TRAFFIC IMPACT STUDY
FOR
PRESQUE ISLE DOWNS

PRESQUE ISLE DOWNS

SUMMIT TOWNSHIP
ERIE COUNTY, PENNSYLVANIA

DECEMBER 2002

HRG
Herbert, Rowland & Grubic, Inc.
Engineering & Related Services

280 Executive Drive
Cranberry Township, PA 16066
(724) 779-4777
Fax (724) 779-4711
www.hrg-inc.com

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ERIE COUNTY, PENNSYLVANIA

PREPARED FOR:
PRESQUE ISLE DOWNS, INC.
130 7TH STREET
SUITE 820
PITTSBURGH, PA 15222

PREPARED BY:
Herbert, Rowland & Grubic, Inc.

STAFF PROFESSIONALS: DARREN S. MYER, E.I.T.
AMBER N. MIKEC, E.I.T.

SUPERVISING ENGINEER: MATTHEW J. RADINOVIC, P.E.

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FOR
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EXECUTIVE SUMMARY

Overview of the Development

- The Presque Isle Downs development is planned to be located to the south of Interstate 90 and to the east of Perry Highway in Summit Township, Erie County, Pennsylvania.
- The proposed horse racing development is planned to consist of a 3000 person capacity grandstand, a 500 person capacity restaurant and a 50,000 square foot showroom.
- Access to the development is planned via two full-access driveways located on Perry Highway and one full-access driveway on Footmill Road, which will be used by employees only.
- The development, upon full build-out in 2008, is anticipated to generate 1633 entering trips and 313 exiting trips during the PM peak hour.

Study Intersections

- I-90 Westbound Ramps and Perry Highway (S.R. 0097)
- I-90 Eastbound Ramps and Perry Highway (S.R. 0097)
- Fairfield Avenue and Perry Highway (S.R. 0097)
- Jefferson Avenue and Perry Highway (S.R. 0097)
- North Site Driveway/Frank Avenue and Perry Highway (S.R. 0097)
- Race Avenue and Perry Highway (S.R. 0097)
- South Site Driveway and Perry Highway (S.R. 0097)
- Academy Avenue and Perry Highway (S.R. 0097)
- Johnson Road and Perry Highway (S.R. 0097)
- Robison Road (S.R. 4024) and Perry Highway (S.R. 0097)
- Robison Road (S.R. 4024) and Footmill Road

Deficiencies Without Development

- I-90 Westbound Ramps/Perry Highway – 2004, 2008 and 2014
- I-90 Eastbound Ramps/Perry Highway – 2002, 2004, 2008 and 2014
- Jefferson Avenue/Perry Highway – 2014
- Johnson Road/Perry Highway – 2014

Additional Deficiencies with Development

- I-90 Westbound Ramps/Perry Highway – 2004, 2008 and 2014
- I-90 Eastbound Ramps/Perry Highway – 2004, 2008 and 2014
- Fairfield Avenue/Perry Highway – 2004, 2008 and 2014
- Frank Avenue/North Site Driveway/Perry Highway – 2004, 2008 and 2014
- Race Avenue/Perry Highway – 2008 and 2014
- South Site Driveway/Perry Highway – 2008 and 2014
- Johnson Road/Perry Highway – 2008 and 2014
- Robison Road/Perry Highway – 2008 and 2014

Improvements Necessary to Mitigate Impact of Development in 2004

- The phasing at both I-90 ramp intersections should be changed to simultaneous lagging phasing. A 225-foot westbound left-turn lane should be constructed on the I-90 Westbound Off-Ramp. A 475-foot eastbound right-turn lane should be constructed on the I-90 Eastbound Off-Ramp.

- The two-way-left-turn lane that currently ends north of the Fairfield Avenue/Perry Highway intersection should be extended through the Fairfield Avenue intersection and end as a 370-foot exclusive southbound left-turn lane at the North Site Driveway intersection.
- A signal should be installed at the North Site Driveway intersection with Route 97. With the concurrence of both Summit Township and PENNDOT, Frank Avenue, currently a paper street, should be extended to align with the North Site Driveway. The existing Jefferson Avenue and Route 97 intersection should be converted to a right-in/right-out only access to Jefferson Avenue. All left turns to the area currently accommodated by Jefferson may be rerouted to the signal at Frank Avenue.
- Dual westbound right-turn lanes should be constructed on the North Site Driveway approach and two receiving lanes should be provided. A second northbound through lane currently begins immediately north of the Fairfield Avenue intersection and should be lengthened to continue through the Fairfield Avenue intersection and end at the North Site Driveway intersection to accommodate the dual westbound right-turn lanes. An additional northbound through lane should begin immediately south of the North Site Driveway and can be received by the same additional receiving lane constructed for the dual westbound right-turn lanes.

Improvements Necessary to Mitigate Impact of Development in 2008

- A second eastbound right-turn lane is required on the I-90 Eastbound Off-Ramp and should be constructed to a length of 425 feet. To receive the dual eastbound right-turn lanes, a second receiving lane is required to begin at the I-90 Eastbound Ramps/Perry Highway intersection. Additionally, to accommodate high exiting volumes during time periods other than the PM peak hour, dual northbound left-turn lanes are required at the I-90 Westbound Ramps/Perry Highway intersection. Rather than constructing a second northbound left-turn lane, the innermost existing northbound through lane should be converted, only during certain time periods, to a northbound left-turn lane. Proper illuminated overhead signage must be provided to indicate if the middle northbound lane is operating as a left-turn lane or a through lane. Furthermore, when the signage is indicating that the dual northbound left-turn lanes are in operation, protected/prohibited phasing for the northbound left-turning movement must be implemented. The phasing can remain protected/permitted when only one northbound left-turn lane is operating. Finally, to receive the dual northbound left-turn lanes, a second receiving lane is required on the I-90 Westbound On-Ramp and can be tapered back to one lane prior to reaching the merge point with I-90.
- The additional southbound lane that was required to receive the dual eastbound right-turn lanes at the I-90 Eastbound Ramps/Perry Highway intersection will continue as an additional southbound through lane at the Fairfield Avenue/Perry Highway intersection.
- As was the situation in the 2004 improvements, the two-way-left-turn lane that was continued through the Fairfield Avenue/Perry Highway intersection will be striped as an exclusive southbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection. An additional southbound left-turn lane is also required at this intersection to accommodate the high volume of turning movements into the site. The additional southbound through lane, which is proposed to begin at the I-90 Eastbound Ramps/Perry Highway intersection, should end as the second southbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection. The two-way-left-turn lane should also be striped as an exclusive northbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection to a minimal length of 75 feet.
- Although striped as exclusive left-turn lanes at the Frank Avenue/North Site Driveway/Perry Highway intersection, the two-way-left-turn lane should continue through the unsignalized intersections of Perry Highway with Race Avenue, the South Site Driveway, Academy Avenue, and Johnson Road. The two-way-left-turn lane is recommended to end south of the Johnson Road/Perry Highway intersection (i.e. prior to reaching the Robison Road/Perry Highway intersection). The two-

way-left-turn lane should be striped as a 300-foot exclusive southbound left-turn lane at the South Site Driveway/Perry Highway intersection.

- A southbound advance phase should be implemented at the intersection of Robison Road and Perry Highway.

Improvements Necessary to Mitigate Impact of Development in 2014

- At the I-90 Westbound Ramps/Perry Highway intersection, the existing exclusive southbound right-turn lane must be converted to a shared through/right lane. A second receiving lane will need to be constructed under the I-90 overpass and then will continue to the I-90 Eastbound Ramps/Perry Highway intersection where an additional southbound through lane will already be provided under the 2008 improvements. This may be a possible partnership project with PENNDOT to widen under the I-90 overpass to obtain proper design width including shoulders for the additional lane.
- A southbound left-turn lane should be constructed at the Robison Road/Perry Highway intersection to a length of 100 feet and the phasing should remain as protected/permitted for this movement.

Improvements the Developer is willing to Construct

The developer is willing to do the following:

- Construct a 225-foot westbound left-turn lane on the I-90 Westbound Off-Ramp as well as a 475-foot eastbound right-turn lane on the I-90 Eastbound Off-Ramp. Modify the traffic signals as necessary at the I-90 ramps and Route 97 intersections.
- Extend the two-way-left-turn lane that currently ends north of the Fairfield Avenue/Perry Highway intersection through the South Site Driveway intersection.
- Add a traffic signal at the North Site Driveway intersection with Route 97. With the concurrence of both Summit Township and PENNDOT the developer is willing to extend Frank Avenue, currently a paper street, to align with the North Site Driveway. The existing Jefferson Avenue and Route 97 intersection may be converted to a right-in/right-out only access to Jefferson Avenue with the addition of Frank Avenue. All left turns to the area currently accommodated by Jefferson may then be rerouted to the signal at Frank Avenue.
- Construct dual westbound right-turn lanes exiting the North Site Driveway and construct an additional receiving lane along Route 97. This additional northbound lane along Route 97 will begin immediately south of the north site drive and extend north to join the existing second northbound thru lane.

The engineer believes that while the traffic study includes both 2008 full operational and 2014 ten-year horizon study years, the possible improvements listed to mitigate those study years should not be constructed at the time of the development. The improvements listed above should be more than adequate to handle the development traffic for the first several years of operation. They include transportation system improvements identified for the 2004 with proposed development condition as well as an additional two-way-left-turn lane terminating at the south site driveway as an exclusive left turn lane.

We further suggest that a follow up study be conducted several years into operation to more accurately determine the need for additional roadway improvements beyond those the developer is willing construct at this time.

After the follow up study is completed negotiations should take place between PENNDOT and the developer to complete the improvements required to accommodate future development traffic, while also

investigating the potential for partnering on more comprehensive traffic solutions for the benefit of the entire area.

INTRODUCTION

The Presque Isle Downs development is planned on a 135-acre parcel of land in Summit Township, Erie County, Pennsylvania. The proposed horse racing development is intended to consist of a 3000 person capacity grandstand with a 500 person capacity restaurant and a 50,000 square foot showroom. Currently, this parcel of land is mostly vacant with a few residential buildings that are planned to be acquired upon development of the proposed site. The proposed development will be equipped for horse racing events that, for purposes of this traffic study, were assumed to commence at approximately 6:00 PM with most of the patron traffic arriving between 4:30 PM and 5:30 PM. The proposed development is anticipated to be operational in 2004 and operating at full capacity by 2008. The site location map is shown in Figure 1.

All patron traffic destined for the proposed horse racing development will utilize two full-access driveways located along Perry Highway. Most of the employee traffic is expected to utilize a rear full-access entrance located along Footmill Road. The surrounding area is mostly residential with a few commercial land uses closer to the I-90 interchange and along Perry Highway. Specifically, a Pilot truck stop, Shell gas station and Super 8 Motel are located immediately south of the I-90 interchange.

The objectives of this study were to analyze existing traffic conditions in the study area, project and analyze traffic conditions in the study area for opening day, full build-out and the 10-year horizon year, identify any traffic impact that operation of the proposed site will have on the study area, and recommend improvements to mitigate any adverse effects caused by the proposed development. This study has been conducted in accordance with the Institute of Transportation Engineers (ITE) Traffic Impact Study Guidelines, PENNDOT criteria outlined in Publication 282 (1) and the scope of work PENNDOT District 1-0 had previous agreed upon.

EXISTING TRANSPORTATION SYSTEM

Study Area

The study area, which was determined by both Summit Township and PENNDOT District 1-0, was selected based on the intersections and roadways that potentially could be affected by the proposed development. In addition to the proposed site driveways, the following intersections were selected for further study:

1. I-90 Westbound Ramps and Perry Highway (S.R. 0097)
2. I-90 Eastbound Ramps and Perry Highway (S.R. 0097)
3. Fairfield Avenue and Perry Highway (S.R. 0097)
4. Jefferson Avenue and Perry Highway (S.R. 0097)
5. Race Avenue and Perry Highway (S.R. 0097)
6. Academy Avenue and Perry Highway (S.R. 0097)
7. Johnson Road and Perry Highway (S.R. 0097)
8. Robison Road (S.R. 4024) and Perry Highway (S.R. 0097)
9. Robison Road (S.R. 4024) and Footmill Road

Roadway Network Description

Interstate 90 is a 4-lane, limited access divided highway that provides access to Interstate 79 and Cleveland, Ohio to the west, and to the state of New York to the east. The I-90 interchange with Perry Highway provides full access from the east and west to the site. There are no existing turn lanes on the I-90 exit ramps. The eastbound and westbound I-90 ramps on Perry Highway are currently signalized. Counts conducted on the eastbound and westbound I-90 exit ramps yielded average daily traffic volumes of approximately 5150 and 5450 vehicles, respectively.

Perry Highway (S.R. 0097) is a state roadway classified as a minor arterial in the study area with an average daily traffic volume of 10,500 vehicles per day. Perry Highway provides access to the City of Erie to the north. The typically two-lane roadway widens to include an additional northbound through lane near the I-90 interchange. All lanes are delineated with pavement markings and separated by raised concrete medians near the I-90 interchange intersections. The through travel lanes are twelve feet in width. The heavy vehicle percentage counted along Perry Highway was approximately nine percent.

Robison Road (S.R. 4024) is a two-lane state roadway classified as a minor arterial in the study area with an average daily traffic volume of 3000 vehicles per day. Approximately fourteen percent of the vehicles are classified as heavy vehicles. Many of these are accessing the nearby Waste Management Site. Robison Road is delineated with white and yellow pavement markings with ten-foot travel lanes in each direction.

The remaining roads included in the study area are two-lane township roads with average daily traffic volumes ranging from approximately 120 vehicles per day to 1000 vehicles per day. Johnson Road is delineated with yellow and white pavement markings with 10-foot lanes in each direction.

Average daily traffic volumes provided in the above discussion were obtained from traffic counts described below and the roadway classifications were similarly found using PENNDOT functional classification maps. Figure 2 shows the existing intersection geometry and traffic control for the roadway network within the study area.

Existing Traffic Volumes

Turning movement counts at each of the study intersections were conducted for the PM time period during the weeks of October 14, 2002 and October 28, 2002 from 4:00PM to 6:00PM. Twenty-four hour traffic volume counts were also collected using Automatic Traffic Recorders (ATR's) which were placed along Perry Highway, Robison Road, Jefferson Avenue, Race Avenue and on the I-90 Eastbound and Westbound Off-Ramps. The ATR's were in place during the weeks of October 14, 2002 and November 2, 2002. The traffic count data can be found in Appendix A. Figure 3 displays the existing PM peak hour traffic volumes for each of the study intersections.

Capacity Analyses

Capacity analysis, as defined by the Highway Capacity Manual (2), is a set of procedures used to estimate the traffic-carrying ability of a facility over a range of defined operational conditions. The capacity analysis uses ***Levels of Service*** (LOS) to describe the operational conditions. Levels of Service are assigned letter designations "A" through "F," with "A" being the most desirable operating conditions. A Level of Service "E" is considered to be at or near capacity, while a Level of Service "D" is considered acceptable according to the Highway Capacity Manual (2). The LOS criteria for unsignalized intersections and signalized intersections are given in Table 1 and Table 2, respectively.

At unsignalized intersections, the level of service measures the ability of turning traffic to find gaps in the major street traffic flow that permit successful completion of the desired turning movement. The critical movements at unsignalized intersections are the left turns from the major street and egress movements from the minor street.

TABLE 1: UNSIGNALIZED INTERSECTIONS – LOS CRITERIA

AVERAGE CONTROL DELAY (SEC/VEH)	LEVEL OF SERVICE	EXPECTED DELAY TO MINOR STREET TRAFFIC
≤ 10	A	Little or no delay
> 10 and ≤ 15	B	Short traffic delays
> 15 and ≤ 25	C	Average traffic delays
> 25 and ≤ 35	D	Long traffic delays
> 35 and ≤ 50	E	Very long delays
> 50	F	*

*When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing, which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvements to the intersection. LOS "F" is considered to be unacceptable to most drivers.

For signalized intersections, the level of service measures the average control delay time per vehicle. Also, the volume to capacity ratio, which is a ratio of the peak hour traffic volumes for a facility to the theoretical maximum traffic volume the facility can handle, relates to the level of service of a facility.

TABLE 2: SIGNALIZED INTERSECTIONS – LOS CRITERIA

AVERAGE CONTROL DELAY (SEC/VEH)	LEVEL OF SERVICE	EXPECTED DELAY TO MINOR STREET TRAFFIC
≤ 10	A	Little or no delay
> 10 and ≤ 20	B	Short traffic delays
> 20 and ≤ 35	C	Average traffic delays
> 35 and ≤ 55	D	Long traffic delays
> 55 and ≤ 80	E	Very long delays
> 80	F	*

*When demand volume exceeds the capacity of the lane, extreme delays will be encountered with queuing, which may cause severe congestion affecting other traffic movements in the intersection. This condition usually warrants improvements to the intersection. LOS "F" is considered to be unacceptable to most drivers.

Capacity analyses at each of the study intersections were performed using HCS2000™ (3) software. The analyses were conducted based on the existing traffic volumes, intersection controls, and geometrics for each study intersection. Existing conditions analyses were performed at each study intersection for the PM peak hour. Table 3 provides a summary of the PM peak hour existing levels of service at each of the study intersections.

TABLE 3: EXISTING CONDITIONS LEVEL OF SERVICE SUMMARY

INTERSECTION	*MOVEMENT*	*2002 EXISTING*
		PM
I-90 WESTBOUND RAMPS AND PERRY HIGHWAY		
I-90 WESTBOUND OFF-RAMP	WBLTR	D
PERRY HIGHWAY	NBL	D
	NBT	A
	SBT	D
	SBR	C
OVERALL		C
I-90 EASTBOUND RAMPS AND PERRY HIGHWAY		
I-90 EASTBOUND OFF-RAMP	EBLTR	E
PERRY HIGHWAY	NBTR	C
	SBL	A
	SBT	A
OVERALL		C
PERRY HIGHWAY AND FAIRFIELD AVENUE		
PERRY HIGHWAY	NBLT	A
FAIRFIELD AVENUE	EBLR	C
PERRY HIGHWAY AND JEFFERSON AVENUE/PRIVATE DRIVEWAY		
PERRY HIGHWAY	NBLTR	A
	SBLTR	A
PRIVATE DRIVEWAY	WBLTR	C
JEFFERSON AVENUE	EBLTR	C
PERRY HIGHWAY AND RACE AVENUE		
PERRY HIGHWAY	NBLT	A
RACE AVENUE	EBLR	C
PERRY HIGHWAY AND ACADEMY AVENUE		
PERRY HIGHWAY	NBLT	A
ACADEMY AVENUE	EBLR	C
PERRY HIGHWAY AND JOHNSON ROAD		
PERRY HIGHWAY	NBLTR	A
	SBLTR	A
JOHNSON ROAD	WBLTR	C
	EBLTR	C

TABLE 3: EXISTING CONDITIONS LEVEL OF SERVICE SUMMARY (CONT.)		
INTERSECTION	*MOVEMENT*	*2002 EXISTING*
		PM
ROBISON ROAD AND PERRY HIGHWAY		
ROBISON ROAD	EBLTR	C
	WBLTR	B
PERRY HIGHWAY	NBLTR	A
	SBLTR	B
OVERALL		B
ROBISON ROAD AND FOOTMILL ROAD		
ROBISON ROAD	EBLTR	A
	WBLTR	A
FOOTMILL ROAD	NBLTR	B
	SBLTR	A

As shown in Table 3, the levels of service for each movement or approach at the study intersections, with the exception of the I-90 Eastbound Ramp intersection, are all at acceptable levels under the existing conditions (i.e. LOS "D" or higher). At the I-90 Eastbound Ramps/Perry Highway intersection, the eastbound approach is operating at a deficient LOS "E" under the existing lane configuration and signal timings. Worksheets for the level of service/capacity analyses for existing conditions are included in Appendix B.

Crash Analysis

Crash data summaries for each of the study intersections were obtained from PENNDOT, Engineering District 1-0. The crash data are contained in Appendix C and Table 4 summarizes the data found in the appendix.

TABLE 4: CRASH SUMMARY
(-- Indicates zero accidents reported)

INTERSECTION		NUMBER OF INCIDENTS										
Year	*Number of Accidents*	*Non-Collision*	*Rear-End*	*Head-On*	*Backing Up*	*Angle*	*Sideswipe*	*Hit Fixed Object*	*Hit Pedestrian*	*All Others*	*Unknown*	***INTERSECTION TOTAL***
I-90 WESTBOUND RAMPS AND PERRY HIGHWAY												
1998	*0*	--	--	--	--	1	--	--	--	--	--	**1**
1999	*0*											
2000	*1*											
I-90 EASTBOUND RAMPS AND PERRY HIGHWAY												
1998	*3*	--	--	--	--	1	--	2	--	--	--	**3**
1999	*0*											
2000	*0*											

TABLE 4: CRASH SUMMARY (CONT.)
(-- Indicates zero accidents reported)

INTERSECTION		NUMBER OF INCIDENTS										
Year	*Number of Accidents*	*Non-Collision*	*Rear-End*	*Head-On*	*Backing Up*	*Angle*	*Sideswipe*	*Hit Fixed Object*	*Hit Pedestrian*	*All Others*	*Unknown*	***INTERSECTION TOTAL***
FAIRFIELD AVENUE AND PERRY HIGHWAY												
1998	*0*	--	--	--	--	1	--	--	--	--	--	**1**
1999	*1*											
2000	*0*											
JEFFERSON AVENUE AND PERRY HIGHWAY												
1998	*0*	--	--	--	--	--	--	1	--	--	--	**1**
1999	*1*											
2000	*0*											
RACE AVENUE AND PERRY HIGHWAY												
1998	*1*	--	--	--	--	--	--	--	--	1	--	**1**
1999	*0*											
2000	*0*											
ACADEMY AVENUE AND PERRY HIGHWAY												
1998	*1*	--	1	--	--	--	--	--	--	--	--	**1**
1999	*0*											
2000	*0*											
JOHNSON ROAD AND PERRY HIGHWAY												
1998	*0*	--	--	--	--	--	--	1	--	--	--	**1**
1999	*0*											
2000	*1*											
ROBISON ROAD AND PERRY HIGHWAY												
1998	*2*	--	--	--	--	5	--	--	--	--	1	**6**
1999	*1*											
2000	*3*											
ROBISON ROAD AND FOOTMILL ROAD												
1998	*0*	--	--	--	--	--	--	--	--	--	--	**0**
1999	*0*											
2000	*0*											

The detailed summary for each crash was categorized according to location, type of crash, and the movement of each vehicle involved. A trend or pattern was determined to be present if five or more of the same type of accident occurred at a particular intersection (±500 feet of the intersection in each direction) each year over a three year period. Per this criterion and as shown in Table 4, no trend or pattern in the crash data was apparent at any of the study intersections and the proposed development is not anticipated to have an adverse effect on the crash rate at any of the study intersections.

SITE ANALYSIS

Trip Generation

The PM peak hour was assumed to be the crucial time period due to the nature of this development. It is assumed that with a 6:00 PM post time, most of the horse racing patron traffic and restaurant customer traffic will arrive during the PM peak hour of the local roadway. Patrons utilizing the showroom are expected to be more evenly distributed throughout the day and evening since the facility does not have a designated start time but rather may host conferences or events that last an entire day or over a multiple day period. The various values discussed throughout this trip generation section are based on intended operating characteristics and capacity of the proposed site development.

With a 3,000 person capacity grandstand and a 500 person capacity restaurant under the full-operational scenario (i.e. 2008), approximately 3600 patrons are expected to attend the horse racing events. During the PM peak hour 80% of these patrons are expected to arrive. This is a conservative estimate based upon the client's previous experience. Using a vehicle occupancy of 2.5 patrons per vehicle, approximately 1152 patron vehicles will arrive during the PM peak hour. The auto occupancy rate of 2.5 patrons per vehicle is comparable to 2.6 auto occupancy rate derived from the Mountaineer counts summarized in Appendix A. Furthermore, for a facility this size, the total number of employees will amount to approximately 136 racing department employees, 100 food and beverage employees and 1,200 backside employees, which include stable workers, owners of the horses, and horse trainers. On a racing day, all 136 racing department employees, 80% of the food and beverage employees and 45% of the backside employees are expected to be working. Of those employees that will be working on a race day, 20% of them are expected to arrive during the same PM peak hour the patrons arrive. Most employees are expected to arrive before 4:00 PM and more specifically, the backside employee arrival will depend heavily upon their specific race times. This amounts to 756 employees (i.e. 136 racing department, 80 food and beverage, and 540 backside) working on a race day, of which 151 will arrive during the PM peak hour. Assuming a vehicle occupancy of 1.1 employees per vehicle, 138 employee vehicles are expected to enter the horse racing facility during the PM peak hour. Excluding the showroom trips, 1290 vehicles are expected to arrive during the PM peak hour and a nominal number of vehicles will exit during the PM peak hour (i.e. 32 exiting trips).

In the 50,000 square foot showroom, which will generate traffic throughout the day due to the various types of events planned to be held, the average space required per person is expected to be 15 square feet. Taking the 50,000 square feet and dividing it by the space per person results in a 3333 person capacity facility. Because the same 3333 people will not occupy the showroom for an entire day a turnover rate, which converts the capacity to the total expected daily attendance, was utilized. Due to the nature of the showroom facility, a turnover rate of 1.8 was assumed. Multiplying the capacity by the turnover rate results in a daily attendance of 6000 patrons. Utilizing the same 2.5 patrons per vehicle occupancy rate as used for the horse racing facility, approximately 2400 vehicles are expected to arrive in a day and the equivalent 2400 vehicles will exit in the same day. Of the 4800 total trips generated by the showroom, 13% were assumed to be generated during the PM peak hour which results in 624 PM peak hour trips. Assuming 55% of the trips enter and 45% of the trips exit, approximately 343 entering trips and 281

exiting trips are expected during the PM peak hour. Including the showroom trips, during the PM peak hour the total number of trips is estimated to be 1633 entering vehicles and 313 exiting vehicles. See Table 5 for details on the entering trip generation.

TABLE 5: FULL BUILD-OUT ENTERING TRIP GENERATION SUMMARY

TOTAL NUMBER OF PATRONS/EMPLOYEES ENTERING	% AT RACETRACK DAY OF EVENT	% ARRIVING DURING PEAK HOUR	NUMBER OF PATRONS/EMPLOYEES ARRIVING DURING PEAK HOUR	VEHICLE OCCUPANCY	VEHICLES ARRIVING DURING PEAK HOUR
HORSE RACING/RESTAURANT FACILITY					
3599 Horse Racing/ Restaurant Patrons	100%	80%	2879	2.5	1152
136 Racing Department Employees	100%	20%	27	1.1	138
100 Food and Beverage Employees	80%		16		
1200 Backside Employees	45%		108		
SHOWROOM FACILITY					343
TOTAL NUMBER OF VEHICLES ARRIVING DURING PEAK HOUR					***1633***

In the opening year 2004, approximately 60% of the full-operational scenario racetrack/restaurant traffic is expected to utilize the proposed site. The showroom trips are expected to be the same in 2004 as they were determined for the full build-out year. Therefore, the 1290 racetrack/restaurant entering PM peak hour trips determined for the full build-out year were reduced to 774 trips entering in 2004. Added to the 343 entering trips from the showroom, the total number of entering trips in 2004 is expected to be 1,117 PM peak hour trips. Figure 4A displays the racetrack/restaurant trips expected in 2004 and similarly, Figure 4B displays the racetrack/restaurant trips expected upon full build-out in 2008 and 2014. Figure 5 displays the showroom trips utilized for each study year. Finally, Figure 6A displays the total trips for 2004 and Figure 6B displays the total trips upon full build-out in 2008 and 2014. See Appendix D for details on the trip generation analysis.

Trip Distribution and Assignment

The distribution of trips generated by the site was based on data obtained from a marketing study along with a graphical analysis of all possible travel routes accessing the site. As part of the marketing study, the surrounding area that is expected to attract patrons was divided into regions by postal zip codes. Based on various demographics, each zip code was assigned a corresponding number of patrons expected to travel to the proposed development. A map showing the zip code boundaries as well as the roadway network was examined to determine the most logical route choice(s) to access the site for patrons from each zip code region. In some cases, the entire zip code region would logically use the same route, while in other cases, multiple routes will be used depending on one's location within the zip code region. Seven main routes to the site were established as follows: I-90 Eastbound, I-90 Westbound, Perry Highway (S.R. 0097) Northbound, Perry Highway (S.R. 0097) Southbound, Robison Road Eastbound, Robison Road Westbound and Johnson Road Eastbound. The distribution of trips to these various routes is

displayed in Table 6. Details of the trip distribution and assignment analyses can be found in Appendix D.

TABLE 6: TRIP DISTRIBUTION SUMMARY		
ROADWAY	DIRECTION	DISTRIBUTION
INTERSTATE 90	Eastbound	69.1%
	Westbound	21.1%
PERRY HIGHWAY (S.R. 0097)	Northbound	2.9%
	Southbound	5.2%
ROBISON ROAD	Eastbound	0.9%
	Westbound	0.5%
JOHNSON ROAD	Eastbound	0.3%

FUTURE TRANSPORTATION SYSTEM

Roadway Network Description

Because the North Site Driveway to the proposed development is planned to be located immediately south of the existing Jefferson Avenue/Perry Highway intersection, it has been assumed in the future with development analyses that Frank Avenue would be extended to align with the North Site Driveway. Extending Frank Avenue to Route 97 and aligning the North Site Driveway will allow the eastbound approach on Frank Avenue to utilize the planned signal at this intersection (to be discussed in detail in later sections). No other major changes to the local roadway network are anticipated.

Future Traffic Volumes

In order to establish future traffic volumes before considering the increased traffic volumes from the proposed development, the existing traffic volumes were factored to project the volumes for the opening day year of 2004, the full build-out year of 2008 and the 10-year horizon year in 2014. To obtain these future volumes, a linear growth factor of 2% per year was used. This growth factor for Summit Township was obtained from PENNDOT, Engineering District 1-0. The 2% growth factor accounts for potential traffic from the background growth of the area. Figure 7, Figure 9 and Figure 11 show the future traffic volumes in 2004, 2008 and 2014, respectively, for the without development conditions. The future traffic volumes without the proposed development were then combined with the total anticipated trip generation volumes from the proposed development for that year to provide the total future traffic volumes with the proposed site in place. The 2004, 2008 and 2014 traffic volumes with the proposed site trips are displayed in Figure 8, Figure 10 and Figure 12, respectively.

Capacity Analyses

The future conditions capacity analyses were performed for the 2004, 2008 and 2014 PM peak hour with and without the proposed development. Table 7 displays the a summary of the levels of service found at the 2004, 2008 and 2014 volumes in addition to displaying the existing condition levels of service previously discussed. The volumes at the current Jefferson Avenue/Route 97 intersection are assumed to be transferred to the new North Site Drive/Frank Avenue and Route 97 intersection. The capacity analyses for the 2004, 2008 and 2014 future conditions can be found in Appendix E, Appendix F and Appendix G, respectively.

TABLE 7: EXISTING AND FUTURE CONDITIONS LEVEL OF SERVICE SUMMARY

INTERSECTION	*MOVEMENT*	*2002 EXISTING*	*2004 WITHOUT DEVELOPMENT*	*2004 WITH DEVELOPMENT*	*2008 WITHOUT DEVELOPMENT*	*2008 WITH DEVELOPMENT*	*2014 WITHOUT DEVELOPMENT*	*2014 WITH DEVELOPMENT*
		PM	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*
I-90 WESTBOUND RAMPS AND PERRY HIGHWAY								
I-90 WESTBOUND OFF-RAMP	WBLTR	D	D	F (360.2)	E	F (562.9)	E	F (608.7)
PERRY HIGHWAY	NBL	D	D	F (109.9)	D	F (123.9)	E	F (136.4)
	NBT	A	A	A	A	A	A	A
	SBT	D	E	E	E	F (88.7)	F (126.7)	F (131.1)
	SBR	C	C	C	C	C	C	D
OVERALL		C	D	F (108.3)	D	F (171.3)	E	F (191.3)
I-90 EASTBOUND RAMPS AND PERRY HIGHWAY								
I-90 EASTBOUND OFF-RAMP	EBLTR	E	E	F (863.0)	F (82.7)	F (1257.0)	F (116.7)	F (1317.0)
PERRY HIGHWAY	NBTR	C	C	C	C	C	C	C
	SBL	A	A	A	A	A	A	D
	SBT	A	A	A	A	B	A	C
OVERALL		C	C	F (255.8)	C	F (407.7)	C	F (421.9)
PERRY HIGHWAY AND FAIRFIELD AVENUE								
PERRY HIGHWAY	NBLT	A	A	C	A	C	A	C
FAIRFIELD AVENUE	EBLR	C	C	F (106.3)	C	F (348.8)	C	F (602.3)
PERRY HIGHWAY AND JEFFERSON AVENUE (FRANK AVENUE)/NORTH SITE DRIVEWAY								
PERRY HIGHWAY	NBLTR	A	A	A	A	B	A	B
	SBLTR	A	A	C	A	F (111.0)	A	F (136.6)
NORTH SITE DRIVEWAY	WBLT	C	C	F (*)	C	F (*)	D	F (*)
	WBR			C		D		D
JEFFERSON AVENUE (FRANK AVENUE)	EBLTR	C	D	F (*)	D	F (*)	E	F (*)
OVERALL		--	--	--	--	--	--	--
PERRY HIGHWAY AND RACE AVENUE								
PERRY HIGHWAY	NBLT	A	A	B	A	B	A	B
RACE AVENUE	EBLR	C	C	D	C	E	C	E

(99.9) = Delay in second/vehicle
"--" = No analysis performed
(Frank Avenue) – Assumed to be in place in the with development scenario

TABLE 7: EXISTING AND FUTURE CONDITIONS LEVEL OF SERVICE SUMMARY (CONT.)

INTERSECTION	*MOVEMENT*	*2002 EXISTING*	*2004 WITHOUT DEVELOPMENT*	*2004 WITH DEVELOPMENT*	*2008 WITHOUT DEVELOPMENT*	*2008 WITH DEVELOPMENT*	*2014 WITHOUT DEVELOPMENT*	*2014 WITH DEVELOPMENT*
		PM	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*
PERRY HIGHWAY AND SOUTH SITE DRIVEWAY								
PERRY HIGHWAY	SBLT	--	--	A	--	A	--	B
SOUTH SITE DRIVEWAY	WBL	--	--	E	--	F (80.0)	--	F (99.7)
	WBR	--	--	B	--	B	--	B
PERRY HIGHWAY AND ACADEMY AVENUE								
PERRY HIGHWAY	NBLT	A	A	A	A	A	A	A
ACADEMY AVENUE	EBLR	C	C	C	C	C	C	D
PERRY HIGHWAY AND JOHNSON ROAD								
PERRY HIGHWAY	NBLTR	A	A	A	A	A	A	A
	SBLTR	A	A	A	A	A	A	A
JOHNSON ROAD	WBLTR	C	D	D	D	F (50.5)	E	F (90.1)
	EBLTR	C	C	C	C	D	C	D
ROBISON ROAD AND PERRY HIGHWAY								
ROBISON ROAD	EBLTR	C	C	C	C	C	C	C
	WBLTR	B	B	B	B	B	B	B
PERRY HIGHWAY	NBLTR	A	A	A	A	A	A	B
	SBLTR	B	B	C	B	E	C	F (124.3)
OVERALL		B	B	C	B	D	C	E
ROBISON ROAD AND FOOTMILL ROAD								
ROBISON ROAD	EBLTR	A	A	A	A	A	A	A
	WBLTR	A	A	A	A	A	A	A
FOOTMILL ROAD	NBLTR	B	B	B	B	C	B	C
	SBLTR	A	A	A	A	A	A	B

(99.9) = Delay in second/vehicle
"--" = No analysis performed

As shown in Table 7, under the 2004 without development volumes, one additional deficiency occurs do to the background growth in the area. Specifically, the southbound through movement on Perry Highway at the I-90 Westbound Ramps intersection drops from an acceptable LOS "D" under the existing condition to a deficient LOS "E" in 2004 without the proposed development traffic. Factoring the volumes to 2008 causes the westbound approach at the I-90 Westbound Ramps/Perry Highway intersection to drop a LOS "E" while the southbound through movement remains at a LOS "E." At the I-90 Eastbound Ramps/Perry Highway intersection in 2008, factoring the volumes causes the eastbound approach to drop to a failing level of service. Finally, in 2014 before considering the proposed development, additional movements and approaches drop to deficient levels of service. At the I-90 Westbound Ramps/Perry Highway intersection, the northbound left-turn movement drops to a LOS "E" as does the overall level of service and furthermore, the southbound through movement drops to a failing level of service. At the I-90 Eastbound Ramps/Perry Highway intersection, the eastbound approach, which was already failing under the 2008 without development volumes, continues to fail with an increased delay. The eastbound approach on Jefferson Avenue and the westbound approach on Johnson Road at their intersections with Perry Highway drop to deficient LOS "E" under the 2014 without development volumes.

Adding the trips anticipated to be generated by the proposed development to the future without development traffic volumes causes various movements and approaches at several study intersections to drop to unacceptable levels of service. The additional deficiencies are outlined as follows:

I-90 Westbound Ramps and Perry Highway (S.R. 0097): At the I-90 Westbound Ramps/Perry Highway intersection, the westbound approach, northbound left-turn movement and overall level of service fail in the 2004, 2008 and 2014 with development conditions. Furthermore, at this intersection, the southbound through movement will drop from a LOS "E" in 2008 without the development to a failing level of service with the development and then continue to fail under the 2014 with development condition.

I-90 Eastbound Ramps and Perry Highway (S.R. 0097): At the I-90 Eastbound Ramps/Perry Highway intersection, eastbound approach will drop from a LOS "E" in 2004 without the development to a failing level of service with the development. This approach will continue to fail in 2008 and 2014 with the development with large increases in the delay per vehicle compared to the without development conditions. In each future year, the overall level of service will drop from a LOS "C" without the development to a failing level of service with the development.

Fairfield Avenue and Perry Highway (S.R. 0097): The eastbound approach on Fairfield Avenue at its intersection with Perry Highway will drop from a LOS "C" without the development to a failing level of service with the development in each future year.

Jefferson Avenue (Frank Avenue)/North Site Driveway and Perry Highway (S.R. 0097): Under the existing unsignalized condition and with the addition of the north site driveway, the westbound shared left/through movement and the eastbound approach will have failing levels of service in 2004, 2008 and 2014 with the proposed development. In 2008 and 2014 with the proposed development, the southbound approach will drop to failing levels of service.

Race Avenue and Perry Highway (S.R. 0097): In the 2008 and 2014, the eastbound approach on Race Avenue at its intersection with Perry Highway will drop from a LOS "C" in the without development conditions to a LOS "E" in the with development scenarios.

South Site Driveway and Perry Highway (S.R. 0097): The westbound left-turn movement exiting the proposed site onto Perry Highway is expected to operate a LOS "E" in 2004 and a failing level of service in 2008 and 2014.

Johnson Road and Perry Highway (S.R. 0097): The westbound approach on Johnson Road at its intersection with Perry Highway is expected to drop from a LOS "D" in 2008 without the development to a failing level of service with the development and will continue to operate at a failing level of service in 2014 with the proposed development.

Robison Road and Perry Highway (S.R. 0097): The southbound approach on Perry Highway at its signalized intersection with Robison Road is expected to drop from a LOS "B" in 2008 without the development to a deficient LOS "E" in 2008 with the development. Also, in 2014, this approach is expected to drop from a LOS "C" under the without development conditions to a failing level of service with the proposed development.

IMPROVEMENT ANALYSIS

Peak Hour Volume Warrant Evaluation

In accordance with PENNDOT Publication 201, Engineering and Traffic Studies (4), an evaluation of the peak hour traffic signal warrant was conducted for the unsignalized intersection of Frank Avenue and the North Site Driveway with Perry Highway. Evaluation of this intersection under the with development traffic volumes indicated that for each future year (i.e. 2004, 2008 and 2014) a traffic signal will be warranted. The traffic signal warrant analysis is documented in Appendix H.

Left-turn Phasing Analyses

In accordance with PENNDOT Publication 149 (5), the Robison Road/Perry Highway intersection and the Perry Highway/Frank Avenue/North Site Driveway intersection were both evaluated to determine the most appropriate left-turn phasing. The PENNDOT criteria recommends either protected/permitted or protected/prohibited left-turn phasing if the conflict factors, which are based on the left-turn and opposing through volumes, exceed the minimum for at least two hours during a 24 hour period. Additionally, the criteria indicate that the left-turn movement under consideration for left-turn phasing must exceed two left-turns per cycle during at least two hours. Details of the left-turn phasing analyses can be found in Appendix H.

At the Perry Highway/Frank Avenue/North Site Driveway intersection, it was determined that the southbound left-turn movement exceeds the criteria to warrant protected/prohibited left-turn phasing for each future with development condition. As shown in the following improvement capacity analyses, this

movement will need two southbound left-turn lanes in 2008 and 2014 to accommodate the high turning volume and would require protected/prohibited phasing due to the lane configuration.

At the intersection of Perry Highway and Robison Road, protected phasing is warranted under each future with development condition (i.e. 2004, 2008 and 2014). In 2004, however, the protected phasing is not required to mitigate the impact of the development and was not implemented in the following capacity analyses. In 2008, with the existing lane configuration, protected/permitted phasing for the southbound left-turning movement is needed to mitigate the impact of the development. Finally, in 2014, an auxiliary southbound left-turn lane and protected/permitted phasing is required to mitigate the impact of the development, which is displayed in the following improvement capacity analyses.

Required Turn Lane Lengths at Unsignalized Intersections

The need for a southbound left-turn lane at the South Site Driveway intersection was evaluated using the Volume Warrants for Left Turn Storage Lanes at Unsignalized Grade Intersections by Harmelink (6). The southbound left-turn lane at this intersection should be striped as an exclusive left-turn lane for a length of 300 feet in 2008 and 2014. The detailed left-turn lane analyses are located in Appendix H.

Capacity Analyses

Taking into consideration the above analyses at the various intersections, an incremental series of improvements were implemented to determine the level of improvements necessary to mitigate the impact of the additional traffic added by the proposed development. The effect of these improvements was documented through additional capacity analyses. Table 8 displays the levels of service under existing conditions, future conditions with and without the proposed development, and future conditions with the proposed development with recommended improvements. Appendix H contains the detailed improvement capacity analyses for each intersection.

TABLE 8: LEVEL OF SERVICE SUMMARY WITH IMPROVEMENTS

INTERSECTION	*MOVEMENT*	*2002 EXISTING*	*2004 WITHOUT DEVELOPMENT*	*2004 WITH DEVELOPMENT*	*2004 WITH DEVELOPMENT WITH IMPROVEMENTS*	*2008 WITHOUT DEVELOPMENT*	*2008 WITH DEVELOPMENT*	*2008 WITH DEVELOPMENT WITH IMPROVEMENTS*	*2014 WITHOUT DEVELOPMENT*	*2014 WITH DEVELOPMENT*	*2014 WITH DEVELOPMENT WITH IMPROVEMENTS*
		PM	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*
I-90 WESTBOUND RAMPS AND PERRY HIGHWAY											
I-90 WESTBOUND OFF-RAMP	WBL	D	D	F (360.2)	D	E	F (562.9)	E	E	F (608.7)	E
	WBTR				C			C			C
PERRY HIGHWAY	NBL	D	D	F (109.9)	B	D	F (123.9)	D	E	F (136.4)	E
	NBT	A	A	A	A	A	A	A	A	A	A
	SBT	D	E	E	D	E	F (88.7)	E	F (126.7)	F (131.1)	D
	SBR	C	C	C	B	C	C	B	C	D	
OVERALL		C	D	F (108.3)	C	D	F (171.3)	D	E	F (191.3)	D
I-90 EASTBOUND RAMPS AND PERRY HIGHWAY											
I-90 EASTBOUND OFF-RAMP	EBLT	E	E	F (863.0)	B	F (82.7)	F (1257.0)	C	F (116.7)	F (1317.0)	C
	EBR				E			E			D
PERRY HIGHWAY	NBTR	C	C	C	D	C	C	C	C	C	D
	SBL	A	A	A	B	A	A	A	A	D	B
	SBT	A	A	A	D	A	B	D	A	C	A
OVERALL		C	C	F (255.8)	D	C	F (407.7)	D	C	F (421.9)	C
PERRY HIGHWAY AND FAIRFIELD AVENUE											
PERRY HIGHWAY	NBLT	A	A	C	C	A	C	C	A	C	C
FAIRFIELD AVENUE	EBLR	C	C	F (106.3)	E	C	F (348.8)	F (56.3)	C	F (602.3)	F (67.8)
PERRY HIGHWAY AND JEFFERSON AVENUE (FRANK AVENUE)/NORTH SITE DRIVEWAY											
PERRY HIGHWAY	NBL	A	A	A	D	A	B	C	A	B	C
	NBTR							D			D
	SBL	A	A	C	D	A	F (111.0)	D	A	F (136.6)	D
	SBTR				A			B			C
NORTH SITE DRIVEWAY	WBLT	C	C	F (*)	D	C	F (*)	C	D	F (*)	C
	WBR			C	B		D	B		D	B
JEFFERSON (FRANK) AVENUE	EBLTR	C	D	F (*)	D	D	F (*)	C	E	F (*)	C
OVERALL		--	--	--	C	--	--	C	--	--	D
PERRY HIGHWAY AND RACE AVENUE											
PERRY HIGHWAY	NBLT	A	A	B	--	A	B	B	A	B	B
RACE AVENUE	EBLR	C	C	D	--	C	E	C	C	E	D
PERRY HIGHWAY AND SOUTH SITE DRIVEWAY											
PERRY HIGHWAY	SBLT	--	--	A	--	--	A	A	--	B	B
SOUTH SITE DRIVEWAY	WBL	--	--	E	--	--	F (80.0)	E	--	F (99.7)	E
	WBR	--	--	B	--	--	B	B	--	B	B
PERRY HIGHWAY AND ACADEMY AVENUE											
PERRY HIGHWAY	NBLT	A	A	A	--	A	A	A	A	A	A
ACADEMY AVENUE	EBLR	C	C	C	--	C	C	C	C	D	C

(99.9) = Delay in second/vehicle
"--" = No analysis performed

TABLE 8: LEVEL OF SERVICE SUMMARY WITH IMPROVEMENTS (CONT.)

INTERSECTION	*MOVEMENT*	*2002 EXISTING*	*2004 WITHOUT DEVELOPMENT*	*2004 WITH DEVELOPMENT*	*2004 WITH DEVELOPMENT WITH IMPROVEMENTS*	*2008 WITHOUT DEVELOPMENT*	*2008 WITH DEVELOPMENT*	*2008 WITH DEVELOPMENT WITH IMPROVEMENTS*	*2014 WITHOUT DEVELOPMENT*	*2014 WITH DEVELOPMENT*	*2014 WITH DEVELOPMENT WITH IMPROVEMENTS*
		PM	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*	*PM*
PERRY HIGHWAY AND JOHNSON ROAD											
PERRY HIGHWAY	NBLTR	A	A	A	--	A	A	A	A	A	A
	SBLTR	A	A	A	--	A	A	A	A	A	A
JOHNSON ROAD	WBLTR	C	D	D	--	D	F (50.5)	C	E	F (90.1)	D
	EBLTR	C	C	C	--	C	D	C	C	D	C
ROBISON ROAD AND PERRY HIGHWAY											
ROBISON ROAD	EBLTR	C	C	C	--	C	C	D	C	C	C
	WBLTR	B	B	B	--	B	B	C	B	B	C
PERRY HIGHWAY	NBLTR	A	A	A	--	A	A	B	A	B	C
	SBL	B	B	C	--	B	E	C	C	F (124.3)	B
	SBTR										B
OVERALL		B	B	C	--	B	D	C	C	E	B
ROBISON ROAD AND FOOTMILL ROAD											
ROBISON ROAD	EBLTR	A	A	A	--	A	A	--	A	A	--
	WBLTR	A	A	A	--	A	A	--	A	A	--
FOOTMILL ROAD	NBLTR	B	B	B	--	B	C	--	B	C	--
	SBLTR	A	A	A	--	A	A	--	A	B	--

(99.9) = Delay in second/vehicle
"--" = No analysis performed

As shown in Table 8, the proposed improvements at the various study intersections dramatically reduce the amount of delay and show significant increases in the levels of service compared to the with development without improvement conditions. The improvements and corresponding levels of service are outlined as follows:

I-90 Westbound Ramps and Perry Highway (S.R. 0097): First, the phasing at this intersection (and at the I-90 Eastbound Ramps intersection) needed to be altered to a lagging simultaneous phasing which is typical for a diamond interchange. The simultaneous lagging phasing allows good coordination between the ramp intersection and more efficiently allocates green time to the heavier movements. In addition to the altered phasing, in each study year at this intersection, a westbound left-turn lane on the I-90 Westbound Off-Ramp would need to be constructed to achieve the adequate levels of service shown on Table 8. In 2014 with the proposed development, the southbound right-turn lane will need to be converted to a shared through/right lane and correspondingly an additional receiving lane for the two southbound through lanes would need to be constructed under the I-90 overpass. Dual northbound left-turn lanes are required at this intersection in 2008 and 2014 to accommodate the peak exiting traffic volumes from the proposed site. The second northbound left-turn lane can be provided by converting the innermost northbound through lane to an exclusive northbound left-turn lane only when exiting traffic from the proposed site is heavy. This allows for the middle northbound lane to be switched between a through lane and a left-turn lane depending on the time of day when certain movements are heaviest. To receive the dual northbound left-turn lanes, in 2008 and 2014 an additional receiving lane on the I-90 Westbound Off-Ramp should be constructed and tapered back to one lane prior to the merge point with I-90. The PM capacity analyses for this intersection do not reflect the dual northbound left-turn lanes as they are not required for the PM peak hour volumes anticipated and the middle northbound lane is best utilized as a through lane during this time period.

I-90 Eastbound Ramps and Perry Highway (S.R. 0097): As discussed above, the phasing at this intersection would also change to simultaneous lagging under each future with improvement scenario. In 2004, an auxiliary eastbound right-turn lane is required to mitigate the impact of the development. Furthermore, in 2008 and 2014, an additional westbound right-turn lane will be required and correspondingly an additional receiving lane for the dual westbound right-turns will be needed. In 2014, because an additional receiving lane will be required for the two southbound through lanes at the I-90 Westbound Ramp intersection, an additional southbound through lane will also be present at this intersection.

Fairfield Avenue and Perry Highway (S.R. 0097): Because signalization is not warranted at this intersection under any of the future with development scenarios, few improvements are available to improve the levels of service for the minor street approach. Currently, a two-way-left-turn lane begins immediately south of the I-90 Eastbound Ramps/Perry Highway intersection and ends prior to the Fairfield Avenue/Perry Highway intersection. To improve the levels of service for the side street, the improvement capacity analyses shown in Table 8 include continuing that two-way-left-turn lane through the Fairfield Avenue/Perry Highway intersection. The two-way-left-turn lane allows eastbound left-turning vehicles to make their turn when a sufficient gap is present in the southbound traffic and then wait in the lane until a sufficient gap is present in the northbound traffic. In 2008 and 2014, an additional

southbound through lane will be added through the Fairfield Avenue/Perry Highway intersection due to the improvements necessary at the intersections to the north. As will be discussed in the following paragraph, an additional northbound through lane will also be required to continue from the North Site Driveway intersection through the Fairfield Avenue/Perry Highway intersection in all future with development conditions.

Frank Avenue/North Site Driveway and Perry Highway (S.R. 0097): As discussed previously, signalization of this intersection will be warranted under each future with development condition. Furthermore, the improvement capacity analyses indicated that in 2004 one southbound left-turn lane is required to mitigate the impact of the development and in 2008 and 2014 dual southbound left-turn lanes are needed. As mentioned in the above paragraph, a two-way-left-turn lane is planned to continue through the Fairfield Avenue/Perry Highway intersection. In 2004, this two-way-left-turn lane can end as the single southbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection. In 2008 and 2014, the two-way-left-turn lane from Fairfield Avenue can be striped as the innermost exclusive southbound left-turn lane at the North Site Driveway and then continue past the North Site Driveway to the next intersection south. In 2008 and 2014, this geometry allows for the two-way-left-turn lane to be striped for an exclusive northbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection, which is reflected in the improvement capacity analyses shown in Table 8. In each improvement scenarios, protected/prohibited left-turn phasing was implemented for the southbound left-turn movement and permitted phasing was implemented for the northbound left-turn movement. Finally, the westbound approach on the North Site Driveway is planned to consist of a shared left/through lane and dual right turn lanes in each future with development scenario. An additional receiving lane for the dual right-turn lanes will need to be constructed north of this intersection. Presently, a second northbound through lane begins north of the Fairfield Avenue/Perry Highway intersection and could be extended southward to receive the dual right-turn lanes at the North Site Driveway intersection. Utilizing this additional receiving lane, in each study year, a second northbound through lane at this intersection was implemented and should begin immediately south of the North Site Driveway.

Race Avenue and Perry Highway (S.R. 0097): As part of the improvements for the above intersections, the two-way-left-turn lane is planned to extend past the Frank Avenue/North Site Driveway/Perry Highway intersection in 2008 and 2014. Therefore, the improvement capacity analyses for the Race Avenue/Perry Highway intersection reflect the addition of the two-way-left-turn lane through this intersection in those study years. As was the case for the Fairfield Avenue/Perry Highway intersection, signalization is not warranted and few other improvements are available to improve the levels of service for the minor street approach. The two-way-left-turn lane improves the level of service for the minor street approach by allowing two-stage gap acceptance.

South Site Driveway and Perry Highway (S.R. 0097): Consistent with the improvements at the intersection of Race Avenue and Perry Highway, the two-way-left-turn lane will also continue through this unsignalized intersection in 2008 and 2014. Furthermore, the westbound approach on the South Site Driveway is planned to include separate left and right-turn lanes that are both stop controlled. Signalization is not warranted at this intersection under any future with development condition and the

two-way-left-turn lane will allow for the westbound left-turns to utilize the area while waiting for acceptable gaps in the southbound traffic. The two-way-left-turn lane should be striped as an exclusive southbound left-turn lane in 2008 and 2014.

Academy Avenue and Perry Highway (S.R. 0097): In 2008 and 2014, the two-way-left-turn lane will continue through this intersection thus providing two-stage gap acceptance for the eastbound left-turning vehicles. Signalization is not warranted at this intersection under any future with development condition and although the two-way-left-turn lane is not needed from a mitigation standpoint at this intersection, it is planned to continue through because it is needed at the next intersection to the south.

Johnson Road and Perry Highway (S.R. 0097): Signalization of this intersection is not warranted under any future with development scenario and therefore, the two-way-left-turn lane is planned to continue through this intersection in 2008 and 2014. The two-way-left-turn lane can then end south of this intersection, prior to the next intersection to the south (i.e. the intersection of Robison Road and Perry Highway).

Robison Road and Perry Highway (S.R. 0097): In 2004 at this intersection, no improvements are required to mitigate the impact of the proposed development. In 2008, an advanced southbound phase was added to the phasing along with minor modifications to the green times to mitigate the impact of the development. Finally, in 2014 to mitigate the impact of the development, the advanced southbound phase must remain and a southbound left-turn lane is required.

Robison Road and Footmill Road: No improvements are required to mitigate the impact of the proposed development.

The new portions of the two-way-left-turn lane will be striped as exclusive left-turn lanes at major intersections to a length appropriate for the number of left-turns at the particular intersection.

Analyses of Anticipated Queues at Signalized Intersections

Using AASHTO's A Policy on Geometric Design of Highways and Streets (7), queue analyses were performed at existing signalized intersections of I-90 Westbound Ramps and Perry Highway, I-90 Eastbound Ramps and Perry Highway, and Robison Road and Perry Highway and at the proposed signalized intersection of Frank Avenue/North Site Driveway and Perry Highway. The results of the analyses are summarized in the following table.

TABLE 9: ANTICIPATED QUEUES AT SIGNALIZED INTERSECTIONS

INTERSECTION	*MOVEMENT*	*2004 WITH IMPROVEMENTS (FT.)**	*2008 WITH IMPROVEMENTS (FT.)**	*2014 WITH IMPROVEMENTS (FT.)**	*AVAILABLE STORAGE LENGTH (FT.)*
I-90 WESTBOUND RAMPS AND PERRY HIGHWAY (S.R. 0097)	WBL	224	316	340	--
	WBTR	130	150	176	> 500
	NBL	89	118	75	170
	NBT	54	73	51	630
	SBR	137	161	--	325
I-90 EASTBOUND RAMPS AND PERRY HIGHWAY (S.R. 0097)	EBLT	98	134	125	> 500
	EBR	474	422	355	--
	SBL	66	62	73	145
	SBT	307	326	365	630
FRANK AVENUE/NORTH SITE DRIVEWAY AND PERRY HIGHWAY (S.R. 0097)	NBL	--	1	1	--
	SBL	370	267	276	--
ROBISON ROAD AND PERRY HIGHWAY (S.R. 0097)	SBL	--	--	76	--

* *Assumes a length of 20 feet per vehicle*

At the I-90 Westbound Ramps/Perry Highway intersection, the existing 170-foot northbound left-turn lane will provide adequate storage under each future with development condition. Likewise, the existing 325-foot southbound right-turn lane will provide adequate storage in 2004 and 2008 until it is converted to a shared through/right lane in 2014. Furthermore, the northbound through queue is not expected to exceed the 630 feet between the two interchange intersections and the westbound queues on the I-90 Westbound Off-Ramp will not extend onto I-90. Finally, the proposed westbound left-turn lane on the I-90 ramp is expected to have queues of 224 feet in 2004, 316 feet in 2008 and 340 feet in 2014 which can be accommodated in the I-90 Westbound Off-Ramp length.

At the I-90 Eastbound Ramps/Perry Highway intersection, the existing 145-foot southbound left-turn lane will provide adequate storage under each future with development condition. Similar to the westbound ramp, the eastbound queues are not expected to extend onto I-90 and the southbound through queue will not exceed the 630 feet between the two interchange intersections. In 2004, when only a single westbound right-turn lane is required, the queue is expected to be 474 feet. Upon adding a second westbound right-turn lane, each turn lane is expected to have queues of 422 feet and 355 feet in 2008 and 2014, respectively, which can be accommodated in the I-90 Eastbound Off-Ramp length.

In 2004, at the Frank Avenue/North Site Driveway/Perry Highway intersection, only one southbound left-turn lane will be present and the resulting southbound left-turn queue is expected to be 370 feet. In 2008 and 2014, when dual southbound left-turn lanes are proposed, the queue is expected to be 267 feet and 276 feet, respectively, for each left-turn lane. The northbound left-turn movement at this intersection has minimal volume and, in turn, the northbound queue is expected to be negligible.

At the intersection of Robison Road and Perry Highway, the southbound left-turn lane which is only required in 2014 will have a queue of approximately 76 feet. The analyses for the queues at these signalized intersections can be found in Appendix H.

CONCLUSIONS

Study Findings

Based on the data collected and the analyses performed under various conditions, the following are the results found:

- The proposed horse racing/restaurant facility, under the full-build out scenario, will generate an estimated 1290 entering trips and 32 exiting trips during the PM peak hour.
- The proposed showroom facility, in each study year, will generate an estimated 343 entering trips and 281 exiting trips during the PM peak hour.
- In total, the proposed Presque Isle Downs development will generate an estimated 1633 entering trips and 313 exiting trips during the PM peak hour under the full-operational scenario.
- The proposed site will be accessed by two full-access driveways located along Perry Highway. The North Site Driveway is planned to align with an extended Frank Avenue to form a "+" intersection. The South Site Driveway will be located immediately north of Academy Avenue and will remain a "T" intersection. Finally, a third full-access driveway will be located on Footmill Road and will only be utilized employees.
- Capacity analyses indicate that under existing conditions the following deficiencies are present:
    - Eastbound approach at the I-90 Eastbound Ramps/Perry Highway intersection operates at a LOS "E."
- By factoring the existing volumes to 2004, the following additional deficiencies are anticipated:
    - Southbound through movement at the I-90 Westbound Ramps/Perry Highway intersection drops to a LOS "E."
- By factoring the existing volumes to 2008, the following additional deficiencies are anticipated:
    - Westbound approach at the I-90 Westbound Ramps/Perry Highway intersection drops to a LOS "E."
    - Eastbound approach at the I-90 Eastbound Ramps/Perry Highway intersection drops to a failing level of service.

- By factoring the existing volumes to 2014, the following additional deficiencies are anticipated:
    - Northbound left-turn movement at the I-90 Westbound Ramps/Perry Highway intersection drops to a LOS "E" as does the overall level of service at this intersection. Southbound through movement drops to a failing level of service at the I-90 Westbound Ramps/Perry Highway intersection.
    - Eastbound approach at the I-90 Eastbound Ramps/Perry Highway intersection continues to fail with an increase in delay.
    - Eastbound approach at the Frank Avenue/Perry Highway intersection drops to a LOS "E."
    - Westbound approach at the Johnson Road/Perry Highway drops to a LOS "E."

- Capacity analyses show that operation of the proposed site will impact the traffic operations in the study area. The following is a list of the study intersections and the years at which additional deficiencies are anticipated:
    - I-90 Westbound Ramps/Perry Highway – 2004, 2008 and 2014
    - I-90 Eastbound Ramps/Perry Highway – 2004, 2008 and 2014
    - Fairfield Avenue/Perry Highway – 2004, 2008 and 2014
    - Frank Avenue/North Site Driveway/Perry Highway – 2004, 2008 and 2014
    - Race Avenue/Perry Highway – 2008 and 2014
    - South Site Driveway/Perry Highway – 2008 and 2014
    - Academy Avenue/Perry Highway – N/A
    - Johnson Road/Perry Highway – 2008 and 2014
    - Robison Road/Perry Highway – 2008 and 2014
    - Robison Road/Footmill Road – N/A

- The intersection of Frank Avenue/North Site Driveway and Perry Highway will meet signal warrants in 2004, 2008 and 2014 under the with development conditions.

- Under the signalized conditions, the southbound left-turn movement at the Frank Avenue/North Site Driveway/Perry Highway intersection will meet the criteria for protected/prohibited left-turn phasing under each future with development scenario.

- The southbound left-turn movement at the Robison Road/Perry Highway intersection will meet the criteria for protected/permitted phasing under each future with development scenario.

- At the South Site Driveway/Perry Highway intersection, a 300-foot exclusive southbound left-turn lane is required in 2008 and 2014 with the proposed development's traffic.

- All existing storage lanes will provide adequate storage for the queues anticipated under each future with development scenario. Additionally, the northbound through queue at the I-90 Westbound Ramps/Perry Highway intersection will not extend through the I-90 Eastbound Ramps/Perry Highway intersection. Likewise, the southbound through queue at the I-90 Eastbound Ramps/Perry Highway intersection will not extend through the I-90 Westbound Ramps/Perry Highway intersection.

Recommendations

Based on traffic engineering observations of the study area, data collected, development assumptions, and various analyses, and to ensure the proper management of traffic flow through the study area, the recommendations for each study year are outlined below.

It is the engineers' recommendation that only the 2004 opening day improvements need to be constructed prior to the opening of the development with the addition of a two way left turn lane extended to the south site drive. The previous transportation analysis illustrates that with the following improvements in place, the roadway network surrounding the site should be more than adequate to handle the current and initial development traffic requirements. Based on the conservative nature of the peak hour trip generation, as stated previously in this report, the following 2008 and 2014 improvements should not be implemented until the development is in operation for several years, and a follow up study can be conducted to verify that the additional improvements are indeed warranted.

Due to the facilities one of a kind nature, no trip generation calculation can be expected to be fool proof in estimating future development traffic. While the trip generation is based on as much knowledge as was available at the time of this report, no guarantee can be made that all approximated factors will be realized. One main concern is that assumed future racetrack attendance is based primarily upon the client's expectations. If business does not go as expected, the improvements listed for 2008 and 2014 may not be warranted. To the contrary, if business takes off, or a change in business characteristics occurs, more roadway improvements may be required to mitigate the development traffic. Therefore, in the best interest of Presque Isle Downs, Summit Township and PENNDOT, it is suggested that a follow up study be conducted within four (4) years after the opening of the development to better identify future transportation improvements for the study area..

GENERAL IMPROVEMENTS NECESSARY FOR EACH STUDY YEAR

At the proposed unsignalized driveways, stop signs should be installed and adequate sight distance should be provided in accordance with PENNDOT Publication 282, Highway Occupancy Permit Handbook (1).

2004 IMPROVEMENTS

- The phasing at both I-90 ramp intersections should be changed to simultaneous lagging phasing which will allow for better coordination between intersections and the best allocation of green time to heavy movements. A 225-foot westbound left-turn lane should be

constructed on the I-90 Westbound Off-Ramp. A 475-foot eastbound right-turn lane should be constructed on the I-90 Eastbound Off-Ramp.

- The two-way-left-turn lane that currently ends north of the Fairfield Avenue/Perry Highway intersection should be extended through the Fairfield Avenue intersection and end as a 370-foot exclusive southbound left-turn lane at the North Site Driveway intersection.
- A traffic signal should be installed at the North Site Drive intersection with Route 97. Frank Avenue, currently a paper street, should be extended to align with the North Site Driveway at the concurrence of both PENNDOT and Summit Township. Existing Jefferson Avenue should then be modified to right-in/right-out only access to Route 97.
- Dual westbound right-turn lanes should be constructed on the North Site Driveway approach and two eastbound receiving lanes should be provided. A second northbound through lane on Perry Highway currently begins north of the Fairfield Avenue intersection and should be lengthened to continue through the Fairfield Avenue intersection and end at the North Site Driveway intersection to accommodate the dual westbound right-turn lanes. An additional northbound through lane is also recommended to begin immediately south of the North Site Driveway and can be received by the same additional receiving lane constructed for the dual westbound right-turn lanes.

The following 2008 and 2014 improvements are included to illustrate PENNDOT's requirement of a ten year horizon year for a traffic impact study. These improvements should not be necessary prior to the opening of the development and should be reevaluated after the development is in full operation.

2008 IMPROVEMENTS

- The phasing at both I-90 ramp intersections should remain as simultaneous lagging phasing as was needed for the 2004 improvements. A second eastbound right-turn lane is required on the I-90 Eastbound Off-Ramp and should be constructed to a length of 425 feet. To receive the dual eastbound right-turn lanes, a second receiving lane is required to begin at the I-90 Eastbound Ramps/Perry Highway intersection. Additionally, to accommodate high exiting volumes during time periods other than the PM peak hour, dual northbound left-turn lanes are required at the I-90 Westbound Ramps/Perry Highway intersection. Rather than constructing a second northbound left-turn lane, it is recommended that the innermost existing northbound through lane be converted, only during certain time periods, to a northbound left-turn lane. Proper internally illuminated overhead signage must be provided to indicate if the middle northbound lane is operating as a left-turn lane or a through lane. Furthermore, when the signage is indicating that the dual northbound left-turn lanes are in operation, protected/prohibited phasing for the northbound left-turning movement must be implemented. The phasing can remain protected/permitted when only one northbound left-turn lane is operating as was shown in the PM peak hour capacity analyses. Finally, to receive the dual northbound left-turn lanes, a second receiving lane is required on the I-90 Westbound On-Ramp and can be tapered back to one lane prior to reaching the merge point with I-90.

- The additional southbound lane that was required to receive the dual eastbound right-turn lanes at the I-90 Eastbound Ramps/Perry Highway intersection will continue as an additional southbound through lane at the Fairfield Avenue/Perry Highway intersection. Consistent with the 2004 improvements, the geometry on Perry Highway at this intersection will include a southbound shared through/right lane, an exclusive southbound through lane, a two-way-left-turn lane, and two exclusive northbound through lanes.
- As was the situation in the 2004 improvements, the two-way-left-turn lane that was continued through the Fairfield Avenue/Perry Highway intersection will be striped as an exclusive southbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection. An additional southbound left-turn lane is also required at this intersection to accommodate the high volume of turning movements into the site. It is recommended that the additional southbound through lane, which is proposed to begin at the I-90 Eastbound Ramps/Perry Highway intersection, end as the second southbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection. The two-way-left-turn lane will also be striped as an exclusive northbound left-turn lane at the Frank Avenue/North Site Driveway/Perry Highway intersection to a minimal length of 75 feet. In the 2008 improvements, the dual westbound right-turn lanes will remain on the North Site Driveway approach and the additional receiving lane will still be required.
- Although exclusive left-turn lanes are proposed along Perry Highway at its planned intersection with Frank Avenue and the North Site Driveway, the two-way-left-turn lane is recommended to be continued through the unsignalized intersections with Race Avenue, the South Site Driveway, Academy Avenue, and Johnson Road, thus providing two-stage gap acceptance for minor street left-turns at each of these intersections. The two-way-left-turn lane is recommended to end south of the Johnson Road/Perry Highway intersection (i.e. prior to reaching the Robison Road/Perry Highway intersection). The two-way-left-turn lane should be striped as a 300-foot exclusive southbound left-turn lane at the South Site Driveway/Perry Highway intersection.
- A southbound advance phase should be implemented at the intersection of Robison Road and Perry Highway.

2014 IMPROVEMENTS

- At the I-90 Westbound Ramps/Perry Highway intersection, the existing exclusive southbound right-turn lane must be converted to a shared through/right lane. A second receiving lane will need to be constructed under the I-90 overpass and then will continue to the I-90 Eastbound Ramps/Perry Highway intersection where an additional southbound through lane will already be provided under the 2008 improvements.
- A southbound left-turn lane should be constructed at the Robison Road/Perry Highway intersection to a length of 100 feet and the phasing should remain as protected/permitted for this movement.

The recommended lane configuration and traffic control for the 2004, 2008 and 2014 future conditions with the proposed development are illustrated in Figure 13, Figure 14 and Figure 15, respectively.

LIST OF REFERENCES

1. Highway Occupancy Permit Handbook, Publication 282, Pennsylvania Department of Transportation, September 1993.

2. 2000 Highway Capacity Manual, Transportation Research Board, Washington D.C., 2000.

3. Highway Capacity Software 2000, Version 4.1, University of Florida, Gainesville, RL, 2000.

4. Engineering and Traffic Studies, Publication 201, Pennsylvania Department of Transportation, September 1993.

5. Traffic Signal Design Handbook, Publication 149, Pennsylvania Department of Transportation, September 1988.

6. Harmelink, M.D., Volume Warrants for Left Turn Storage Lanes at Unsignalized Grade Intersections, RR122, Department of Highways, Ontario, 1967.

7. A Policy on the Geometric Design of Highways and Streets, American Association of State Highway and Transportation Officials, Washington, D.C., 2001.

FIGURES
FOR
PRESQUE ISLE DOWNS
TRAFFIC IMPACT STUDY

SUMMIT TOWNSHIP
ERIE COUNTY, PENNSYLVANIA

NOVEMBER 2002

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IMAGE SOURCE: TYPE 10 GENERAL HIGHWAY MAP,
ERIE COUNTY, PENNSYLVANIA
COPYRIGHT - COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF GENERAL SERVICES

SCALE: 1 INCH = 1 MILE

SITE LOCATION

Dwg. Name: P:\25\2586\001\dwg\Locationmap.dwg [Copyright 2002 HRG Inc.] NOV 22, 2002 TIME: 3:07 PM DMYER

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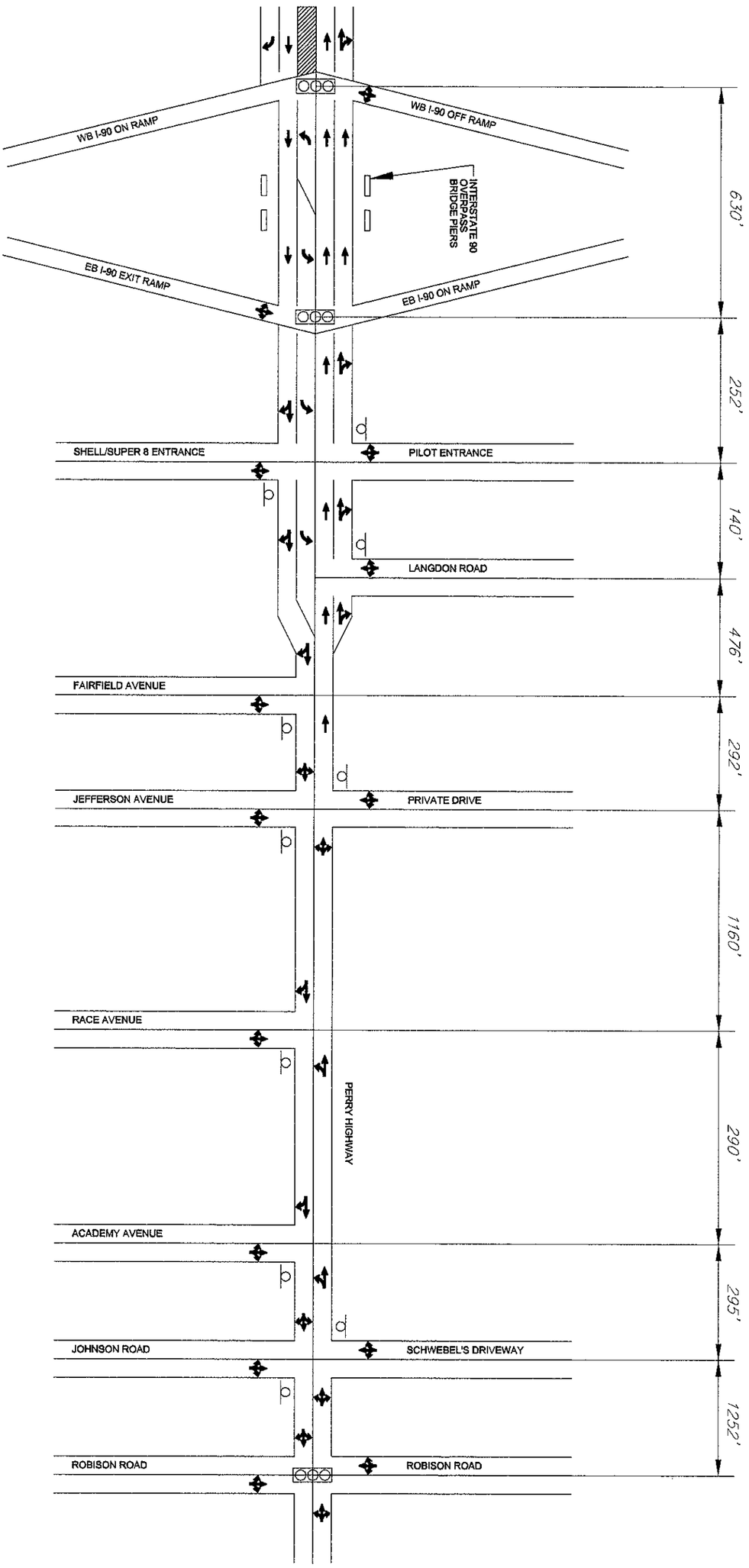
FIGURE 1
PROJECT LOCATION MAP
PRESQUE ISLE DOWNS
SUMMIT TOWNSHIP ERIE COUNTY PENNSYLVANIA

PROJ. MGR. – MJR	
DESIGN– DSM	
CADD– DSM	
CHECKED– MJR	
SCALE– NTS	
DATE–	

FIGURE NO.
1
PROJECT 2586.002

NOTES: DRAWING NOT TO SCALE
ALL DIMENSIONS ARE APPROXIMATE



LEGEND

EXISITNG TRAFFIC SIGNAL

EXISITNG STOP CONTROL

FIGURE 2

PROJECT 2586.002

FIGURE 2

2002 EXISTING GEOMETRY

PRESQUE ISLE DOWNS DEVELOPMENT

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PROJ. MGR. –	MJR
DESIGN–	DSM/AND
CADD–	DSM
CHECKED–	MJR
SCALE–	Not To Scale
DATE–	NOV. 2002

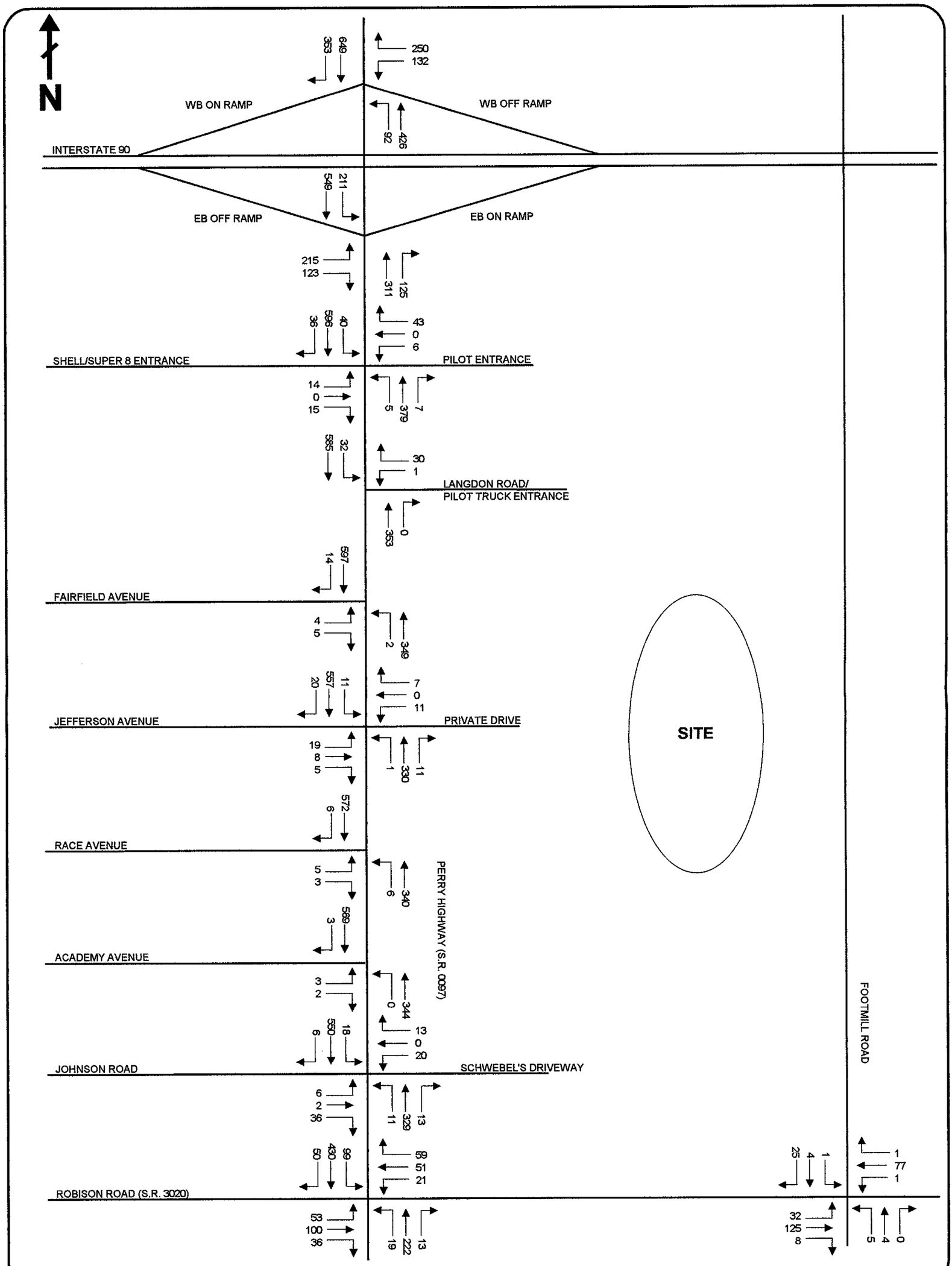

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FIGURE 3

2002 EXISITNG PM PEAK HOUR TRAFFIC VOLUMES

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO. **3**

PROJECT 2586.002

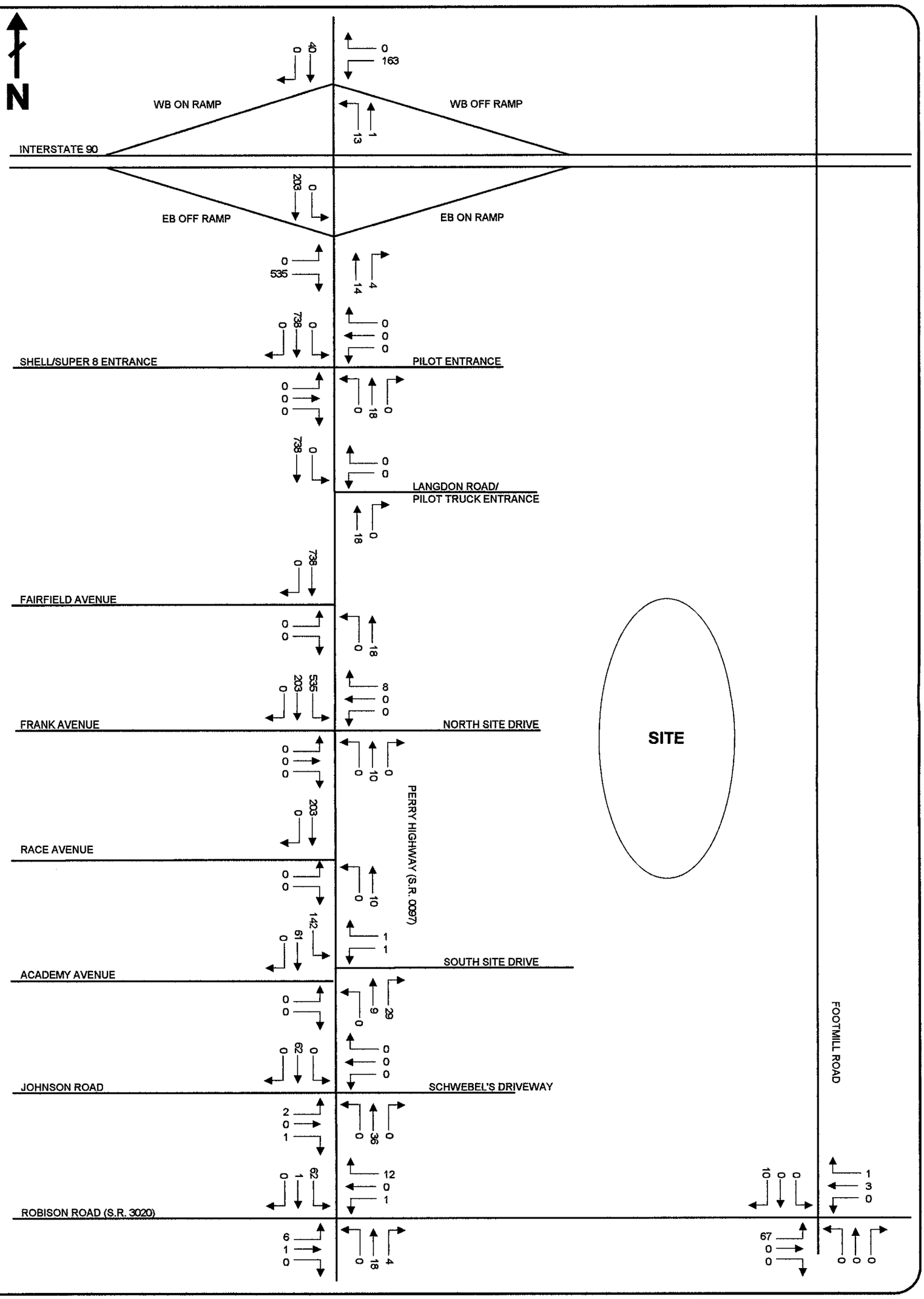

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FIGURE 4A

OPENING YEAR
2004 PM PEAK HOUR
RACETRACK TRIP GENERATION

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

4A

PROJECT 2586.002

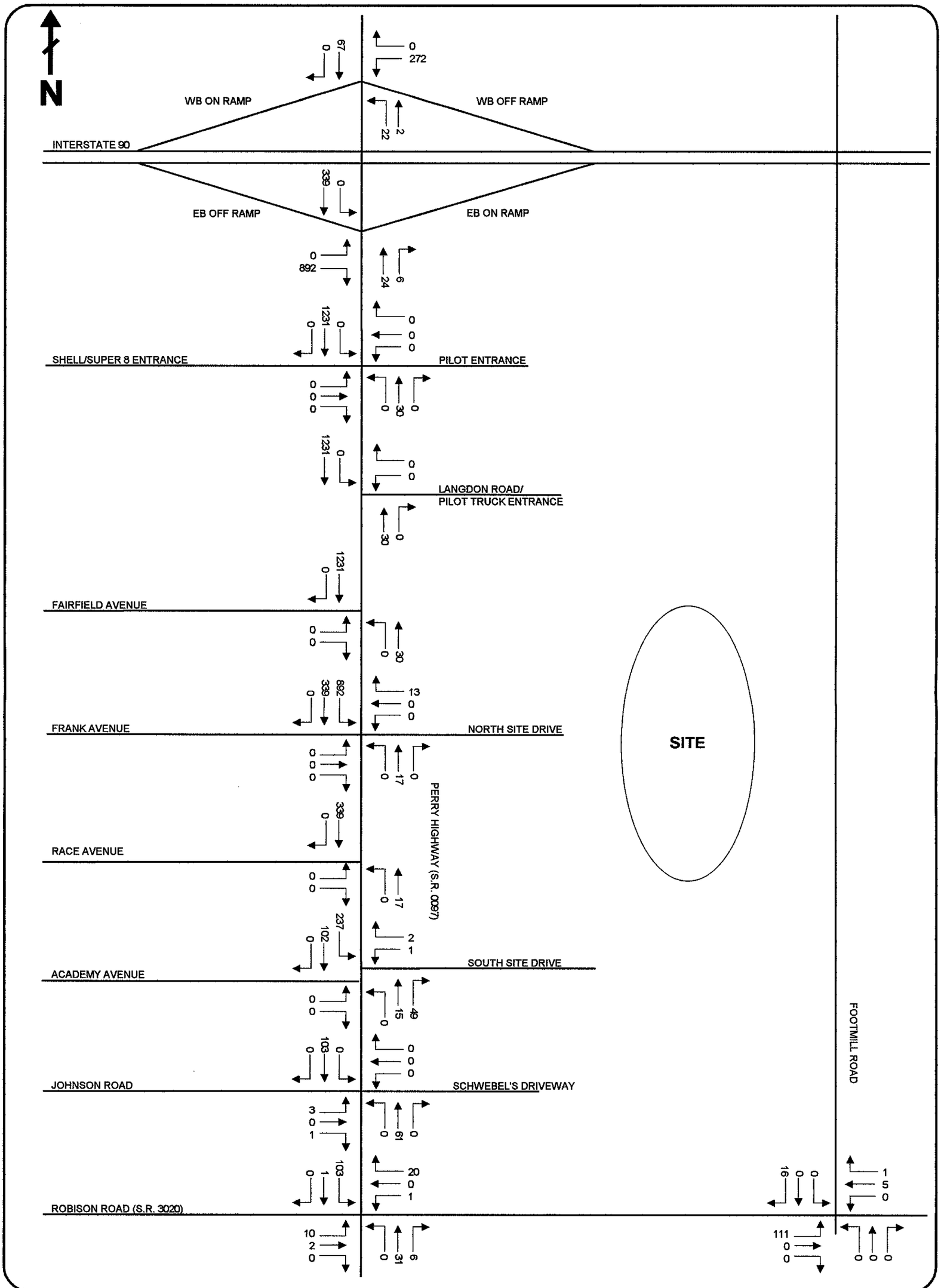

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FIGURE 4B

FULL OPERATIONAL
2008 PM PEAK HOUR
RACETRACK TRIP GENERATION

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

4B

PROJECT 2586.002

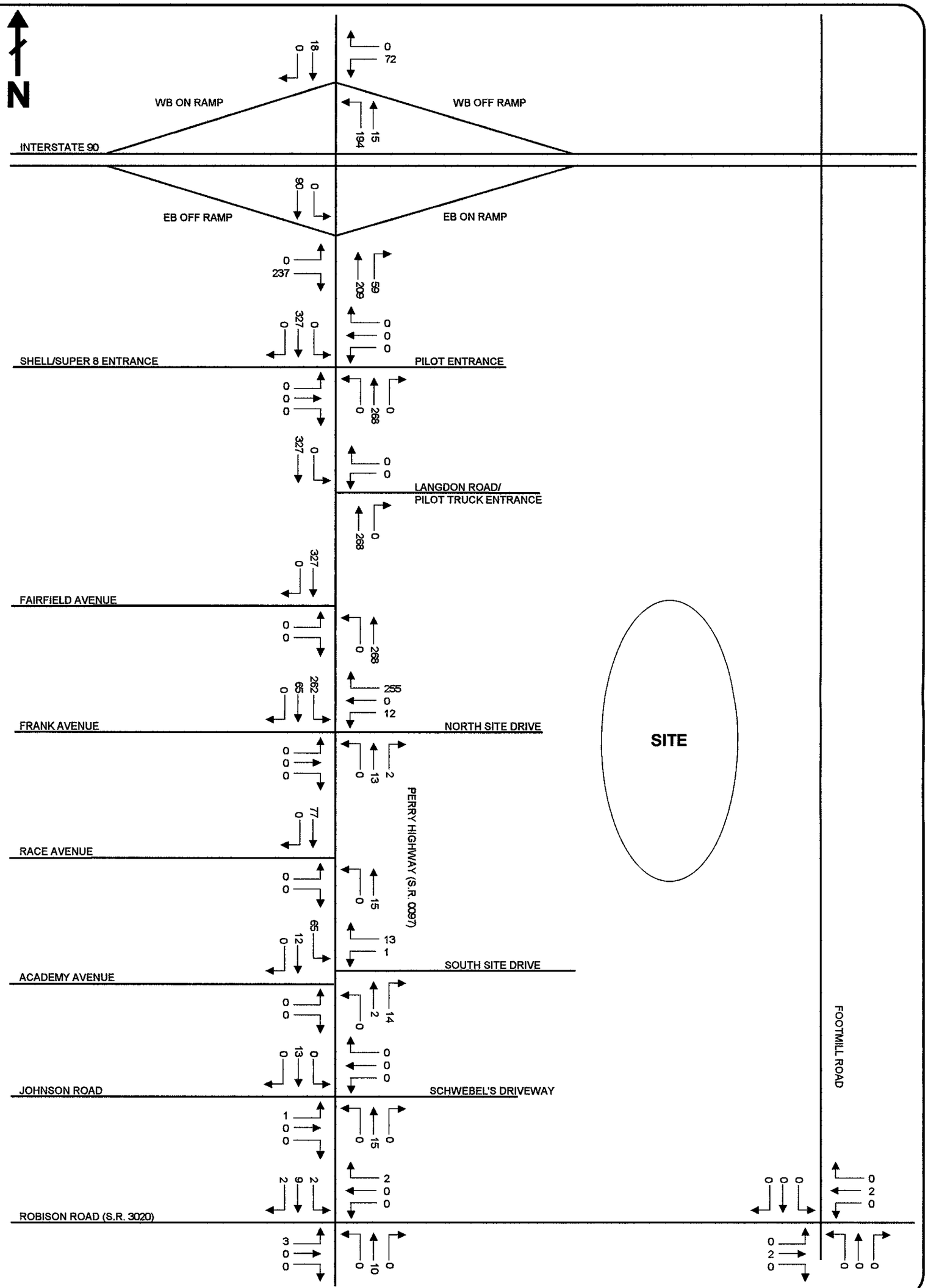

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FIGURE 5

PM PEAK HOUR
SHOWROOM TRIP GENERATION

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

5

PROJECT 2586.002

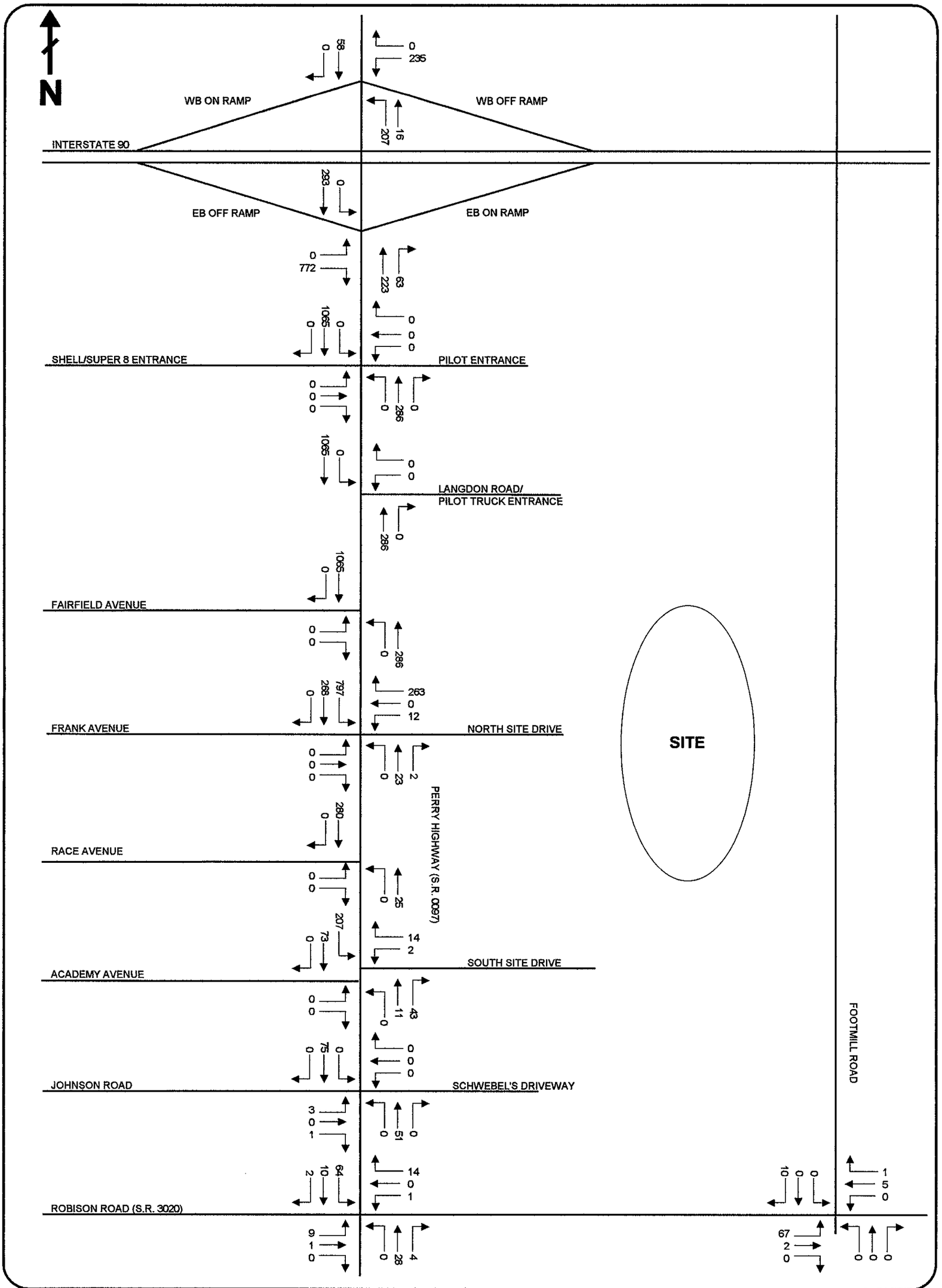

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FIGURE 6A

OPENING YEAR
2004 PM PEAK HOUR
TOTAL TRIP GENERATION

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

6A

PROJECT 2586.002

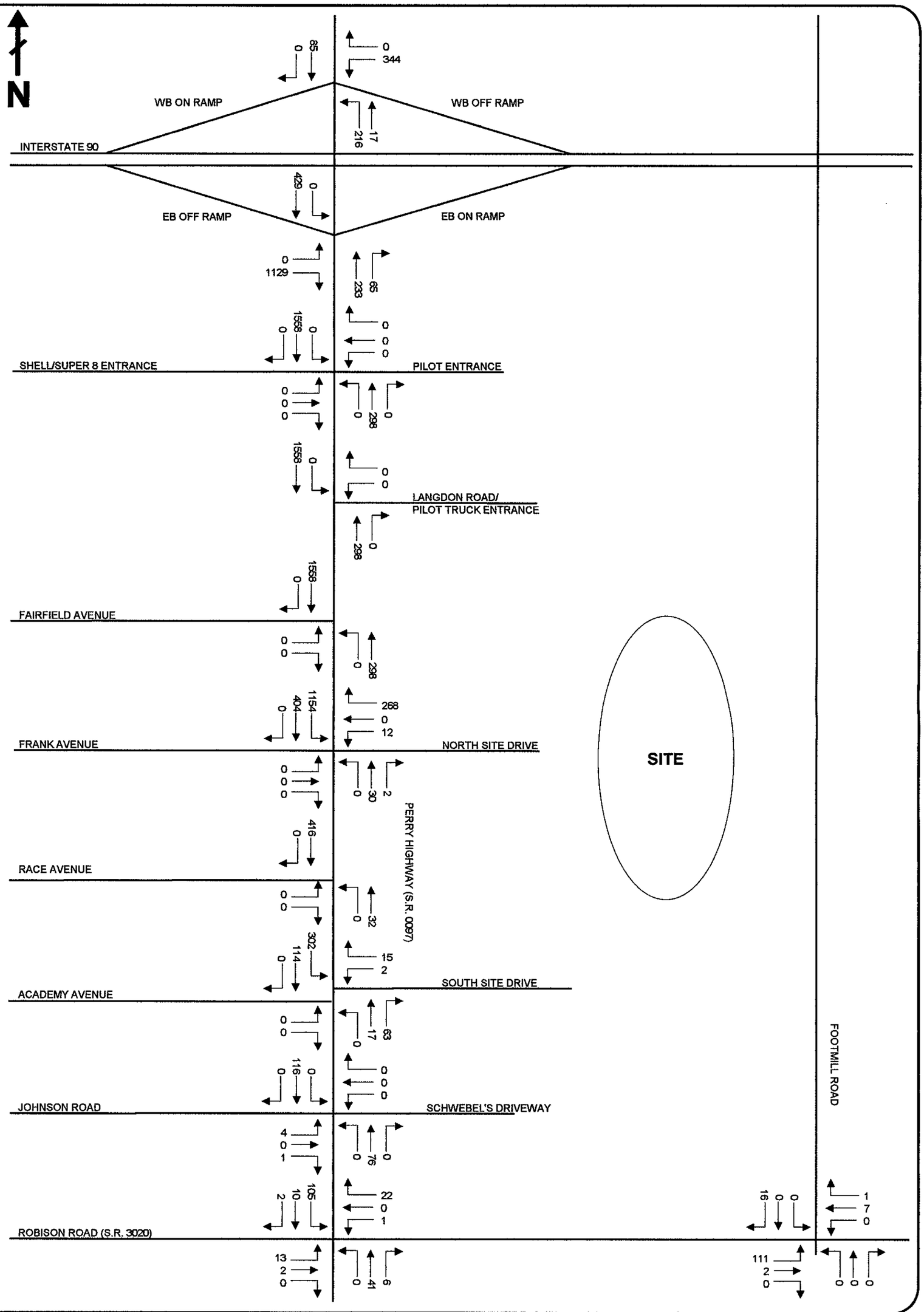

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FIGURE 6B

FULL OPERATIONAL
2008 PM PEAK HOUR
TOTAL TRIP GENERATION

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

6B

PROJECT 2586.002

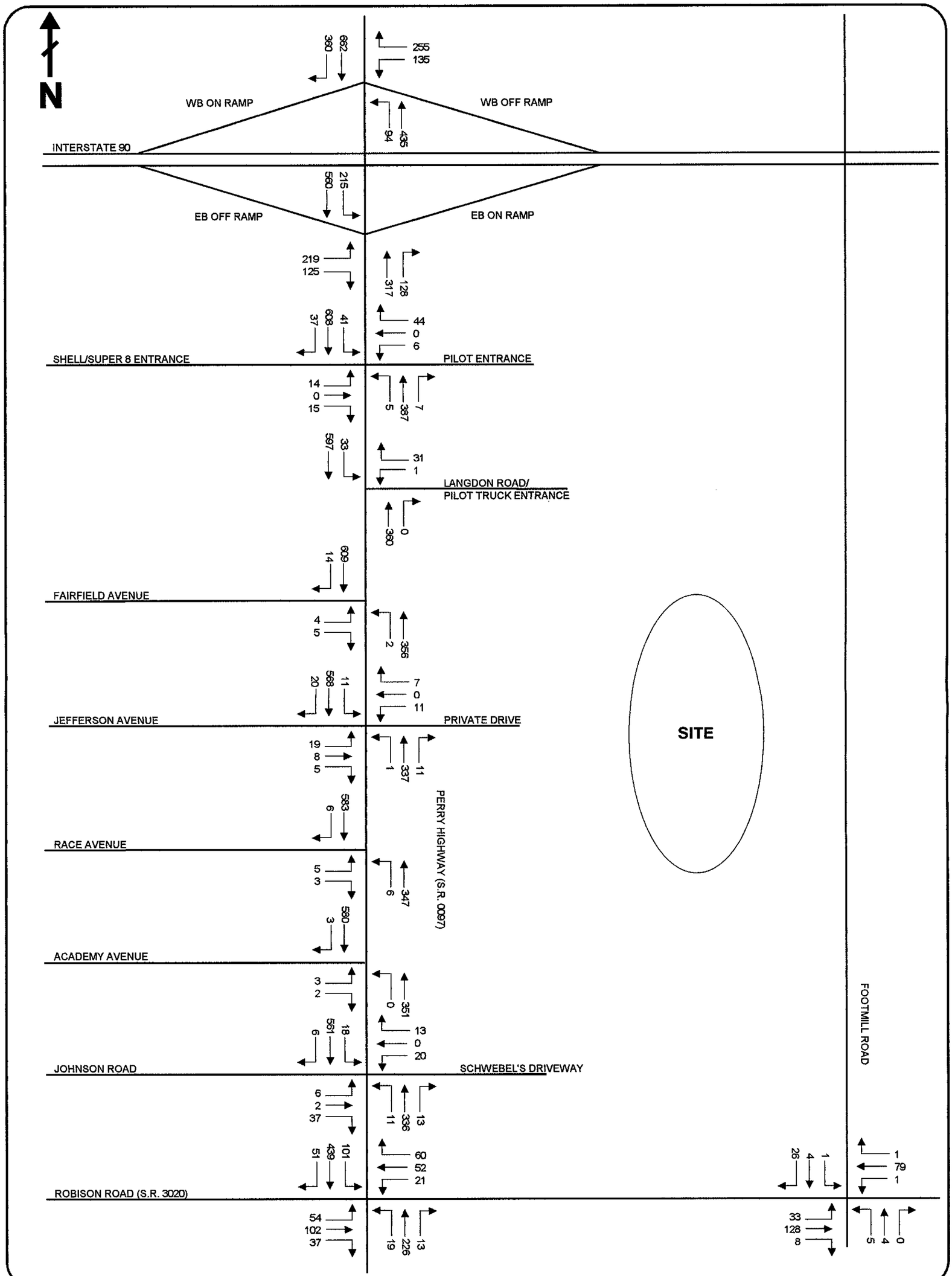

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FIGURE 7

2004 PM PEAK HOUR TRAFFIC VOLUMES WITHOUT DEVELOPMENT

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

7

PROJECT 2586.002

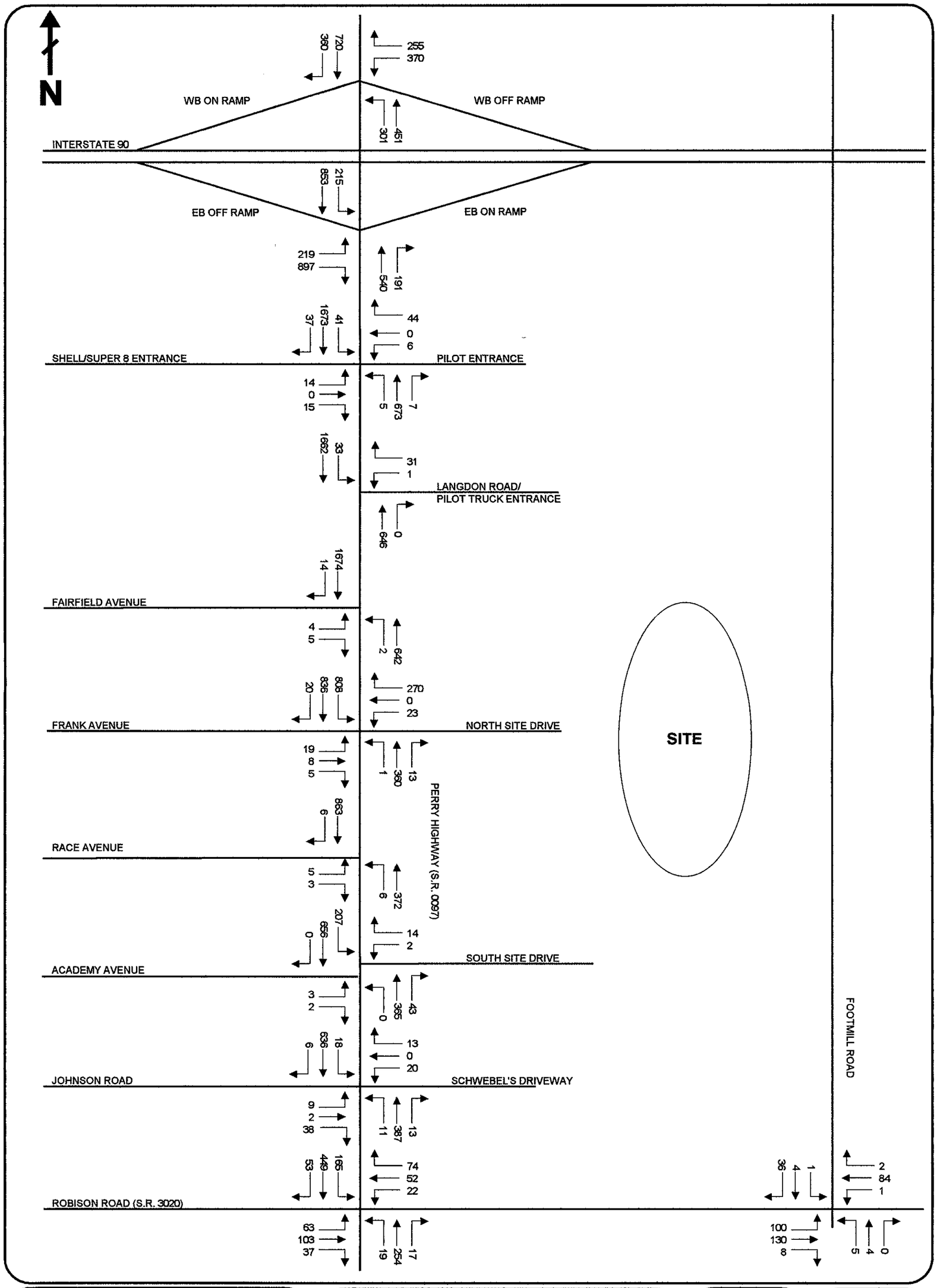

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FIGURE 8

2004 PM PEAK HOUR TRAFFIC VOLUMES WITH DEVELOPMENT

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

8

PROJECT 2586.002

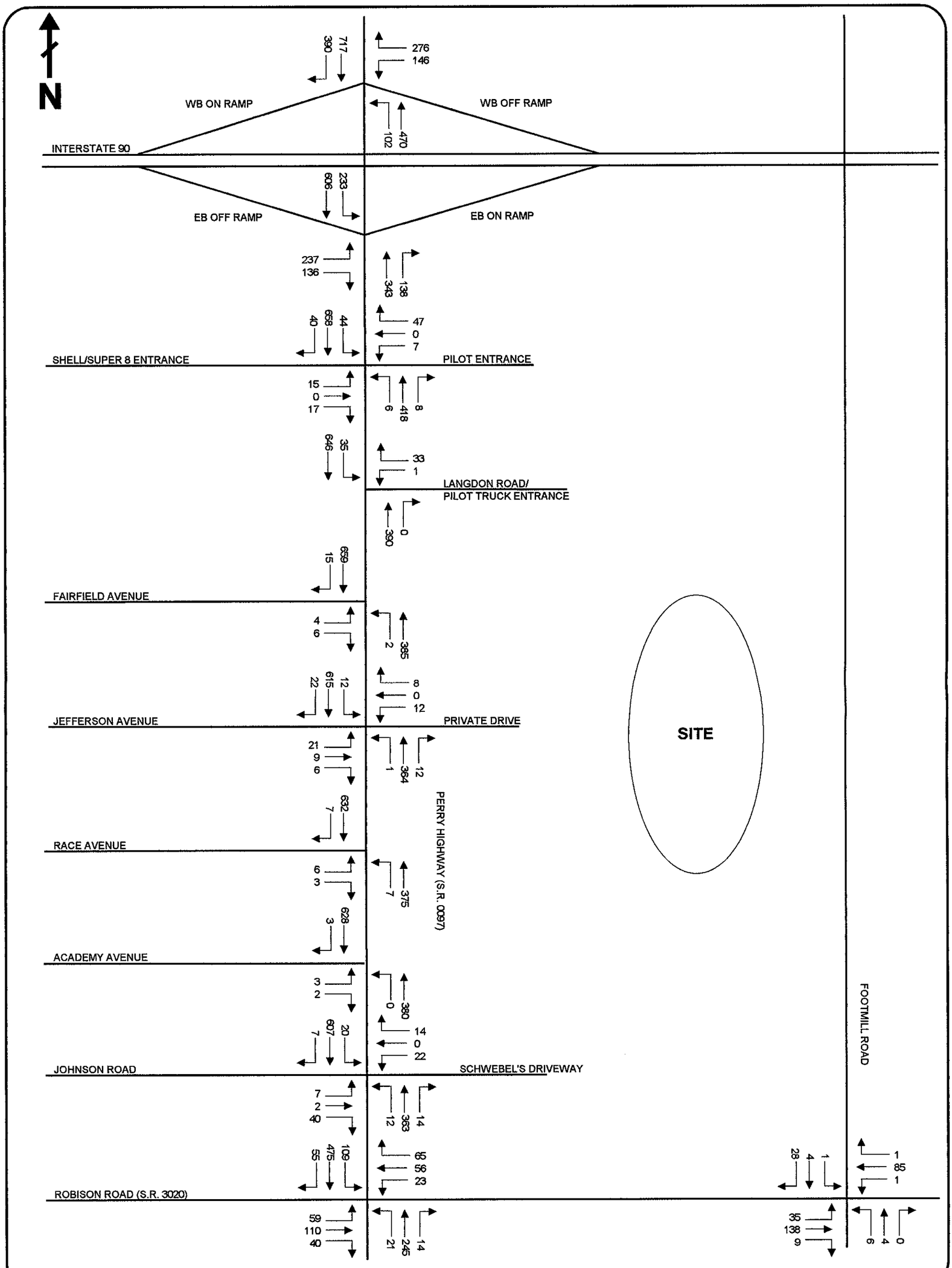

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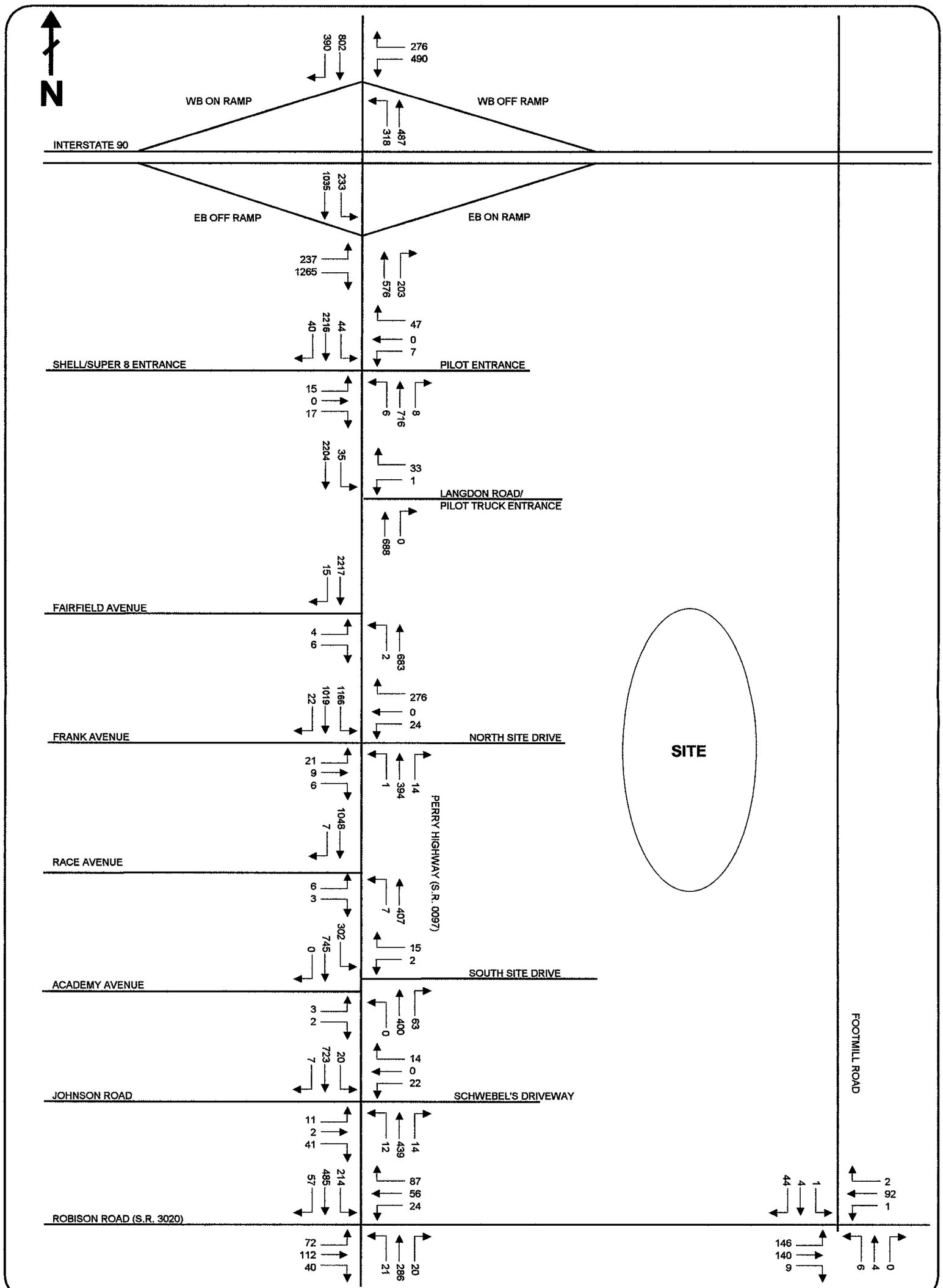
FIGURE 9

2008 PM PEAK HOUR TRAFFIC VOLUMES WITHOUT DEVELOPMENT

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO. **9**

PROJECT 2586.002



HRG
Herbert, Rowland & Grubic, Inc.
Engineering & Related Services
280 Executive Drive
Cranberry Township, PA 16066
(724) 779 - 4777
Fax (724) 779 - 4711
Email - pbgh@hrg-inc.com
Website - www.hrg-inc.co.
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FIGURE 10

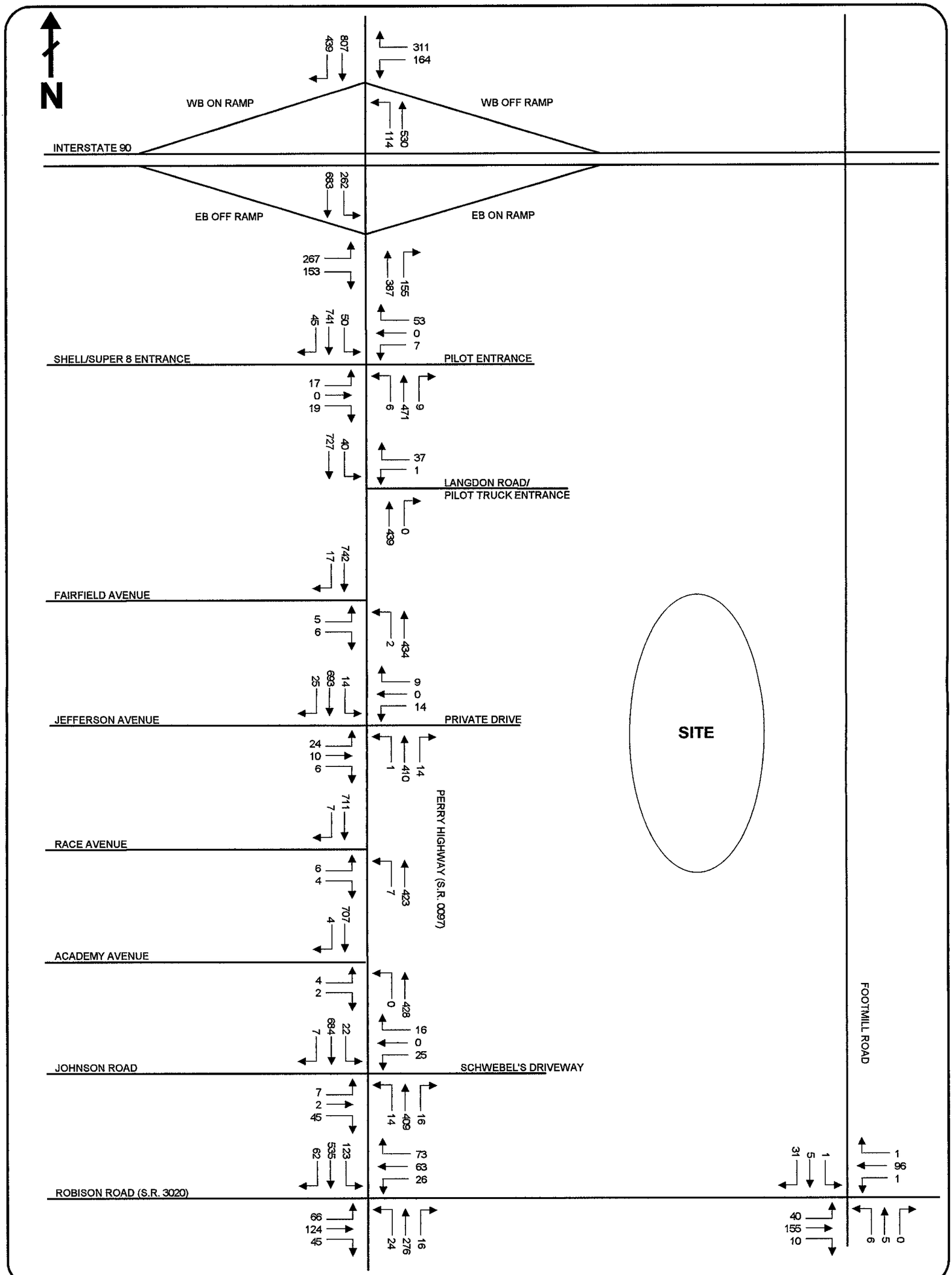
2008 PM PEAK HOUR TRAFFIC VOLUMES WITH DEVELOPMENT

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

10

PROJECT 2586.002



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Cranberry Township, PA 16066
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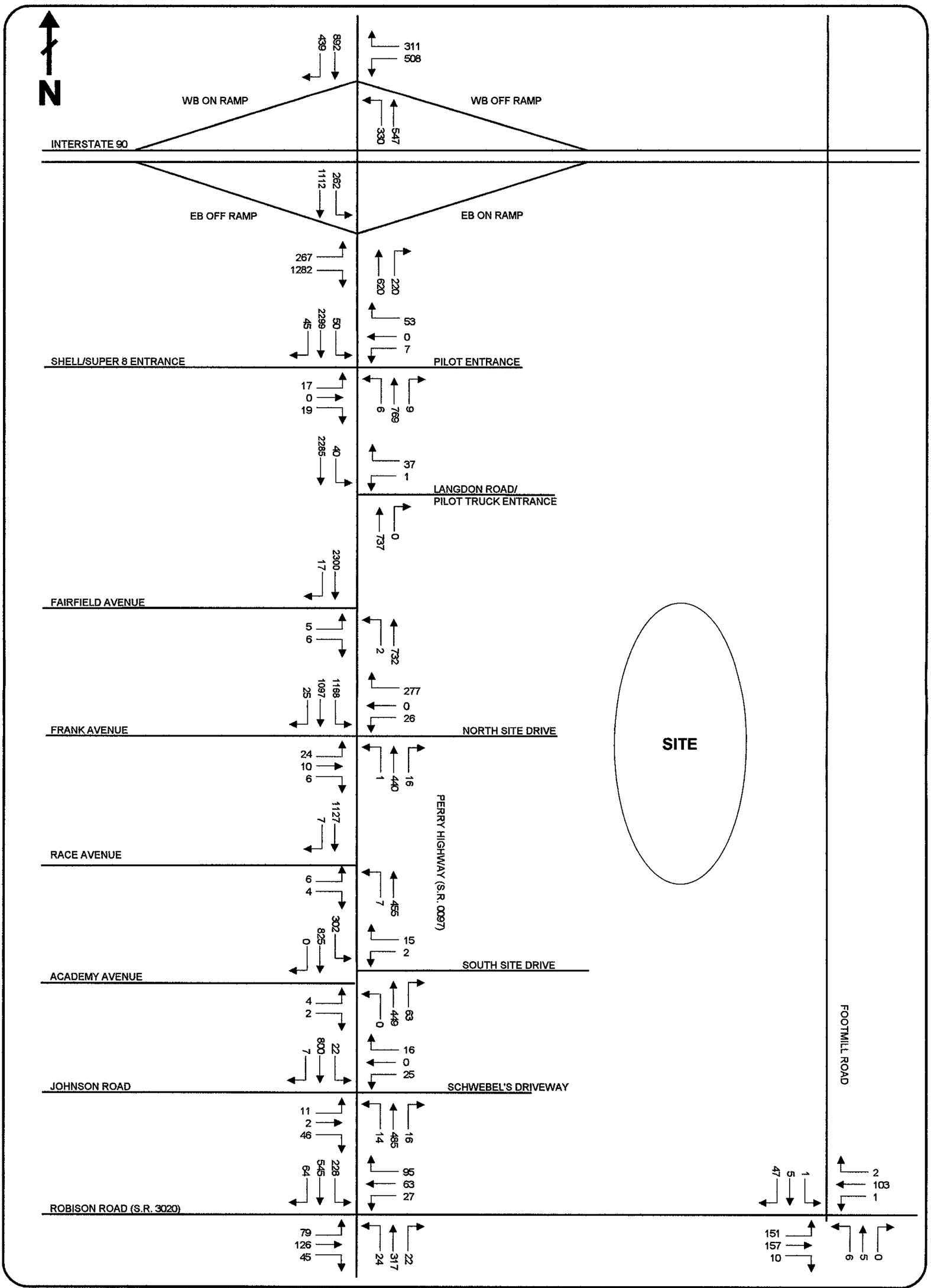
FIGURE 11

2014 PM PEAK HOUR TRAFFIC VOLUMES WITHOUT DEVELOPMENT

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO. **11**

PROJECT 2586.002



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Engineering & Related Services
280 Executive Drive
Cranberry Township, PA 16066
(724) 779 - 4777
Fax (724) 779 - 4711
Email - pbgh@hrg-inc.com
Website - www.hrg-inc.co.
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FIGURE 12

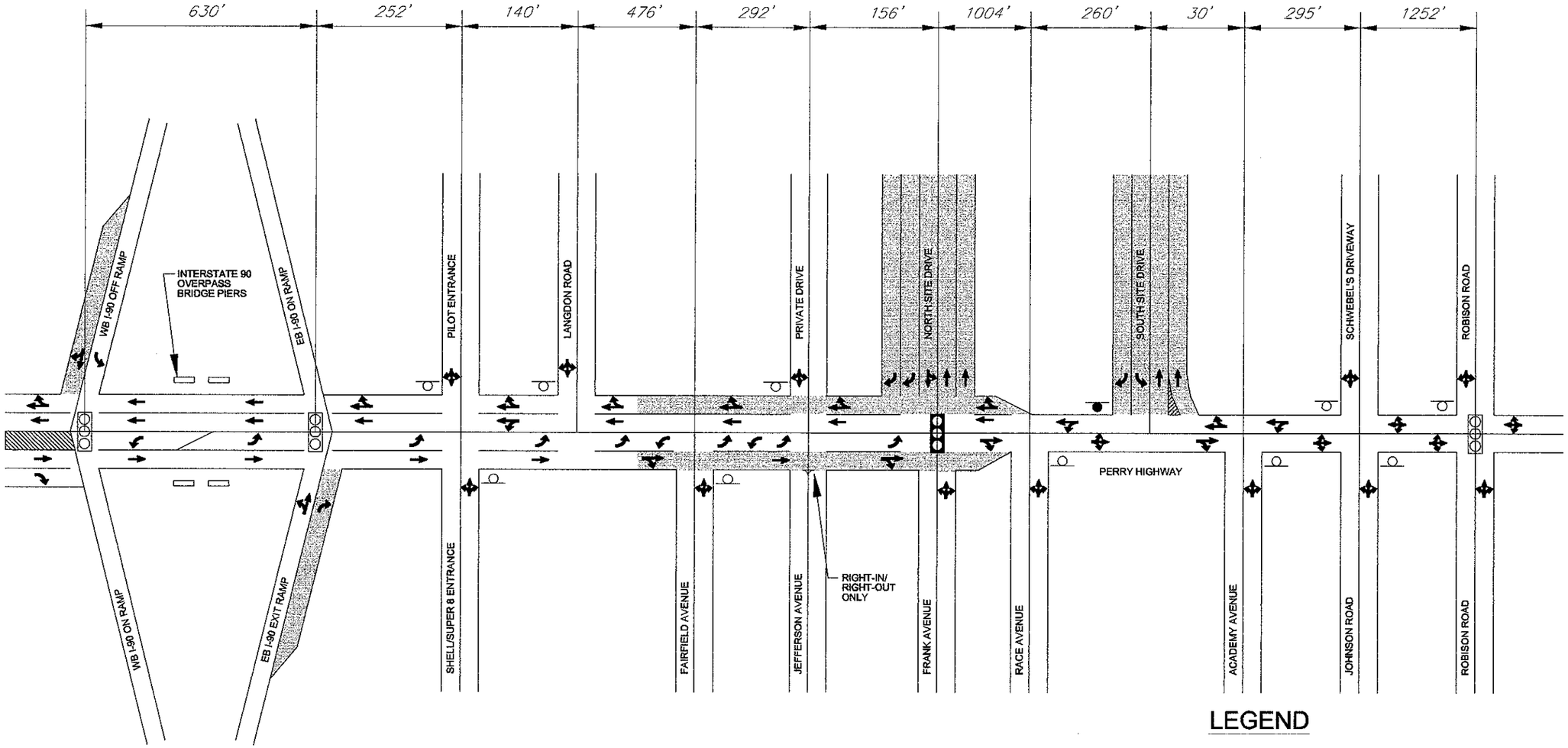
2014 PM PEAK HOUR TRAFFIC VOLUMES WITH DEVELOPMENT

PROJ. MGR. - MJR	
DESIGN - DSM	
DRAWING - DSM	
CHECKED - ANM	
SCALE - N.T.S.	
DATE - NOV. 2002	

FIGURE NO.

12

PROJECT 2586.002



LEGEND

- EXISITNG TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- EXISITNG STOP CONTROL
- PROPOSED STOP CONTROL
- PROPOSED LANE ADDITION

NOTE: DRAWING NOT TO SCALE
ALL DIMENSIONS ARE APPROXIMATE

PROJ. MGR. – MJR	
DESIGN– DSM/AND	
CADD– DSM	
CHECKED–MJR	
SCALE– Not To Scale	
DATE– NOV. 2002	

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Herbert, Rowland & Grubic, Inc.
Engineering & Related Services
280 Executive Drive
Cranberry Township, PA 16066
(724) 779-4777
Fax (724) 779-4711
Email - pbgh@hrg-inc.com
Website - www.hrg-inc.com
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FIGURE 13
2004 PROPOSED GEOMETRY
PRESQUE ISLE DOWNS DEVELOPMENT

FIGURE
13

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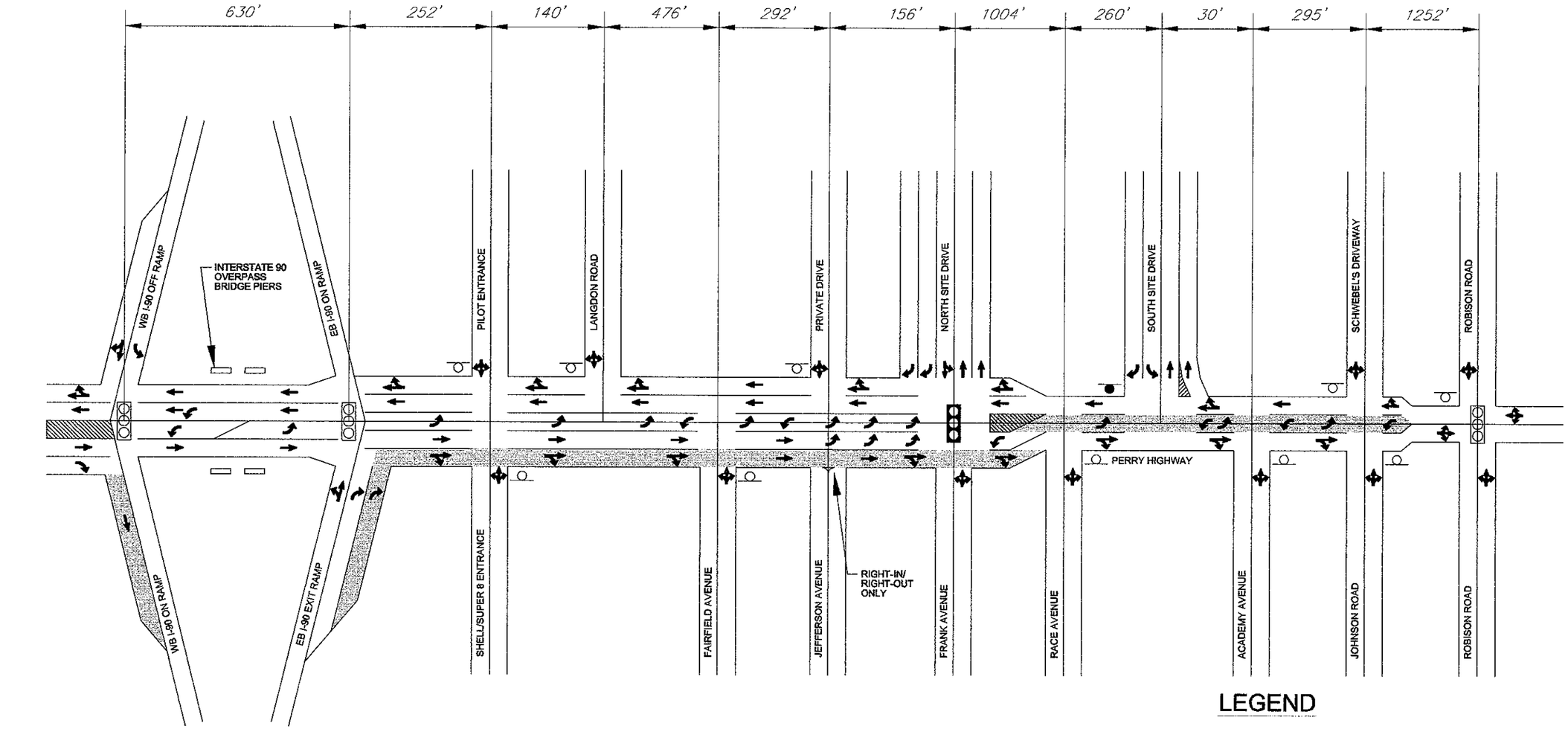

LEGEND

- EXISITNG TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- EXISITNG STOP CONTROL
- PROPOSED STOP CONTROL
- PROPOSED LANE ADDITION

NOTE: DRAWING NOT TO SCALE
ALL DIMENSIONS ARE APPROXIMATE

PROJ. MGR. –	MJR
DESIGN–	DSM/AND
CADD–	DSM
CHECKED–	MJR
SCALE–	Not To Scale
DATE–	NOV. 2002

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Herbert, Rowland & Grubic, Inc.
Engineering & Related Services
280 Executive Drive
Cranberry Township, PA 16066
(724) 779-4777
Fax (724) 779-4711
Email - pbgh@hrg-inc.com
Website - www.hrg-inc.com
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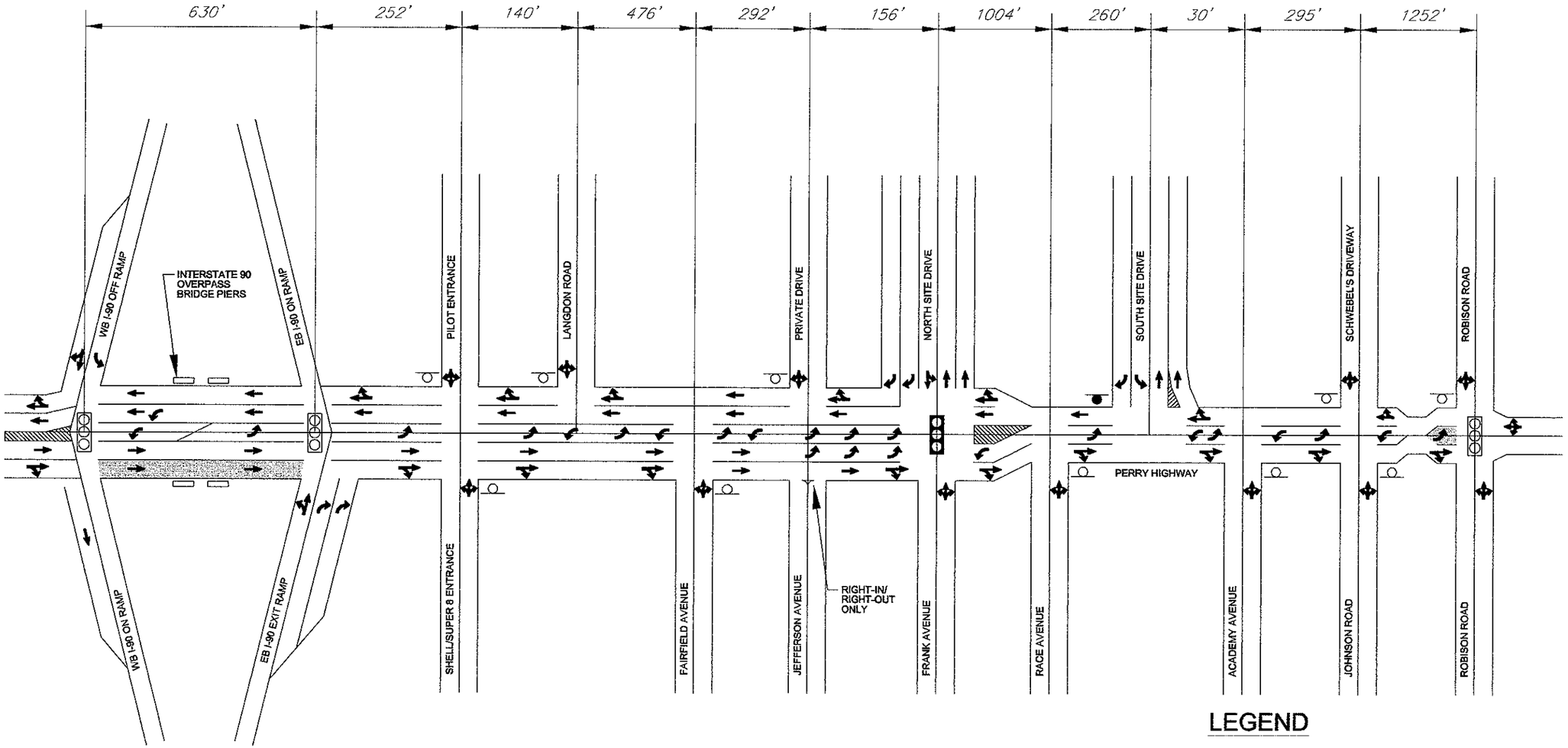
FIGURE 14
2008 PROPOSED GEOMETRY
PRESQUE ISLE DOWNS DEVELOPMENT

FIGURE
14

PROJECT 2586.002



LEGEND

- EXISITNG TRAFFIC SIGNAL
- PROPOSED TRAFFIC SIGNAL
- EXISITNG STOP CONTROL
- PROPOSED STOP CONTROL
- PROPOSED LANE ADDITION

NOTE: DRAWING NOT TO SCALE
ALL DIMENSIONS ARE APPROXIMATE

PROJ. MGR.	– MJR
DESIGN–	DSM/AND
CADD–	DSM
CHECKED–	MJR
SCALE–	Not To Scale
DATE–	NOV. 2002

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Herbert, Rowland & Grubic, Inc.
Engineering & Related Services
280 Executive Drive
Cranberry Township, PA 16066
(724) 779-4777
Fax (724) 779-4711
Email - pbgh@hrg-inc.com
Website - www.hrg-inc.com
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FIGURE 15
2014 PROPOSED GEOMETRY
PRESQUE ISLE DOWNS DEVELOPMENT

FIGURE
15

PROJECT 2586.002