TRAFFIC IMPACT STUDY

Hollywood Casino

THE CITY OF PHILADELPHIA
Pennsylvania

Prepared For:
Penn National Gaming, Inc.
825 Berkshire Boulevard, Suite
Wyomissing, PA 19610

Prepared By:

Pennoni Associates, Inc.
3001 Market Street, Suite 200
Philadelphia, PA 19104
(215) 222-3000

Debra Ferraro
PENNA. REG. P.E. NO. 048404E

Brian Williams
PENNA. REG. P.E. NO. 078240

Spencer Slack

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EXECUTIVE SUMMARY

This Study documents the results of an investigation of transportation impacts and parking requirements for the Hollywood Casino proposed on the site of the existing Turf Club (700 Packer Avenue) in the Stadium District of Philadelphia, Pennsylvania. The study has been prepared for Penn National Gaming, Inc. in support of an application to the Pennsylvania Gaming Control Board for a license to operate a casino in Philadelphia.

This report will serve as a revision to the previously submitted TIS prepared for the site. The report has been revised to address comments received from PennDOT via Orth-Rodgers & Associates, Inc in a letter dated May 23, 2013. The letter was issued on behalf of the Pennsylvania Gaming Control Board. The revised report includes an analysis of the additional intersections and study periods requested in the review letter. Additionally, as requested, the report includes a Phase 1 and Phase 2 analysis.

The casino license would permit operation of a 3,250 slot casino facility with 66 table games and 15 poker tables to be built in 2 Phases. The Phase 1 Development Program for the site consists of the following:

- Multi–level, 102,000 SF gaming area with 2,250 slot machines and 81 table games
- 3380 vehicle parking garage (2700 customer spaces, 230 valet spaces, 450 employee spaces)
- 76 vehicle surface lot (70 valet spaces, 6 bus spaces)
- 935 seat restaurant and bar facilities
- 500 SF of retail
- 12,500 SF of multi-purpose space

The Phase 2 development program for the Hollywood Casino project consists of the following:

- Expansion of the gaming area with 1,000 additional slot machines
- 500 room hotel
- 12,000 square foot ballroom
- 4 board rooms totaling 2,000 square feet
- Expansion of the parking garage with 1,000 additional spaces

It is anticipated that the Pennsylvania Gaming Control Board will award the Philadelphia gaming license by the end of 2013 and if awarded a license, Penn National Gaming, Inc. will complete design and construction of the casino within 24 to 36 months following the license award. According to this anticipated timeline, Phase 1 of the Hollywood Casino will open in mid-2016 and the Phase 2 will open in 2021.

Access

The site is well situated near the Packer Avenue (Exit 350) and Broad Street (Exit 349) Interchanges on Interstate 76 (I-76) and the Broad Street Interchange (17) on Interstate 95 (I-95). These interchanges and the surrounding roadway network have been designed to accommodate peak traffic flows associated with fully attended events at the three major sporting venues, the largest of which houses the Philadelphia Eagles.

The proximity of the Hollywood Casino to major public transit facilities is another attribute of this site. The AT&T Station of SEPTA's Broad Street Line is located approximately ¾ mile from the site. In addition, Bus Route G services Packer Avenue with stops adjacent to the site and several additional bus routes (including Routes 4, 7, 12, 24, and 63) pass in close proximity to the site. The proximity of these transit facilities is expected to be particularly attractive for local employees and also patrons of the casino.

The site will be accessed from South Darien Street and Seventh (7th) Street. Access to the porte cochere is proposed via a one-way entrance driveway on 7th Street and a one-way exit driveway proposed on Darien Street. Valet staff will utilize subsurface parking spaces accessed by driveways connected to the porte cochere. The eight-level customer parking garage will be accessed by a one-way entrance driveway located on 7th Street and a one-way exit driveway on Darien Street.

Employees will access their parking facilities via a two-way driveway on South Darien Street. Loading facilities will be located on 7th Street. Bus parking will be located off of South Darien Street.

Parking

The Hollywood Casino will provide 3,000 patron/guest parking spaces for 2,736 gaming positions in Phase 1 and 4,000 patron/guest spaces for 3,736 gaming positions in Phase 2, both of which satisfy the requirement of the Philadelphia Code requiring 4 patron/guest parking spaces for every 5 slot machines or gaming positions. The Hollywood Casino will ultimately provide parking spaces for patrons and guests at a rate of 1.07 spaces per gaming position. The rate is consistent with the industry wide parking ratios which range from .75 to 1.59 spaces per gaming position with the median being 1.07 spaces per gaming position

Land Uses

The existing site at 700 Packer Avenue is comprised of a mixed-use building with associated surface parking. The first floor is occupied and contains office, industrial, and retail uses including the Pennsylvania Lottery Commission, Packer Avenue Foods, and Verifone Transportation Systems. The second floor houses the Turf Club, an off-track betting facility and restaurant.

The site is currently zoned **I-2, Medium Industrial** and is surrounded by a CMX-3 (Neighborhood Commercial Mixed-Use-3) zoned parcel to the west, I-2 (Medium Industrial) zoned parcels to the east/southeast, and Sports Stadium District (SPA-STA) zoned parcels to the south and west. All of these zoning areas include the Airport Hazard Control Overlay District. There are some residential communities to the north and west of the site, all of which are buffered by I-76 or the Hotel and Stadium parking facilities.

Accident History

The accident summary report provided by the City indicates that accident rates are low for the twenty-four (24) study intersections. Twenty-one of the intersections averaged less than 3 reportable accidents per year. The intersections of Broad Street and Pattison, Broad Street SB and Pattison Avenue, South Broad Street SB and Packer Avenue, and South Broad Street SB and I-95 NB on-ramp have slightly higher occurrences of accidents averaging between 4 and 6 crashes per year. The highest percentage of accidents occurring at the Packer Avenue intersections was angle accidents and most occurred during daytime hours. Two pedestrian accidents occurred at the intersection of Packer Avenue and 7th Street with one being fatal. Based on the information provided, there are no discernible patterns for the accidents at the study intersections which would indicate a correctable condition.

Casino Trip Estimates and Characteristics

The trip estimates for the Hollywood Casino were computed using the following trip generation rates of 0.41 trips per gaming position for the Friday Evening Commuter Peak Hour, 0.46 trips per gaming position for the Friday Evening Casino Peak Hour and 0.58 trips per gaming position for the Saturday Casino peak hour. These rates were developed from a comprehensive review of pertinent published studies and an examination of actual traffic data from the Sugarhouse Casino in Philadelphia, Rivers Casino in Pittsburgh, and the St. Charles casino in Saint Louis, facilities with similar demographic and geographic environments.

The Philadelphia Gaming Advisory Task Force prepared a report in 2007 which estimated that approximately 16% of patrons visiting a South Delaware Avenue site will arrive and depart utilizing alternative modes of transportation with 2% to 6% utilizing public transit. The anticipated travel modes were noted as follows:

Drive	= 84%
Pedestrian	= <1%
Taxi	= 6%
Casino Bus	= 8%
Public Transit	= 2%

The trip generation for the Friday Pre-Phillies Event peak period includes adjustments made to account for linked trips and a stay-away factor as identified in the *Philadelphia Sports Complex Management Parking and Traffic Management Plan*.
It is anticipated that when events are held at the sports complex venues some patrons will park in the sports complex lots and walk to the casino prior to attending the event and some patrons will park at the casino lot and visit the casino before and/or after the event. The linked trips factor for the Casino as identified in the *Philadelphia Sports Complex Management Parking and Traffic Management Plan* is estimated to be 15% of the arrival trips. The stay-away factor for the Casino as identified in the *Philadelphia Sports Complex Management Parking and Traffic Management Plan* is estimated to be 15% during Phillies events.

The parcel is currently occupied by office, industrial and commercial uses as noted above. The proposed casino will replace the existing uses and therefore, a trip credit equivalent to the observed site activity has been taken in calculating the proposed **NEW** site trips utilized in the capacity analysis of the adjacent roadway network.

The anticipated peak hour site trips to/from the proposed casino are summarized as follows:

Casino Trip Generation Summary (New Site Trips)

SCENARIO	PHASE 1		PHASE 2	
	ENTER	EXIT	ENTER	EXIT
Friday Evening Commuter Peak	471	392	842	732
Friday Evening Pre-Phillies Event Peak	320	325	625	636
Friday Evening Casino Peak	450	541	839	917
Saturday Evening Casino Peak	626	681	1,106	1,141

The new vehicle trips generated by the proposed Casino will be distributed and assigned to the roadway network based on a combined evaluation of existing traffic patterns, the anticipated characteristics and behavior of the development-generated traffic, and the proposed site access. It is expected that the majority of site traffic generated during the peak periods will use I-95 and I-76. The percentages of site traffic assigned to these roadways are summarized as follows:

Casino Trip Distribution Summary

ENTERING	PM	EXITING	PM
From I-95 NB	16%	To I-95 NB	19%
From I-95 SB	19%	To I-95 SB	16%
From I-76 EB	25%	To I-76 EB	30%
From I-76 WB	30%	To I-76 WB	25%
From Local Streets	10%	To Local Streets	10%

Existing and Future No-Build Traffic Operations

For all peak periods evaluated under existing conditions and future conditions for the 2016 Phase 1 No-Build, 2021 Phase 2 No-Build, and 2026 Horizon No-Build (5 years after opening), all study intersections are expected to operate at overall LOS “C” or better with all traffic movements also operating at LOS “D” or better with the exception of Packer Avenue and Darien Street. During the Friday Evening Pre-Phillies Event peak period for existing and future no-build conditions, the Packer Avenue and Darien Street intersection operates at an overall LOS “D” but the westbound approach is operating at a LOS “E” and the left turn lane operates at LOS “F” as a result of heavy left turns destined for several event parking lots located south on Darien Street.

The estimated 95th percentile queues at the study intersections during the Friday Evening Commuter Peak, Friday Evening Casino Peak, and Saturday Evening Casino Peak are considered within acceptable limits as none of the

queues extend into the adjacent intersection with the exception of the eastbound left turn and through movement of Oregon Avenue at Packer Avenue. The reported 95th percentile queue on the eastbound left turn movement of Oregon Avenue extends into the adjacent signalized intersection at Moyamensing Avenue during the Friday Commuter Peak period.

During the Friday Pre-Phillies Event Peak, the estimated 95th percentile queues at the study intersections are generally within acceptable limits. At the following locations, the 95th percentile queues extend beyond the storage length or into adjacent intersections due to event traffic proceeding to venue parking:

- Packer Avenue & 10th Street – westbound left
- Packer Avenue & Darien Street – westbound left, westbound through, westbound right
- Packer Avenue & 7th Street – eastbound left, westbound left
- Front Street & I-95 Ramps – eastbound right
- Broad Street & Pattison Avenue – northbound right
- Broad Street & Oregon Avenue – eastbound left, eastbound through

The estimated 95th percentile queues on the I-95 southbound off-ramp at Front Street are a result of the event traffic destined to the venue parking. The right turn queue extends beyond the length of the channelized right turn lane into the through lane. However, the I-95 southbound off ramp is over 2,000 feet long and the eastbound queue does not extend to I-95. The northbound right turning movement at Broad Street and Patterson Avenue experiences long queues which exceed the available storage lengths and impact the upstream traffic signals and the merge from the I-95 southbound ramp on Broad Street. The reported 95th percentile queue on the eastbound left and through movements of Oregon Avenue at Broad Street both extend into the adjacent signalized intersection at Moyamensing Avenue (140 feet away). However, due to the close intersection spacing, the eastbound queue is metered by the signal at Moyamensing Avenue.

Future Build Traffic Operations

With the addition of casino traffic, all study intersections are expected to maintain their overall levels of service or stay within PennDOT's 10 second threshold under all 3 Build scenarios during all peak periods with the exception of the following intersections:

Packer Avenue and Darien Street:

- The intersection drops to an overall LOS "D" during the 2016 Friday Commuter Peak.
- The intersection drops to an overall LOS "F" during the 2021 & 2026 Friday Pre-Phillies Event Peak.
- The intersection drops to an overall LOS "F" during the 2021 & 2026 Friday Commuter Peak.
- The intersection drops to an overall LOS "F" during the 2021 & 2026 Friday Casino Peak.
- The intersection drops to an overall LOS "F" during the 2021 & 2026 Saturday Casino Peak.

Packer Avenue and 7th Street:

- The intersection drops to an overall LOS "D" during the 2021 & 2026 Friday Pre-Phillies Event Peak.

In the 2016, 2021 & 2026 Build conditions, the 95th percentile queue at the study intersections are within acceptable limits as none of the queues extend beyond the available storage, into adjacent intersections or significantly increase from the No-Build conditions with the exception of the following intersections:

- Broad Street & Packer Avenue – westbound through
- Packer Avenue & 10th Street – westbound left
- Packer Avenue & Darien Street – westbound left
- Packer Avenue & 7th Street – westbound left

At the Broad Street and Packer Avenue intersection, traffic signal timing adjustments are required to improve the westbound through queue in the 2021 and 2026 Build conditions. Additionally, traffic signal timing adjustments and/or signal phasing adjustments will be implemented at the Packer Avenue intersections to alleviate the westbound left turn queues during the Friday Pre-Phillies Event Peak.

Recommended Improvements

The following are recommendations for the proposed driveway intersections to provide safe and efficient site access:

- The proposed site access intersections on 7th Street and Darien Street should be constructed with a driveway apron to provide vehicular access to the site. The driveway aprons should be constructed to be distinguishable from the sidewalk paving and provide a pedestrian access route. The exit driveways should be constructed to provide a minimum 12' sight triangle across both sides of the sidewalk so that the driver of any vehicle will be able to see pedestrians on the sidewalk adjacent to the driveway before any part of the vehicle exits the lot. The following improvements are recommended for the proposed site access intersections on Darien Street and 7th Street:
    - <u>Darien Street & Port Cochere Exit Driveway</u>
        - Install "Stop", R1-1, sign at the driveway approach.
    - <u>Darien Street & Employee Driveway</u>
        - Restripe the southbound approach to provide a 100 foot dedicated left turn lane.
        - Install "Stop", R1-1, sign at the driveway approach.
    - <u>Darien Street & Garage Exit Driveway</u>
        - Install "Stop", R1-1, sign at the driveway approach.
    - <u>7th Street & Port Cochere Entrance Driveway</u>
        - Restripe the southbound approach to provide a 75 foot southbound right turn deceleration lane.
    - <u>7th Street & Garage Entrance Driveway</u>
        - Restripe the southbound approach to provide a 145 foot southbound right turn deceleration lane.
        - Restripe the northbound approach to provide a dedicated 100 foot northbound left turn lane.

The following off-site intersection specific improvements are recommended for mitigating the site traffic impacts for the Phase 1 development:

- <u>Packer Avenue & Darien Street</u>
    - Restripe/widen SB approach to include a 300 foot southbound left turn lane, a shared southbound left/through lane, and channelized southbound right turn lane.
    - Provide overhead signage for the proposed lane configuration.
    - Modify the signal phasing to include northbound and southbound split phasing.
    - Add a Westbound advance left turn phase.
    - Optimize the signal timing splits for all peak periods.
- <u>Packer Avenue & 7th Street</u>
    - Optimize the signal timing splits for Friday Evening Pre-Phillies Event Peak

The following off-site intersection specific improvements are recommended for mitigating the site traffic impacts for the Phase 2 development:

- Packer Avenue & 7th Street
  - Add a westbound advance left turn phase.

- Broad Street & Packer Avenue
  - Optimize the signal timing splits.

★ *Additional follow-up studies may be required for the Phase 2 development if the final program differs significantly from the assumptions in this study.*

The following improvements are recommended to improve pedestrian accommodations and enhance pedestrian safety:

- Construct a new sidewalk on the east side of Darien Street from Packer Avenue south to the newly constructed sidewalk adjacent to Citizens Bank Park to improve pedestrian connectivity to the Stadium District.

- Enhance the pedestrian accommodations at the intersections of Packer Avenue/7th Street, Packer Avenue/Darien Street and Packer Avenue/10th Street. The pedestrian improvements include:

  - Installation of hand/man countdown indications for existing crosswalks at both intersections
  - Implementation of MUTCD compliant pedestrian clearances.
  - Installation of ADA compliant handicap ramps at the southeast and southwest corners of the Packer Avenue/Darien Street Intersection.

Additionally, the following improvements are proposed to be implemented as recommended in the *Philadelphia Sports Complex Management Parking and Traffic Management Plan*. These improvements are not required to mitigate the proposed development site traffic, but will help improve traffic flow:

- Install new traffic signal controllers at the signalized intersections along Packer Avenue (Packer Avenue/10th Street, Packer Avenue/Darien Street and Packer Avenue/7th Street) to allow multiple time of day programs.
- Development and implement pre-event and post-event signal timings for Packer Avenue.
- Provide interconnect and coordination of the traffic signals along Packer Avenue.

INTRODUCTION

Project Description

This report documents the results of an investigation of transportation impacts associated with the Hollywood Casino proposed on the Turf Club site situated on the south side of Packer Avenue between South Darien Street and South Seventh Street. The site is located in the Philadelphia Stadium District with convenient access to Interstate 76 (I-76) and Interstate 95 (I-95). The existing site is comprised of a mixed-use building with associated surface parking. The first floor is occupied and contains office, industrial, and retail uses including the Pennsylvania Lottery Commission, Packer Avenue Foods, and Verifone Transportation Systems. The second floor houses the Turf Club, an off-track betting facility and restaurant. The project area is shown in **FIGURE 1**.

The initial development program (Phase 1) for this site includes construction of a 2,250 slot casino with table games, a small gift shop, and associated food/entertainment facilities. The final development program (Phase 2) for this site includes expansion of the casino and the addition of a hotel with banquet and conference facilities.
It is anticipated that the Phase 1 will be completed in 2016 and Phase 2 completed in 2021.

The Phase 1 development program for the Hollywood Casino project consists of the following:

- Multi–level, 102,000 square foot gaming area with 2,250 slot machines and 81 table games
- 3,380 vehicle parking garage (450 employee, 2,700 patron, 230 valet)
- 76 vehicle surface lot (70 valet, 6 bus)
- 935 seat restaurant and bar facilities
- 500 square foot of retail
- 12,500 square foot of multi-purpose space

The Phase 2 development program for the Hollywood Casino project consists of the following:

- Expansion of the gaming area with 1,000 additional slot machines
- 500 room hotel
- 12,000 square foot ballroom
- 4 board rooms totaling 2,000 square feet
- Expansion of the parking garage with 1,000 additional spaces

The conceptual site plans for each phase of the Hollywood Casino project are shown in **FIGURES 2 and 3**.

The site will be accessed from South Darien Street and Seventh (7th) Street. Access to the porte cochere is proposed via a one-way entrance driveway on 7th Street approximately 200 feet south of Packer Avenue and a one-way exit driveway proposed on South Darien Street approximately 180 feet south of Packer Avenue. Valet staff will utilize subsurface parking spaces accessed by driveways connected to the porte cochere.

The customer parking garage will be accessed by a one-way entrance driveway located on 7th Street approximately 740 feet south of Packer Avenue and a one-way exit driveway located on South Darien Street approximately 960 feet south of Packer Avenue. Customers exiting the parking garage and the porte cochere will have the option of turning right onto northbound South Darien Street to access I-76 and other northbound destinations. Customers destined for I-95 will be able to turn left from the garage and the porte cochere to travel southbound on South Darien Street to connect to westbound Pattison Avenue to South Broad Street.

Employees will access their parking facilities via a two-way driveway on South Darien Street 400 ft south of Packer Avenue. Loading facilities will be located on 7th Street and will utilize an entrance driveway approximately 390 feet south of Packer Avenue and an exit driveway approximately 140 feet south of the entrance driveway. Six bus parking spots will be located on the ground level of the garage and accessed from South Darien Street. Buses will enter the bus parking utilizing the employee driveway. The bus exiting maneuver will utilize the garage

exit driveway to access South Darien Street. The site circulation plans for passenger cars and heavy vehicles are illustrated in **FIGURES 3, 4 and 5**.

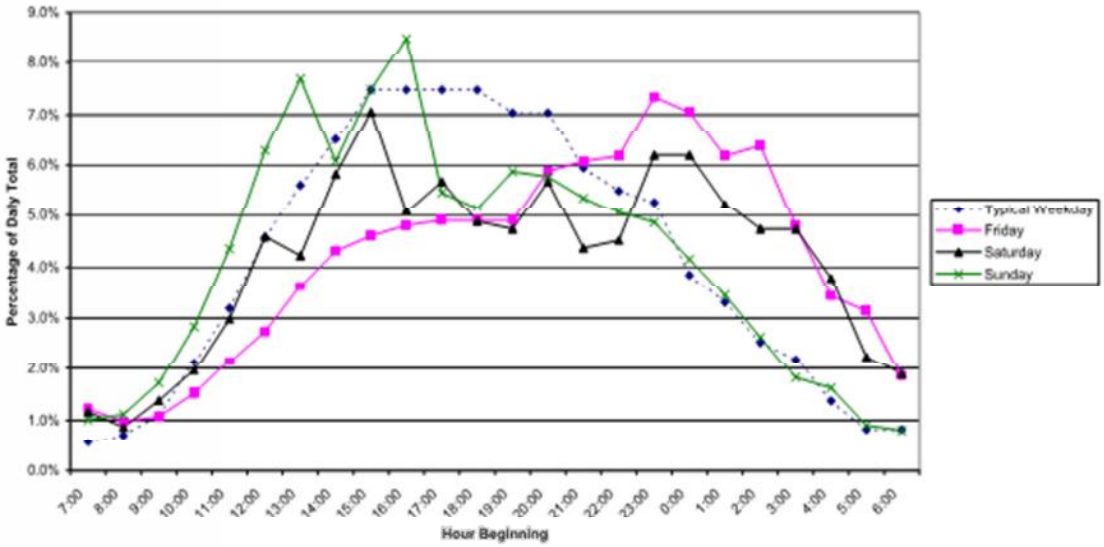
It is anticipated that the Pennsylvania Gaming Control Board will award the Philadelphia gaming license by the end of 2013 and if awarded a license, Penn National Gaming, Inc. will complete design and construction for Phase 1 of the casino within 24 to 36 months following the license award. According to this anticipated timeline, Phase 1 of the Hollywood Casino would open in mid-2016.It is anticipated that Phase 2 of the Hollywood Casino will be open in 2021.

Horizon Year and Analysis Periods

The analysis was conducted in accordance with guidelines presented in Pennsylvania Department of Transportation (PennDOT) *Policies and Procedures for Transportation Impact Studies*, dated January 28, 2009. As required, four analysis years are considered: existing baseline traffic conditions, Phase 1 opening year analysis, Phase 2 opening year analysis, and design horizon year analysis (5 years after the Phase 2 opening year). The existing condition analysis provides a baseline for model calibration and a reference point from which future conditions can be assessed. The opening year and horizon year analyses include an assessment of the operational conditions of the study intersections under "no build" and "build" scenarios. Mitigation is assessed for intersections that experience an overall level of service drop and delay increase of more than ten (10) seconds from the "no build" to "build" conditions. *Level of service* is a measure of operating conditions discussed in detail on Page 25 of this report.

The weekday afternoon commuting peak hour (rush hour) of the adjacent road network is established as a key analysis period. The weekday pm peak hour conditions represent the traffic peak on the adjacent roadway network combined with the weekday afternoon peak hour for the casino. According to compiled data on casino time-of-day patterns, Weekday afternoon (4:00 pm – 6:00 PM) hourly volumes on Monday through Thursday represent the peak volumes for the casino. On Fridays, the late evening peak volumes (7:00 pm to 10:00 PM) are slightly higher than the rush hour volumes (4:00 pm – 6:00 PM) as indicated in Chart 1 below.

Chart 1
Casino Time of Day Travel Patterns



Source: Casino Niagara in Niagara Falls, Canada, *the Majestic Star Casino, Pittsburgh Transportation and Parking Assessment*, IBI Group, Final Report October 2006.

The highest expected peak hours for casino entering and exiting volumes are anticipated from 1:00 pm to 4:00 PM and from 6:00 pm to 10:00 PM on a typical Saturday based on casino attendance data. The Saturday peak hour volumes may be on average 25%-50% higher than Weekday rush hour volumes[1]. Actual count data collected at the Sugarhouse Casino and Rivers Casino in May and June of 2013 shows peak Saturday evening (9:45 PM to 10:45 PM) volumes to be approximately 50% higher than peak weekday pm hour volumes. For the Hollywood Casino this equates to an estimated additional 480 casino trips that may be added to the adjacent roadway network over Weekday afternoon rush hour conditions. During the Saturday late evening hours, the decrease in background traffic on the adjacent roadway network is greater than the anticipated increase in casino volumes.

The study area is located within Philadelphia's Stadium District. There are three (3) major sporting venues within the District: Lincoln Financial Field, Citizens Bank Park, and the Wells Fargo Center. The venues host hundreds of events with attendances ranging from 16,000 for a basketball or hockey game to 65,000 for an Eagles game[2]. The highest attended events are the Philadelphia Eagles Games in Lincoln Financial Field with an attendance of close to 60,000. There are 8 regular season home games at Lincoln Financial field. The event that occurs most frequently is a Philadelphia Phillies Game at Citizens Bank Park which has an attendance of approximately 43,000 spectators arriving in approximately 10,000 vehicles. A Phillies game can occur on any day of the week with the majority scheduled for Weekdays and most having start times of 7:05 PM. The Wells Fargo Center is home to the Philadelphia 76ers, Philadelphia Flyers, and the Philadelphia Wings. The basketball games allow for the highest seating capacity for this facility providing over 21,000 seats.

Because of the attendance numbers and frequency of the Philadelphia Phillies Baseball games at Citizens Bank Park, pre-event conditions for this venue are considered in the analysis. The *Philadelphia Sports Complex Management Parking and Traffic Management Plan* notes that the ingress to the Phillies games start approximately 2 hours prior to the start of the game and can coincide with the adjacent roadway peak period. The weekday peak trips generated by the casino were added to the pre-Phillies event traffic volumes in order to evaluate the effects of the casino traffic on roadway operations prior to a large event.

As requested in the May 23, 2013 review letter issued by Orth-Rodgers & Associates on behalf of the PA Gaming Central Board, this report includes an analysis of the following peak periods:

- Friday Evening Commuter Peak Hour *(between 4:00-7:00 PM at all non-event intersections)*
- Friday Evening Pre-Phillies Event Peak Hour *(5:00-7:30 PM at all intersections)*
- Friday Casino Peak Hour *(between 7:00-10:00 PM, only for intersection on Packer Avenue from S. Broad St to Front St and intersections on S Front St at the I-95 Ramps)*
- Saturday Casino Peak Hour *(between 8:00-11:00 PM only for intersection on Packer Avenue from S. Broad St to Front St and intersections on S Front St at the I-95 Ramps)*

[1] *Bridgeport Casino Traffic Impacts on the Southwestern Region of Connecticut*, Buckhurst Fish & Jacquemart Inc., July 2001
[2] *Philadelphia Sports Complex Management Parking and Traffic Management Plan,* Philadelphia Industrial Development Corporation, September 2010

EXISTING CONDITIONS ASSESSMENT

Study Area Roadways

The site is located in close proximity to the limited access freeways of Interstate 76 (I-76) and Interstate 95 (I-95). Patrons travelling to the site from I-76 eastbound and travelling to and from I-76 westbound/Walt Whitman Bridge are expected to primarily utilize Exit 350 at Packer Avenue but also have the option of Exit 349 Broad Street/Sports Complex which is in close proximity. Outbound trips to I-76 westbound will utilize Exit 349 at Broad Street. The I-76 eastbound on and off-ramps intersect with Packer Avenue across from the site at the northern terminus of South Darien Street. The I-76 westbound off-ramp at Packer Avenue intersects with 7th Street just north of Packer Avenue. The I-76 Broad Street interchange is accessed via Packer Avenue.

Access to I-95 northbound and southbound is provided via Interchange 19 Packer Avenue and Interchange 17 Broad Street. The I-95 Packer Avenue Interchange is accessed via Packer Avenue and Front Street just east of the site. The I-95 Broad Street I-17 is accessed via 7th Street, Pattison Avenue and Broad Street southwest of the site. The site access to and from the I-76 and I-95 is illustrated in **FIGURES 6 and 7.**

Per the May 23 2013 review letter issued by the PA Gaming Central Board, twenty-one (21) intersections in addition to the site access intersections were selected as part of the study area. However, not all intersections were required to be studied during each peak period. The following intersections were studied for each peak period:

Friday Evening Commuter Peak Hour

- Penrose Avenue and Pattison Avenue
- Pattison Avenue and S. Broad Street (Southbound)
- Pattison Avenue and S. Broad Street (Northbound)
- Pattison Avenue and S. Darien Street
- Pattison Avenue and S. 7th Street
- S. Broad Street (NB and SB) and Packer Avenue
- S. Broad Street (NB and SB) ad Pollock Street
- Packer Avenue and S. 10th Street
- Packer Avenue and S. Darien Street/I-76 Eastbound Off/On-Ramps
- Packer Avenue and S. 7th Street
- Packer Avenue and S. Front Street
- S. Front Street and I-76 Eastbound On-Ramp (Unsignalized Intersection)
- S. Front Street and I-76 Westbound Off-Ramp/I-95 Southbound On-Ramp
- S. Front Street and I-95 (SB Off/NB On-Ramps)/Dunkin Donuts Driveway
- S. Broad Street (SB) and I-95 SB Off-Ramp
- S. Broad Street (NB) and I-95 SB On-Ramp
- W. Oregon Avenue and S. Broad Street
- I-95 SB and Exit 17 Off-Ramp (Broad Street/Pattison Avenue) – Unsignalized Intersection
- I-95 SB Off-Ramp (Exit 19) and WB Packer Avenue – Unsignalized Merge Condition

Friday Evening Pre-Phillies Event Peak Hour

- Penrose Avenue and Pattison Avenue
- Pattison Avenue and S. Broad Street (Southbound)
- Pattison Avenue and S. Broad Street (Northbound)
- Pattison Avenue and S. 11th Street
- Pattison Avenue and S. Darien Street
- Pattison Avenue and S. 7th Street
- S. Broad Street (NB and SB) and Packer Avenue
- S. Broad Street (NB and SB) ad Pollock Street
- Packer Avenue and S. 10th Street

- Packer Avenue and S. Darien Street/I-76 Eastbound Off/On-Ramps
- Packer Avenue and S. 7th Street
- Packer Avenue and S. Front Street
- S. Front Street and I-76 Eastbound On-Ramp (Unsignalized Intersection)
- S. Front Street and I-76 Westbound Off-Ramp/I-95 Southbound On-Ramp
- S. Front Street and I-95 (SB Off/NB On-Ramps)/Dunkin Donuts Driveway
- S. Broad Street (NB) and S. 11th Street
- S. Broad Street (SB) and I-95 SB Off-Ramp
- S. Broad Street (NB) and I-95 SB On-Ramp
- W. Oregon Avenue and S. Broad Street
- I-95 SB and Exit 17 Off-Ramp (Broad Street/Pattison Avenue) – Unsignalized Intersection
- I-95 SB Off-Ramp (Exit 19) and WB Packer Avenue – Unsignalized Merge Condition

Friday Casino Peak Hour

- S. Broad Street (NB and SB) and Packer Avenue
- Packer Avenue and S. 10th Street
- Packer Avenue and S. Darien Street/I-76 Eastbound Off/On-Ramps
- Packer Avenue and S. 7th Street
- Packer Avenue and S. Front Street
- S. Front Street and I-76 Eastbound On-Ramp (Unsignalized Intersection)
- S. Front Street and I-76 Westbound Off-Ramp/I-95 Southbound On-Ramp
- S. Front Street and I-95 (SB Off/NB On-Ramps)/Dunkin Donuts Driveway

Saturday Casino Peak Hour

- S. Broad Street (NB and SB) and Packer Avenue
- Packer Avenue and S. 10th Street
- Packer Avenue and S. Darien Street/I-76 Eastbound Off/On-Ramps
- Packer Avenue and S. 7th Street
- Packer Avenue and S. Front Street
- S. Front Street and I-76 Eastbound On-Ramp (Unsignalized Intersection)
- S. Front Street and I-76 Westbound Off-Ramp/I-95 Southbound On-Ramp
- S. Front Street and I-95 (SB Off/NB On-Ramps)/Dunkin Donuts Driveway

A field view of existing conditions at the study intersections was conducted to obtain intersection geometry, traffic controls, operational characteristics, and traffic signal field timings.

Penrose Avenue and Pattison Avenue

Image 1

The intersection of Penrose Avenue and Pattison Avenue (SR 0291) is a four-leg signalized intersection operating under a pre-timed two phase timing plan with a 90 second cycle length. The eastbound, westbound, northbound and southbound left turns operate under permitted phasing. Crosswalks are provided on the Southbound and Westbound legs of the intersection. An aerial view of the intersection and approach directions of travel are illustrated in **Image 1.**

North of Pattison Avenue, Penrose Avenue (SR 0291) is a principal arterial highway with two lanes of travel that transition into two through lanes, a designated left turn lane and a bike lane in the southbound approach to the signalized intersection. A sidewalk is provided on both sides of the road. South of Pattison Avenue, Penrose Avenue (SR 0291) provides three through lanes as well as a right turning lane and a bike lane in the northbound approach to the signalized intersection. The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

West of Penrose Avenue (SR 0291), Penrose Ferry Road is a local roadway with one through lane in the eastbound approach to the signalized intersection. Sidewalks are provided on the east side of the roadway. The speed limit is not posted but is assumed to be 25 miles per hour.

East of Penrose Avenue (SR 0291), Pattison Avenue is a principal arterial highway with three lanes of travel that transition into two left turn lanes and one left/right turn lane in the westbound approach to the signalized intersection. The speed limit is not posted but is assumed to be 30 miles per hour and on-street parking is not permitted.

Pattison Avenue and S. Broad Street (Northbound & Southbound)

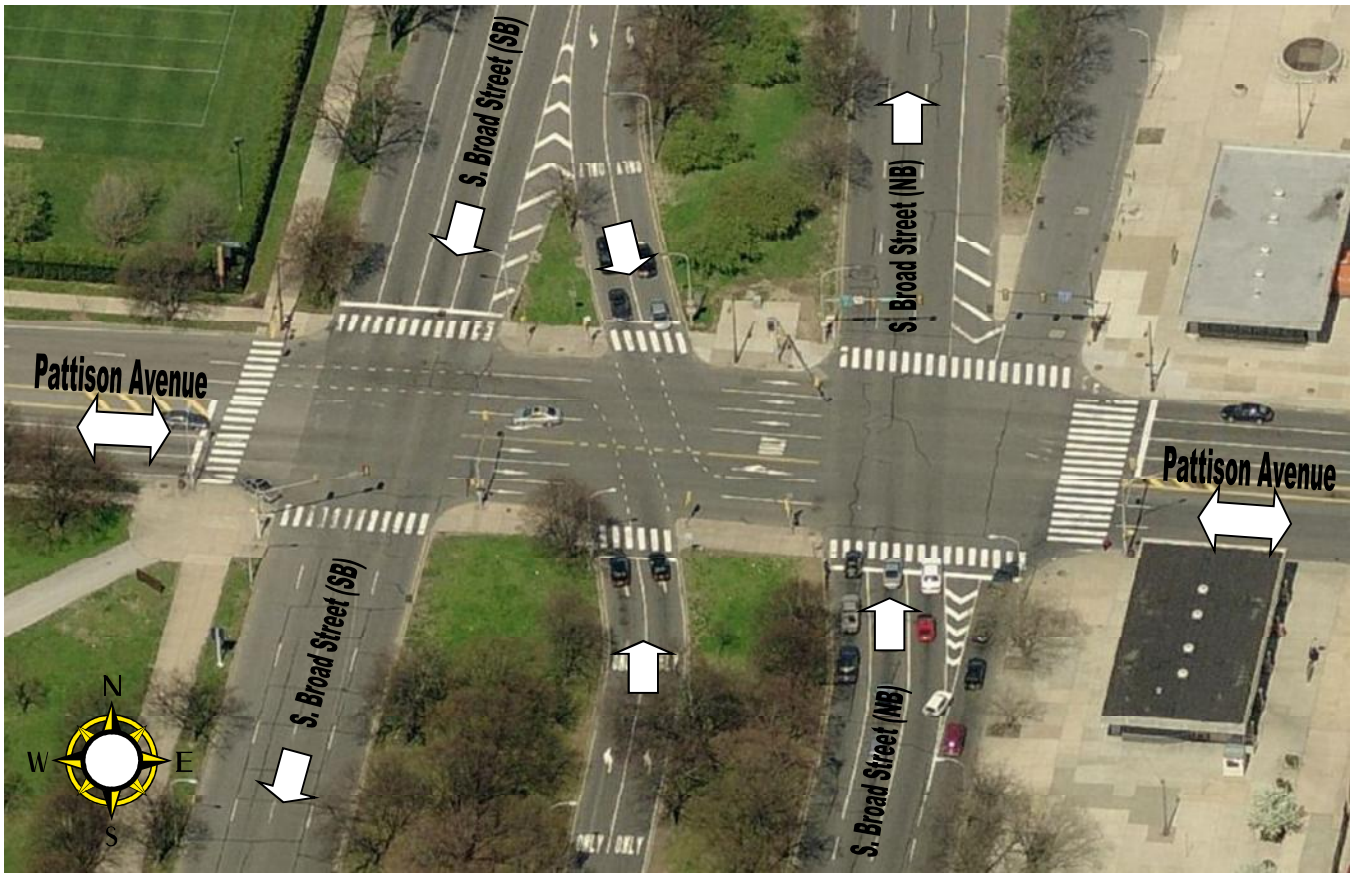


Image 2

The intersection of Pattison Avenue and S. Broad Street (SR 611) is a four-leg signalized intersection operating under a pre-timed four phase timing plan with a 90 second cycle length. The northbound and southbound left turns operate under protected-prohibited phasing and the eastbound and westbound left turns operate under permitted phasing. Additionally, due to the separation of the northbound and southbound legs, the signal operates with an additional 'clear out' phase to allow vehicles to clear the intersection. Crosswalks are present on all four legs of the intersection. An aerial view of the intersection with approach directions of travel is illustrated in **Image 2.**

North of Pattison Avenue, S. Broad Street (SR611) is a principal arterial highway with five lanes of travel that transition into four through lanes and two dedicated left turn lanes on the southbound approach to the signalized intersection. South of Pattison Avenue, S. Broad Street provides three through lanes as well as two dedicated left turn lanes and one right turn lane on the northbound approach to the signalized intersection. A sidewalk is provided on both sides of S. Broad Street. The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

East of S. Broad Street, Pattison Avenue is a principal arterial highway with two through lanes, one left turn/through lane and one right turn/through lane in the westbound approach to the signalized intersection. West of S. Broad Street, Pattison Avenue has one through lane, one left turn/through lane and one right turn/through lane in the eastbound approach to the signalized intersection. Sidewalks are provided on both sides of the roadway. The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

The May 2013 review letter requests that the Pattison Avenue and S. Broad Street (Southbound) and the Pattison Avenue and S. Broad Street (Northbound) intersections be analyzed as separate intersections. However, due to the complex geometry of the intersections, the northbound and southbound legs were analyzed as one intersection with three separate nodes. Additionally, since the HCM 2010 methodology does not support the complex intersection geometry and signal phasing, the level of service analysis for this intersection was completed utilizing the Synchro 8 Percentile Delay Methodology per the PennDOT Memorandum dated December 13, 2012 issued by Francis J. Hanney.

Pattison Avenue and S. 11th Street

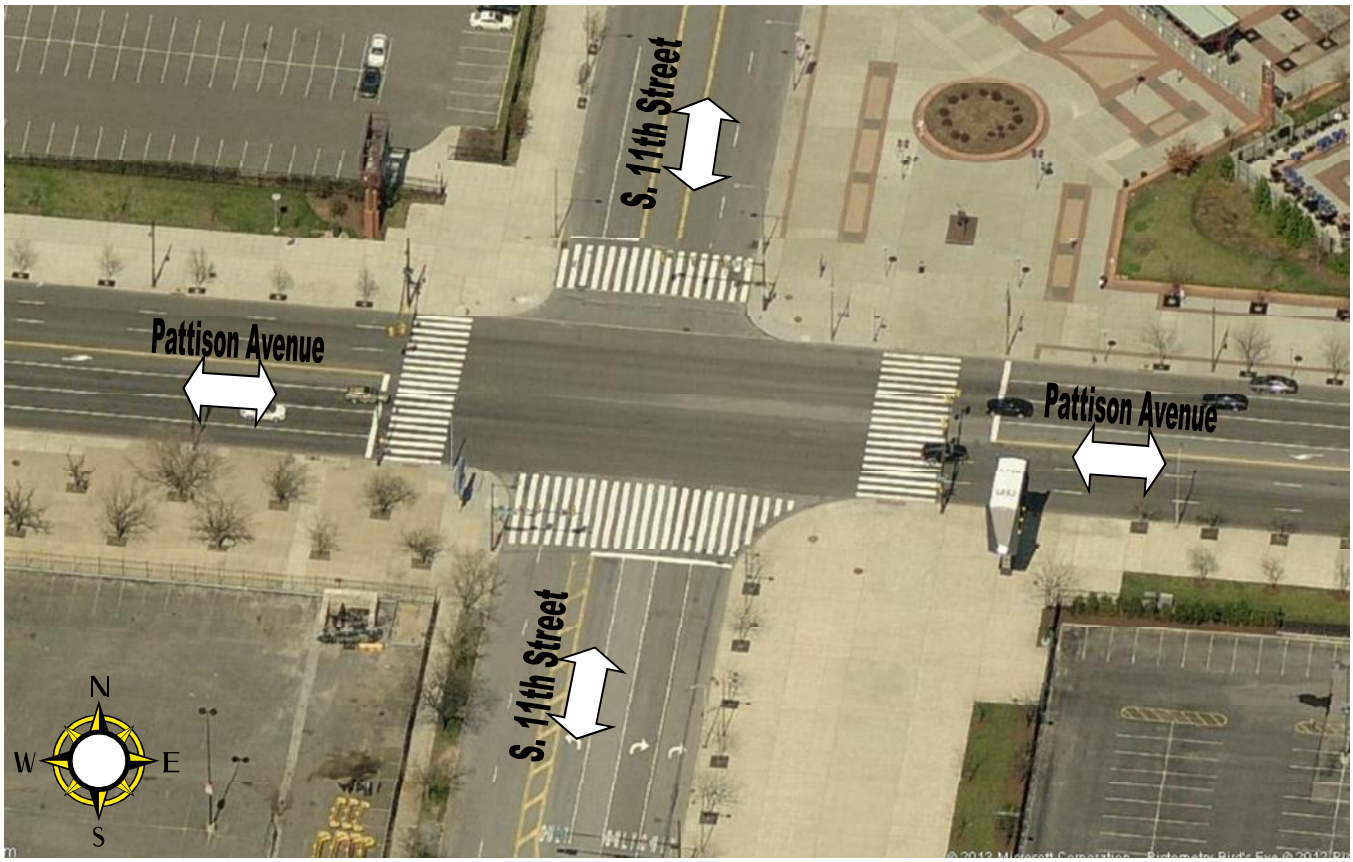


Image 3

The intersection of Pattison Avenue and S. 11th Street is a four-leg signalized intersection operating under a pre-timed four phase timing plan with a 120 second cycle length. Improvements to the signal equipment were recently constructed at this intersection and are not reflected on the signal plan provided by the City. The northbound and southbound movements operate under split phasing. The westbound lefts operate under protected/permitted phasing. Video detection is present for the northbound approach, southbound approach and westbound left turn, however, the signal was observed to operate with pre-timed splits. The existing signal timings and phasing were obtained from field views. During the Pre-Phillies event peak, the northern leg of S. 11th Street is closed to vehicular traffic. Crosswalks are present on all four legs of the intersection. An aerial view of the intersection with approach directions of travel is illustrated in **Image 3.**

South of Pattison Avenue, S. 11th Street is a local route with four lanes of travel that transition into one through lane, one left turn lane and two designated right turn only lanes on the northbound approach to the signalized intersection. There are two receiving lanes north of Pattison Avenue. North of Pattison Avenue, S. 11th Street provides two through lanes that transition into a through lane and a shared through/right lane. Left turns are prohibited on the southbound approach to the signalized intersection. A sidewalk is provided on both sides of S.

11th Street. The speed limit is not posted, but is assumed to be 35 miles per hour and on-street parking is not permitted.

East of S. 11th Street, Pattison Avenue is a principal arterial highway with three through lanes and one designated left turn lane in the westbound approach to the signalized intersection. West of S. 11th Street, Pattison Avenue provides three through lanes and one designated left turn lane in the eastbound approach to the signalized intersection. Sidewalks are provided on both sides of the roadway. The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

Pattison Avenue and S. Darien Street

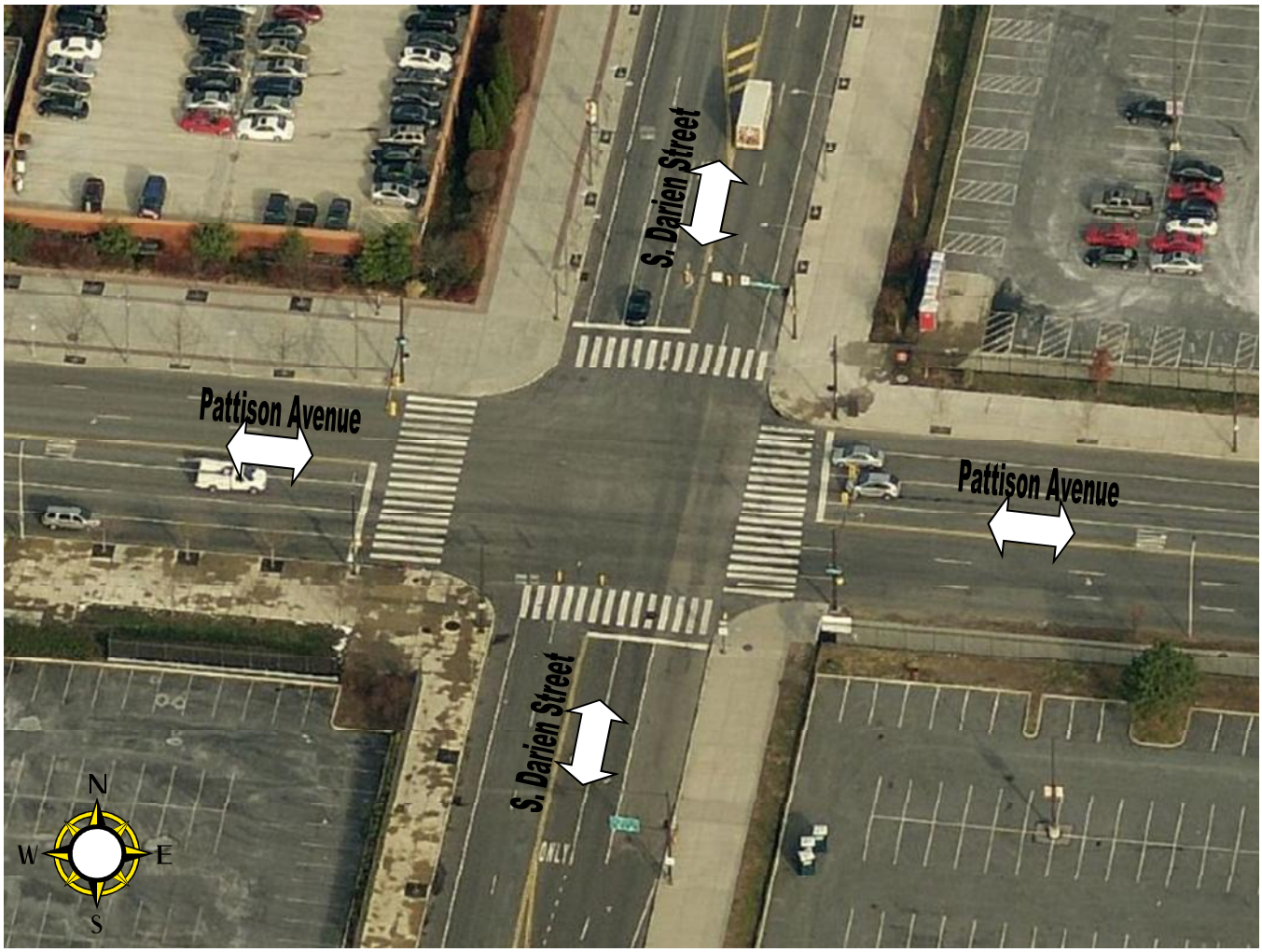


Image 4

The intersection of Pattison Avenue and S. Darien Street is a four-leg signalized intersection operating under a semi-actuated three phase timing plan with a 90 second cycle length. Improvements to the signal equipment were recently constructed at this intersection and are not reflected on the signal plan provided by the City. The eastbound and westbound left turns operate under protected-permitted phasing. Crosswalks are present on all four legs of the intersection. Video detection is present for the northbound approach, southbound approach, eastbound left turn and westbound left turn. The existing signal timings and phasing were obtained from field views. An aerial view of the intersection with approach directions of travel is illustrated in **Image 4.**

South of Pattison Avenue, S. Darien Street is a local route with two lanes of travel that transition into two through lanes and one dedicated left turn lane on the northbound approach to the signalized intersection. There are two receiving lanes north of Pattison Avenue. North of Pattison Avenue, S. Darien Street provides two through lanes as well as one dedicated left turn lane on the southbound approach to the signalized intersection. A sidewalk is provided on both sides of S. Darien Street. The speed limit is not posted, but assumed to be at 30 miles per hour and on-street parking is not permitted.

East of S. Darien Street, Pattison Avenue is a principal arterial highway with three lanes of traffic that transition into three through lanes and one dedicated left turn lane in the westbound approach to the signalized intersection. West of S. Darien Street, Pattison Avenue has three through lanes and one dedicated left turn lane in the eastbound approach to the signalized intersection. Sidewalks are provided on both sides of the roadway. The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

Pattison Avenue and S. 7th Street

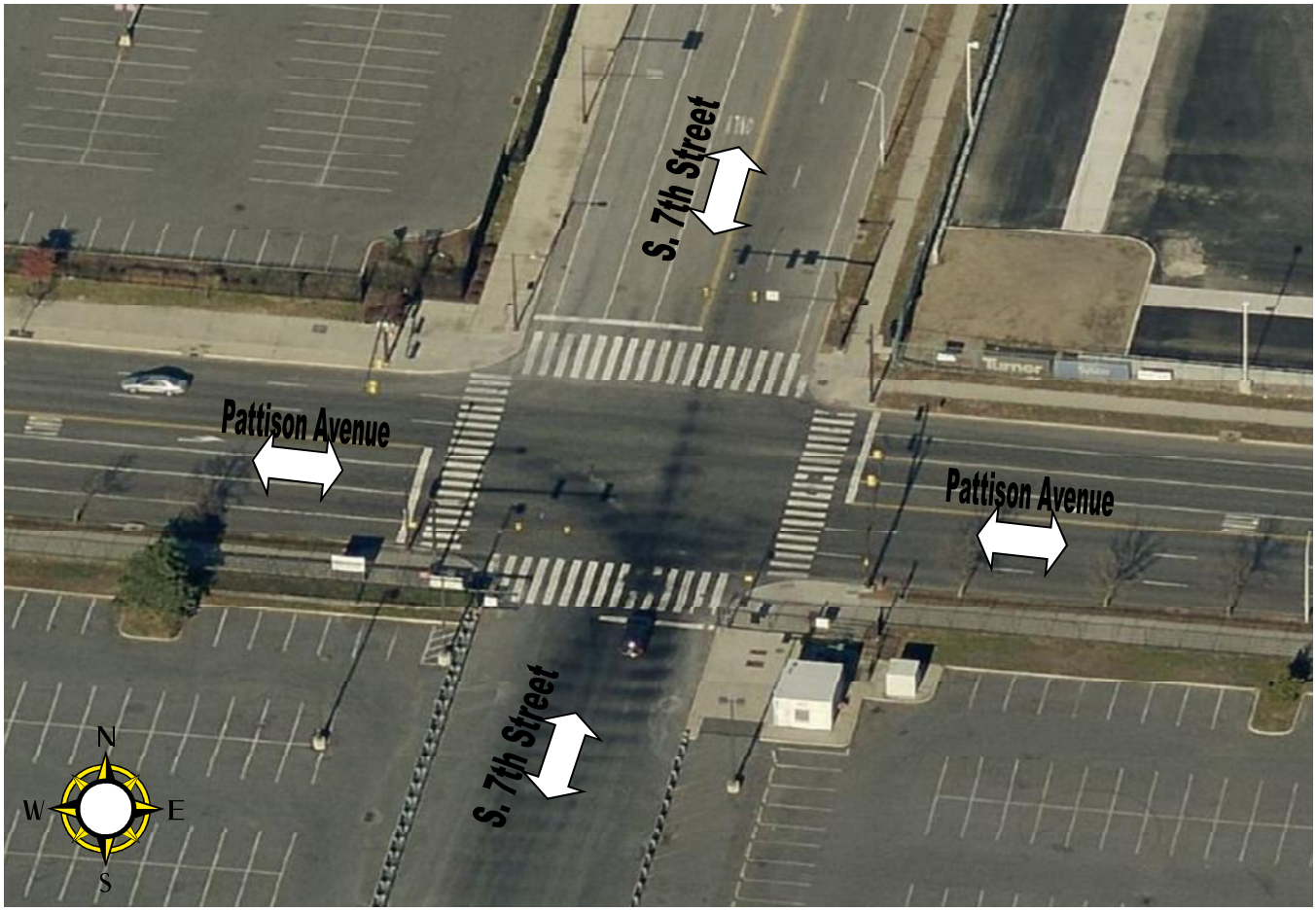


Image 5

The intersection of Pattison Avenue and S. 7th Street is a four-leg signalized intersection operating under a pre-timed two phase timing plan with a 90 second cycle length. Improvements to the signal equipment were recently constructed at this intersection and are not reflected on the signal plan provided by the City. A 5-section signal head was installed for the westbound approach however the intersection was not observed to operate with a protected left turn phase. The eastbound, westbound, northbound and southbound left turns operate under permitted phasing. Crosswalks are present on all four legs of the intersection. Video detection is present for the northbound and southbound approaches and westbound left turn. However, the signal was observed to operate

with pre-timed splits. The existing signal timings and phasing were obtained from field views. An aerial view of the intersection with approach directions of travel is illustrated in **Image 5.**

South of Pattison Avenue, S. 7th Street is a local route with two lanes of travel that transition into two through lanes on the northbound approach to the signalized intersection. There are two receiving lanes north of Pattison Avenue. North of Pattison Avenue, S. 7th Street provides two through lanes as well as one dedicated left turn lane on the southbound approach to the signalized intersection. A sidewalk is provided on both sides of S. 7th Street. The speed limit is not posted, but assumed to be 30 miles per hour and on-street parking is not permitted.

East of S. 7th Street, Pattison Avenue is a principal arterial highway with three lanes of traffic that transition into three through lanes and one dedicated left turn lane in the westbound approach to the signalized intersection. West of S. 7th Street, Pattison Avenue has three through lanes and one dedicated left turn lane in the eastbound approach to the signalized intersection. Sidewalks are provided on both sides of the roadway. The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

S. Broad Street and Packer Avenue

Image 6

The intersection of Packer Avenue and S. Broad Street (SR 611) is a four-leg signalized intersection operating under a pre-timed four phase timing plan with a ninety second cycle length. The southbound left turn operates under protected-prohibited phasing while the eastbound, westbound and northbound left turns operate under permitted phasing. Additionally, due to the separation of the northbound and southbound legs, the signal operates with an additional 'clear out' phase to allow vehicles to clear the intersection. Crosswalks are on all four legs of the intersection. An aerial view of the intersection with approach directions of travel is illustrated in **Image 6.**

South of Packer Avenue, S. Broad Street (SR 611) is a principal arterial highway with four lanes of travel that transition into three through lanes and one dedicated right turn only lane on the northbound approach to the signalized intersection. There are three receiving lanes and an entrance ramp to I-75 eastbound, north of Packer Avenue. North of Packer Avenue, S. Broad Street (SR 611) provides three through lanes as well as one dedicated right turn lane on the southbound approach to the signalized intersection. A sidewalk is provided on both sides of S. Broad Street (SR 611). The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

East of S. Broad Street (SR 611), Packer Avenue is a local roadway with two through lanes of traffic in the westbound approach to the signalized intersection. West of S. Broad Street (SR 611), Packer Avenue has two through lanes of traffic in the eastbound approach to the signalized intersection. Sidewalks are provided on both sides of the roadway. The speed limit is posted at 30 miles per hour and on-street parking is not permitted.

Due to the complex geometry of the intersections, the northbound and southbound legs were analyzed as one intersection. Additionally, since the HCM 2010 does not support the complex intersection geometry and signal phasing, the level of service analysis for this intersection was completed utilizing the Synchro 8 Percentile Delay Methodology.

S. Broad Street and Pollock Street

Image 7

The intersection of Pollock Street and S. Broad Street (SR 611) is a four-leg signalized intersection operating under a pre-timed two phase timing plan with a 90 second cycle length. The eastbound, westbound, northbound and southbound left turns operate under permitted phasing. The eastbound and westbound Pollock Street approaches are each one-way entering the intersection. Through traffic on Pollock Street is prohibited. A concrete island present in the median between the northbound and southbound Broad Street legs directs all Pollock Street traffic to either make a left or right turn. Crosswalks are present on all four legs of the intersection.

The existing signal timings were obtained from field views. An aerial view of the intersection with approach directions of travel are illustrated in **Image 7.**

South of Pollock Street, S. Broad Street (SR 611) is a principal arterial highway with two lanes of travel that transition into two through lanes on the northbound approach to the signalized intersection. There is also a ramp to I-76 Eastbound on the northern approach. There are two receiving lanes north of Pollock Street. North of Pollock Street, S. Broad Street (SR 611) provides two through lanes on the southbound approach to the signalized intersection. A sidewalk is provided on both sides of S. Broad Street (SR 611). The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

East of S. Broad Street (SR 611), Pollock Street is a local road with one dedicated left turn lane and one dedicated right turn lane of traffic in the westbound approach to the signalized intersection. Parking is permitted on the north side of the road. West of S. Broad Street (SR 611), Pollock Street has one dedicated left turn lane and one dedicated right turn lane of traffic on the eastbound approach to the signalized intersection. Sidewalks are provided on both sides of the roadway. The speed limit is posted at 25 miles per hour and on-street parking is permitted on the north side of the street.

Since the HCM 2010 does not support the signal phasing present at this intersection, the level of service analysis for this intersection was completed utilizing the Synchro 8 Percentile Delay Methodology.

Packer Avenue and S. 10th Street

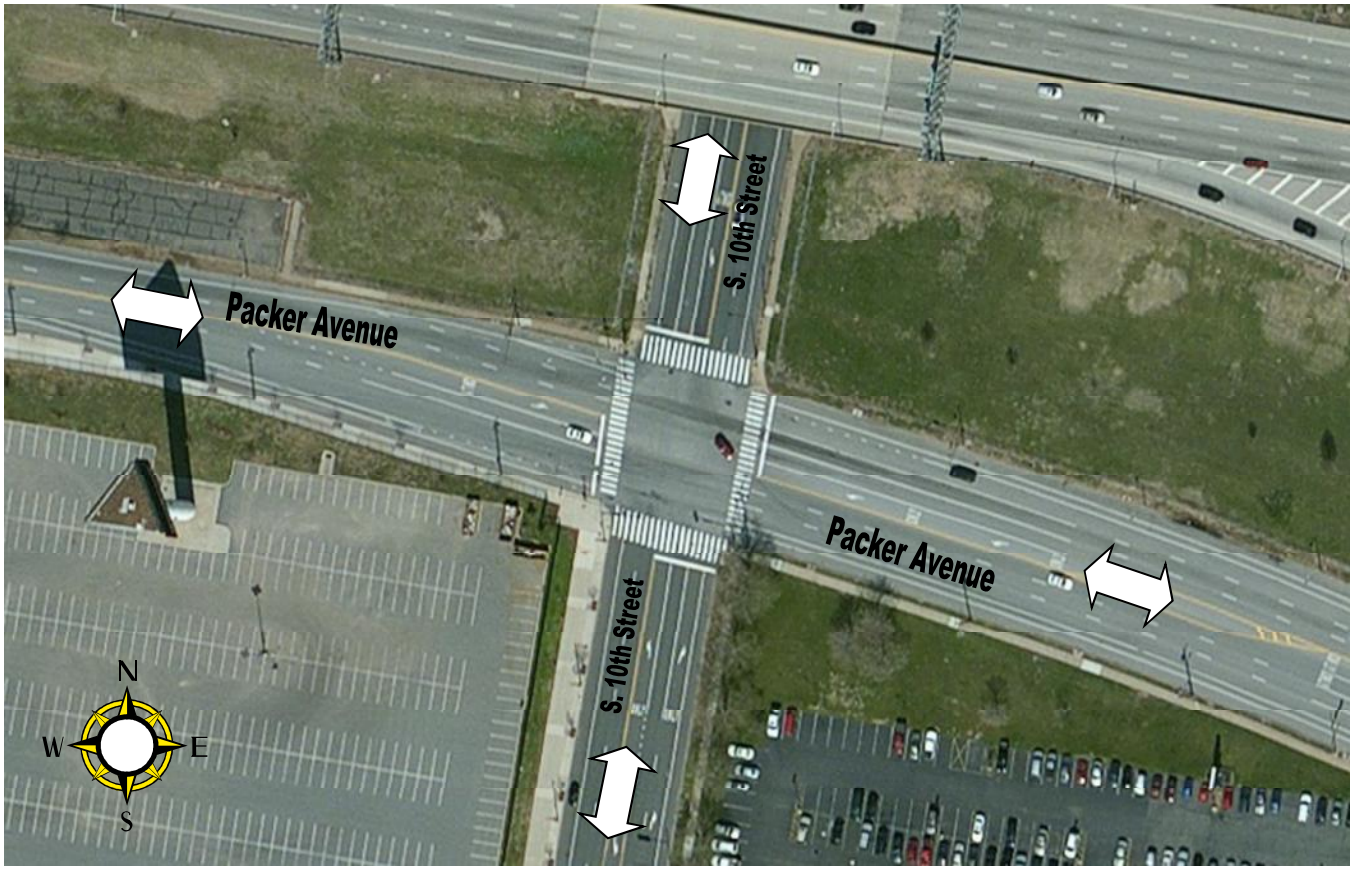


Image 8

The intersection of Packer Avenue and South 10th Street is a four-leg signalized intersection operating under a pre-timed two-phase timing plan with a 90 second cycle length. The eastbound, westbound, northbound, and

southbound left turns operate under permitted phasing. Crosswalks are provided on all four legs of the intersection. An aerial view of the intersection with approach directions of travel are illustrated in **Image 8**.

West of South 10th Street, Packer Avenue is a local roadway with two lanes of travel in each direction and a left turn lane provided on the eastbound approach to the signalized intersection. Sidewalks are provided on both sides of the roadway. East of South 10th Street, Packer Avenue provides three lanes of travel in each direction with a left turn lane at the signalized intersection. A sidewalk is provided on the southern side of Packer Avenue. The speed limit is posted at 30 miles per hour and there is no on-street parking. South 10th Street is a local roadway with two lanes of travel in each direction and a center turn lane which transitions to an exclusive left turn lane at the intersection. The speed limit is not posted but is assumed to be 25 miles per hour. Sidewalks are provided on both sides of the roadway and there is no on-street parking provided.

The eastbound approach provides a separate left turn lane, a through lane, a shared through/right lane and a bike lane. Across from the eastbound approach are three receiving lanes. The westbound approach provides a separate left turn lane, two through lanes, a shared through/right lane and a bike lane. Across from the westbound approach are three receiving lanes that quickly taper down to two lanes. The northbound approach provides a separate left turn lane, a through lane and a separate right turn lane. Across from the northbound approach are two receiving lanes. The southbound approach contains a separate left turn lane, a through lane and a share through/right turn lane.

Packer Avenue and I-76 Eastbound Ramps – South Darien Street

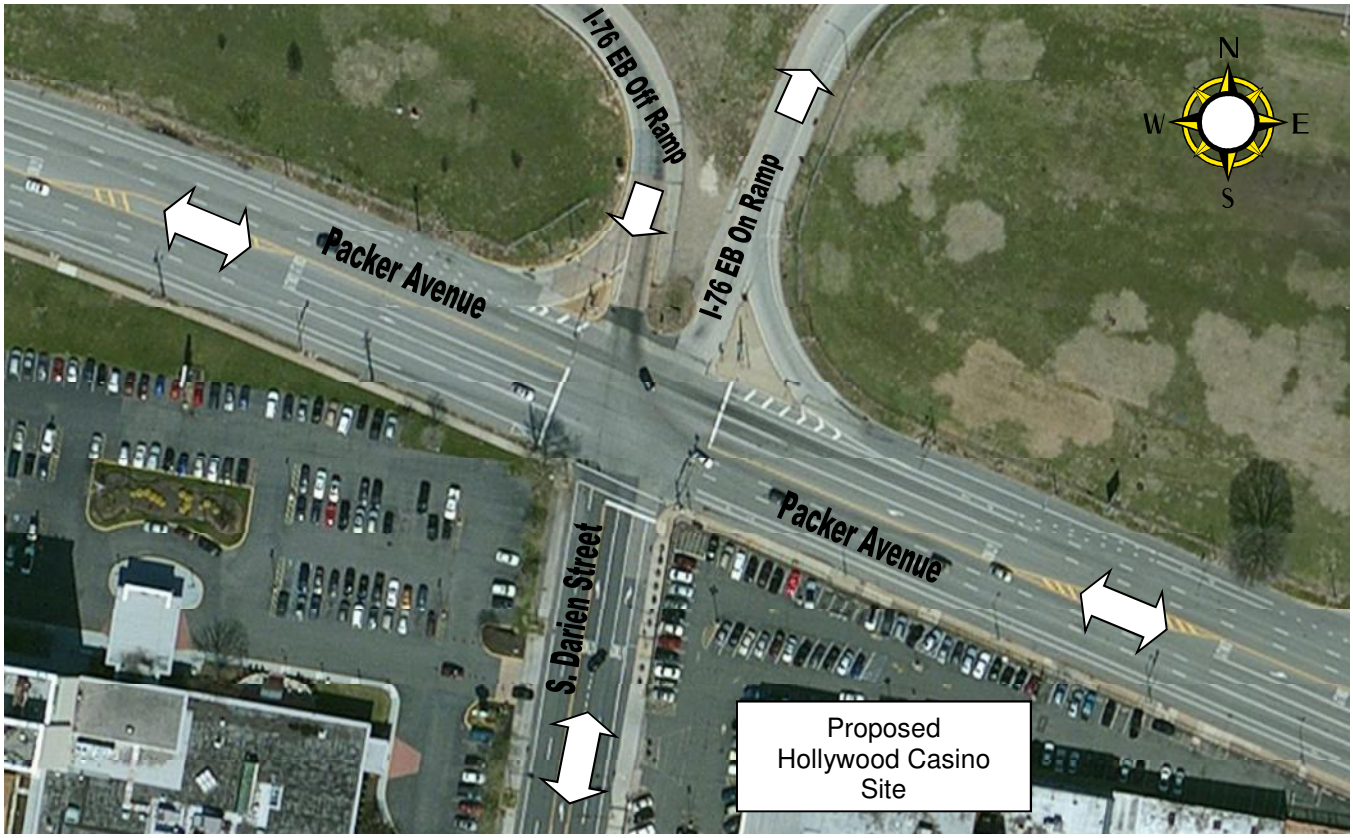


Image 9

The intersection of Packer Avenue and South Darien Street/I-76 Eastbound ramps is a four-leg signalized intersection operating under a pre-timed three-phase timing plan with a 90 second cycle length. The eastbound left turns operate under protected/permitted phasing while the westbound, northbound and southbound left turns

operate under permitted phasing. A crosswalk is provided across the South Damien Street approach only. An aerial view of the intersection with approach directions of travel are illustrated in **Image 9.**

Packer Avenue is a local roadway with three through lanes and a bike lane in each direction and separate left-turning lanes. A sidewalk is provided on the southern side of Packer Avenue. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway. South Darien Street is a local roadway with two through lanes in each direction and a center two-way left turn lane. The speed limit is not posted but is assumed to be 25 miles per hour. There are no sidewalks provided and on-street parking is provided on both sides of the roadway. The I-76 eastbound ramps provide one lane of travel in each direction. The eastbound on-ramp is posted with a 15 mile per hour advisory speed.

The eastbound Packer Avenue approach provides a separate left turn lane, two through lanes, a shared through/right lane, and a bike lane. The westbound approach provides a separate left turn lane, a through lane, a shared through/right lane with a right turn slip ramp and a bike lane. The westbound right turn is controlled by a "Yield" sign. The northbound approach provides a separate left turn lane, a through lane, and a separate right turn lane. A reconstruction/resurfacing project was recently completed on the I-76 Eastbound Ramps. The southbound approach was restriped to include a separate left turn lane, a through lane and a right turn slip lane. The southbound right turn is controlled by a "Yield" sign.

Packer Avenue and South 7th Street

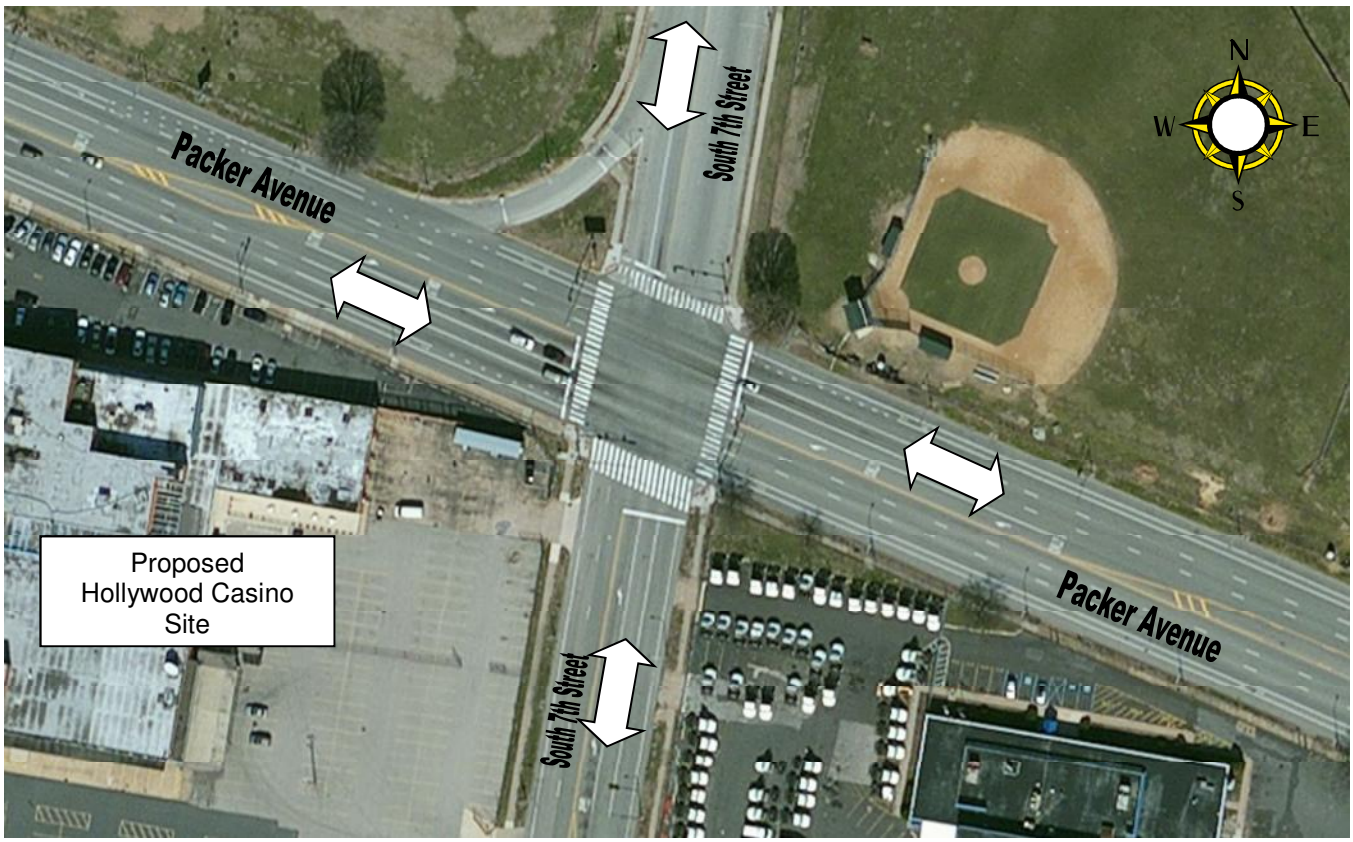


Image 10

The intersection of Packer Avenue and South 7th is a four-leg signalized intersection operating under a pre-timed two-phase timing plan with an 80 second cycle length. The eastbound, westbound, northbound and southbound left turns operate under permitted phasing. Crosswalks are provided on all four legs of the intersection. An aerial view of the intersection with approach directions of travel are illustrated in **Image 10.**

Packer Avenue is a local roadway with three through lanes in each direction, a center two-way left turn lane and a bike lane in each direction. A sidewalk is provided on the southern side on Packer Avenue. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway. South 7th Street is a local roadway with two through lanes in each direction and a center two-way left turn lane. Sidewalks are provided on both sides of the roadway. The speed limit is not posted but is assumed to be 25 miles per hour. Tractor trailers were observed to be parking on both sides of 7th Street south of Packer Avenue.

The eastbound and westbound approaches each provide a separate left turn lane, two through lanes, a shared through/right lane, and a bike lane. The northbound approach provides a separate left turn lane, a through lane, and a shared through/right lane. The southbound approach provides a shared left/through lane, a through lane, and a separate right turn lane with a right turn slip ramp. The southbound right turn is controlled by a "Yield" sign.

Packer Avenue and South Front Street

Image 11

The intersection of Packer Avenue and South Front Street is a three-leg signalized intersection operating under a pre-timed two-phase timing plan with a 90 second cycle length. The eastbound, northbound and southbound left turns operate under permitted phasing. Crosswalks are provided on the western and southern legs of the intersection. An aerial view of the intersection with approach directions of travel are illustrated in **Image 11.**

Packer Avenue is a local roadway with three through lanes in each direction, a center two-way left turn lane, and a bike lane in each direction. A sidewalk is provided on the southern side on Packer Avenue. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway. South Front Street is a local roadway with two lanes of travel in each direction and left turn lanes at the signalized intersections. A

sidewalk is provided on the eastern side of South Front Street. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway.

The eastbound approach provides dual left turn lanes, a shared through/right lane, and a bike lane. The northbound approach both provides a separate left turn lane, a through lane, and a shared through/right lane. The southbound approach both provides a separate left turn lane, a through lane, and a shared through/right lane with a right turn slip lane. The southbound right turn is controlled by a "Yield" sign.

South Front Street and I-76 Eastbound On-Ramp

Image 12

The intersection of Front Street and the /I-76 Eastbound on-ramp is a three-leg unsignalized intersection. An aerial view of the intersection with approach directions of travel are illustrated in **Image 12.**

South Front Street is a local roadway with two through lanes in each direction and a center two-way left turn lane. A sidewalk is provided on the eastern side of South Front Street. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway. The I-76 eastbound on-ramp provides access onto Interstate 76 eastbound and has one lane of travel. A 20 mile per hour advisory speed is posted on the ramp. Parking is prohibited on both sides of the roadway.

The northbound approach provides a separate left turn lane and two through lanes. The southbound approach provides a through lane and a share through/right lane. There are no crosswalks.

South Front Street and I-76 Westbound Off-Ramp – I-95 Southbound On-Ramp

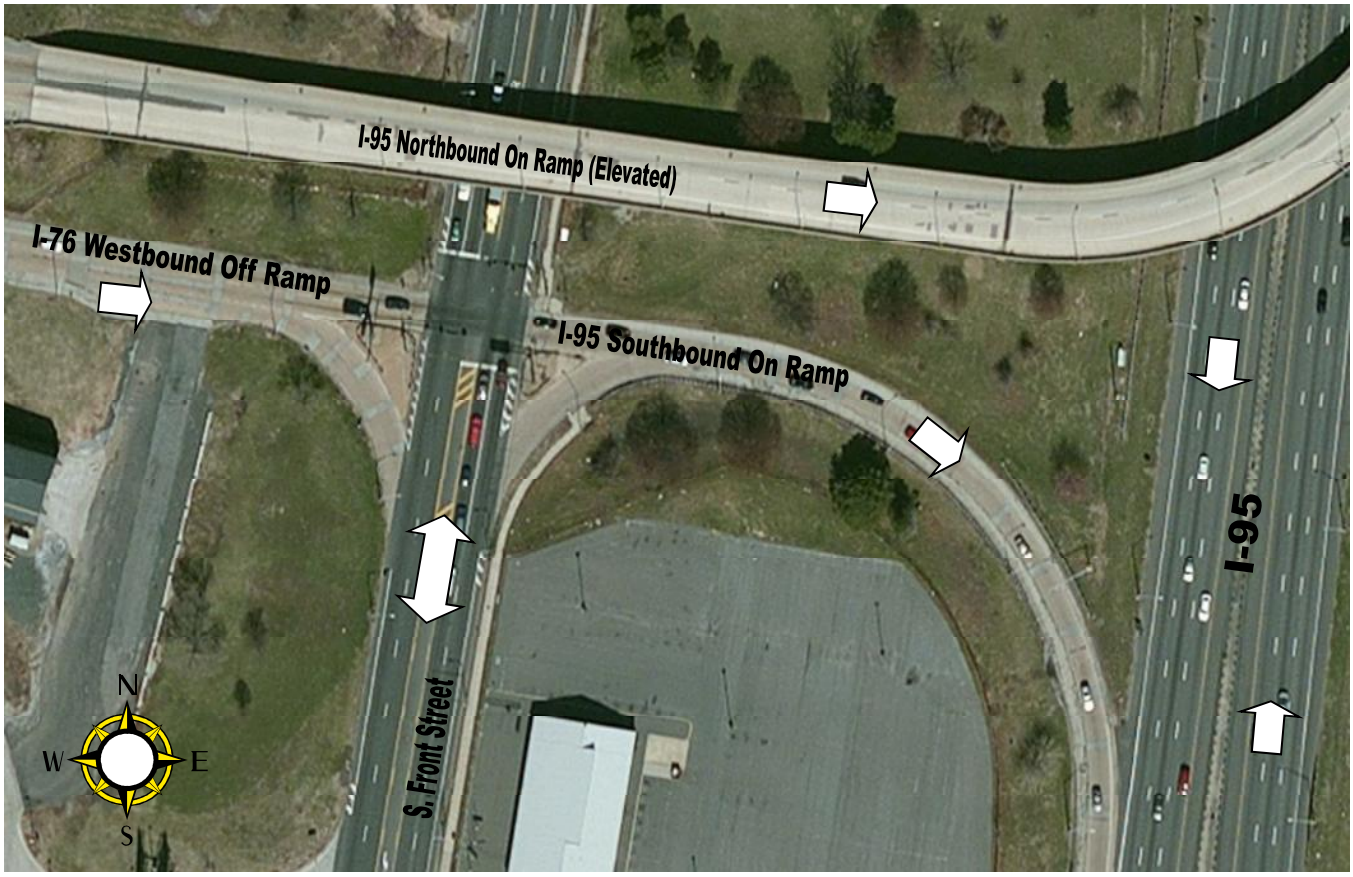


Image 13

The intersection of South Front Street and the I-76 westbound off-ramp/I-95 southbound on-ramp is a four-leg signalized intersection operating under a pre-timed three-phase timing plan with a 90 second cycle length. The southbound left turns operate under lagging protected/permitted phasing while the eastbound left turns operate under permitted phasing. There are currently no crosswalks striped on any of the approaches. An aerial view of the intersection with approach directions of travel are illustrated in **Image 13.**

South Front Street is a local roadway with two through lanes in each direction and a center two-way left turn lane. A sidewalk is provided on the eastern side of South Front Street. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway.

The eastbound approach provides a shared left/through lane, a through lane, and a right turn lane with a right turn slip lane. The eastbound right turn is controlled by a “Yield” sign. The northbound approach provides a through lane, a shared through/right lane, and a right turn slip lane. The northbound right turn is controlled by a “Yield” sign. The southbound approach provides a separate left turn lane and two through lanes.

South Front Street and I-95 Ramps – Dunkin Donuts Driveway

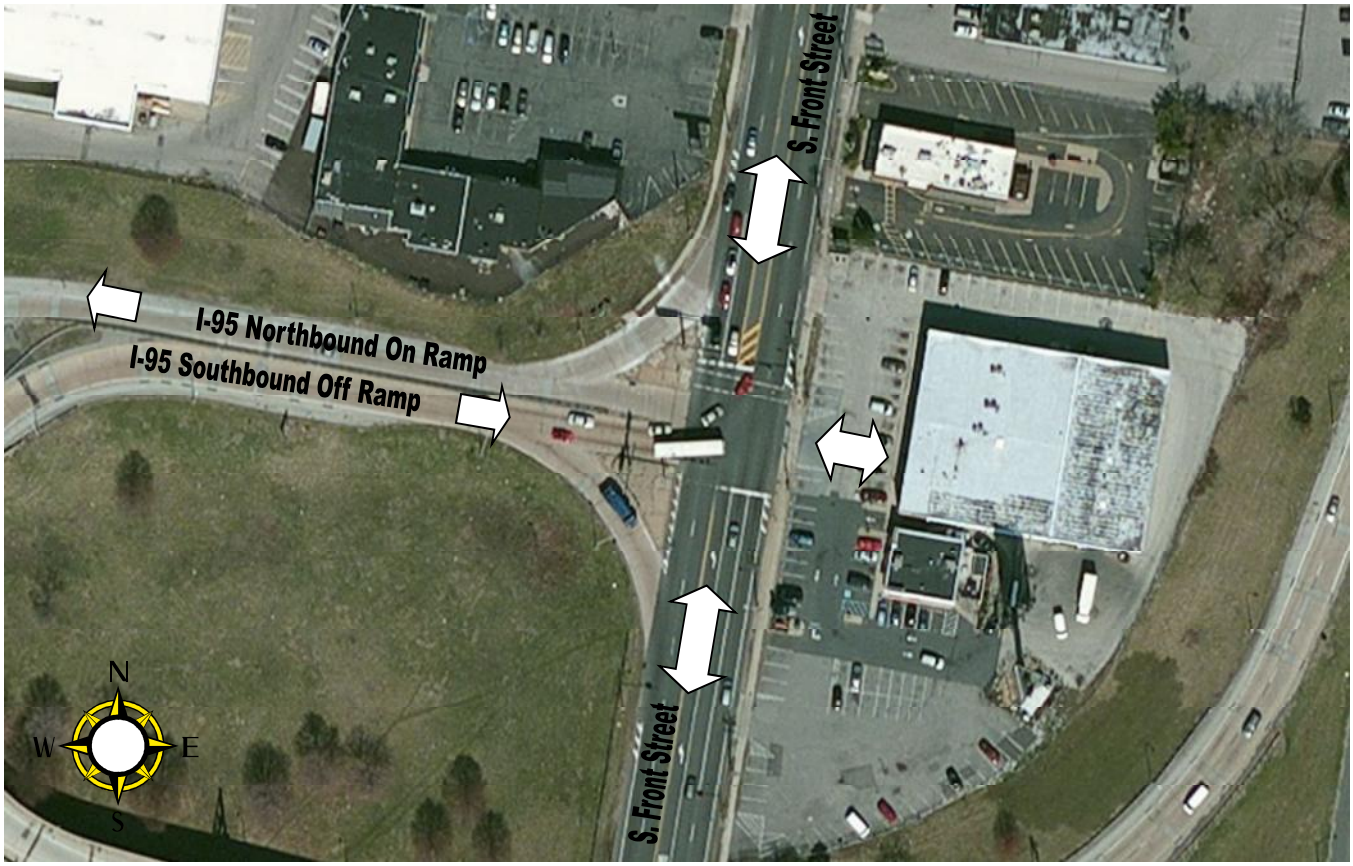


Image 14

The intersection of South Front Street and the I-95 northbound on-ramp/I-95 southbound off-ramp is a three-leg signalized intersection operating under a pre-timed three-phase timing plan with a 90 second cycle length. The northbound left turns operate under lagging protected/permitted phasing while the eastbound and westbound left turns operate under permitted phasing. There is a crosswalk striped across South Front Street to the north of the I-95 Ramps. An aerial view of the intersection with approach directions of travel are illustrated in **Image 14.**

South Front Street is a local roadway with two through lanes in each direction and a center two-way left turn lane. A sidewalk is provided on the eastern side of South Front Street. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway.

The eastbound approach provides a left turn lane and a shared left/through/right lane with a right turn slip lane. The eastbound right turn is controlled by a “Stop” sign. The westbound approach provides a shared left/through/right lane. The northbound approach provides a separate left turn lane, a through lane, and a shared through/right lane. The southbound approach provides a through lane and a shared through/right lane with a with turn slip lane. The southbound right turn is controlled by a “Yield” sign. Southbound left turns are prohibited.

S. Broad Street and I-95 Southbound Off-Ramp
S. Broad Street and I-95 Northbound Off-Ramp
S. Broad Street and I-95 Northbound On-Ramp
S. Broad Street and Terminal Avenue (11th Street)

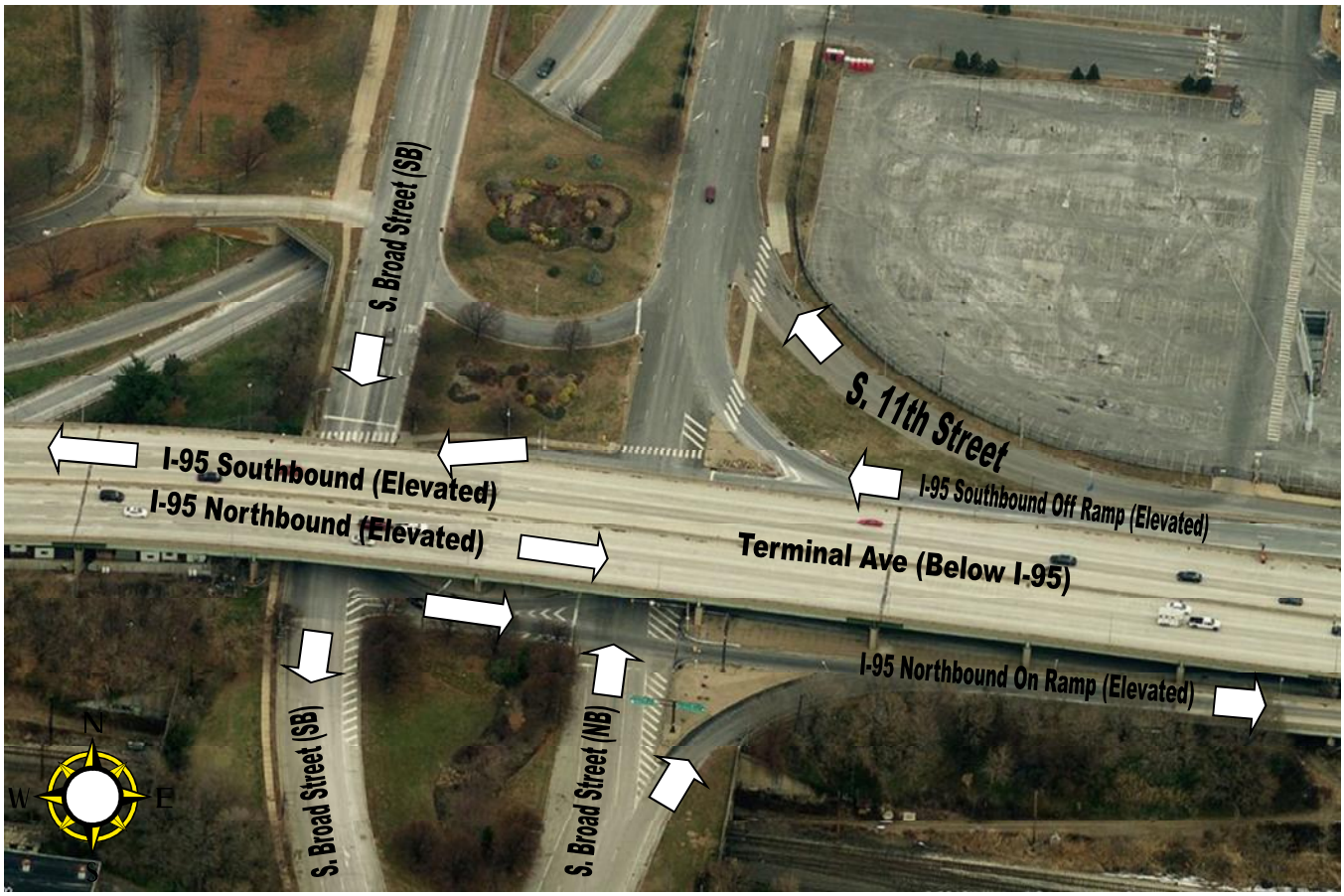


Image 15

The I-95 and S. Broad Street (SR 611) interchange (Exit 17) is a complex set of signalized intersections which operate with one controller under a pre-timed two phase timing plan with a 90 second cycle length. All left turn movements operate under permitted phasing. An aerial view of the intersections with approach directions of travel are illustrated in **Image 15.**

At the intersection of S. Broad Street (Southbound) and I-95 Northbound Off-Ramp, the southbound S. Broad Street approach provides two through lanes, a shared left-through lane and a dedicated left turn lane. The left turn lanes continue beneath I-95 and form the eastbound approach to the S. Broad Street (Northbound) and I-95 Northbound Off-Ramp intersection. The westbound I-95 Southbound Off-Ramp approach provides 3 left turn lanes; two from the I-95 Southbound Off-Ramp and one from 11th Street. A sidewalk is provided along the western side of S. Broad Street and on the northern side of the I-95 Southbound Off-Ramp. A crosswalk is provided to cross the southern S. Broad Street approach. The speed limit on S. Broad Street is posted at 35 miles per hour and on-street parking is not permitted.

At the intersection of S. Broad Street (Northbound) and I-95 Southbound Off-Ramp – Terminal Avenue (11th Street), the northbound S. Broad Street approach provides two through lanes and a shared through-left turn lane. The westbound I-95 Southbound Off-Ramp approach provides two through lanes with a right turn slip lane. The right turn slip lane is controlled by a "Yield" sign. The westbound Terminal Avenue (11th Street) approach provides one through lane. The I-95 Southbound Off-Ramp and Terminal Avenue operate concurrently on one signal

phase. A sidewalk is provided on the eastern side of Broad Street north of the I-95 Ramp and on the northern side of the I-95 Southbound Off-Ramp west of S. Broad Street (Northbound). A crosswalk is provided to cross the northern leg of S. Broad Street (Northbound).

At the intersection of S. Broad Street (Northbound) and I-95 Northbound On-Ramp, the northbound S. Broad Street approach provides three through lanes and one right turn slip lane. The right turn slip lane is controlled by a "Yield" sign. The eastbound I-95 Ramp approach provides two through lanes onto I-95 Northbound and one left turn lane. There are no sidewalks or crosswalks present at this intersection. The speed limit on S. Broad Street is posted at 35 miles per hour and on-street parking is not permitted.

Due to the complex geometry of the intersections, the Terminal Avenue (11th Street) approach was analyzed as part of the I-95 Ramps. Also, the three signalized intersections are controlled by one signal controller. Since the HCM 2010 does not support the complex intersection geometry and signal control, the level of service analysis for this intersection was completed utilizing the Synchro 8 Percentile Delay Methodology.

S. Broad Street and W. Oregon Avenue

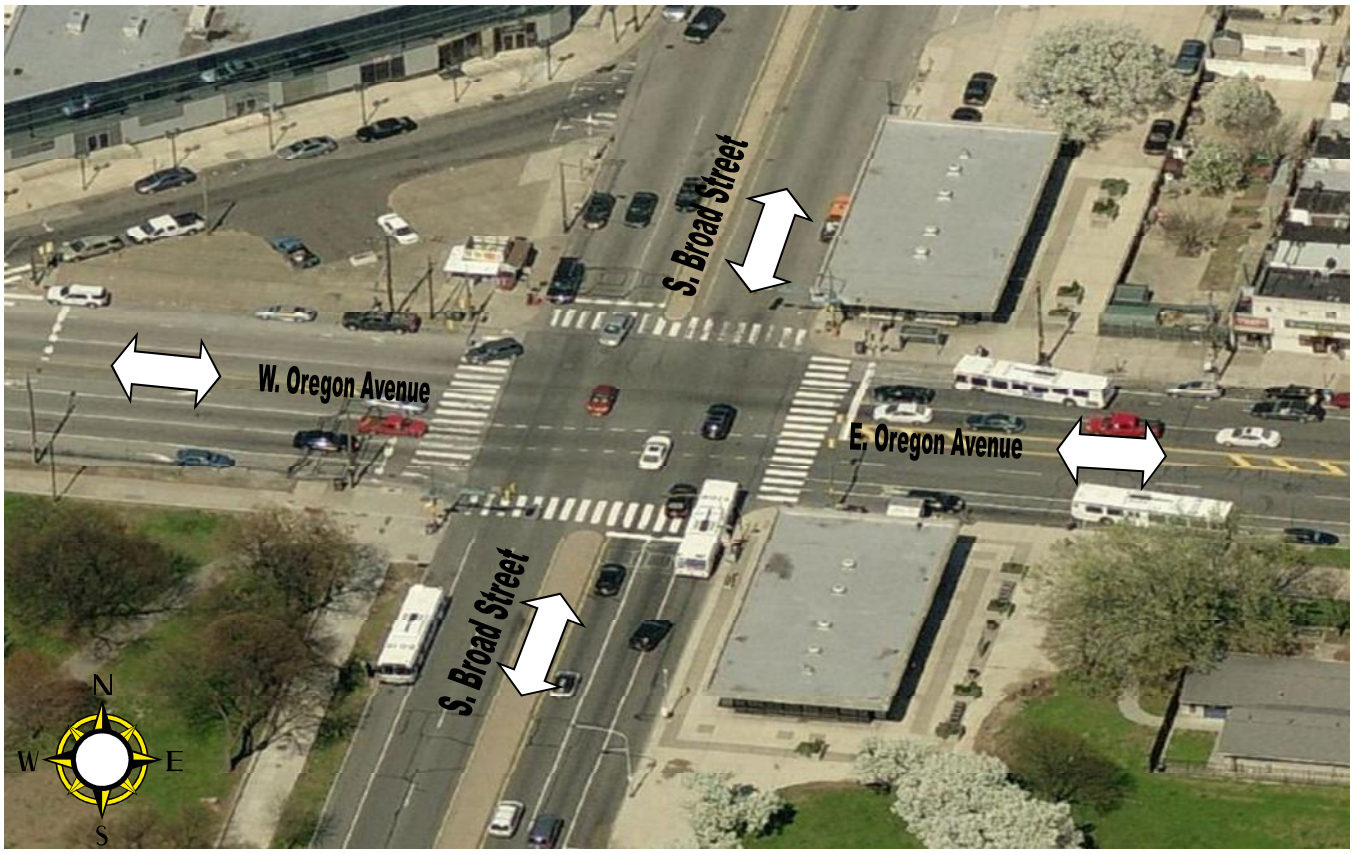


Image 16

The intersection of W. Oregon Avenue and S. Broad Street (SR 611) is a four-leg signalized intersection operating under a pre-timed two phase timing plan with a 90 second cycle length. The eastbound left turns operate under permitted phasing. Left turns are prohibited on the westbound, northbound, and southbound approaches. Crosswalks are provided on all four legs of the intersection. An aerial view of the intersection with approach directions of travel are illustrated in **Image 16.**

West of S. Broad Street (SR 611), W. Oregon Avenue is a local roadway with two through lanes, a dedicated right turn only lane, a dedicated left turn only lane and a bike lane in the eastbound approach to the signalized intersection. A sidewalk is provided on both sides of the avenue. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway. East of S. Broad Street (SR 611), W. Oregon Avenue has two through lanes and a bike lane. Sidewalks are provided on both sides of the roadway. The speed limit is posted at 30 miles per hour and on-street parking is provided on both sides of the roadway. Cars were observed to be parking on the center painted median.

North of W. Oregon Avenue, S. Broad Street (SR 611) is a principal arterial highway with two through lanes and a bus lane on the southbound approach to the signalized intersection. A sidewalk is provided on both sides of the roadway. The speed limit is posted at 35 miles per hour and on-street parking is not permitted. South of W. Oregon Avenue, S. Broad Street (SR 611) has two through lanes and one bus lane. A sidewalk is provided on both sides of the roadway. The speed limit is posted at 35 miles per hour and on-street parking is not permitted.

I-95 Northbound and Exit 17 Off-Ramp (Broad Street/Pattison Avenue) – Unsignalized Intersection

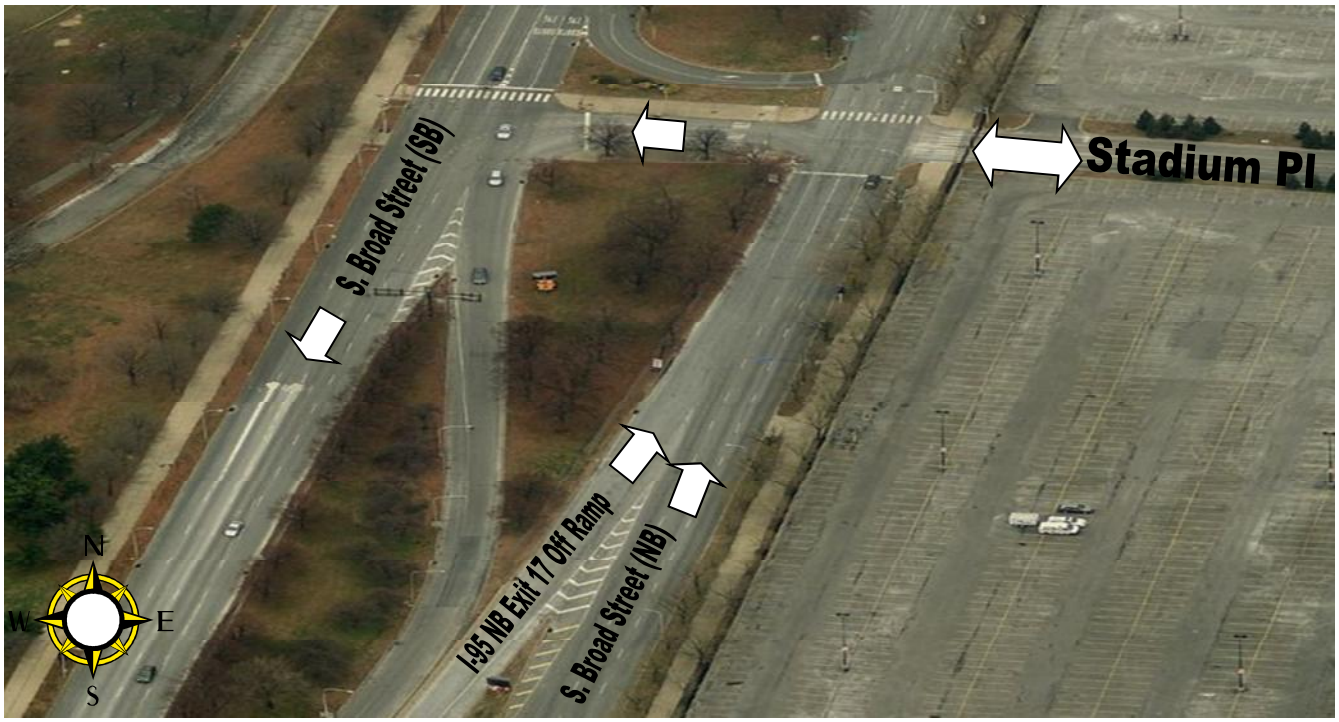


Image 17

The intersection of I-95 Northbound Exit 17 off-ramp and S. Broad Street northbound is a two-leg unsignalized intersection. An aerial view of the intersection with approach directions of travel are illustrated in **Image 17.**

S. Broad Street (SR 611) is a principal arterial highway with three lanes of traffic in each direction. The speed limit is posted at 35 miles per hour and on-street parking is not permitted. The I-95 northbound off-ramp provides access onto S. Broad Street northbound and has one lane of travel. The speed limit on the ramp is not posted, but assumed to be 25 miles per hour. Parking is prohibited on both sides of the roadway. The merge from I-95 Northbound Exit 17 off-ramp onto S. Broad Street northbound is controlled by a "Yield" sign. The level of service analysis for this merge intersection was completed utilizing the HCM 2010 Freeway Merge Segments analysis.

I-95 NB Off-Ramp (Exit 19) and WB Packer Avenue – Unsignalized Merge Condition

Image 18

The intersection of I-95 Northbound Exit 19 off-ramp and Westbound Packer Avenue is yield controlled merge condition. An aerial view of the intersection with approach directions of travel are illustrated in **Image 18.**

South of I-95 Northbound Exit 19 off-Ramp, Westbound Packer Avenue is a local roadway with three lanes of traffic, a bike lane and a center two-way left turn lane in each direction. The speed limit is posted at 30 miles per hour and on-street parking is not permitted. The I-95 northbound off-ramp provides access onto Westbound Packer Avenue northbound and has one lane of travel. A 25 mile per hour advisory speed is posted on the ramp. Parking is prohibited on both sides of the roadway. The merge from I-95 Northbound Exit 19 off-ramp onto Westbound Packer Avenue northbound is controlled by a "Yield" sign. The level of service analysis for this merge intersection was completed utilizing the HCM 2010 Freeway Merge Segments analysis.

Public Transit Facilities

The proximity of the Hollywood Casino to major public transit facilities is another attribute of this site. The AT&T Station of SEPTA's Broad Street Line is located approximately ¾ mile from the site. In addition, Bus Route G services Packer Avenue with stops adjacent to the site and several additional bus routes (including Routes 4, 7, 12, 24, and 63) pass in close proximity to the site. The proximity of these transit facilities is expected to be particularly attractive for local employees and also patrons of the casino. It is anticipated that 2% of the patrons/employees of the proposed casino will utilized public transportation.

The existing transit facilities within the study area are illustrated in **FIGURE 8**.

Existing Traffic Volumes

Manual turning movement counts including right turns on red, heavy vehicles, bicycle and pedestrian activity counts were completed at the requested study intersections for the following peak periods:

- Friday evening commuter peak hour (between 4:00 – 7:00 PM)
- Friday evening with pre-Phillies event peak hour (between 5:00 – 7:30 PM)
- Friday evening casino peak hour (between 7:00 – 10:00 PM)
- Saturday evening casino peak hour *(*between 8:00 – 11:00 PM*)*

Traffic counts were conducted on Friday, June 14, 2013 from 4:00 to 7:00 PM and on Friday, May 31, 2013 before a Phillies game from 5:00 PM to 7:30 PM at the following intersections:

- Penrose Avenue and Pattison Avenue
- Pa ttison Avenue and S. Broad Street (Southbound)
- Pattison Avenue and S. Broad Street (Northbound)
- Pattison Avenue and S. 11th Street *(Pre-Phillies event only)*
- Pattison Avenue and S. Darien Street
- Pattison Avenue and S. 7th Street
- S. Broad Street (NB & SB) and Packer Avenue
- S. Broad Street (NB & SB) and Pollock Street
- Packer Avenue and S. 10th Street
- Packer Avenue and S. Darien Street/I-76 Eastbound Off/On-Ramps
- Packer Avenue and S. 7th Street
- Packer Avenue and S. Front Street
- S. Front Street and I-76 Eastbound On-Ramp (Unsignalized Intersection)
- S. Front Street and I-76 Westbound Off-Ramp/I-95 Southbound On-Ramp
- S. Front Street and I-95 (SB Off/On-Ramps)/Dunkin Donuts Driveway
- S. Broad Street (NB) and S. 11th Street *(Pre-Phillies event only)*
- S. Broad Street (SB) and I-95 SB Off-Ramp
- S. Broad Street (NB) and I-95 SB On-Ramp
- W. Oregon Avenue and S. Broad Street
- I-95 SB and Exit 17 Off-Ramp (Broad Street/Pattison Avenue) – Unsignalized Intersection
- I-95 SB Off-Ramp (Exit 19) and WB Packer Avenue – Unsignalized Merge Condition

Additionally, turning movement counts were conducted on Friday, June 14, 2013 from 7:00 to 10:00 PM and on Saturday June 15, 2013 from 8:00 PM to 11:00 PM at the following intersections:

- S. Broad Street (NB & SB) and Packer Avenue
- Packer Avenue and S. 10th Street
- Packer Avenue and S. Darien Street/I-76 Eastbound Off/On-Ramps
- Packer Avenue and S. 7th Street
- Packer Avenue and S. Front Street
- S. Front Street and I-76 Eastbound On-Ramp (Unsignalized Intersection)
- S. Front Street and I-76 Westbound Off-Ramp/I-95 Southbound On-Ramp
- S. Front Street and I-95 (SB Off/On-Ramps)/Dunkin Donuts Driveway

The system peak hours were identified as:

- Non-Event Friday Evening Commuter Peak: 4:00 – 5:00 PM
- Friday Evening Pre-Phillies Event Peak: 6:00 – 7:00 PM
- Friday Evening Casino Peak: 7:00 PM – 8:00 PM
- Saturday Evening Casino: 8:00 PM – 9:00 PM

The Phillies reported attendance the day the pre-event peak period counts were performed was 37,420 (85.7% of capacity). The pre-event peak hour traffic volumes associated with event attendance were increased by 14% to simulate conditions during a "sell-out". The event related traffic was determined through comparison of the non-event Friday commuter peak and pre-event peak volumes for each movement.

The existing traffic volumes for the study area intersections are illustrated in **FIGURES 9** through **12**. Copies of the manual traffic count data are provided in **APPENDIX A**.

Existing Land Uses

The Hollywood Casino Site at 700 Packer Avenue is currently zoned **I-2, Medium Industrial**. Within the immediate vicinity of the project site, the primary land uses to the east and southeast are zoned I-2 (Medium Industrial). The Sports Stadium District (SPA-STA) is located to the south and west. The parcel to the west is zoned CMX-3 (Neighborhood Commercial Mixed-Use-3). All of these zoning areas include the Airport Hazard Control Overlay District.

There are some residential communities to the north and west of the site. Interstate 76 is located between the residential communities to the north and the proposed Hollywood Casino Project site providing a buffer between the site and those residential communities. The residential communities to the west are separated from the casino site by a hotel and a large parking area that services the sports venues.

The zoning classifications of the parcels within the study area are illustrated on **Figure 13**.

Existing Levels of Service/Queue Analysis

The performance of the study intersections under existing conditions was evaluated through a qualitative measure of operating conditions called Levels of Service. Six levels of Service (LOS) are defined with letter designations from 'A' to 'F', with Level of Service 'A' representing delays up to ten seconds and Level of Service 'F' indicating delays exceeding eighty seconds. Level of Service 'C' or better is considered acceptable, with a threshold of Level of Service 'D' in urban areas. Levels of Service are determined through analysis procedures outlined in the 2010 *Highway Capacity Manual* (Transportation Research Board, Washington, D.C.).

Levels of Service for signalized intersections are based on average delay experienced by motorists passing the intersection. The delay is based on the results of the capacity analysis (rate of demand flow to capacity) and other important variables such as quality of progression, cycle length, and ratio of green time.

Levels of Service for unsignalized intersections are defined in terms of delay to vehicles entering from the side road and turning left from a major road. Delay is a function of the capacity of the approach and degree of saturation. The capacity is based on the distribution of gaps in the major street traffic stream, driver judgment in selecting a gap through which to execute the desired maneuver, and follow-up time required by each driver in a queue. The Level of Service Criteria for signalized and unsignalized intersections is provided in **APPENDIX B**.

The operational analyses of the study intersections under the Friday Evening Commuter Peak, Friday Evening Pre-Phillies Event Peak, Friday Evening Casino Peak, and Saturday Evening Casino Peak were performed using the *Synchro/Simtraffic* Version 8.0 software developed by Trafficware® and the *Highway Capacity Software 2010* developed by McTrans. The levels of service and delays are based on the *2010 Highway Capacity Manual (HCM2010)* published by the Transportation Research Board, Washington D.C. The HCM sets forth nationally accepted standards regarding traffic operations and capacity analysis. The queue length analysis was conducted utilizing *Simtraffic* software. The *Simtraffic* model was calibrated in accordance with procedures outlines in PennDOT Publication 46. Three simulation runs were completed for each analysis scenario and were averaged together to determine the 95th percentile queues at each study intersection. As previously noted, the HCM2010 signalized intersection analysis does not support complex intersection geometry and signal phasing. The PennDOT District 6-0 policy regarding complex intersection analysis that is not supported by the HCM2010 is to utilize the Synchro Percentile Delay Methodology per the PennDOT Memorandum dated December 13, 2012

issued by Francis J. Hanney. The Synchro 8 Percentile Delay Methodology was utilized for the following intersections:

- S. Broad Street and Pollock Road
- S. Broad Street and Packer Avenue
- S. Broad Street and Pattison Avenue
- S. Broad Street (Southbound) and I-95 Southbound Off Ramp
- S. Broad Street (Northbound) and I-95 Southbound Off Ramp
- S. Broad Street (Northbound) and I-95 Northbound On Ramp

Signal timing for the study area intersections were obtained from existing signal and timing plans, which are included in **APPENDIX C.** Field measured signal timings were utilized at intersections where the signal plan does not match existing conditions and where timings were not provided.

Chapter 10 of *PennDOT Publication 46* provides Pennsylvania default values to be utilized in the HCM 2010 Level of Service analysis. The following default values were used for signalized intersections: base saturation flow rate of 2100 pcpcpl (Urban Core); a start-up lost time of 2.5 seconds; and the number of left turn sneakers of 2 vehicles. The results of the capacity analysis for existing conditions are as follows:

2013 Existing Friday Evening Commuter Peak:

The roadway network in the vicinity of the site has been designed to accommodate traffic for the major sporting venues and, as such, provides sufficient capacity during normal Friday evening peak commuter conditions. Under existing conditions, all study intersections operate at overall LOS "C" or better with all individual movements operating at LOS "D" or better with the exception of the following:

- The signalized intersection of Broad Street and Pattison Avenue operates at an overall LOS "B" with 14.5 seconds of intersection delay, however the southbound left operates at a LOS "E" with 56.3 seconds of delay.

The estimated 95th percentile queues at the study intersections are considered within acceptable limits as none of the queues extend into adjacent intersections with the exception of the eastbound left and through movements at Broad Street and Oregon Avenue. The reported 95th percentile queue on the eastbound left and through movements of Oregon Avenue both extend into the adjacent signalized intersection at Moyamensing Avenue.

2013 Existing Friday Evening Casino Peak:

The peak for the Casino occurs late in the evening on Friday after the commuter rush hour. The existing roadway network provides sufficient capacity during normal Weekday late evening conditions. Under existing conditions, all study intersections operate at overall LOS "C" or better with all individual movements also operating at LOS "C" or better.

The estimated 95th percentile queues at the study intersections are considered within acceptable limits as none of the queues extend into adjacent intersections.

2013 Existing Saturday Evening Casino Peak:

During the existing Saturday evening casino peak, all study intersections operate at overall LOS "C" or better with all individual movements also operating at LOS "C" or better. The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues extend into adjacent intersections.

2013 Existing Friday Evening Pre-Phillies Event Peak:

Capacity analyses at the study intersections prior to a sold-out Phillies game indicate that all intersections operate at overall LOS "C" or better and all movements with a LOS "D" or better with the following exception:

- The signalized intersection of Packer Avenue and Darien Street operates at an overall LOS "D" with 52.2 seconds of intersection delay. The westbound approach is operating at a LOS "E" with 73.5 seconds of delay and the westbound left turn lane operates at LOS "F" with 141.1 seconds of delay as a result of 514 left turns destined for several event parking lots located south on Darien Street.

The estimated 95th percentile queues at the study intersections are generally within acceptable limits. At the following locations, 95th percentile the queues extend into adjacent intersections due to event traffic proceeding to venue parking:

- Broad Street & Pollock Street – eastbound right
- Packer Avenue & 10th Street – westbound left
- Packer Avenue & Darien Street – westbound left, westbound through, westbound right
- Packer Avenue & 7th Street – eastbound left, westbound left
- Front Street & I-95 Ramps – eastbound right
- Broad Street & Oregon Avenue – eastbound left, eastbound through

The estimated 95th percentile queues on the eastbound and westbound movements of Packer Avenue at Broad Street exceeding available storage lengths can be directly attributed to the traffic destined for several event parking lots. The eastbound right turns from Pollock Street at Broad Street and the eastbound right on the I-95 southbound off-ramp at Front Street are also a result of the event traffic destined to the venue parking. The northbound right turning movement at Broad Street and Patterson Avenue experiences long queues which exceed the available storage lengths and impact the upstream traffic signals and the merge from the I-95 southbound ramp on Broad Street. The reported 95th percentile queue on the eastbound left and through movements of Oregon Avenue both extend into the signalized intersection at Moyamensing Avenue which is a condition which is also present during the non-event commuter peak.

The detailed level of service and queue reports for the existing peak hour conditions are provided in **APPENDIX D**. The levels of service and queues are summarized in tables provided in **APPENDIX M.**

Crash Analysis

Crash histories for the length of the affected area were requested from the City of Philadelphia Streets Department. The City data represents the five-year period from 2008 to 2012 and is the most recent data available from City at the time of preparation of this report. The City provided data for the following study intersections:

- Penrose Avenue and Pattison Avenue
- Pattison Avenue and S. Broad Street NB
- Pattison Avenue and S. Broad Street SB
- Pattison Avenue and S. 11th Street
- Pattison Avenue and S. Darien Street
- Pattison Avenue and S. 7th Street
- S. Broad Street NB and Packer Avenue
- S. Broad Street SB and Packer Avenue
- S. Broad Street NB and Pollock Street
- S. Broad Street SB and Pollock Street
- Packer Avenue and S. 10th Street
- Packer Avenue and I-76 Eastbound Ramps – S. Darien Street
- Packer Avenue and S. 7th Street
- Packer Avenue and S. Front Street
- S. Front Street and I-76 Eastbound On-Ramp
- S. Front Street and I-76 Westbound Off-Ramp/ I-95 Southbound On-Ramp
- S. Front Street and I-95 Ramps

- S. Broad Street NB and S. 11th Street
- S. Broad Street and I-95 NB On-Ramp
- S. Broad Street SB and I-95 SB Off-Ramp
- W. Oregon Avenue and S. Broad Street
- I-95 NB and Exit 17 Off-Ramp
- I-95 NB Off-Ramp and WB Packer Avenue

The engineering extract summary classifies accident data into various categories. Accidents are broken down by year, roadway conditions, time-of-day, type of vehicle, severity of the accident, month, and probable cause, among many other categories. For each category, data is presented by number of vehicles per year and by the percentage of total vehicles in the time frame. An evaluation of the City of Philadelphia Streets Department reportable accidents by location, type and severity is provided in **APPENDIX E.**

The accident summary report provided by the City indicates that accident rates are low for the study intersections. The majority of the intersections averaged less than 3 reportable accidents per year. The intersections of Broad Street and Pattison, Broad Street SB and Pattison Avenue, South Broad Street SB and Packer Avenue, and South Broad Street SB and I-95 NB on-ramp have slightly higher occurrences of accidents averaging between 4 and 6 crashes per year. The following is a summary of the crash data provided for the Packer Avenue intersections:

Packer Avenue at South 10th Street
There were four reportable crashes with one head-on crash, two angle crashes and one rear end crash. Of the four crashes, three were injury occupant crashes and one was a property damage with towing crash.

Packer Avenue at I-76 EB Ramps and South Darien Street
There were five reportable crashes with one head on crash, three angle crashes, and one rear end crash. Of the five crashes, four were injury occupant crashes and one was a property damage with towing crash.

Packer Avenue at South 7th Street
There were 12 reportable crashes with two being head on crashes, one hit pedestrian crash, four angle crashes, one other or unknown crash, one rear end crash, one rear to rear backing crash, one sideswipe (same direction) crash, and one sideswipe (opposite direction) crash. Of the 12 crashes, six were injury occupant crashes, five were property damage with towing crashes and one crash was a fatal pedestrian accident.

Based on the information provided, there are no discernible patterns for the accidents at the study intersections which would indicate a correctable condition.

FUTURE NO-BUILD TRAFFIC CONDITIONS

Pre-Development Traffic Volumes

In order to account for general traffic growth in the area, an annual background growth rate is applied to existing traffic volumes on the study area roadways. An annual background growth rate of 0% per year has been established by PENNDOT's *Bureau of Planning and Research* for urban, non-interstate roads in the study area. Due to the proximity of the site to the old Philadelphia Navy Yard, which is experiencing significant growth, an annual growth rate factor of 1% was applied to the background traffic. At the time this study was conducted, there were no other planned developments on record in the immediate vicinity of the study area which would contribute additional traffic to the roadway network.

For the Weekday Pre- Phillies Event scenarios, it is assumed that the traffic volumes consist predominantly of event traffic related to the capacity of the stadiums and will remain constant through the future analysis scenarios. As such, there is no growth factor applied to the background traffic for the 2016, 2021, and 2026 Pre-Phillies Event scenarios.

Description of the Analyzed Pre-Development Scenarios

The following are the three pre-development scenarios which are included for analysis: Phase 1 Opening Day in 2016, Phase 2 Opening Day in 2021, and the 5-year horizon in 2026.

- **2016 Phase 1 Opening Day No-Build Conditions.** This condition is based on the existing configuration of study area roadways and traffic patterns for both non-event and Pre-Phillies sold-out event scenarios. The "non-event" scenarios do include small events such as concerts at the sports venues. For the "non-event" scenarios, a background annual traffic growth of 1% is applied to all existing volumes to represent the increase of traffic from 2013 existing conditions as noted above, no growth factor has been applied to background traffic for the Pre-Phillies event scenarios. The 2016 Phase 1 Opening Day No-Build traffic volumes are illustrated in **FIGURES 14-17**.

- **2021 Phase 2 Opening Day No-Build Conditions.** This condition is based on the existing configuration of study area roadways and traffic patterns for both non-event and Pre-Phillies sold-out event scenarios. The "non-event" scenarios do include small events such as concerts at the sports venues. For the "non-event" scenarios, a background annual traffic growth of 1% is applied to all existing volumes to represent the increase of traffic from 2013 existing conditions as noted above, no growth factor has been applied to background traffic for the Pre-Phillies event scenarios. The 2021 Phase 2 Opening Day No-Build traffic volumes are illustrated in **FIGURES 18 - 21**.

- **2026 Horizon No-Build Conditions.** This condition is based on the existing configuration of study area roadways and traffic patterns for both non-event and Pre-Phillies sold-out event scenarios. The "non-event" scenarios do include small events such as concerts at the sports venues. For the "non-event" scenarios, a background annual traffic growth of 1% is applied to all existing volumes to represent the increase of traffic from 2013 existing conditions as noted above, no growth factor has been applied to background traffic for the Pre-Phillies event scenarios. The 2026 Horizon No-Build traffic volumes are illustrated in **FIGURES 22-25**.

Pre-Development Levels of Service/Queue Analysis

Traffic operations for the future pre-development conditions were evaluated at the study intersections for the analyzed peak hours. The assessment of the pre-development scenarios was conducted for the purpose of identifying any future traffic operational issues which are anticipated to arise without the presence of the proposed Hollywood Casino. Pre-development conditions include minor modifications to the existing signal timing splits to optimize operations at some of the intersections.

2016 Friday Evening Commuter Peak (No-Build):

Capacity analyses at the study intersections indicate that all intersections will continue to operate at overall LOS "C" or better with all movements operating at LOS "D" or better. The timing of the signalized intersection of Broad Street and Pattison Avenue, whose southbound left operates at a LOS "E" with 56.3 seconds of delay under existing conditions, was optimized and improved to a LOS "D with 46.0 seconds of delay.

The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues are expected to extend into adjacent intersections with the exception of the eastbound approach of Packer Avenue at Broad Street and the eastbound left and through movements on Oregon Avenue at Broad Street. The reported 95th percentile queue on the eastbound approach of Packer Avenue extends approximately 3 car lengths beyond the unsignalized intersection at 15th Street. The reported 95th percentile queue on the eastbound left and through movements of Oregon Avenue both extend beyond the signalized intersection at Moyamensing Avenue.

2016 Friday Evening Casino Peak (No-Build):

As with the Friday evening commuter peak, the roadway network provides sufficient capacity during normal weekday late evening conditions. All study intersections operate at overall LOS "B" or better with all individual movements operating at LOS "C" or better. The estimated 95th percentile queues at the study intersections are considered within acceptable limits as none of the queues extend into adjacent intersections.

2016 Saturday Evening Casino Peak (No-Build):

During the 2016 Saturday evening casino peak, all study intersections operate at overall LOS "C" or better with all individual movements also operating at LOS "C" or better. The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues extend into adjacent intersections.

2021 Friday Evening Commuter Peak (No-Build):

Capacity analyses at the study intersections indicate that all intersections will continue to operate at overall LOS "C" or better with all movements operating at LOS "D" or better.

The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues are expected to extend into adjacent intersections with the exception of three locations: the northbound right turn of Broad Street at Packer Avenue, the eastbound left and through movements at Broad Street and Oregon Avenue, and the southbound right turn at Packer Avenue and Darien Street. The reported 95th percentile queue on the northbound right turning movement on Broad Street extends approximately 2 car lengths beyond the signalized intersection at Curtin Street. The reported 95th percentile queue on the eastbound left and through movements of Oregon Avenue both extend beyond the signalized intersection at Moyamensing Avenue, and the southbound right turn on Darien Street exceeds the channelized right turn storage by less than a single car length.

2021 Friday Evening Casino Peak (No-Build):

During the 2021 Friday evening casino peak, all study intersections operate at overall LOS "C" or better with all individual movements operating at LOS "C" or better. The estimated 95th percentile queues at the study intersections are considered within acceptable limits as none of the queues extend into adjacent intersections.

2021 Saturday Evening Casino Peak (No-Build):

In the 2021 Saturday evening casino peak, all study intersections operate at overall LOS "C" or better with all individual movements also operating at LOS "D" or better. The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues extend into adjacent intersections.

2026 Friday Evening Commuter Peak (No-Build):

Capacity analyses at the study intersections for the 2026 weekday pm no-build scenario indicate that all intersections will operate at overall LOS "C" or better with all movements also operating at LOS "D" or better.

The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues are expected to extend into adjacent intersections with the exception the eastbound left and through movements at Broad Street and Oregon Avenue. The reported 95th percentile queue on the eastbound left and through movements of Oregon Avenue both extendbeyond the signalized intersection at Moyamensing Avenue.

2026 Friday Evening Casino Peak (No-Build):

Capacity analyses at the study intersections indicate that all intersections will continue to operate at overall LOS "C" or better with all movements also operating at LOS "D" or better. The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues are expected to extend into adjacent intersections.

2026 Saturday Evening Casino Peak (No-Build):

During the 2026 Saturday evening casino peak, all study intersections operate at overall LOS "C" or better with all individual movements also operating at LOS "D" or better. The estimated 95th percentile queues at the study intersections are within acceptable limits as none of the queues extend into adjacent intersections.

2016, 2021, and 2026 Friday Pre-Phillies Event Condition (No-Build):

Because the background growth factor was not applied to the base volumes for the Pre-Phillies Event scenarios, the 2016, 2021, and 2026 No-Build scenarios share the same traffic volumes as the existing 2013 scenario. The capacity analysis results for the 2016, 2021, and 2026 No-Build scenarios are identical to each other and the existing 2013 scenario. As previously stated in the existing conditions section, capacity analyses at the study intersections prior to a Phillies game indicate that all intersections operate at overall LOS "C" or better and all movements operate with a LOS "D" or better with the following exception:

- The signalized intersection of Packer Avenue and Darien Street operates at an overall LOS "D" with 52.2 seconds of intersection delay. The westbound approach is operating at a LOS "E" with 73.5 seconds of delay and the left turn lane operates at LOS "F" with 141.1 seconds of delay as a result of 514 left turns destined for several event parking lots located south on Darien Street.

The estimated 95th percentile queues at the study intersections will remain the same as the existing 2013 scenario.

The detailed level of service and queue reports for the 2016, 2021, and 2026 No-Build conditions are provided in **APPENDIX F**. The levels of service and queues are summarized in tables provided in **APPENDIX M**.

TRIP GENERATION

Developing the Trip Generation Rates

The standard reference utilized to estimate traffic generated by new developments is the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 9th Edition*. However, the *Trip Generation Manual* provides limited information for full service casinos. The *Trip Generation Manual* provides a trip generation rate for Land Use Code (LUC) 472 "Casino/Video Lottery Establishment" derived from gaming sites in South Dakota that do not provide full-service food. The data provided by the *Trip Generation Manual* does not sufficiently represent an urban full-service casino, which includes food service and entertainment, as proposed at the Hollywood Casino site.

As such, in order to develop an accurate estimate of trips generated by a proposed gaming facility, the trips generated at the following facilities, which have similar demographic and geographic environments, were examined:

- Sugarhouse Casino, Philadelphia Pennsylvania
- Rivers Casino, Pittsburgh, Pennsylvania
- St. Charles Casino, St. Louis, Missouri

In September, 2010, the Sugarhouse Casino was opened on Delaware Avenue approximately 4 miles north of the proposed Hollywood Casino site. The Sugarhouse Casino includes full-service food and bar facilities with 2010 gaming positions. Manual traffic counts were conducted on Friday May 31, 2013 and Saturday June 8, 2013 during the Friday Commuter Peak (5:00 to 6:00 PM), Friday Evening Casino Peak (8:00 to11:00 PM) and the Saturday Casino Peak (8:00 to 11:00 PM).

The Rivers Casino was opened in August, 2009, and is located adjacent to Heinz Field and less than a mile from PNC Park on the North Shore in Pittsburgh, PA. The Rivers Casino includes full-service food and bar facilities with 3810 gaming positions. Manual traffic counts were conducted on Friday June 7, 2013 and Saturday June 8, 2013 during the Friday Commuter Peak (5:00 to 6:00 PM), Friday Evening Casino Peak (8:00 to 11:00 PM) and the Saturday Casino Peak (8:00 to 11:00 PM).

The St. Charles Casino is located along the Missouri River in the City of St. Charles, Missouri. Traffic data was collected on a Friday and Saturday in 1998 for the article *Trip Generation Characteristics of Small to Medium Sized Casinos* [3] for the site which, at the time, had 2477 gaming positions.

The Institute of Transportation Engineers (ITE) article *Gaming Casino Traffic* [4] identifies monthly variations in casino traffic based on economic reports. The article identified May, July, and August as peak gaming months for St. Louis casinos and provided multipliers to expand to seasonal peak volumes. The article indicated that Casino volumes may vary from as much as 30% from month to month depending on the type of facility and its location. The 2012/2013 monthly revenue reports for the Sugarhouse Casino and the Rivers Casino indicates that activity at both the Sugarhouse and Rivers casino does not vary by more than 10% from the average, with the exception of March which at both casinos is over 15% above average monthly revenue. Therefore, the calculated trip rates were not adjusted for monthly variations at any of the casinos.

Employees and patrons of the Sugarhouse Casino and Rivers Casino utilizing alternate forms of transportation such as public transit or walking are not included in the data used to generate the Casino trip generation rate. Patrons utilizing taxis and casino buses are accounted for in the calculated trip rates noted above as those vehicles were recorded entering/exiting the casinos. Modal split data is not available for the Casino St. Charles counts.

The summary of the peak traffic volumes in and out of the casinos, the average trip rates, and the direction distribution for all three sites and the average of the sites are summarized in Table 1 below:

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[3] *Trip Generation Characteristics of Small to Medium Sized Casinos*, Michael Trueblood and Tara Gude, published ITE 2001 Annual Meeting, August 2001

[4] *Gaming Casino Traffic*, Paul Box and William Bunte, published ITE Journal March 1998

TABLE 1
Casino Trip Rate Calculation

Peak Hour	Casino	Enter	Exit	Total	# of Gaming Positions	Average Trip Generation Rate (1)	Directional Distribution	
Friday Commuter Peak 5:00 - 6:00 PM	SugarHouse, Philadelphia PA	449	431	880	2010	0.44	0.51	0.49
	Rivers, Pittsburgh PA	816	509	1325	3810	0.35	0.62	0.38
	St Charles, St Louis Mo	475	600	1075	2477	0.43	0.44	0.56
	Total	**1740**	**1540**	**3280**	**8297**	**0.41**	**0.53**	**0.47**
Friday Casino Peak 8:00 - 11:00 PM	SugarHouse, Philadelphia PA	423	492	915	2010	0.46	0.46	0.54
	Rivers, Pittsburgh PA	555	879	1434	3810	0.38	0.39	0.61
	St Charles, St Louis Mo	725	625	1350	2477	0.55	0.54	0.46
	Total	**1703**	**1996**	**3699**	**8297**	**0.46**	**0.46**	**0.54**
Saturday Casino Peak 8:00 - 11:00 PM	SugarHouse, Philadelphia PA	469	508	977	2010	0.49	0.48	0.52
	Rivers, Pittsburgh PA	1015	1317	2332	3810	0.61	0.44	0.56
	St Charles, St Louis Mo	850	750	1600	2477	0.65	0.53	0.47
	Total	**2334**	**2575**	**4909**	**8297**	**0.58**	**0.48**	**0.52**

(1) - Trip generation rate per number of gaming positions

Traffic Generated by Existing Site Uses

The parcel is currently occupied by office, industrial, and commercial uses including: an office of the Pennsylvania Lottery Commission, Verifone Transportation Systems (a company that maintains meters in taxi cabs), Packer Avenue Foods, and the Philadelphia Turf Club (which offers off-track betting with food services and a bar). The site is fenced with access on 7th Street and Darien Street. Traffic counts were performed during the following peak periods:

- Friday evening commuter peak hour (between 4:00 – 7:00 PM)
- Friday evening with pre-Phillies event peak hour (between 5:00 – 7:30 PM)
- Friday casino peak hour (between 7:00 – 10:00 PM)
- Saturday casino peak hour (between 8:00 – 11:00 PM)

The proposed casino will replace the existing uses. The site trips generated by the existing site uses will be deducted from the proposed site trip generation and have been redistributed through the roadway network to/from the proposed driveways on 7th Street and Darien Street in the 2016, 2021, and 2026 Build Scenarios. Additionlly, during the pre-phillies event peak, the site was observed to be utilized for event parking. The trips for the patrons destined to park at the site will be redistributed to the proposed garage driveway on 7th Street.

Modal Split, Transit Facility and Charter Bus Utilization

The proposed Hollywood Casino Project is to be located near public transit services. The AT&T Station of SEPTA's Broad Street is located approximately ¾ mile from the site. In addition, several bus routes, including the G route which has stops at 7th and Packer, run in close proximity to the site. Casino and Franchise buses are commonly utilized by many casinos. Although it is not anticipated that charter buses would figure significantly in the operation of the Hollywood Casino Project.

The Philadelphia Gaming Advisory Task Force prepared a report in 2007[5] which estimated that approximately 16% of gamers visiting a South Delaware Avenue site will arrive and depart utilizing alternative modes of transportation as follows:

Drive = 84%

[5] *Interim Report of Findings,* Philadelphia Gaming Advisory Task Force, unpublished

Pedestrian = <1%
Taxi = 6%
Casino Bus = 8%
Public Transit = 2%

According to the report, Public Transit mode of transportation trips range from 2% to 6%. However, employees and patrons of the Sugarhouse Casino and Rivers Casino utilizing alternate forms of transportation such as Public Transit or walking are not included in the data used to generate the Casino trip generation rate. Patrons utilizing taxis and casino buses are accounted for in the calculated trip rates as noted above as those vehicles were recorded entering/exiting the casinos. Therefore no modal split adjustment will be made to the trips calculated for the Hollywood Casino for walking, public transit, taxi, or casino bus.

A pedestrian rate of 2% was utilized in the analysis to account for pedestrians whose primary mode of travel is walking and also those patrons utilizing public transit that complete their trip on foot. An 2% of the calculated site trips were added to the appropriate study intersections as pedestrian trips. The pedestrian volumes recorded as part of the manual traffic counts were increased to account for the additional foot traffic. For the purpose of this analysis, the additional pedestrian volumes were assumed to exit the Broad Street Subway line at AT&T station, head eastbound on Pattison Avenue then turn left and head northbound on Darien Street to access the casino.

Pre-Phillies Adjustments

The trip generation for the Pre-Phillies peak period includes adjustments made to account for linked trips and a stay-away factor as identified in the *Philadelphia Sports Complex Management Parking and Traffic Management Plan*. The linked trips will be patrons who will be attending the casino prior to the event and are already included in the pre-event background traffic. The Stay-away factor accounts for patrons who will avoid the area as a result of the traffic conditions related to the event.

The stay-away factor for the Casino as identified in the *Philadelphia Sports Complex Management Parking and Traffic Management Plan* is estimated to be 15% during Phillies events.

It is anticipated that when events are held at the sports complex venues some patrons will park in the sports complex lots and walk to the casino prior to attending the event and some patrons will park at and visit the casino lot and then attend the event. It is also anticipated that there will be patrons who park at the casino with the intention of visiting the casino after the event. The linked trips factor for the Casino as identified in the *Philadelphia Sports Complex Management Parking and Traffic Management Plan* is estimated to be 15% of the arrival trips. The existing site provides event parking during Phillies games and it was observed that approximately 170 vehicles arrive at the site during the peak hour prior to a Phillies game. It is anticipated that approximately the same number of vehicles will utilize the new casino lot with the intention of visiting the casino either before or after the game. The existing vehicles which park on the site and currently enter from Darien Street will be redistributed through the network to the proposed site driveway on 7th Street.

Pedestrians travelling to/from the casino during events are assumed to access the casino via entrances on Darien Street. The 15% linked trips were assumed to be pedestrian trips traveling the Philadelphia Sports Complex venues and the casino. The pedestrian trips were added to the intersections along Darien Street.

Hollywood Casino Trip Generation

The trips generated by the Hollywood Casino were computed using the trip generation rates noted above. Per the Hollywood Casino Program, Phase 1 will include 2,250 slots, 66 table games, and 15 poker tables for a total of 2,817 gaming positions. Phase 2 will consist of a casino expansion of 1000 additional slot machines and a 500 room hotel. A large portion of the Hotel guests are expected to frequent the casino. However, as a conservative measure, no reduction in the Hotel trip generation was assumed.

The Hollywood Casino will include other auxiliary uses such as food and beverage areas, entertainment, amenity retail, employee facilities, public circulation and support space. These auxiliary uses are not considered to

function on their own, and as such will not generate any traffic independently (e.g., the concession stand in a movie theater, or a dedicated parking garage).

The peak hour site-generated traffic projections with adjustments for the existing site trips for the non-event peak periods are summarized in **TABLE 2** below:

TABLE 2
Trip Generation Summary (Non-Event)

Scenario	In/Out
Friday Evening Commuter Peak Hour– Phase 1	471/392
Friday Evening Commuter Peak Hour– Phase 2	842/732
Friday Evening Casino Peak Hour– Phase 1	450/541
Friday Evening Casino Peak Hour– Phase 2	839/917
Saturday Evening Casino Peak Hour– Phase 1	626/681
Saturday Evening Casino Peak Hour– Phase 2	1106/1141

The trip generation for the Pre-Phillies peak period includes adjustments made to account for linked trips and a stay-away factor as noted above. The peak hour site-generated traffic estimate with adjustments made for the linked trips, stay away factor, and existing site are summarized in **TABLE 3** below:

TABLE 3
Trip Generation Summary (Pre-Phillies Event)

Scenario	In/Out
Friday Evening Pre-Phillies Peak Hour– Phase 1	320/325
Friday Evening Pre-Phillies Peak Hour– Phase 2	625/636

Summary worksheets of the trip generation calculations are provided in **APPENDIX G**.

Trip Distribution and Assignment

The new vehicle trips generated by the proposed Casino will be distributed and assigned to the roadway network based on a combined evaluation of existing traffic patterns, the anticipated characteristics and behavior of the development-generated traffic, and the proposed site access.

It is expected that the majority of site traffic generated during the peak periods will use I-95 and I-76. In addition, the trips generated by the proposed Hollywood Casino will also use local roadways such as Packer Avenue, Front Street, Pattison Avenue, and Broad Street. The percentages of site traffic assigned to these roadways are summarized in **TABLE 4**.

TABLE 4
Trip Distribution Summary

I-95					
ENTERING	**Via:**	**%**	**EXITING**	**Via:**	**%**
From South	I-95 N Off-Ramp to Broad Street	5%	To North	Broad Street to I-95 N On-Ramp	6%
From South	I-95 N Off-Ramp to Packer Avenue	11%	To North	Front Street to I-95 N On-Ramp	13%
From North	I-95 S Off-Ramp to Front Street	13%	To South	Broad Street to I-95 S On-Ramp	5%
From North	I-95 S Off-Ramp to Broad Street	6%	To South	Front Street to I-95 S On-Ramp	11%
I-76					
ENTERING	**Via:**	**PM**	**EXITING**	**Via:**	**PM**
From West	I-76 E Off-Ramp to Packer Avenue	25%	To West	Broad Street to I-76 W On-Ramp	25%
From East	I-76 W Off-Ramp to 7th Street	30%	To East	Packer Avenue to I-76 E On-Ramp	30%
Local Streets					
ENTERING	**Via:**	**PM**	**EXITING**	**Via:**	**PM**
From North	7th Street	.5%	To North	7th Street	.5%
From North	10th Street	.5%	To North	10th Street	.5%
From North	Front Street	1%	To North	Front Street	1%
From East	Pattison Avenue.	1%	To East	Pattison Avenue.	1%
From West	Pattison Avenue.	1%	To East	Pattison Avenue.	1%
From West	Packer Avenue	1%	To West	Packer Avenue	1%
From North	Broad Street	5%	To North	Broad Street	5%

FIGURES 26-28 illustrate the anticipated distribution of project traffic and the assignment of the new trips to the roadway network in the vicinity of the project. A summary worksheet of future traffic volume assignments are provided in **APPENDIX H**. The site generated traffic volumes are illustrated in **FIGURES 29- 36**.

SITE ACCESS / PARKING

All parking for the Hollywood Casino will be self-contained on-site. Access to the on-site parking and the Porte Cochere will be through four site driveways on 7th Street and three driveways on Darien Street. An eight level 2,700 space customer parking garage structure will be constructed in Phase 1 on the southerly portion of the site as indicated on the site plan. The proposed parking garage will be accessible from a two lane entry driveway on 7th Street and a two lane exit driveway on Darien Street. The 450 employee spaces are located in a lot under the casino and accessible from an entry/exit driveway on Darien Street. The 300 valet spaces are also located under the casino with access to and from the Porte Cochere whose entry/exit driveways are located on Darien Street and 7th Street respectively. There are 6 bus spaces located in a surface lot on the southwest corner of the site which are accessible from Darien Street employee driveway. The service yard is located on the east side of the site with access through an entry and exit driveway on 7th Street. Phase 2 of the Hollywood Casino will include an expansion of the Phase 1 garage by 1,000 parking spaces. The driveway locations are illustrated on **FIGURE 2**.

The Hollywood casino will provide 3,000 patron/guest parking spaces for 2,736 gaming positions in Phase 1 and 4,000 patron/guest spaces for 3,736 gaming positions in Phase 2, both of which satisfy the requirement of the Philadelphia Code requiring 4 patron/guest parking spaces for every 5 slot machines or gaming positions. The ITE *Parking Generation*[6] manual establishes an average peak parking demand for a Casino/Video Lottery Establishment (Land Use 473) to be 0.34 vehicles per gaming position. The Hollywood Casino will ultimately provide parking spaces for patrons and guests at a rate of 1.07 spaces per gaming position. The rate is consistent with the industry wide parking ratios which range from .75 to 1.59 spaces per gaming position with the median being 1.07 spaces per gaming position[7].

Turn Lane Warrant Assessment

An analysis was conducted at each of the entry driveways to determine whether left or right turn lane into the site were warranted in accordance with *PennDOT Publication 46.* Under Phase 1 conditions the left turn lane and right turn lane warrants are met at the parking garage entrance on 7th Street. The warrants are also met for the northbound left turn into the Porte Cochere driveway on 7th Street and the southbound left into the employee driveway on Darien Street. For the Phase 2 development, the right turn lane warrants are met at the Porte Cochere driveway on 7th Street. The detailed turn lane warrant analyses for the driveway entries are provided in **APPENDIX I** along with a conceptual sketch of the proposed Phase 1 pavement marking striping for 7th Street and Darien Street in the vicinity of site driveways (**FIGURE 53)**.

Sight Distance Analysis

A sight distance analysis was performed for the proposed site driveways intersecting 7th Street and Darien Street in accordance with Pennsylvania Code, Title 67, Chapter 441. Using a speed of 25 miles per hour, the desirable sight distance for cars exiting the site driveways onto 7th Street and Darien Street is 250 feet to the left and 195 feet to the right measured from a vehicle ten feet back of the pavement edge. The proposed driveways intersecting Darien Street and 7th Street meet the desirable sight distance requirements. **TABLE 5** provides a summary of the sight distance analysis.

[6] *Parking Generation, 4th Edition*, Institute of Transportation Engineers, 2010
[7] *"Parking and Profits in Indian Country"*, James M. Klas, Indian Gaming, October 2010

TABLE 5
Sight Distance Analysis Results

Intersection	Left			Right		
	Measured/ Available	Required	Desirable	Measured/ Available	Required	Desirable
Darien Street & Garage Driveway	195' (1)	147'	175'	225' (2)	147'	195'
Darien Street & Employee Parking Driveway	225' (2)	147'	175'	500' (3)	147'	195'
Darien Street & Porte Cochere Driveway	500' (3)	147'	175'	200' (4)	147'	195'
Front Street & Service Yard Driveway	756' (5)	147'	175'	250' (6)	147'	195'

1 – Distance to the signalized Darien Street & Phillies Drive intersection.
2 – Distance to the unsignalized Darien Street & Employee Parking Driveway.
3 – Distance to the unsignalized Darien Street & Porte Cochere Driveway.
4 – Distance to the signalized Darien Street & Packer Avenue.
5 – Distance to the unsignalized 7th Street & Packer Avenue.
6 – Distance to the signalized 7th Street & Parking Garage Driveway.

FUTURE TRAFFIC CONDITIONS

In this section, the impact of the Hollywood Casino traffic on the adjacent roadway network will be analyzed.

Description of the Analyzed Post-Development Scenarios

As previously discussed, the three post-development scenarios considered in the analysis are:

- **2016 Phase 1 Opening Day Build Conditions.** This condition is based on the existing configuration of study area roadways and traffic patterns with the trips generated by Phase 1 of the Hollywood Casino integrated for both non-event and Pre-Phillies sold-out event scenarios. The "non-event" scenarios do include small events such as concerts at the sports venues. For the "non-event" scenarios, a background annual traffic growth of 1% is applied to all existing volumes to represent the increase of traffic from 2013 existing condition. No growth factor has been applied to background traffic for the Pre-Phillies event scenarios. The 2016 Phase 1 Opening Build traffic volumes are illustrated in **FIGURES 37-40**.

- **2021 Phase 2 Opening Day Build Conditions.** This condition is based on the existing configuration of study area roadways and traffic patterns with the trips generated by Phase 1 and Phase 2 Hollywood Casino integrated. For the "non-event" scenarios, a background annual traffic growth of 1% is applied to all existing volumes to represent the increase of traffic from 2013 existing condition. No growth factor has been applied to background traffic for the Pre-Phillies event scenarios. The 2021 Phase 2 Opening Build traffic volumes are illustrated in **FIGURES 41-44**.

- **2026 Horizon Build Conditions.** This condition is based on the existing configuration of study area roadways and traffic patterns with the trips generated by Phase 1 and Phase 2 Hollywood Casino integrated. For the "non-event" scenarios, a background annual traffic growth of 1% is applied to all existing volumes to represent the increase of traffic from 2013 existing condition. No growth factor has been applied to background traffic for the Pre-Phillies event scenarios. The 2026 5-Year Horizon Build traffic volumes are illustrated in **FIGURES 45-48**.

For the Weekday Pre-Phillies Event scenarios, it is assumed that the background traffic volumes consist predominantly of event traffic related to the capacity of the stadiums and will remain constant through the future analysis scenarios. As such, there will be no growth factor applied to the background traffic for the 2016, 2021, and 2026 Pre-Phillies Event scenarios.

Post-Development Levels of Service

Traffic operations for the future post-development conditions are evaluated at the study intersections during the analyzed peak hours. The comparison of the pre-development and the post development conditions were conducted for the purpose of identifying any traffic issues which may arise due to the presence of the proposed Hollywood Casino Project. The results of the capacity analyses will be utilized to formulate recommended mitigation efforts (if required).

*2016 Phase 1 Opening Day Friday Evening Commuter Peak (Build)***:**

During the 2016 Phase 1 Friday evening commuter peak, all intersections operate at LOS "C" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 17.5 seconds of delay to an overall LOS "D" with 43.1 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left turning movement drops from a LOS "C" with 31.6 seconds of delay to LOS "F" with 150.5 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

2016 Phase 1 Opening Day Friday Evening Casino Peak (Build):

During the 2016 Saturday evening casino peak, all intersections operate at LOS "C" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 18.1 seconds of delay to an overall LOS "D" with 38 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left turning movement drops from a LOS "C" with 26.6 seconds of delay to LOS "E" with 101.6 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

- The signalized intersection of Front Street and I-76 WB ramp/I-95 SB ramp drops from an overall LOS "B" with 19.6 seconds of delay to an overall LOS "C" with 20.1 seconds of delay. The drop in Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

2016 Phase 1 Opening Day Saturday Evening Casino Peak (Build):

All intersections maintained their No-Build overall Level of Service with the exception of the following:

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 17.4 seconds of delay to an overall LOS "C" with 28.5 seconds of delay. The drop in Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

2016 Phase 1 Opening Day Friday Evening Pre-Phillies Event Peak (Build):

All intersections operate at LOS "D" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Packer Avenue and 7th Street drops from an overall LOS "B" with 16.2 seconds of delay to an overall LOS "C" with 21.7 seconds of delay. The drop in Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

The signalized intersection of Packer Avenue and Darien Street maintains an overall LOS "D", however the westbound and southbound approaches operate at a LOS "E" with the left turn movements operating at LOS "F".

2021 Phase 2 Opening Day Friday Evening Commuter Peak (Build):

During the 2021 Phase 2 Friday evening commuter peak, all intersections operate at LOS "C" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 17.5 seconds of delay to an overall LOS "F" with 115.7 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left drops from a LOS "C" with 33.5 seconds of delay to LOS "F" with 516.4 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

- The signalized intersection of Packer Avenue and 7th Street drops from an overall LOS "A" with 6.5 seconds of delay to an overall LOS "B" with 10.2 seconds of delay. This increase in delay is within PennDOT's 10-second threshold; therefore mitigation is not required at this intersection.

2021 Phase 2 Opening Day Friday Evening Casino Peak (Build):

During the 2021 Phase 2 Saturday evening casino peak, all intersections operate at LOS "C" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Broad Street and Packer Avenue drops from an overall LOS "B" with 18.5 seconds of delay to an overall LOS "C" with 21.9 seconds of delay. The drop in Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 18.9 seconds of delay to an overall LOS "F" with 111.1 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left drops from a LOS "C" with 28.6 seconds of delay to LOS "F" with 414.7 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

2021 Phase 2 Opening Day Saturday Evening Casino Peak (Build):

All intersections maintained their No-Build overall Level of Service with the exception of the following:

- The signalized intersection of Packer Avenue and 7th Street drops from an overall LOS "A" with 7.6 seconds of delay to an overall LOS "B" with 11.2 seconds of delay. The drop in Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "C" with 22.3 seconds of delay to an overall LOS "F" with 104.8 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left drops from a LOS "D" with 37.4 seconds of delay to LOS "F" with 425.8 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

2021 Phase 2 Opening Day Friday Evening Pre-Phillies Event Peak (Build):

All intersections operate at LOS "D" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Pattison Avenue and Darien Street drops from an overall LOS "B" with 17.0 seconds of delay to an overall LOS "C" with 20.3 seconds of delay. The drop in overall intersection Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

- The signalized intersection of Packer Avenue and 7th Street drops from an overall LOS "B" with 16.2 seconds of delay to an overall LOS "D" with 45.1 seconds of delay due to the increased delay on the westbound left turning movement. The westbound left drops from a LOS "C" with 21.7 seconds of delay to LOS "F" with 229.1 seconds of delay. The drop in Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "D" with 52.2 seconds of delay to an overall LOS "E" with 78.4 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left drops from a LOS "C" with 31.7 seconds of delay to LOS "F" with 270.9 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

The signalized intersection of Packer Avenue and 10th Street maintains an overall LOS "C" however the westbound left drops from a LOS "D" with 44.6 seconds of delay to a LOS "E" with 74.2 seconds of delay.

2026 Horizon Friday Evening Commuter Peak (Build):

During the 2026 Phase 2 Friday evening commuter peak, all intersections operate at LOS "C" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 18.0 seconds of delay to an overall LOS "F" with 125.3 seconds of delay due to the increased delay on the

southbound left turning movement. The southbound left drops from a LOS "D" with 35.9 seconds of delay to LOS "F" with 565.2 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

*2026 Horizon Friday Evening Casino Peak (Build)***:**

During the 2021 Phase 2 Saturday evening casino peak, all intersections operate at LOS "C" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Broad Street and Packer Avenue drops from an overall LOS "B" with 18.9 seconds of delay to an overall LOS "C" with 21.6 seconds of delay. The drop in Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 19.4 seconds of delay to an overall LOS "F" with 84.3 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left drops from a LOS "C" with 29.9 seconds of delay to LOS "F" with 302.7 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

2026 Horizon Saturday Evening Casino Peak (Build):

All intersections maintained their No-Build overall Level of Service with the exception of the following:

- The signalized intersection of Packer Avenue and 7th Street drops from an overall LOS "A" with 7.5 seconds of delay to an overall LOS "B" with 11.2 seconds of delay. The drop in Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "B" with 17.6 seconds of delay to an overall LOS "F" with 107.6 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left drops from a LOS "C" with 22.4 seconds of delay to LOS "F" with 439.6 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

2026 Horizon Friday Evening Pre-Phillies Event Peak (Build):

All intersections operate at LOS "D" or better and maintained their No-Build overall Levels of Service with the exception of the following:

- The signalized intersection of Pattison Avenue and Darien Street drops from an overall LOS "B" with 17.0 seconds of delay to an overall LOS "C" with 20.3 seconds of delay. The drop in overall intersection Level of Service does not exceed PennDOT's 10-second threshold indicating that mitigation is not required.

- The signalized intersection of Packer Avenue and 7th Street drops from an overall LOS "B" with 16.2 seconds of delay to an overall LOS "D" with 52.8 seconds of delay due to the increased delay on the westbound left turning movement. The westbound left drops from a LOS "C" with 21.7 seconds of delay to LOS "F" with 141.2 seconds of delay. The drop in Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

- The signalized intersection of Packer Avenue and Darien Street drops from an overall LOS "D" with 52.2 seconds of delay to an overall LOS "F" with 84.5 seconds of delay due to the increased delay on the southbound left turning movement. The southbound left drops from a LOS "C" with 31.7 seconds of delay to LOS "F" with 270.9 seconds of delay. The drop in overall intersection Level of Service exceeds PennDOT's 10-second threshold indicating that mitigation is required.

The signalized intersection of Packer Avenue and 10th Street maintains an overall LOS "C" however the westbound left drops from a LOS "D" with 44.6 seconds of delay to a LOS "E" with 74.2 seconds of delay.

In the 2016, 2021 & 2026 Build conditions, the 95th percentile queue at the study intersections are within acceptable limits as none of the queues extend beyond the available storage, into adjacent intersections or significantly increase from the No-Build conditions with the exception of the following intersections:

- Broad Street & Packer Avenue – westbound through
- Packer Avenue & 10th Street – westbound left
- Packer Avenue & Darien Street – westbound left
- Packer Avenue & 7th Street – westbound left

At the Broad Street and Packer Avenue intersection, traffic signal timing adjustments are required to improve the westbound through queue in the 2021 and 2026 Build conditions. Additionally, traffic signal timing adjustments and/or signal phasing adjustments will be implemented at the Packer Avenue intersections to alleviate the westbound left turn queues during the Friday Pre-Phillies Event Peak.

The detailed level of service and queue reports for the 2016, 2021, and 2026 Build conditions without improvements are provided in **APPENDIX J**. The levels of service and queues are summarized in tables provided in **APPENDIX M**.

Left Turn Phase Warrant Analysis

A left turn phasing analysis was conducted at the Packer Avenue and Darien Street and Packer Avenue and 7th Street intersections to determine if the eastbound or westbound left turn movements warrant a protected left turn phase. The analysis was conducted in accordance with *PennDOT Publication 149* and the *Manual on Uniform Traffic Control Devices* (MUTCD).

For the 2016 Build scenario, the southbound left turn movement at Packer Avenue and Darien Street meets the warrants for three of the peak hours and the westbound left turn meets the warrants for the Pre-Phillies Event Peak hour. The signal phasing for the northbound and southbound approaches is recommended to be modified to provide split phasing. PennDOT requirements state that the left turn phase should meet warrants for 2 one-hour periods, however, the westbound left turn phase is recommended at the Packer Avenue and Darien Street intersection to help alleviate queuing during events at the stadium complex. The left turn phase will run concurrent with the existing eastbound left turn phase.

For the 2026 Build scenario, the westbound left turn movement at Packer Avenue and 7th Street meets the warrants for all four of the peak hours. A westbound left turn phase is recommended to be installed at this intersection to help alleviate queuing during events at the stadium complex. Detailed left turn phase analysis worksheets are provided in **APPENDIX L**.

RECOMMENDATIONS

Site Access

The following are recommendations for the proposed driveway intersections to provide safe and efficient site access:

- The proposed site access intersections on 7th Street and Darien Street should be constructed with a driveway apron to provide vehicular access to the site. The driveway aprons should be constructed to be distinguishable from the sidewalk paving and provide a pedestrian access route. The exit driveways should be constructed to provide a minimum 12' sight triangle across both sides of the sidewalk so that the driver of any vehicle will be able to see pedestrians on the sidewalk adjacent to the driveway before any part of the vehicle exits the lot. The following improvements are recommended for the proposed site access intersections on Darien Street and 7th Street:

  - Darien Street & Port Cochere Exit Driveway
    - Install "Stop", R1-1, sign at the driveway approach.

  - Darien Street & Employee Driveway
    - Restripe the southbound approach to provide a 100 foot dedicated left turn lane.
    - Install "Stop", R1-1, sign at the driveway approach.

  - Darien Street & Garage Exit Driveway
    - Install "Stop", R1-1, sign at the driveway approach.

  - 7th Street & Port Cochere Entrance Driveway
    - Restripe the southbound approach to provide a 75 foot southbound right turn deceleration lane.

  - 7th Street & Garage Entrance Driveway
    - Restripe the southbound approach to provide a 145 foot southbound right turn deceleration lane.
    - Restripe the northbound approach to provide a dedicated 100 foot northbound left turn lane.

Site Traffic Mitigation

The Hollywood Casino will result in additional traffic on the surrounding roadway network. The analysis of build conditions identified locations where the overall level of service drops and the increase in delay exceeds PennDOT's 10-second threshold and where individual movements experience increases in delay resulting in Levels of Service "E" or "F". Recommendations to mitigate the impacts of the proposed Phase 1 and Phase 2 development on the surrounding roadway network and to enhance pedestrian accommodations have been developed.

The following off-site intersection specific improvements are recommended for mitigating the site traffic impacts for the Phase 1 development:

- Packer Avenue & Darien Street
  - Restripe/widen SB approach to include a 300 foot southbound left turn lane, a shared southbound left/through lane, and channelized southbound right turn lane.
  - Provide overhead signage for the proposed lane configuration.
  - Modify the signal phasing to include northbound and southbound split phasing.
  - Add a Westbound advance left turn phase.
  - Optimize the signal timing splits for all peak periods.

- Packer Avenue & 7th Street
  - Optimize the signal timing splits for Friday Evening Pre-Phillies Event Peak

The identified improvements mitigate the impact of the traffic resulting from Phase 1 of the Casino produce the following results:

2016 Phase 1 Opening Friday Evening Commuter Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "B" with 17.5 seconds of delay to an overall LOS "D" with 43.1 seconds of delay, is improved to an overall LOS "B" with 16.2 seconds of delay.

2016 Phase 1 Opening Friday Evening Casino Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "B" with 18.1 seconds of delay to an overall LOS "D" with 38 seconds of delay, is improved to an overall LOS "B" with 16.8 seconds of delay.

2016 Phase 1 Opening Saturday Evening Casino Peak (Build):

- The signalized intersection of Pattison Avenue and Darien Street, which dropped from an overall LOS "B" with 17.4 seconds of delay to an overall LOS "C" with 28.5 seconds of delay, is improved to an overall LOS "B" with 18.0 seconds of delay.

2016 Phase 1 Opening Friday Evening Pre-Phillies Event Peak (Build):

- The signalized intersection of Packer Avenue and 7th Street, which dropped from an overall LOS "B" with 16.2 seconds of delay to an overall LOS "C" with 21.7 seconds of delay, is improved to an overall LOS "B" with 19.8 seconds of delay.

- The signalized intersection of Packer Avenue and Darien Street, which was operating at LOS "D with south and west approaches operating at LOS "E" and movements operating at LOS "F", is improved LOS "B" with approaches and movements improving to LOS "C" or better.

The following off-site intersection specific improvements are recommended for mitigating the site traffic impacts for the Phase 2 development:

- Packer Avenue & 10th Street
  - Optimize the signal timing splits.

- Packer Avenue & Darien Street
  - Optimize the signal timing splits.

- Packer Avenue & 7th Street
  - Add a westbound advance left turn phase.
  - Optimize the signal timing splits.

- Broad Street & Packer Avenue
  - Optimize the signal timing splits.

★ *Additional follow-up studies may be required for the Phase 2 development if the final program differs significantly from the assumptions in this study.*

The identified improvements mitigate the impact of the additional traffic resulting from the Phase 2 Casino traffic and produce the following results:

2021 Phase 2 Opening Friday Evening Commuter Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "B" with 17.5 seconds of delay to an overall LOS "F" with 115.7 seconds of delay, is improved to an overall LOS "B" with 15.9 seconds of delay.

2021 Phase 2 Opening Friday Evening Casino Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "B" with 18.9 seconds of delay to an overall LOS "F" with 111.1 seconds of delay, is improved to an overall LOS "B" with 17.7 seconds of delay.

2021 Phase 2 Opening Saturday Evening Casino Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "C" with 22.3 seconds of delay to an overall LOS "F" with 104.8 seconds of delay, is improved to an overall LOS "B" with 18.5 seconds of delay.

2021 Phase 2 Opening Friday Evening Pre-Phillies Event Peak (Build):

- The signalized intersection of Packer Avenue and 7th Street, which dropped from an overall LOS "B" with 16.2 seconds of delay to an overall LOS "D" with 45.1 seconds of delay, is improved to an overall LOS "B" with 19.8 seconds of delay.

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "D" with 52.2 seconds of delay to an overall LOS "E" with 78.4 seconds of delay, is improved to an overall LOS "B" with 16.6 seconds of delay.

- The signalized intersection of Packer Avenue and 10th Street, which was operating at LOS "C" with westbound left operating at LOS "E" is improved such that the westbound left operates at LOS "D" or better.

2026 Horizon Friday Evening Commuter Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "B" with 18.0 seconds of delay to an overall LOS "F" with 125.3, is improved to an overall LOS "B" with 16.0 seconds of delay.

2026 Horizon Friday Evening Casino Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "B" with 19.4 seconds of delay to an overall LOS "F" with 84.3 seconds of delay, is improved to an overall LOS "B" with 17.0 seconds of delay.

2026 Horizon Saturday Evening Casino Peak (Build):

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "B" with 17.6 seconds of delay to an overall LOS "F" with 107.6 seconds of delay, is improved to an overall LOS "B" with 18.5 seconds of delay.

2026 Horizon Friday Evening Pre-Phillies Event Peak (Build):

- The signalized intersection of Packer Avenue and 7th Street, which dropped from an overall LOS "B" with 16.2 seconds of delay to an overall LOS "D" with 52.8 seconds of delay, is improved to an overall LOS "B" with 16.0 seconds of delay.

- The signalized intersection of Packer Avenue and Darien Street, which dropped from an overall LOS "D" with 52.2 seconds of delay to an overall LOS "F" with 84.5 seconds of delay, is improved to an overall LOS "B" with 16.7 seconds of delay.

- The signalized intersection of Packer Avenue and 10th Street maintains an overall LOS "C" however the westbound left which operated at LOS "E" with 74.2 seconds of delay is improved to an overall LOS "D" with 52.9 seconds of delay.

The detailed level of service and queue reports for the 2016, 2021, and 2026 Build conditions with improvements are provided in **APPENDIX K**. Left turn signalization warrants were performed for the Packer Avenue and Darien Street and are provided in **APPENDIX L**. The levels of service and queues are summarized in tables provided in **APPENDIX M**. Post-development level of service is illustrated **in FIGURES 49-52**.

Pedestrian Accommodations/Enhancements

The following improvements are recommended to improve pedestrian accommodations and enhance pedestrian safety:

- Construct a new sidewalk on the east side of Darien Street from Packer Avenue south to the newly constructed sidewalk adjacent to Citizens Bank Park to improve pedestrian connectivity to the Stadium District.

- Enhance the pedestrian accommodations at the intersections of Packer Avenue/7th Street, Packer Avenue/Darien Street and Packer Avenue/10th Street. The pedestrian improvements include:

  - Installation of hand/man countdown indications for existing crosswalks at both intersections
  - Implementation of MUTCD compliant pedestrian clearances.
  - Installation of ADA compliant handicap ramps at the southeast and southwest corners of the Packer Avenue/Darien Street Intersection.

Additional Recommended Improvements

The *Philadelphia Sports Complex Management Parking and Traffic Management Plan*[11] recommended several operational improvements for the area in and around the sports complex intended to reduce traffic congestion related to event traffic. These improvements would also benefit the project intersections during non-event periods. The recommended improvements for the study intersections include:

- Install new traffic signal controllers at the signalized intersections along Packer Avenue (Packer Avenue/10th Street, Packer Avenue/Darien Street and Packer Avenue/7th Street) to allow multiple time of day programs.
- Development and implement pre-event and post-event signal timings for Packer Avenue.
- Provide interconnect and coordination of the traffic signals along Packer Avenue.

These improvements are not required to mitigate the impacts of the proposed development. However, implementation of the improvements will reduce the traffic congestion experienced during event traffic conditions and will mutually benefit traffic from the proposed development.

[11] *Philadelphia Sports Complex Management Parking and Traffic Management Plan,* Philadelphia Industrial Development Corporation, September 2010