	1270				612	928

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	172	110	148	310
Volume Left	59	0	0	158
Volume Right	0	0	148	152
cSH	1270	1700	1700	735
Volume to Capacity	0.05	0.06	0.09	0.42
Queue Length 95th (ft)	4	0	0	53
Control Delay (s)	3.0	0.0	0.0	13.4
Lane LOS	A			B
Approach Delay (s)	3.0	0.0		13.4
Approach LOS				B

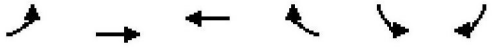
Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	34.1%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	87	83	135	197	90	210
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.76	0.76	0.91	0.91	0.84	0.84
Hourly flow rate (vph)	114	109	148	216	107	250
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	365				487	148
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	365				487	148
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	90				78	72
cM capacity (veh/h)	1177				484	893

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	224	148	216	357
Volume Left	114	0	0	107
Volume Right	0	0	216	250
cSH	1177	1700	1700	713
Volume to Capacity	0.10	0.09	0.13	0.50
Queue Length 95th (ft)	8	0	0	71
Control Delay (s)	4.7	0.0	0.0	15.0
Lane LOS	A			C
Approach Delay (s)	4.7	0.0		15.0
Approach LOS				C

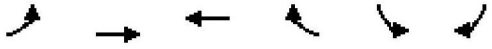
Intersection Summary			
Average Delay	6.8		
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	109	188	245	40	85	156
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	128	221	263	43	91	168
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	306				742	263
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	306				742	263
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	89				73	78
cM capacity (veh/h)	1216				337	759

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	128	221	263	43	259
Volume Left	128	0	0	0	91
Volume Right	0	0	0	43	168
cSH	1216	1700	1700	1700	527
Volume to Capacity	0.11	0.13	0.15	0.03	0.49
Queue Length 95th (ft)	9	0	0	0	67
Control Delay (s)	8.3	0.0	0.0	0.0	18.3
Lane LOS	A				C
Approach Delay (s)	3.1		0.0		18.3
Approach LOS					C

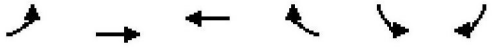
Intersection Summary			
Average Delay	6.3		
Intersection Capacity Utilization	43.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	76	138	142	27	52	92
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.86	0.86	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	88	160	158	30	58	102
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	188				495	158
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	188				495	158
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	94				88	88
cM capacity (veh/h)	1369				489	885

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	88	160	158	30	160
Volume Left	88	0	0	0	58
Volume Right	0	0	0	30	102
cSH	1369	1700	1700	1700	685
Volume to Capacity	0.06	0.09	0.09	0.02	0.23
Queue Length 95th (ft)	5	0	0	0	23
Control Delay (s)	7.8	0.0	0.0	0.0	11.8
Lane LOS	A				B
Approach Delay (s)	2.8		0.0		11.8
Approach LOS					B

Intersection Summary			
Average Delay	4.3		
Intersection Capacity Utilization	30.2%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	89	119	200	33	44	185
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.82	0.82
Hourly flow rate (vph)	106	142	238	39	54	226
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	277				592	238
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	277				592	238
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	92				87	72
cM capacity (veh/h)	1285				420	798

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	106	142	238	39	279
Volume Left	106	0	0	0	54
Volume Right	0	0	0	39	226
cSH	1285	1700	1700	1700	681
Volume to Capacity	0.08	0.08	0.14	0.02	0.41
Queue Length 95th (ft)	7	0	0	0	50
Control Delay (s)	8.1	0.0	0.0	0.0	13.9
Lane LOS	A				B
Approach Delay (s)	3.4		0.0		13.9
Approach LOS					B

Intersection Summary			
Average Delay	5.9		
Intersection Capacity Utilization	39.3%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix D

Detailed Traffic Accident Summary

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Intersection Accidents – West River Road @ Route 282

Location	Date	Day of Week	Time of Day	Severity	Road Condition	Light Condition	Type	Manner of Collision & Causal Factor(s)
West River Road at State Route 282	11/16/2008	Sun	2:45 PM	PDO	Dry	Daylight	Rear End	Following too closely
West River Road at State Route 282	3/8/2009	Sun	3:24 AM	NR	Dry	Dark Rd-Lighted	Rear End	Backing into parked vehicle, Alcohol involvement
West River Road at State Route 282	8/16/2009	Sun	Unknown	PDO	Unknown	Unknown	Unknown	Unknown
West River Road at State Route 282	6/11/2010	Fri	4:13 PM	NR	Dry	Daylight	Rear End	Unknown

NR = Non-Reportable
PDO = Property Damage Only
INJ = One or More Persons Injured

Intersection Accidents – West River Road @ Route 17 Eastbound Ramps

Location	Date	Day of Week	Time of Day	Severity	Road Condition	Light Condition	Type	Manner of Collision & Causal Factor(s)
West River Road at State Route 282	11/16/2008	Sun	2:45 PM	PDO	Dry	Daylight	Rear End	Following too closely

NR = Non-Reportable
PDO = Property Damage Only
INJ = One or More Persons Injured

Intersection Accidents – Route 282 @ Route 17 Westbound Ramps

Location	Date	Day of Week	Time of Day	Severity	Road Condition	Light Condition	Type	Manner of Collision & Causal Factor(s)
State Route 282 at Rte 17 WB Ramps	1/29/2011	Sat	5:05 PM	INJ	Wet	Dusk	Right Turn	Unknown

NR = Non-Reportable
PDO = Property Damage Only
INJ = One or More Persons Injured

Non-Intersection Accidents – Route 282 to Route 17C

Location	Date	Day of Week	Time of Day	Severity	Road Condition	Light Condition	Type	Manner of Collision & Causal Factor(s)
State Route 282 0.3 mi N of W River Rd	10/28/2009	Wed	8:00 PM	PDO	Wet	Dark Rd - Unlighted	Object	Animal's Action, vehicle struck deer

NR = Non-Reportable
PDO = Property Damage Only
INJ = One or More Persons Injured

Non-Intersection Accidents – Tioga Downs Main Entrance/Exit to Route 17 Eastbound Ramps

Location	Date	Day of Week	Time of Day	Severity	Road Condition	Light Condition	Type	Manner of Collision & Causal Factor(s)
West River Road 300 ft west of Rt 17 Ramp	2/29/2008	Fri	7:40 AM	NR	Dry	Daylight	Sideswipe	WB Vehicle making right, turn failure to keep right, glare
West River Road 110 m west of Rt 17 Ramp	3/24/2008	Mon	12:54 PM	INJ	Dry	Daylight	Object	Unknown, Unsafe Lane Change, collision with sign post
West River Road 700 ft west of Rt 17 Ramp	9/28/2008	Sat	1:42 PM	NR	Wet	Daylight	Sideswipe	Unknown, collision with vehicle
West River Road 322 m west of N Cole Hill	10/10/2008	Fri	6:51 AM	INJ	Dry	Dawn	Overturn	Unknown, view obstructed/limited
West River Road 1600 ft west of Rt 282	11/30/2008	Sun	7:38 PM	PDO	Wet	Dark Rd - Unlighted	Rear End	Following Too Closely, Unknown
West River Road 500 ft west of Howland Dr	1/1/2009	Thu	1:56 AM	PDO	Snow/Ice	Dark Rd - Unlighted	Object	Unknown, Collision with utility pole
West River Road 625 m east of N Cole Hill	3/17/2009	Tue	10:00 AM	NR	Dry	Daylight	Overtaking	Unsafe Lane Change, Unknown
West River Road 45 m west of Tioga Downs	5/10/2009	Sun	Unknown	PDO	Unknown	Unknown	Unknown	Unknown, collision with vehicle
West River Road 200 m west of N Cole Hill	7/19/2009	Sun	1:38 AM	PDO	Dry	Dark Rd - Unlighted	Object	Unsafe Speed, Alcohol Involvement, collision with tree
West River Road 1000 ft east of Tioga Downs	7/24/2009	Fri	8:22 PM	NR	Dry	Dusk	Overtaking	Driver Inattention
West River Road 200 ft west of N Cole Hill	12/31/2009	Thu	10:37 PM	PDO	Snow/Ice	Dark Rd - Unlighted	Object	Pavement Slippery, Unsafe Speed, Vehicle struck mailbox and tree
West River Road 300 ft west of Howland Dr	12/31/2009	Thu	1:44 PM	INJ	Snow/Ice	Daylight	Object	Pavement Slippery, Unsafe Speed, Vehicle struck tree
West River Road 105 m west of N Cole Hill	1/12/2010	Tue	6:47 AM	INJ	Snow/Ice	Dark Rd - Unlighted	Object	Unknown, collision with building
West River Road 150 m west of Rt 17 Ramp	11/4/2010	Thu	10:01 AM	PDO	Wet	Daylight	Right Angle	Unknown, Collision with vehicle
West River Road 130 m west of Rt 17 Ramp	11/22/2010	Mon	6:13 PM	INJ	Wet	Dark Rd - Unlighted	Bike	Collision with Crossing Bicyclist
West River Road 1000 ft west of N Cole Hill	1/12/2011	Wed	9:48 AM	PDO	Snow/Ice	Daylight	Object	Unknown, collision with utility pole
West River Road 1000 ft east of Rt 282	4/15/2011	Fri	11:15 PM	PDO	Dry	Dark Rd - Unlighted	Rear End	Following Too Closely

NR = Non-Reportable
PDO = Property Damage Only
INJ = One or More Persons Injured

Appendix E

2014 Signal Warrant Analysis at Route 282 and Route 17 Westbound Ramp

Bergmann associates

Tioga Downs Expansion Traffic Impact Study: Town of Nichols, NY
Route 282 at Route 17 Westbound Ramps
SIGNAL WARRANT ANALYSIS
2014 YEAR CONDITION

55 MPH = speed limit on Route 282

			VOLUMES				WARRANTS									
TIME			Route 282 2014 Build Weekday Volumes			Route 17 WB Off-Ramp 2014 Build Weekday Volumes	WARRANT 1 Condition A Minimum Vehicular Volume		WARRANT 1 Condition B Interruption of Continuous Traffic		WARRANT 1 Combination of Condition A and Condition B 56% Condition A		WARRANT 1 Combination of Condition A and Condition B 56% Condition B		WARRANT 2	WARRANT 3
			NB	SB	TOTAL	WB	MAJOR	MINOR	MAJOR	MINOR	MAJOR	MINOR	MAJOR	MINOR		
VOLUME CRITERIA:							350	105	525	53	280	84	420	42		
7:00 AM	TO	8:00 AM	113	162	275	84	NO	NO	NO	YES	NO	YES	NO	YES	NO	NO
8:00 AM	TO	9:00 AM	97	139	236	96	NO	NO	NO	YES	NO	YES	NO	YES	NO	NO
9:00 AM	TO	10:00 AM	106	141	247	113	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO
10:00 AM	TO	11:00 AM	107	129	236	138	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO
11:00 AM	TO	12:00 PM	126	132	258	157	NO	YES	NO	YES	NO	YES	NO	YES	NO	NO
12:00 PM	TO	1:00 PM	135	151	286	132	NO	YES	NO	YES	YES	YES	NO	YES	NO	NO
1:00 PM	TO	2:00 PM	142	146	288	144	NO	YES	NO	YES	YES	YES	NO	YES	NO	NO
2:00 PM	TO	3:00 PM	166	152	318	180	NO	YES	NO	YES	YES	YES	NO	YES	NO	NO
3:00 PM	TO	4:00 PM	263	181	444	224	YES	YES	NO	YES	YES	YES	YES	YES	YES	NO
4:00 PM	TO	5:00 PM	301	202	503	241	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES
5:00 PM	TO	6:00 PM	337	252	589	245	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
6:00 PM	TO	7:00 PM	254	187	441	271	YES	YES	NO	YES	YES	YES	YES	YES	YES	YES
7:00 PM	TO	8:00 PM	228	120	348	219	NO	YES	NO	YES	YES	YES	NO	YES	YES	NO
8:00 PM	TO	9:00 PM	192	119	311	127	NO	YES	NO	YES	YES	YES	NO	YES	NO	NO
HOURS SATISFIED:							4 Hours Met		1 Hour Met		4 Hours Met				5 Hours Met	3 Hours Met

CONCLUSION

IN YEAR 2014

Warrant	Met?	
1	No	
2	Yes	
3	Yes	
4	No	(pedestrian volumes much lower than threshold)

WARRANT DEFINITIONS:

WARRANT 1 = Eight-Hour Vehicular Volume
WARRANT 2 = Four-Hour Vehicular Volume
WARRANT 3 = Peak Hour
WARRANT 4 = Pedestrian Volume

Appendix F

Detailed Level of Service Analysis Results

- **2014 Build Conditions**

Bergmann associates

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	32	58	346	41	38	179
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.84	0.84	0.88	0.88
Hourly flow rate (vph)	37	67	412	49	43	203
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			103		943	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			103		943	70
tC, single (s)			4.2		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.3
p0 queue free %			72		78	80
cM capacity (veh/h)			1464		199	993

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	103	461	43	203
Volume Left	0	412	43	0
Volume Right	67	0	0	203
cSH	1700	1464	199	993
Volume to Capacity	0.06	0.28	0.22	0.20
Queue Length 95th (ft)	0	29	20	19
Control Delay (s)	0.0	7.8	28.0	9.6
Lane LOS		A	D	A
Approach Delay (s)	0.0	7.8	12.8	
Approach LOS			B	

Intersection Summary			
Average Delay	8.3		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	32	58	346	41	38	179
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.87	0.87	0.84	0.84	0.88	0.88
Hourly flow rate (vph)	37	67	412	49	43	203
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			103		943	70
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			103		943	70
tC, single (s)			4.2		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.3		3.6	3.3
p0 queue free %			72		78	80
cM capacity (veh/h)			1464		199	993

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	103	461	247
Volume Left	0	412	43
Volume Right	67	0	203
cSH	1700	1464	1138
Volume to Capacity	0.06	0.28	0.22
Queue Length 95th (ft)	0	29	21
Control Delay (s)	0.0	7.8	12.8
Lane LOS		A	B
Approach Delay (s)	0.0	7.8	12.8
Approach LOS			B

Intersection Summary			
Average Delay	8.3		
Intersection Capacity Utilization	38.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	36	24	298	27	13	163
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.77	0.77
Hourly flow rate (vph)	46	31	382	35	17	212
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			77		860	62
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			77		860	62
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			75		93	79
cM capacity (veh/h)			1522		244	992

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	77	417	17	212
Volume Left	0	382	17	0
Volume Right	31	0	0	212
cSH	1700	1522	244	992
Volume to Capacity	0.05	0.25	0.07	0.21
Queue Length 95th (ft)	0	25	6	20
Control Delay (s)	0.0	7.7	20.8	9.6
Lane LOS		A	C	A
Approach Delay (s)	0.0	7.7	10.4	
Approach LOS			B	

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	36	24	298	27	13	163
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.78	0.78	0.78	0.78	0.77	0.77
Hourly flow rate (vph)	46	31	382	35	17	212
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			77		860	62
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			77		860	62
tC, single (s)			4.1		6.4	6.3
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.4
p0 queue free %			75		93	79
cM capacity (veh/h)			1522		244	992

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	77	417	229
Volume Left	0	382	17
Volume Right	31	0	212
cSH	1700	1522	1071
Volume to Capacity	0.05	0.25	0.21
Queue Length 95th (ft)	0	25	20
Control Delay (s)	0.0	7.7	10.4
Lane LOS		A	B
Approach Delay (s)	0.0	7.7	10.4
Approach LOS			B

Intersection Summary			
Average Delay	7.7		
Intersection Capacity Utilization	34.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	19	45	487	35	25	240
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	30	71	541	39	33	320
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			102		1187	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			102		1187	66
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			64		73	68
cM capacity (veh/h)			1491		125	998

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	102	580	33	320
Volume Left	0	541	33	0
Volume Right	71	0	0	320
cSH	1700	1491	125	998
Volume to Capacity	0.06	0.36	0.27	0.32
Queue Length 95th (ft)	0	42	25	35
Control Delay (s)	0.0	8.4	43.8	10.3
Lane LOS		A	E	B
Approach Delay (s)	0.0	8.4	13.5	
Approach LOS			B	

Intersection Summary			
Average Delay	9.3		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	19	45	487	35	25	240
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	19	45	487	35	25	240
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			64		1050	42
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			64		1050	42
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			68		85	77
cM capacity (veh/h)			1538		163	1029

Direction, Lane #	EB 1	WB 1	NB 1	NB 2
Volume Total	64	522	25	240
Volume Left	0	487	25	0
Volume Right	45	0	0	240
cSH	1700	1538	163	1029
Volume to Capacity	0.04	0.32	0.15	0.23
Queue Length 95th (ft)	0	35	13	23
Control Delay (s)	0.0	8.0	31.1	9.6
Lane LOS		A	D	A
Approach Delay (s)	0.0	8.0	11.6	
Approach LOS			B	

Intersection Summary			
Average Delay	8.5		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	60		

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	19	45	487	35	25	240
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.63	0.63	0.90	0.90	0.75	0.75
Hourly flow rate (vph)	30	71	541	39	33	320
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						12
Median type	None			None		
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			102		1187	66
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			102		1187	66
tC, single (s)			4.1		6.5	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.6	3.3
p0 queue free %			64		73	68
cM capacity (veh/h)			1491		125	998

Direction, Lane #	EB 1	WB 1	NB 1
Volume Total	102	580	353
Volume Left	0	541	33
Volume Right	71	0	320
cSH	1700	1491	1102
Volume to Capacity	0.06	0.36	0.32
Queue Length 95th (ft)	0	42	35
Control Delay (s)	0.0	8.4	13.5
Lane LOS		A	B
Approach Delay (s)	0.0	8.4	13.5
Approach LOS			B

Intersection Summary			
Average Delay	9.3		
Intersection Capacity Utilization	45.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	223	0	30	192	169	0	0	206	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.85	0.85	0.85	0.91	0.91	0.91	0.92	0.92	0.92
Hourly flow rate (vph)	0	0	0	262	0	35	211	186	0	0	224	41
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	888	852	245	852	873	186	265			186		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	888	852	245	852	873	186	265			186		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	0	100	96	83			100		
cM capacity (veh/h)	220	245	794	238	239	844	1222			1389		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	298	397	265
Volume Left	262	211	0
Volume Right	35	0	41
cSH	260	1222	1700
Volume to Capacity	1.15	0.17	0.16
Queue Length 95th (ft)	330	16	0
Control Delay (s)	142.4	5.3	0.0
Lane LOS	F	A	
Approach Delay (s)	142.4	5.3	0.0
Approach LOS	F		

Intersection Summary				
Average Delay	46.4			
Intersection Capacity Utilization	56.9%	ICU Level of Service	B	
Analysis Period (min)	15			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	223	0	30	192	169	0	0	206	38
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	223	0	30	192	169	0	0	206	38
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	808	778	225	778	797	169	244			169		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	808	778	225	778	797	169	244			169		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.3			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	18	100	97	85			100		
cM capacity (veh/h)	255	277	814	271	270	862	1244			1409		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	253	361	244
Volume Left	223	192	0
Volume Right	30	0	38
cSH	295	1244	1700
Volume to Capacity	0.86	0.15	0.14
Queue Length 95th (ft)	290	14	0
Control Delay (s)	76.6	5.2	0.0
Lane LOS	F	A	
Approach Delay (s)	76.6	5.2	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	24.7		
Intersection Capacity Utilization	56.9%	ICU Level of Service	B
Analysis Period (min)	60		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	172	0	22	87	157	0	0	147	30
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.88	0.88	0.88	0.86	0.86	0.86	0.68	0.68	0.68
Hourly flow rate (vph)	0	0	0	195	0	25	101	183	0	0	216	44
Pedestrians								2			3	
Lane Width (ft)								12.0			12.0	
Walking Speed (ft/s)								4.0			4.0	
Percent Blockage								0			0	
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	651	623	240	625	645	186	260			183		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	651	623	240	625	645	186	260			183		
tC, single (s)	7.1	6.5	6.2	7.2	6.5	6.3	4.2			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.0	3.4	2.3			2.2		
p0 queue free %	100	100	100	47	100	97	92			100		
cM capacity (veh/h)	347	370	797	367	359	837	1265			1393		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	220	284	260
Volume Left	195	101	0
Volume Right	25	0	44
cSH	392	1265	1700
Volume to Capacity	0.56	0.08	0.15
Queue Length 95th (ft)	83	7	0
Control Delay (s)	25.4	3.4	0.0
Lane LOS	D	A	
Approach Delay (s)	25.4	3.4	0.0
Approach LOS	D		

Intersection Summary			
Average Delay	8.6		
Intersection Capacity Utilization	50.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	262	0	10	189	159	0	0	131	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.79	0.79	0.79	0.88	0.88	0.88	0.83	0.83	0.83
Hourly flow rate (vph)	0	0	0	332	0	13	215	181	0	0	158	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	791	778	168	778	789	181	178			181		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	791	778	168	778	789	181	178			181		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	0	100	98	84			100		
cM capacity (veh/h)	267	276	876	273	273	842	1380			1395		

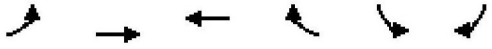
Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	344	395	178
Volume Left	332	215	0
Volume Right	13	0	20
cSH	280	1380	1700
Volume to Capacity	1.23	0.16	0.10
Queue Length 95th (ft)	402	14	0
Control Delay (s)	168.8	5.0	0.0
Lane LOS	F	A	
Approach Delay (s)	168.8	5.0	0.0
Approach LOS	F		

Intersection Summary			
Average Delay	65.5		
Intersection Capacity Utilization	51.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	0	0	262	0	10	189	159	0	0	131	17
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			2%			0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	0	0	0	262	0	10	189	159	0	0	131	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	686	676	140	676	685	159	148			159		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	686	676	140	676	685	159	148			159		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.4	2.2			2.2		
p0 queue free %	100	100	100	20	100	99	87			100		
cM capacity (veh/h)	321	325	909	326	321	866	1415			1420		

Direction, Lane #	WB 1	NB 1	SB 1
Volume Total	272	348	148
Volume Left	262	189	0
Volume Right	10	0	17
cSH	333	1415	1700
Volume to Capacity	0.82	0.13	0.09
Queue Length 95th (ft)	250	12	0
Control Delay (s)	58.2	4.8	0.0
Lane LOS	F	A	
Approach Delay (s)	58.2	4.8	0.0
Approach LOS	F		

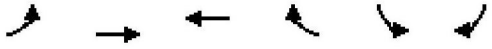
Intersection Summary				
Average Delay	22.8			
Intersection Capacity Utilization	51.9%	ICU Level of Service	A	
Analysis Period (min)	60			



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	132	161	240	229	184	245
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.95	0.95	0.91	0.91	0.91	0.91
Hourly flow rate (vph)	139	169	264	252	202	269
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	515				711	264
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	515				711	264
tC, single (s)	4.3				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.4				3.6	3.4
p0 queue free %	86				40	65
cM capacity (veh/h)	964				336	763

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	308	264	252	471
Volume Left	139	0	0	202
Volume Right	0	0	252	269
cSH	964	1700	1700	493
Volume to Capacity	0.14	0.16	0.15	0.96
Queue Length 95th (ft)	13	0	0	300
Control Delay (s)	5.0	0.0	0.0	59.2
Lane LOS	A			F
Approach Delay (s)	5.0	0.0		59.2
Approach LOS				F

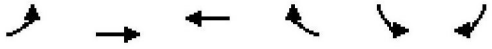
Intersection Summary			
Average Delay	22.7		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	132	161	240	229	184	245
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	132	161	240	229	184	245
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	469				665	240
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	469				665	240
tC, single (s)	4.3				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.4				3.6	3.4
p0 queue free %	87				49	69
cM capacity (veh/h)	1005				363	787

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	293	240	229	429
Volume Left	132	0	0	184
Volume Right	0	0	229	245
cSH	1005	1700	1700	524
Volume to Capacity	0.13	0.14	0.13	0.82
Queue Length 95th (ft)	11	0	0	275
Control Delay (s)	4.8	0.0	0.0	40.4
Lane LOS	A			E
Approach Delay (s)	4.8	0.0		40.4
Approach LOS				E

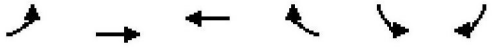
Intersection Summary			
Average Delay	15.8		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	60		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	112	156	190	132	115	204
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.82	0.82	0.89	0.89	0.73	0.73
Hourly flow rate (vph)	137	190	213	148	158	279
Pedestrians			2		1	
Lane Width (ft)			11.5		12.0	
Walking Speed (ft/s)			4.0		4.0	
Percent Blockage			0		0	
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	363				680	214
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	363				680	214
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	88				56	66
cM capacity (veh/h)	1162				360	812

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	327	213	148	437
Volume Left	137	0	0	158
Volume Right	0	0	148	279
cSH	1162	1700	1700	559
Volume to Capacity	0.12	0.13	0.09	0.78
Queue Length 95th (ft)	10	0	0	182
Control Delay (s)	4.2	0.0	0.0	30.7
Lane LOS	A			D
Approach Delay (s)	4.2	0.0		30.7
Approach LOS				D

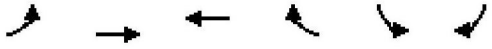
Intersection Summary			
Average Delay	13.1		
Intersection Capacity Utilization	53.4%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	151	146	227	197	90	303
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.76	0.76	0.91	0.91	0.84	0.84
Hourly flow rate (vph)	199	192	249	216	107	361
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	466				839	249
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	466				839	249
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	82				61	54
cM capacity (veh/h)	1080				272	784

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	391	249	216	468
Volume Left	199	0	0	107
Volume Right	0	0	216	361
cSH	1080	1700	1700	548
Volume to Capacity	0.18	0.15	0.13	0.85
Queue Length 95th (ft)	17	0	0	229
Control Delay (s)	5.5	0.0	0.0	38.7
Lane LOS	A			E
Approach Delay (s)	5.5	0.0		38.7
Approach LOS				E

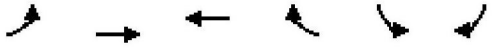
Intersection Summary			
Average Delay	15.3		
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	151	146	227	197	90	303
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Hourly flow rate (vph)	151	146	227	197	90	303
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	424				675	227
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	424				675	227
tC, single (s)	4.1				6.4	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	87				75	62
cM capacity (veh/h)	1119				360	807

Direction, Lane #	EB 1	WB 1	WB 2	SB 1
Volume Total	297	227	197	393
Volume Left	151	0	0	90
Volume Right	0	0	197	303
cSH	1119	1700	1700	629
Volume to Capacity	0.13	0.13	0.12	0.63
Queue Length 95th (ft)	12	0	0	120
Control Delay (s)	5.1	0.0	0.0	20.1
Lane LOS	A			C
Approach Delay (s)	5.1	0.0		20.1
Approach LOS				C

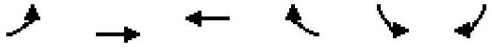
Intersection Summary			
Average Delay	8.5		
Intersection Capacity Utilization	61.6%	ICU Level of Service	B
Analysis Period (min)	60		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	153	192	250	40	85	219
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.85	0.85	0.93	0.93	0.93	0.93
Hourly flow rate (vph)	180	226	269	43	91	235
Pedestrians			1			
Lane Width (ft)			12.0			
Walking Speed (ft/s)			4.0			
Percent Blockage			0			
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	312				856	269
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	312				856	269
tC, single (s)	4.2				6.5	6.3
tC, 2 stage (s)						
tF (s)	2.3				3.6	3.4
p0 queue free %	85				67	69
cM capacity (veh/h)	1210				275	753

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	180	226	269	43	327
Volume Left	180	0	0	0	91
Volume Right	0	0	0	43	235
cSH	1210	1700	1700	1700	507
Volume to Capacity	0.15	0.13	0.16	0.03	0.65
Queue Length 95th (ft)	13	0	0	0	113
Control Delay (s)	8.5	0.0	0.0	0.0	24.1
Lane LOS	A				C
Approach Delay (s)	3.8		0.0		24.1
Approach LOS					C

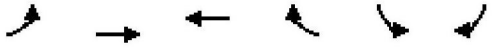
Intersection Summary			
Average Delay	9.0		
Intersection Capacity Utilization	49.8%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	134	143	150	27	52	176
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.86	0.86	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	156	166	167	30	58	196
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	197				645	167
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	197				645	167
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	89				85	78
cM capacity (veh/h)	1358				379	875

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	156	166	167	30	253
Volume Left	156	0	0	0	58
Volume Right	0	0	0	30	196
cSH	1358	1700	1700	1700	674
Volume to Capacity	0.11	0.10	0.10	0.02	0.38
Queue Length 95th (ft)	10	0	0	0	44
Control Delay (s)	8.0	0.0	0.0	0.0	13.5
Lane LOS	A				B
Approach Delay (s)	3.9		0.0		13.5
Approach LOS					B

Intersection Summary			
Average Delay	6.1		
Intersection Capacity Utilization	39.0%	ICU Level of Service	A
Analysis Period (min)	15		



Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Volume (veh/h)	147	124	208	33	44	269
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Peak Hour Factor	0.84	0.84	0.84	0.84	0.82	0.82
Hourly flow rate (vph)	175	148	248	39	54	328
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type		None	None			
Median storage veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	287				745	248
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	287				745	248
tC, single (s)	4.1				6.5	6.2
tC, 2 stage (s)						
tF (s)	2.2				3.6	3.3
p0 queue free %	86				83	58
cM capacity (veh/h)	1275				320	789

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1
Volume Total	175	148	248	39	382
Volume Left	175	0	0	0	54
Volume Right	0	0	0	39	328
cSH	1275	1700	1700	1700	654
Volume to Capacity	0.14	0.09	0.15	0.02	0.58
Queue Length 95th (ft)	12	0	0	0	95
Control Delay (s)	8.3	0.0	0.0	0.0	17.9
Lane LOS	A				C
Approach Delay (s)	4.5		0.0		17.9
Approach LOS					C

Intersection Summary			
Average Delay	8.4		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

Appendix G

Detailed SimTraffic Analysis Results

- **2014 Build Conditions**

Bergmann associates

Summary of All Intervals

Start Time	5:40
End Time	6:45
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intvls	1
Vehs Entered	922
Vehs Exited	921
Starting Vehs	11
Ending Vehs	12
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	185
Travel Time (hr)	13.1
Total Delay (hr)	1.0
Total Stops	162
Fuel Used (gal)	88.8

Interval #0 Information Seeding

Start Time	5:40
End Time	5:45
Total Time (min)	5
Volumes adjusted by Growth Factors.	
No data recorded this interval.	

Interval #1 Information Recording

Start Time	5:45
End Time	6:45
Total Time (min)	60
Volumes adjusted by Growth Factors.	

Vehs Entered	922
Vehs Exited	921
Starting Vehs	11
Ending Vehs	12
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	185
Travel Time (hr)	13.1
Total Delay (hr)	1.0
Total Stops	162
Fuel Used (gal)	88.8

1: West River Road & Tioga Downs Main Entrance Performance by movement

Movement	EBT	EBR	WBL	WBT	NBL	NBR	All
Total Delay (hr)	0.0	0.0	0.5	0.1	0.1	0.2	0.9
Delay / Veh (s)	1.3	0.5	3.3	5.7	18.3	2.8	3.5
Total Stops	0	2	15	0	15	126	158
Travel Dist (mi)	1.6	4.5	49.2	4.0	2.1	26.7	88.3
Travel Time (hr)	0.1	0.2	2.2	0.2	0.3	2.9	5.9
Avg Speed (mph)	32	28	22	24	6	9	15
Fuel Used (gal)	0.6	1.1	15.4	1.3	1.3	12.4	32.1
HC Emissions (g)	0	0	2	0	1	0	3
CO Emissions (g)	45	70	812	81	98	127	1233
NOx Emissions (g)	0	0	6	1	1	2	10
Vehicles Entered	16	45	513	41	23	284	922
Vehicles Exited	17	45	512	42	24	281	921
Hourly Exit Rate	17	45	512	42	24	281	921
Input Volume	19	45	487	35	25	240	851
% of Volume	89	100	105	120	96	117	108
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Total Network Performance

Total Delay (hr)	1.0
Delay / Veh (s)	4.0
Total Stops	162
Travel Dist (mi)	185.4
Travel Time (hr)	13.1
Avg Speed (mph)	14
Fuel Used (gal)	88.8
HC Emissions (g)	10
CO Emissions (g)	4806
NOx Emissions (g)	33
Vehicles Entered	922
Vehicles Exited	921
Hourly Exit Rate	921
Input Volume	1702
% of Volume	54
Denied Entry Before	0
Denied Entry After	0

Intersection: 1: West River Road & Tioga Downs Main Entrance

Movement	EB	WB	NB	NB
Directions Served	TR	LT	L	R
Maximum Queue (ft)	49	76	66	108
Average Queue (ft)	2	12	15	47
95th Queue (ft)	18	47	42	84
Link Distance (ft)	529	506	480	480
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Start Time	4:40
End Time	5:45
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intvls	1
Vehs Entered	1394
Vehs Exited	1386
Starting Vehs	22
Ending Vehs	30
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	553
Travel Time (hr)	25.8
Total Delay (hr)	8.0
Total Stops	1181
Fuel Used (gal)	270.6

Interval #0 Information Seeding

Start Time	4:40
End Time	4:45
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	4:45
End Time	5:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Vehs Entered	1394
Vehs Exited	1386
Starting Vehs	22
Ending Vehs	30
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	553
Travel Time (hr)	25.8
Total Delay (hr)	8.0
Total Stops	1181
Fuel Used (gal)	270.6

2: Route 17 WB On Ramp & Route 282 Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	1.5	0.1	0.2	0.2	0.0	0.0	1.9
Delay / Veh (s)	24.2	13.3	3.7	2.9	0.6	0.1	8.1
Stop Delay (hr)	1.3	0.1	0.1	0.0	0.0	0.0	1.6
St Del/Veh (s)	22.3	13.1	1.3	0.3	0.2	0.1	6.5
Total Stops	217	33	53	1	0	0	304
Stop/Veh	1.00	1.00	0.29	0.01	0.00	0.00	0.35
Travel Dist (mi)	19.6	3.0	21.6	22.2	10.1	1.5	78.0
Travel Time (hr)	2.3	0.3	1.1	0.9	0.3	0.1	4.9
Avg Speed (mph)	9	12	20	25	31	20	16
Vehicles Entered	217	33	181	187	214	32	864
Vehicles Exited	216	33	179	188	214	32	862
Hourly Exit Rate	216	33	179	188	214	32	862
Input Volume	223	30	192	170	206	38	859
% of Volume	97	110	93	111	104	84	100
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Intersection: 2: Route 17 WB On Ramp & Route 282

Movement	WB	NB
Directions Served	LR	LT
Maximum Queue (ft)	291	72
Average Queue (ft)	106	34
95th Queue (ft)	210	68
Link Distance (ft)	475	587
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Summary of All Intervals

Start Time	5:40
End Time	6:45
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intvls	1
Vehs Entered	1376
Vehs Exited	1367
Starting Vehs	14
Ending Vehs	23
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	519
Travel Time (hr)	22.2
Total Delay (hr)	5.3
Total Stops	1185
Fuel Used (gal)	255.5

Interval #0 Information Seeding

Start Time	5:40
End Time	5:45
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	5:45
End Time	6:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Vehs Entered	1376
Vehs Exited	1367
Starting Vehs	14
Ending Vehs	23
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	519
Travel Time (hr)	22.2
Total Delay (hr)	5.3
Total Stops	1185
Fuel Used (gal)	255.5

2: Route 17 WB On Ramp & Route 282 Performance by movement

Movement	WBL	WBR	NBL	NBT	SBT	SBR	All
Total Delay (hr)	1.5	0.1	0.2	0.1	0.0	0.0	1.9
Delay / Veh (s)	21.3	13.1	2.9	2.6	0.4	0.1	8.4
Stop Delay (hr)	1.4	0.0	0.0	0.0	0.0	0.0	1.5
St Del/Veh (s)	19.2	12.4	0.8	0.2	0.2	0.1	6.7
Total Stops	261	14	35	1	0	0	311
Stop/Veh	1.01	1.00	0.18	0.01	0.00	0.00	0.39
Travel Dist (mi)	23.3	1.3	23.5	21.4	7.0	0.7	77.1
Travel Time (hr)	2.5	0.1	1.1	0.8	0.2	0.0	4.8
Avg Speed (mph)	9	12	21	25	32	21	16
Vehicles Entered	258	14	195	179	147	14	807
Vehicles Exited	259	14	196	177	147	14	807
Hourly Exit Rate	259	14	196	177	147	14	807
Input Volume	262	10	189	160	131	17	769
% of Volume	99	140	104	111	112	82	105
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Intersection: 2: Route 17 WB On Ramp & Route 282

Movement	WB	NB
Directions Served	LR	LT
Maximum Queue (ft)	291	96
Average Queue (ft)	101	23
95th Queue (ft)	216	59
Link Distance (ft)	475	587
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Summary of All Intervals

Start Time	4:40
End Time	5:45
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intvls	1
Vehs Entered	1394
Vehs Exited	1386
Starting Vehs	22
Ending Vehs	30
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	553
Travel Time (hr)	25.8
Total Delay (hr)	8.0
Total Stops	1181
Fuel Used (gal)	270.6

Interval #0 Information Seeding

Start Time	4:40
End Time	4:45
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	4:45
End Time	5:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Vehs Entered	1394
Vehs Exited	1386
Starting Vehs	22
Ending Vehs	30
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	553
Travel Time (hr)	25.8
Total Delay (hr)	8.0
Total Stops	1181
Fuel Used (gal)	270.6

3: W River Rd & Route 282 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBT	SBR	All
Total Delay (hr)	0.2	0.1	0.1	0.1	1.6	0.0	2.1	4.3
Delay / Veh (s)	5.6	3.0	2.1	0.9	33.3	1.4	30.1	12.7
Stop Delay (hr)	0.1	0.0	0.0	0.0	1.4	0.0	2.0	3.6
St Del/Veh (s)	3.7	0.9	0.0	0.0	29.6	0.4	28.1	10.7
Total Stops	72	14	1	5	176	0	256	524
Stop/Veh	0.53	0.08	0.00	0.02	1.01	0.00	1.02	0.44
Travel Dist (mi)	12.8	15.8	39.3	37.2	21.4	0.4	30.4	157.2
Travel Time (hr)	0.7	0.6	1.0	1.2	2.4	0.0	3.3	9.2
Avg Speed (mph)	20	29	39	32	9	27	9	17
Vehicles Entered	136	168	242	226	176	6	250	1204
Vehicles Exited	135	167	241	228	175	6	250	1202
Hourly Exit Rate	135	167	241	228	175	6	250	1202
Input Volume	132	161	241	229	184	2	245	1194
% of Volume	102	104	100	100	95	300	102	101
Denied Entry Before	0	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0	0

Intersection: 3: W River Rd & Route 282

Movement	EB	WB	WB	SB
Directions Served	LT	T	R	LR
Maximum Queue (ft)	159	22	22	362
Average Queue (ft)	49	1	4	174
95th Queue (ft)	108	7	18	304
Link Distance (ft)	495	811		587
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			250	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Summary of All Intervals

Start Time	5:40
End Time	6:45
Total Time (min)	65
Time Recorded (min)	60
# of Intervals	2
# of Recorded Intvls	1
Vehs Entered	1376
Vehs Exited	1367
Starting Vehs	14
Ending Vehs	23
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	519
Travel Time (hr)	22.2
Total Delay (hr)	5.3
Total Stops	1185
Fuel Used (gal)	255.5

Interval #0 Information Seeding

Start Time	5:40
End Time	5:45
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	5:45
End Time	6:45
Total Time (min)	60

Volumes adjusted by Growth Factors.

Vehs Entered	1376
Vehs Exited	1367
Starting Vehs	14
Ending Vehs	23
Denied Entry Before	0
Denied Entry After	0
Travel Distance (mi)	519
Travel Time (hr)	22.2
Total Delay (hr)	5.3
Total Stops	1185
Fuel Used (gal)	255.5

3: W River Rd & Route 282 Performance by movement

Movement	EBL	EBT	WBT	WBR	SBL	SBR	All
Total Delay (hr)	0.3	0.1	0.1	0.0	0.5	1.1	2.1
Delay / Veh (s)	5.0	3.3	1.8	0.7	18.9	12.6	6.3
Stop Delay (hr)	0.2	0.0	0.0	0.0	0.4	1.0	1.5
St Del/Veh (s)	3.2	0.8	0.0	0.1	15.8	10.9	4.5
Total Stops	104	13	0	6	91	315	529
Stop/Veh	0.57	0.09	0.00	0.03	1.01	1.01	0.43
Travel Dist (mi)	17.2	13.6	45.6	31.4	10.9	38.3	156.9
Travel Time (hr)	0.9	0.5	1.2	1.0	0.9	2.7	7.1
Avg Speed (mph)	20	28	39	32	12	14	22
Vehicles Entered	184	145	304	192	91	315	1231
Vehicles Exited	183	143	304	191	89	312	1222
Hourly Exit Rate	183	143	304	191	89	312	1222
Input Volume	151	146	281	197	90	303	1168
% of Volume	121	98	108	97	99	103	105
Denied Entry Before	0	0	0	0	0	0	0
Denied Entry After	0	0	0	0	0	0	0

Intersection: 3: W River Rd & Route 282

Movement	EB	WB	SB
Directions Served	LT	R	LR
Maximum Queue (ft)	89	52	211
Average Queue (ft)	49	4	92
95th Queue (ft)	77	22	167
Link Distance (ft)	495		587
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		250	
Storage Blk Time (%)			
Queuing Penalty (veh)			