

TRAFFIC PLANNING

Est. 1989



AND DESIGN, INC.

The Provence Casino Development

Transportation Impact Study

City of Philadelphia, Philadelphia County, PA

For Submission To:

PennDOT District 6-0

Last Revised: November 29, 2013

TPD# TOIN.A.00008



TRANSPORTATION IMPACT STUDY

For:

The Provence Casino Development
City of Philadelphia, Philadelphia County, PA



Prepared For:

Tower Entertainment, LLC

Prepared By:

Traffic Planning and Design, Inc.

One Port Center
2 Riverside Drive, Suite 506
Camden, New Jersey 08103

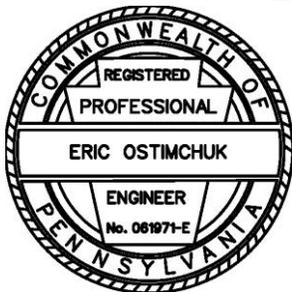
Phone: 856.966.4242
Fax: 856.966.4250
Email: TPD@TrafficPD.com

Date:

November 7, 2012

Previously Revised July 29, 2013

Last Revised November 29, 2013



Eric Ostimchuk, P.E., PTOE
Principal



Francis R. Montgomery, P.E., PTOE
Project Manager



TABLE OF CONTENTS

EXECUTIVE SUMMARY	I
SECTION I – INTRODUCTION	1
A. Site Access Locations	1
B. Parking.....	3
C. Site Circulation	4
SECTION II – EXISTING ROADWAY NETWORK.....	5
A. Multi-Modal Facilities	6
A. Crash Data Investigation	6
SECTION III – EXISTING TRAFFIC CONDITIONS.....	7
A. Manual Turning Movement Counts	7
SECTION IV – BASE (NO-BUILD) CONDITIONS	9
SECTION V – TRIP GENERATION	10
SECTION VI – TRIP DISTRIBUTION	12
SECTION VII – PROJECTED (BUILD) CONDITION TRAFFIC VOLUMES	13
SECTION VIII – CAPACITY ANALYSIS	13
A. Levels of Service for an Intersection	13
B. Capacity Analysis Methodology	13
C. Levels of Service in the Study Area	14
D. Recommended Roadway Improvements	16
E. Queue Analysis	17
F. Site Access Evaluation	18
G. Field Conditions Review	18
SECTION IX – WARRANT ANALYSIS.....	19
A. Auxiliary Turn Lane Analysis	19
B. Preliminary Traffic Signal Warrant Analysis	19
SECTION X – ALTERNATIVE ACCESS SCENARIOS	19
A. Callowhill Street 2-Way Option	19
B. I-676 and Callowhill Street Access Ramps	20
SECTION IX – SUMMARY AND CONCLUSIONS	21

TABLES AND FIGURES

Table 1	Roadway Characteristics within Study Area
Table 2	Crash Data Summary
Tables 3A-C	Manual Traffic Count Information
Tables 4A-C	Trip Generation Summary
Table 5	Trip Distribution Percentages
Table 6	Level of Service Criteria for Intersections
Tables 7A-C	Level of Service Summary
Table 8	Anticipated Roadway Improvements
Table 9	Site Access Evaluation Summary
Figure 1	Project Location
Figures 2A-E	Site Plan
Figure 3	Existing Public Transportation Amenities
Figures 4A-6B	Existing Conditions Traffic Volumes
Figures 7A-9B	Base (No-Build) Conditions Traffic Volumes
Figures 10A-12B	Trip Distribution – Total Traffic Volumes
Figures 13A-15B	Projected (Build) Conditions Traffic Volumes

APPENDICES

Appendix A	Study Area Information
Appendix B	Data Collection Information
Appendix C	Planned Nearby Developments
Appendix D	Trip Generation Information
Appendix E	Trip Distribution Information
Appendix F	Capacity Analysis Information
Appendix G	Capacity Analysis (Input Information)
Appendix H	Traffic Signal Timings Information
Appendix I	Detailed Capacity Analysis Matrices
Appendix J	Field Conditions Review
Appendix K	Auxiliary Turn Lane Warrant Information
Appendix L	Preliminary Traffic Signal Warrant Information

EXECUTIVE SUMMARY

The purpose of this study is to examine the potential traffic impact associated with the proposed development at 400 North Broad in the City of Philadelphia, Philadelphia County, Pennsylvania. Based on this evaluation, the following conclusions were reached:

- The project scope and the extent of the study area were updated based on the PennDOT *Transportation Impact Study Review*, prepared by Orth Rodgers & Associates, Inc. dated April 5, 2013. Additional updates were made to the study based on the October 21, 2013 letter from Orth Rodgers & Associates, Inc. The study included an analysis of the twenty-one (21) study area intersections identified in the vicinity of the proposed development and evaluated the Friday afternoon peak hour of adjacent street traffic, and the Friday and Saturday evening casino peak hour time periods.
- The project site is bound by Callowhill Street to the south, N. 17th Street to the west, Hamilton Street to the north, and N. Broad Street to the east. The site currently consists of existing structures on three separate blocks along Callowhill Street to include the former Inquirer Building between N. Broad Street and N. 15th Street, the parking structure between N. 15th Street and N. 16th Street, and the parking structure between N. 16th Street and N. 17th Street.
- The proposed development will consist of the following amenities:
 - Casino with 3,300 slot machines and 150 table games;
 - Restaurants, Eateries, Coffee Shops, Bars, Clubs;
 - Retail Shops;
 - Meeting rooms and a Theater;
 - 125-room Hotel;
 - Three (3) parking facilities: one 800-space self-park garage, and two garages totaling 900 valet parking spaces.
- Multiple vehicular and pedestrian access locations are provided for the proposed development along the surrounding roadways. After an extensive site visit, TPD maintains that all proposed site access points to N. Broad Street, Callowhill Street, N. 15th Street, and N. 16th Street will be designed to achieve PennDOT minimum safe stopping sight distance standards. Currently, there are no vertical or horizontal limitations to sight lines on the roadway. However, on-street parking will need to be restricted in identified areas to accommodate appropriate sight lines.
- The proposed site is served by numerous multi-modal facilities and public transportation options, and it is anticipated that a significant percentage of its visitors and employees will utilize these facilities.
- Upon full build-out, the proposed development is expected to generate the following trips:
 - Friday P.M. Peak Hour (4:00-6:00 P.M.): 1,064 new vehicle-trips (592 entering, 472 exiting), 1,343 mass transit trips, and 347 pedestrian trips, during the weekday P.M. peak hour.

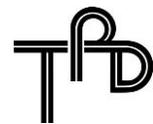


- Friday Evening Peak Hour (7:00-10:00 P.M.): 1,271 new vehicle-trips (714 entering, 557 exiting), 1,424 mass transit trips, and 368 pedestrian trips, during the weekday P.M. peak hour.
- Saturday Evening Peak Hour (6:00-9:00 P.M.): 1,365 new vehicle-trips (718 entering, 647 exiting), 1,544 mass transit trips, and 398 pedestrian trips, during the weekday P.M. peak hour.

It should be noted that these trip totals include employees of the complex and local patrons who live and work in Center City and the surrounding neighborhoods.

- The table below lists the recommended transportation improvements which the Applicant will pursue:

Intersection	Description of Roadway Improvements
Intersections along Vine Street Local	Modify traffic signal timings to accommodate site traffic, including signal phasing, cycle lengths, and offset. Add southbound left turn phase to 15 th Street and the southern local Vine Street intersection.
Vine Street Local (EB) and Broad Street	Restripe the northbound Broad Street approach in order to provide an exclusive right-turn lane.
Site Frontage along Callowhill Street	Restrict parking for a majority of the site frontage, including, but not limited to section between Broad Street and 15 th Street, and the section between 15 th Street and 16 th Street.
	Review and upgrade pedestrian facilities to meet current ADA regulations.
Callowhill Street and Broad Street	Remove a portion of the existing concrete median and construct a separate left-turn lane on the northbound Broad Street. The removal of the existing median is anticipated to extend approximately 125'-150'.
	Restrict on-street parking along the southbound Broad Street approach in order to provide a separate right-turn lane. The restriction is anticipated to extend along the site frontage between Broad Street and Noble Street.
	Review and upgrade pedestrian facilities to meet current ADA regulations.
Callowhill Street and 15 th Street	Install traffic signal and upgrade pedestrian facilities to meet current ADA regulations.
	Restripe the southbound 15 th Street approach in order to provide a separate right-turn lane.
Callowhill Street and 16 th Street	Modify traffic signal timings to accommodate site traffic, including but, not limited to signal phasing, cycle lengths, and offset.
Callowhill Street and 17 th Street	Review and upgrade pedestrian facilities to meet current ADA regulations.
Callowhill Street and Franklin Town Boulevard	No improvements are anticipated at this time.
Intersections along Broad Street	Modify traffic signal timings to accommodate site traffic, including but, not limited to signal phasing, cycle lengths, and offset.
Intersections along Spring Garden Street	Modify traffic signal timings to accommodate site traffic, including but, not limited to signal phasing, cycle lengths, and offset.



-
- With the recommended improvements, all study area intersections will operate at acceptable LOS D operations or better, have a less than 10 second increase in delay, or have marginal level of service degradations. Therefore, it is our opinion the PennDOT criteria will be satisfied.
 - Based upon TPD's analysis, with provision of the roadway improvements anticipated for the development of the proposed 400 North Broad Street site, it is our opinion adequate accommodations for vehicles, pedestrians, mass transit, and bicycles can be provided for the site.

SECTION I – INTRODUCTION

Traffic Planning and Design, Inc. (TPD) has completed a Transportation Impact Study (TIS) for the proposed development at 400 North Broad in the City of Philadelphia, Philadelphia County, Pennsylvania. The project site, as depicted in **Figure 1**, is bound by Callowhill Street to the south, N. 17th Street to the west, Hamilton Street to the north, and N. Broad Street to the east. The following analysis for the 400 North Broad development is based on information provided by Tower Entertainment, LLC.

Existing Site

The site currently consists of existing structures on three separate blocks along Callowhill Street to include the former Inquirer Building between Broad Street and 15th Street, the parking structure between 15th Street and 16th Street, and the parking structure between 16th Street and 17th Street.

Proposed Development

The proposed development will consist of the following amenities as shown in **Figures 2A-D**:

- Casino with 3,300 slot machines and 150 table games;
- Restaurants, Eateries, Coffee Shops, Bars, Clubs;
- Retail Shops;
- Meeting rooms and a Theater;
- 125-room Hotel;
- Three (3) parking facilities: one 800-space self-park garage, and two garages totaling 900 valet parking spaces.

The site is anticipated to be open in 2015 and TPD utilized a design year of 2020 for the project.

A. Site Access Locations

Vehicular Access

Vehicular access locations for the proposed Provence development are as follows and are shown in **Figure 2** of this report:

Callowhill Street:

- Ingress and egress access to the valet parking between Broad Street and N. 15th Street.

N. 16th Street:

- Ingress access to the main porte-cochere area between Callowhill Street and Hamilton Street;
- Ingress and egress access to the secondary porte-cochere area Callowhill Street and Hamilton Street.

- Ingress and egress access to the parking garage on western side of N. 16th Street between Callowhill Street and N. 16th Street (also has an access to N. 17th Street).

N. 15th Street:

- Egress access from the main porte-cochere area between Callowhill Street and Hamilton Street;
- Bus and shuttle access to loading area between Callowhill Street and Hamilton Street;
- Service access to loading dock area between Callowhill Street and Hamilton Street.

Pedestrian Access Locations

Pedestrian access locations for the proposed Provence development are as follows and are shown in **Figure 2** of the report:

N. Broad Street: There are three separate, street-level pedestrian access points to the former Inquirer building that will serve the hotel, the banquet area, and the village and casino. These entrances are all located along the site frontage on N. Broad Street immediately north of Callowhill Street. There is sidewalk that exists along this frontage, but ADA compliant curb ramps are not currently present at its intersection with Callowhill Street.

N. 15th Street: There is a street-level pedestrian entrance to the development between Callowhill Street and the main porte-cochere area providing entry for bus/shuttle patrons. There is sidewalk that exists along both sides of N. 15th Street, but ADA compliant curb ramps are not currently present in this area.

N. 16th Street: There is a street-level pedestrian entrance to the development between Callowhill Street and the main porte-cochere area. There is sidewalk that exists along both sides of N. 16th Street, but ADA compliant curb ramps are not currently present in this area.

N. Callowhill Street: Callowhill Street serves as the pedestrian gateway to the site with multiple street-level pedestrian entrances to the development between N. 16th Street and N. Broad Street. There is sidewalk on both sides of Callowhill Street between N. Broad Street and N. 16th Street, however, there are no ADA curb ramps currently present in this area and sidewalk conditions between N. 15th Street and N. Broad Street (northern side) must be improved to ensure a pedestrian accessible path.

Main Porte-Cochere Area: There are multiple street-level pedestrian entrances to the development located along the main porte-cochere area.

Self-Park Garage: There are street-level pedestrian entrances to the development located along Callowhill Street and N. 16th Street for patrons utilizing the self-park garage to gain access.

TPD maintains that all proposed site access points to N. Broad Street, Callowhill Street, N. 15th Street, and N. 16th Street will be designed to achieve PennDOT minimum safe stopping sight distance (SSSD) standards. For 25 mph roadways with flat grade, the SSSD is 161 feet. Currently, there are no vertical or horizontal limitations to sight lines on the roadway. However,

on-street parking will need to be restricted in identified areas to accommodate appropriate sight lines

B. Parking

Off-Street Dedicated Parking

The dedicated garage parking for the proposed Provence will be provided in the following areas:

- Valet parking garages below the proposed development houses approximately 900 total parking spaces for guests/employees.
- Existing self-park garage at northwest corner of N. 16th Street and Callowhill Street houses approximately 800 parking spaces for guests/employees.

In addition to the dedicated garage parking for the proposed development, there are approximately 2,955 existing parking spaces within a 2-3 block radius around the site as shown in Figure 2E.

On-Street Parking Removal

The Applicant for the Provence is pursuing the elimination of on-street parking in areas adjacent or close to the site to increase lane capacity, accommodate pedestrian facility upgrades, increase vehicle mobility near site access points, and accommodate site frontage improvements. The following locations are proposed to eliminate on-street parking:

- N. Broad Street (western side) from Callowhill Street north approximately 180 feet. This portion of N. Broad Street has approximately a 120 linear foot loading zone from Callowhill Street with daily A.M. peak hour restrictions 7:00-9:30 A.M. Considering the site no longer requires the loading zone, there is the proposed elimination of 3 parking spaces along this section of N. Broad Street to accommodate the right turn lane.
- N, Broad Street (western side) from Callowhill Street south to Wood Street has 3 hour (kiosk) parking that is restricted during the morning and afternoon peak hours with approximately 150 feet of linear parking area. In order to accommodate constructing a left turn lane down the center of N. Broad Street in this area, it is proposed to eliminate approximately 7 parking spaces.
- Callowhill Street between N. Broad Street and N. 15th Street has 3 hour parking from 8:00 A.M. to 8:00 P.M. allowed with metered parking on both sides. This results in the proposed elimination of approximately 10 spaces on the southern side and 19 parking spaces on the northern side of Callowhill Street in this area.
- Callowhill Street between N. 15th Street and N. 16th Street has 3 hour (kiosk) parking from 8:00 A.M. to 8:00 P.M. allowed along both sides with approximately 360 usable linear feet on the southern side and 280 linear feet on the northern side. This results in the proposed elimination of approximately 16 parking spaces on the southern side and 13 spaces on the northern side of Callowhill Street.

Overall, the total proposed elimination of on-street parking in the vicinity of the Provence development is 68 spaces. It should be noted that TPD assumed that each vehicle parking on street would take up approximately 22 feet.

C. Site Circulation

The following are descriptions of circulation patterns for vehicles and pedestrians to/from the site and its parking facilities.

Self-Park Garage at 16th and Callowhill Streets: Vehicles will approach/depart the self-park garage via N. 16th or N. 17th Street. Pedestrians will gain access to the development by egressing to Callowhill Street/N. 16th Street to cross at the signalized intersection and into the 16th Street Entry.

Valet Park at Proposed Hotel: Vehicles will approach/depart via Callowhill Street. Pedestrians will be able to gain access to the development internally and are not required to exit the facility.

Valet Park at Proposed Casino: Vehicles will approach the main porte-cochere area via N. 16th Street and depart via southbound N. 15th Street. Pedestrians will be able to gain access to the development at the main porte-cochere area or Callowhill Street Entry and are not required to exit the facility.

Taxi and Casino Shuttle Loading: Taxis and Casino Shuttles will approach the main porte-cochere area via N. 16th Street and depart via southbound N. 15th Street. Pedestrians will be able to gain access to the development at the main porte-cochere area or Callowhill Street Entry and are not required to exit the facility.

Bus Loading/Unloading: Buses will arrive at the site via N. 15th Street where they will utilize the bus and shuttle access for loading. Guests will enter/exit buses at this location and utilize the Bus/Shuttle Entry to gain access to the development.

Pedestrians: Pedestrians will utilize the existing sidewalk network along Callowhill Street, N. 15th Street, and N. 16th Street to gain access to the pedestrian access points listed in part A of this section. It should be noted that there are no sidewalks present along N. 15th and N. 16th Streets adjacent to the I-676 ramps, and therefore, pedestrians will be required to use the opposite side of the street for these two locations.

TPD has conducted field investigations and has determined that there are sidewalk areas / curb ramps that will need to be upgraded to ensure ADA compliance for an acceptable pedestrian walking path adjacent to the site. TPD has identified 24 curb ramp locations along Callowhill Street (N. Broad Street, N. 15th Street, and N. 16th Street) and 400 feet of sidewalk along the northern side of Callowhill Street between N. Broad Street and N. 15th Street that will need to be upgraded.



SECTION II – EXISTING ROADWAY NETWORK

A field review of the existing roadway system in the study area was conducted. The existing roadway characteristics within the study area are summarized in **Table 1**. Information pertaining to the study area intersections are included in **Appendix A**.

**TABLE 1
ROADWAY CHARACTERISTICS WITHIN STUDY AREA**

Roadway	Ownership	PennDOT Functional Classification/ Roadway Type	Predominant Directional Orientation	Posted Speed Limit¹
N. Broad Street	State (S.R. 0611)	Urban Principal Arterial	North-South	Not Posted
Spring Garden Street	State (S.R. 2006)	Urban Principal Arterial	East-West	25 mph
Vine Street	State (S.R. 2676)	Urban Minor Arterial	East-West	25 mph
Callowhill Street	City	Urban Collector	Westbound	Not Posted
N. 18 th Street	City	Urban Collector	Northbound	Not Posted
N. 17 th Street	City	Urban Collector	Southbound	Not Posted
N. 16 th Street	City/State (S.R. 3027)	Urban Minor Arterial	Northbound	Not Posted
N. 15 th Street	City/State (S.R. 3029)	Urban Minor Arterial	Southbound	Not Posted
N. 13 th Street	City	Urban Collector	Northbound	Not Posted
Franklin Town Boulevard	City	Urban Collector	North-South	Not Posted

¹ TPD assumes 25 mph when not posted

A. Multi-Modal Facilities

Based on the observations during field visits, sidewalks exist on both sides of the street for all roadways considered for this study with the exception of the west side of N. 15th Street between Callowhill Street and Vine Street, along the Vine Street Expressway frontage. Most of the sidewalks are in fair condition; however, curb ramps throughout the study area do not appear in compliance with current ADA standards. There are exclusive bicycle lanes along Spring Garden Street in the vicinity of the site.

Public transportation is available in the vicinity of the proposed site via bus and subway routes of the Southeastern Pennsylvania Transportation Authority (SEPTA). SEPTA Bus Routes 2, 4, 16, and 43 have scheduled stops in the vicinity of the proposed site. The Broad Street Subway Line has nearby stops along N. Broad Street at Race-Vine Street and Spring Garden Street. NJ Transit also has a significant number of bus routes that stop at the southeast corner of Vine Street and N. Broad Street. The following routes 400, 401, 402, 404, 406, 408, 409, 410, 412, 414, 417 provide services to such areas as Cherry Hill, Marlton, Moorestown, Trenton, and Willingboro.

Lastly, the proposed site is located less than ½ mile from the following transportation amenities:

- SEPTA Regional Rail – Suburban Station;
- Market Frankford Line (subway-elevated line);
- Numerous other SEPTA bus routes;
- Philadelphia FLASH;
- Greyhound Bus Terminal Facility.

As indicated above, the proposed site is served by numerous multi-modal facilities and it is anticipated that a significant percentage of its visitors will utilize them, to include locally employed persons. The existing public transportation amenities surrounding the site are shown in **Figure 3**.

A. Crash Data Investigation

Crash data were obtained from PennDOT for the critical study area intersections. PennDOT defines a reportable crash as follows, “A reportable (crash) is one in which an injury or fatality occurs or if at least one of the vehicles involved requires towing from the scene.” Reportable crashes were tabulated for the five-year time period beginning 01/01/2008 and ending 12/31/2012. For a given intersection, PennDOT considers a crash occurrence of 5 reportable, correctable crashes over a continuous twelve-month period during the past five years to be a threshold value, above which the intersection design should be reviewed to examine if corrective measures can be taken to enhance safety. The number of reportable crashes at the critical study area intersections is shown in **Table 2**. The crash records utilized for the crash data investigation are provided under a separate appendix.

**TABLE 2
CRASH DATA SUMMARY**

Study Area Intersection	Number of Reportable Crashes				
	2008	2009	2010	2011	2012
Callowhill Street and N. 17 th Street	1	0	0	0	1
Callowhill Street and N. 16 th Street	1	0	4	1	1
Callowhill Street and N. 15 th Street	1	1	2	1	0
Callowhill Street and N. Broad Street	1	2	8	1	3
Spring Garden Street and N. 16 th Street	4	0	3	1	1
Spring Garden Street and N. 15 th Street	4	2	2	1	3
Broad Street and Vine Street Local (EB)	6	7	10	13	10
Broad Street and Vine Street Local (WB)	2	9	5	4	3

At the Broad Street/Callowhill Street intersection, the 8 reportable crashes in 2010 consisted of fleeing police, a physical conditions, illegal left turn, running a red light, stopping in a travel lane, and lane change during adverse weather conditions. There is no discernable pattern and no more than 5 correctable crashes occurred in 2010. Of the 69 reportable crashes at the Vine Street Local intersections with Broad Street, the only patterns noted were 20 running red lights and 27 improper turns/turning from wrong lane. TPD evaluated these intersections during a field view with the Streets Department and several operational changes were identified and included in this report. Also, it is our understanding red light cameras have been installed in order to combat the red light running condition.

SECTION III – EXISTING TRAFFIC CONDITIONS

A. Manual Turning Movement Counts

Manual traffic counts were conducted on 15-minute intervals during the Friday evening (4:00 to 6:00 P.M.) peak period. Data pertaining to heavy vehicles, pedestrians, bicycles, and transit vehicles were observed during the manual counts. Peak hours and count dates for the study area intersections are identified in **Tables 3A-C**.



**TABLE 3A
MANUAL TRAFFIC COUNT INFORMATION –
VINE STREET INTERSECTIONS**

Intersection	Time Period	Date of Traffic Count	Intersection Peak Hour ¹	Peak Hour Volumes	
				Vehicular	Pedestrians/ Bicycles
Vine Street Local (E/W) and N. 17 th Street	Friday PM	06/14/2013	4:30 P.M.	2,299	439 / 1
	Friday Evening	06/14/2013	7:15 P.M.	1,290	296 / 0
	Saturday Evening	06/15/2013	6:00 P.M.	1,057	241 / 11
Vine Street Local (E/W) and N. 16 th Street	Friday PM	09/21/2012	4:00 P.M.	3,702	648 / 25
	Friday Evening	06/14/2013	7:00 P.M.	2,295	110 / 0
	Saturday Evening	06/08/2013	6:00 P.M.	2,117	172 / 0
Vine Street Local (E/W) and N. 15 th Street	Friday PM	09/21/2012	4:00 P.M.	5,163	483 / 1
	Friday Evening	06/14/2013	7:00 P.M.	4,245	196 / 1
	Saturday Evening	06/08/2013	6:00 P.M.	4,566	178 / 8
Vine Street Local (E/W) and N. Broad Street	Friday PM	09/21/2012	4:30 P.M.	6,122	1,164 / 94
	Friday Evening	06/14/2013	7:00 P.M.	4,196	621 / 42
	Saturday Evening	06/08/2013	6:00 P.M.	4,333	535 / 69
Vine Street Local (E/W) and N. 13 th Street	Friday PM	06/14/2013	4:00 P.M.	2,494	395 / 0
	Friday Evening	06/14/2013	7:15 P.M.	1,523	344 / 0
	Saturday Evening	06/15/2013	6:00 P.M.	1,663	216 / 6

1. Peak Hour consists of the four consecutive 15-minute intervals where the highest traffic volumes occur.

**TABLE 3B
MANUAL TRAFFIC COUNT INFORMATION –
CALLOWHILL STREET INTERSECTIONS**

Intersection	Time Period	Date of Traffic Count	Intersection Peak Hour ¹	Peak Hour Volumes	
				Vehicular	Pedestrians/ Bicycles
Callowhill Street and Franklin Town Blvd	Friday PM	09/14/2012	4:00 P.M.	952	112 / 16
	Friday Evening	06/21/2013	7:00 P.M.	505	234 / 2
	Saturday Evening	06/15/2013	6:45 P.M.	395	172 / 11
Callowhill Street and N. 17 th Street	Friday PM	09/14/2012	4:30 P.M.	869	255 / 28
	Friday Evening	06/14/2013	7:00 P.M.	364	125 / 14
	Saturday Evening	06/15/2013	6:00 P.M.	286	49 / 6
Callowhill Street and N. 16 th Street	Friday PM	09/21/2012	4:30 P.M.	1,123	375 / 26
	Friday Evening	06/14/2013	7:00 P.M.	483	113 / 1
	Saturday Evening	06/08/2013	6:00 P.M.	419	89 / 0
Callowhill Street and N. 15 th Street	Friday PM	09/14/2012	4:00 P.M.	1,045	154 / 2
	Friday Evening	06/14/2013	7:00 P.M.	462	85 / 5
	Saturday Evening	06/15/2013	6:15 P.M.	345	55 / 11
Callowhill Street and N. Broad Street	Friday PM	09/21/2012	4:45 P.M.	2,038	312 / 34
	Friday Evening	06/14/2013	7:00 P.M.	1,586	141 / 32
	Saturday Evening	06/15/2013	6:00 P.M.	1,474	119 / 37
Callowhill Street and N. 13 th Street	Friday PM	06/14/2013	4:30 P.M.	604	270 / 6
	Friday Evening	06/14/2013	7:45 P.M.	324	86 / 25
	Saturday Evening	06/15/2013	6:00 P.M.	329	46 / 5

1. Peak Hour consists of the four consecutive 15-minute intervals where the highest traffic volumes occur.

**TABLE 3C
MANUAL TRAFFIC COUNT INFORMATION –
SPRING GARDEN STREET INTERSECTIONS**

Intersection	Time Period	Date of Traffic Count	Intersection Peak Hour ¹	Peak Hour Volumes	
				Vehicular	Pedestrians/ Bicycles
Spring Garden Street and N. 18 th Street	Friday PM	10/26/2012	4:30 P.M.	2,138	279 / 94
	Friday Evening	06/14/2013	7:00 P.M.	1,143	201 / 29
	Saturday Evening	06/15/2013	6:00 P.M.	948	161 / 3
Spring Garden Street and N. 17 th Street	Friday PM	06/14/2013	5:00 P.M.	1,991	246 / 67
	Friday Evening	06/14/2013	7:15 P.M.	1,097	208 / 22
	Saturday Evening	06/15/2013	6:00 P.M.	943	101 / 4
Spring Garden Street and N. 16 th Street	Friday PM	09/14/2012	4:45 P.M.	2,424	633 / 97
	Friday Evening	06/14/2013	7:00 P.M.	1,307	147 / 26
	Saturday Evening	06/15/2013	6:00 P.M.	1,109	125 / 9
Spring Garden Street and N. 15 th Street	Friday PM	09/14/2012	4:15 P.M.	2,101	842 / 76
	Friday Evening	06/21/2013	7:00 P.M.	1,252	201 / 2
	Saturday Evening	06/15/2013	6:00 P.M.	1,064	126 / 0
Spring Garden Street and N. Broad Street	Friday PM	10/26/2012	5:00 P.M.	3,590	521 / 121
	Friday Evening	06/14/2013	7:00 P.M.	2,548	308 / 10
	Saturday Evening	06/15/2013	6:00 P.M.	2,248	148 / 25

1. Peak Hour consists of the four consecutive 15-minute intervals where the highest traffic volumes occur.

Existing condition vehicular and pedestrian traffic volumes for the studied time periods are illustrated in **Figures 4A through 6B**. Manual traffic count data sheets are provided in **Appendix B**.

SECTION IV – BASE (NO-BUILD) CONDITIONS

TPD obtained the background growth factor for the roadways in the study area from the PennDOT Bureau of Planning and Research (BPR). Considering the PennDOT BPR suggests that there is a 0% background growth trend factor per year in Philadelphia County for urban non-interstate roadways, TPD did not include any background growth. However, base (no-build) traffic conditions were calculated to include traffic volumes from proposed developments, which, though not operating under existing conditions, may be operating by the opening year (2015) of the proposed development. Traffic associated with the following nearby planned developments was specifically included in this study:

The Granary is a proposed residential development consisting of 120 apartment dwelling units and is located on the northeast corner of the 20th Street and Callowhill Street intersection.

Broad and Spring Garden (former State building) is a proposed residential development consisting of 204 apartment unit and is located on the southwest corner of the Broad Street and Spring Garden Street intersection.

Mormon Latter Day Saints Temple is a proposed worship place with 53,000 square feet of total floor area. The site is located along the north side of Vine Street between 17th and 18th streets.



The additional traffic volumes due to nearby developments were added to the existing traffic data to produce 2020 base (no-build) condition traffic volumes. Base condition volumes for the studied time periods are illustrated in **Figures 7A through 9B** for the 2020 design year condition. Trip distributions for the background developments are provided in **Appendix C**.

SECTION V – TRIP GENERATION

TPD conducted a trip generation analysis to develop proposed traffic levels for the casino use and ancillary uses. The detailed trip generation data and analysis is included in **Appendix D**. The calculated trip generation for the proposed development is shown in **Tables 4A-C**.

**TABLE 4A
TRIP GENERATION SUMMARY – FRIDAY P.M. (4-6 P.M.) PEAK HOUR**

Land Use	Size / Units (X)	Total Trips	Int. Trips	External Trips					
				Mass Transit ¹	Ped-Bike	Pass-by	New Trips ²		
							Total	Enter	Exit
Casino Use									
Casino	3,300 slots / 150 tables	2,505	---	1,247	322	---	922	510	412
				<i>Shuttle Bus Trips</i>			14	7	7
Ancillary Uses									
Hotel	125	88	66	7	2	0	13	6	7
Restaurant	56,210 ³	554	416	43	11	30	54	32	22
Drinking Place	30,287 ³	343	257	27	7	20	32	21	11
Theater / Clubs	49,148 ³	55	41	4	1	0	9	7	2
Retail	72,264	196	147	15	4	10	20	9	11
Subtotal – Ancillary Trips		1,236	927	96	25	60	128	75	53
Total Site Trips		3,741	927	1,343	347	60	1,064	592	472

Int. = Internal Capture Trips **X** = Independent Variable (Size in KSF, Gaming Positions, Units)

¹ Includes visitors who are employed locally and use transit ² New trips include passenger cars and taxis

³ Assumes 30% of space not utilized/open during Friday P.M. (4-6 PM) peak hour

TABLE 4B
TRIP GENERATION SUMMARY – FRIDAY EVENING (7-10 P.M.) PEAK HOUR

Land Use	Size / Units (X)	Total Trips	Int. Trips	External Trips					
				Mass Transit ¹	Ped-Bike	Pass-by	New Trips ²		
							Total	Enter	Exit
Casino Use									
Casino	3,300 slots / 150 tables	2,425	---	1,207	312	---	893	475	418
			<i>Shuttle Bus Trips</i>				13	7	6
Ancillary Uses									
Hotel	125	93	70	7	2	0	14	8	6
Restaurant	80,300 ¹	944	708	73	19	30	114	58	56
Drinking Place	43,267 ¹	670	503	52	13	22	80	54	26
Theater / Clubs	70,197 ¹	847	635	66	17	0	129	97	32
Retail	72,264	242	182	19	5	8	28	15	13
Subtotal – Ancillary Trips		2,796	2,098	217	56	60	365	232	133
Total Site Trips		5,221	2,098	1,424	368	60	1,271	714	557

Int. = Internal Capture Trips X = Independent Variable (Size in KSF, Gaming Positions, Units)
¹ Includes visitors who are employed locally and use transit ² New trips include passenger cars and taxis

TABLE 4C
TRIP GENERATION SUMMARY – SATURDAY EVENING (6-9 P.M.) PEAK HOUR

Land Use	Size / Units (X)	Total Trips	Int. Trips	External Trips					
				Mass Transit ¹	Ped-Bike	Pass-by	New Trips ²		
							Total	Enter	Exit
Casino Use									
Casino	3,300 slots / 150 tables	2,661	---	1,324	342	---	980	467	513
			<i>Shuttle Bus Trips</i>				15	8	7
Ancillary Uses									
Hotel	125	110	83	8	2	0	17	10	7
Restaurant	80,300 ¹	1,055	791	82	21	34	127	76	51
Drinking Place	43,267 ¹	670	503	52	13	22	80	54	26
Theater / Clubs	70,197 ¹	847	635	66	17	0	129	97	32
Retail	72,264	152	114	12	3	6	17	6	11
Subtotal – Ancillary Trips		2,834	2,126	220	56	62	370	243	127
Total Site Trips		5,495	2,126	1,544	398	62	1,365	718	647

Int. = Internal Capture Trips X = Independent Variable (Size in KSF, Gaming Positions, Units)
¹ Includes visitors who are employed locally and use transit ² New trips include passenger cars and taxis

SECTION VI – TRIP DISTRIBUTION

The distribution of trips generated by the proposed redevelopment was based on the local road network, the existing traffic patterns, the location of the proposed access points, and proprietary marketing information provided by the developer. The vehicular, pedestrian, and mass transit trips for the proposed development were distributed to the local transportation network based on the percentages shown in **Table 5**.

**TABLE 5
TRIP DISTRIBUTION PERCENTAGES**

Direction	Distribution Percentages
Vehicular Trips	
West via Spring Garden Street	4%
North via Broad Street	5%
East via Spring Garden Street	5%
via Callowhill Street	4%
Via Vine Street Local	5%
Via I-676 westbound	30%
South via Broad Street	5%
Via Vine Street Local eastbound	4%
Via I-676 eastbound	30%
Via 16 th Street	4%
Via 15 th Street	4%
Pedestrian Trips	
Northwest of site	13%
North of site	12%
Northeast of site	13%
East of site	13%
Southeast of site	13%
South of site	14%
West of site	22%
Mass Transit Trips	
Bus Routes in project area	25%
Broad Street Line (Spring Garden Station)	15%
Broad Street Line (Race-Vine Station)	15%
Regional Rail – Suburban Station	45%

The assignment of site-generated trips for the proposed development during the studied time periods is shown in **Figures 10A through 12B**. The detailed analysis of trip distribution and trip assignment are shown in **Appendix E**.

SECTION VII – PROJECTED (BUILD) CONDITION TRAFFIC VOLUMES

The site-generated trips for the proposed development were added to the 2020 base condition traffic volumes to develop 2020 projected condition traffic volumes. Projected condition traffic volumes for the opening year of 2020 for the studied time periods are shown in **Figures 13A through 15B**.

SECTION VIII – CAPACITY ANALYSIS

A. Levels of Service for an Intersection

For analysis of intersections, level of service is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS criteria is stated in terms of control delay per vehicle for a one-hour analysis period. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The criteria are shown in **Table 6**. Delay, as it relates to level of service, is a complex measure and is dependent upon a number of variables. For signalized intersections, these variables include the quality of vehicle progression, the cycle length, the green time ratio, and the volume/capacity ratio for the lane group in question. For unsignalized intersections, delay is related to the availability of gaps in the flow of traffic on the major street and the driver’s discretion in selecting an appropriate gap for a particular movement from the minor street (straight across, left or right turn).

**TABLE 6
LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS ¹**

Level of Service	Control Delay Per Vehicle (Seconds)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80 or $v/c > 1.0$	> 50 or $v/c > 1.0$

1. Obtained from Exhibits 18-4 and 19-1 of the Transportation Research Board’s *Highway Capacity Manual 2010*

B. Capacity Analysis Methodology

Capacity analyses were conducted for the studied time periods at the study area intersections. These analyses were conducted according to the methodologies contained in the 2010 *Highway Capacity Manual* (HCM) using *Synchro 8* software, a Trafficware product. The following conditions were analyzed, as applicable:

- Existing conditions;
- 2020 Base conditions (Design year without development);
- 2020 Projected conditions (Design year with development);

The capacity analysis worksheets are included in **Appendix F**, along with supplemental capacity analysis worksheets detailing the input information included in **Appendix G**. The PennDOT-approved signal plans are included in **Appendix H**.

PennDOT's Transportation Impact Study Guidelines outlined in Strike-Off Letter 470-09-4, dated February 12, 2009 contain the following criteria regarding levels of service:

- Page 29 of the Guidelines state that if evaluation of the With Development Horizon Year Scenario to the Without Development Horizon Year Scenario indicates that the overall intersection level of service has dropped, the applicant will be required to mitigate the level of service if the increase in overall intersection delay is greater than 10-seconds. If the overall intersection delay increase is less than or equal to 10-seconds, mitigation of the intersection will not be required.
- Page 29 of the Guidelines state that for mitigation scenarios, applicants are expected to mitigate the overall intersection LOS to the original Without Development LOS; the 10-second delay variance is not applied to mitigation scenarios. Applicants may be required to address available storage and queue lengths at critical movements or approaches even if the overall LOS requirements are met.
- Page 31 of the Guidelines states new signalized or unsignalized intersection established to serve as access to the development shall be designed to operate at minimum LOS C for rural areas, and minimum LOS D for urban areas.
- Page 34 of the Guidelines states that the Department will consider the marginal LOS degradation based on municipal input and review of the Municipal Land Use and Transportation Plan to ensure that congestion and delay are managed in the Study Area. Marginal LOS degradation is defined as overall intersection LOS within the range of LOS B to LOS C for rural areas, and LOS B to LOS D for urban areas.

C. Levels of Service in the Study Area

The Level of service (LOS) summary matrix for the study area intersections are shown in **Tables 7A-C** for the studied time periods. More detailed capacity analysis matrices for the study area intersections during the studied time periods are included in **Appendix I**. The recommended roadway improvements associated with the project and utilized in the projected conditions analysis are shown in **Table 8**.

TABLE 7A
LEVEL OF SERVICE SUMMARY –
VINE STREET INTERSECTIONS

Intersection	Time Period	Existing	Future Conditions	
			Base	Projected ¹
Vine Street Local (E/W) and N. 17 th Street	Friday PM	B(14.7)	B(15.8)	C(21.5)
	Friday Evening	B(12.2)	B(12.8)	B(18.4)
	Saturday Evening	A(8.9)	A(9.1)	B(11.7)
Vine Street Local (E/W) and N. 16 th Street	Friday PM	B(13.0)	B(13.1)	B(13.9)
	Friday Evening	B(11.5)	B(11.5)	B(13.1)
	Saturday Evening	B(12.8)	B(12.8)	B(14.7)
Vine Street Local (E/W) and N. 15 th Street	Friday PM	B(17.5)	B(18.1)	C(27.8)
	Friday Evening	B(14.8)	B(15.5)	C(20.6)
	Saturday Evening	B(15.9)	B(16.5)	C(22.6)
Vine Street Local (E/W) and N. Broad Street	Friday PM	C(27.9)	C(28.1)	C(33.0)
	Friday Evening	B(19.5)	B(19.8)	B(17.9)
	Saturday Evening	B(16.3)	B(16.5)	B(17.0)
Vine Street Local (E/W) and N. 13 th Street	Friday PM	B(13.1)	B(13.2)	B(13.5)
	Friday Evening	B(10.2)	B(10.2)	B(10.4)
	Saturday Evening	B(11.2)	B(11.2)	B(10.8)

1. With Site Related Improvements (see Table 8)

TABLE 7B
LEVEL OF SERVICE SUMMARY –
CALLOWHILL STREET INTERSECTIONS

Intersection	Time Period	Existing	Future Conditions	
			Base	Projected ¹
Callowhill Street and Franklin Town Blvd	Friday PM	B(13.9)	B(14.3)	C(16.7)
	Friday Evening	A(8.7)	A(8.7)	A(9.1)
	Saturday Evening	A(8.5)	A(8.5)	A(9.1)
Callowhill Street and N. 17 th Street	Friday PM	B(14.1)	B(14.3)	C(19.2)
	Friday Evening	A(8.5)	A(8.6)	A(10.0)
	Saturday Evening	A(8.2)	A(8.3)	A(9.9)
Callowhill Street and N. 16 th Street	Friday PM	B(15.1)	B(15.2)	C(20.4)
	Friday Evening	B(10.8)	B(10.8)	B(16.2)
	Saturday Evening	A(9.6)	A(9.6)	B(15.0)
Callowhill Street and N. 15 th Street	Friday PM	C(22.8)	C(22.8)	C(24.5)
	Friday Evening	B(10.1)	B(10.1)	B(19.6)
	Saturday Evening	A(8.7)	A(8.7)	B(18.2)
Callowhill Street and N. Broad Street	Friday PM	B(17.6)	B(17.6)	B(15.7)
	Friday Evening	B(12.0)	B(12.0)	A(8.1)
	Saturday Evening	A(8.3)	B(14.1)	A(8.1)
Callowhill Street and N. 13 th Street	Friday PM	B(18.8)	B(18.7)	B(19.4)
	Friday Evening	B(19.0)	B(19.0)	B(19.3)
	Saturday Evening	B(16.9)	B(16.9)	B(17.2)

1. With Site Related Improvements (see Table 8)

**TABLE 7C
LEVEL OF SERVICE SUMMARY –
SPRING GARDEN STREET INTERSECTIONS**

Intersection	Time Period	Existing	Future Conditions	
			Base	Projected ¹
Spring Garden Street and N. 18 th Street	Friday PM	B(19.7)	B(19.9)	C(20.7)
	Friday Evening	B(10.1)	B(10.1)	B(10.3)
	Saturday Evening	A(9.6)	A(9.6)	A(9.7)
Spring Garden Street and N. 17 th Street	Friday PM	B(16.0)	B(16.3)	B(18.1)
	Friday Evening	A(6.3)	A(6.3)	A(6.6)
	Saturday Evening	A(5.5)	A(5.7)	A(5.8)
Spring Garden Street and N. 16 th Street	Friday PM	C(23.7)	C(23.9)	C(28.2)
	Friday Evening	B(13.5)	B(13.5)	B(14.6)
	Saturday Evening	B(12.9)	B(13.2)	B(14.3)
Spring Garden Street and N. 15 th Street	Friday PM	B(18.8)	B(18.8)	C(21.4)
	Friday Evening	B(11.8)	B(11.9)	B(12.4)
	Saturday Evening	B(10.7)	B(10.7)	B(11.1)
Spring Garden Street and N. Broad Street	Friday PM	B(19.1)	B(19.1)	C(24.0)
	Friday Evening	B(16.2)	B(16.2)	B(18.7)
	Saturday Evening	B(15.1)	B(15.2)	B(17.9)

1. With Site Related Improvements (see *Table 8*)

As indicated in **Tables 7A-C**, with the recommended improvements in *Table 8*, all study area intersections will operate at acceptable LOS D operations or better, have a less than 10 second increase in delay, or have marginal level of service degradations. Therefore, with the recommended improvements, it is our opinion the PennDOT criteria will be satisfied and adequate accommodations for vehicles, pedestrians, mass transit, and bicycles can be provided for the site.

D. Recommended Roadway Improvements

Based on the results of the capacity analyses, TPD identified recommended roadway improvements within the study area associated with the project, which the Applicant will pursue. **Table 8** on the following page outlines the recommended roadway improvements associated with the project.



**TABLE 8
ANTICIPATED ROADWAY IMPROVEMENTS**

Intersection	Description of Roadway Improvements
Intersections along Vine Street Local	Modify traffic signal timings to accommodate site traffic, including signal phasing, cycle lengths, and offset. Add southbound left turn phase to 15 th Street and the southern local Vine Street intersection.
Vine Street Local (EB) and Broad Street	Restripe the northbound Broad Street approach in order to provide an exclusive right-turn lane.
Site Frontage along Callowhill Street	Restrict parking for a majority of the site frontage, including, but not limited to section between Broad Street and 15 th Street, and the section between 15 th Street and 16 th Street.
	Review and upgrade pedestrian facilities to meet current ADA regulations.
Callowhill Street and Broad Street	Remove a portion of the existing concrete median and construct a separate left-turn lane on the northbound Broad Street. The removal of the existing median is anticipated to extend approximately 125' -150'.
	Restrict on-street parking along the southbound Broad Street approach in order to provide a separate right-turn lane. The restriction is anticipated to extend along the site frontage between Broad Street and Noble Street.
	Review and upgrade pedestrian facilities to meet current ADA regulations.
Callowhill Street and 15 th Street	Install traffic signal and upgrade pedestrian facilities to meet current ADA regulations.
	Restripe the southbound 15 th Street approach in order to provide a separate right-turn lane.
Callowhill Street and 16 th Street	Modify traffic signal timings to accommodate site traffic, including but, not limited to signal phasing, cycle lengths, and offset.
Callowhill Street and 17 th Street	Review and upgrade pedestrian facilities to meet current ADA regulations.
Callowhill Street and Franklin Town Boulevard	No improvements are anticipated at this time.
Intersections along Broad Street	Modify traffic signal timings to accommodate site traffic, including but, not limited to signal phasing, cycle lengths, and offset.
Intersections along Spring Garden Street	Modify traffic signal timings to accommodate site traffic, including but, not limited to signal phasing, cycle lengths, and offset.

E. Queue Analysis

TPD evaluated the queues for all signalized intersections within the study area. Per PennDOT Publication 46, “in those cases involving closely spaced intersections and complex transportation systems when intersection function may be affected by adjacent locations, the operational analysis may yield more appropriate results based on site conditions and may be given more consideration than the results obtained from these guidelines. Use the 95th percentile turn lane queue when estimating required storage length from traffic engineering software packages, unless otherwise directed.” Therefore, the queue analysis was completed using the 95th percentile queue from Synchro. The summary of the results of the queue analysis are included in

Appendix I. It is important to note that TPD has not recommended increasing storage lengths of turning lanes as in many cases it's not practical from a context sensitive (urban) approach. Additionally, it is TPD's opinion that widening of roads to create capacity or additional vehicular storage is not consistent with the City of Philadelphia Complete Streets initiative where roadway widening may be required.

F. Site Access Evaluation

TPD conducted an analysis of the site access configurations. The results of the analysis indicate that the site accesses will function at acceptable LOS D operations or better. The Level of service (LOS) summary matrix for the study area intersections are shown in **Table 9** for the studied time periods. Information pertaining to the site access analysis is included in **Appendix F**.

**TABLE 9
SITE ACCESS EVALUATION SUMMARY**

Frontage Roadway	Time Period	Projected Conditions	
		Access Movement	Overall
N. 17 th Street Site Access	Friday PM	B(13.0)	A(2.7)
	Friday Evening	B(11.1)	A(4.1)
	Saturday Evening	B(11.1)	A(4.7)
N. 16 th Street Site Access	Friday PM	D(25.8)	A(1.4)
	Friday Evening	C(23.3)	A(2.0)
	Saturday Evening	C(24.1)	A(2.5)
N. 15 th Street Site Access (Northern)	Friday PM	C(19.2)	A(4.1)
	Friday Evening	B(12.6)	A(4.9)
	Saturday Evening	B(12.5)	A(5.7)
N. 15 th Street Site Access (Southern)	Friday PM	C(15.8)	A(0.3)
	Friday Evening	B(12.0)	A(0.3)
	Saturday Evening	B(12.0)	A(0.4)
Callowhill Street Site Access	Friday PM	B(12.2)	A(1.5)
	Friday Evening	B(11.0)	A(2.0)
	Saturday Evening	B(10.7)	A(2.5)

G. Field Conditions Review

TPD met with the Philadelphia Streets Department in the field on October 17, 2013 during the PM peak hour to observe field conditions along eastbound Vine Street (Local) at its intersections with 15th Street and Broad Street. Based upon this site visit and input from the Streets Department, TPD revised the analysis for both intersections and included this information in **Appendix J**.

For the intersection of 15th Street and eastbound Vine Street (Local), there were no changes to the degradation of ILOS that exceeded the 10 second variance in any condition. Therefore, TPD maintains its conclusions regarding this intersection.

For the intersection of Broad Street and eastbound Vine Street (Local), the only instance where the ILOS degraded more than the 10 second marginal variance or less than ILOS D for an urban area, was in the condition where we assumed the northbound Broad Street approach had an exclusive left turn lane. Although TPD recommends this lane striping be included for safety and operational purposes, it is not a requirement to install. Therefore, it is TPD's opinion that we satisfy the degradation criteria with the proposed site traffic included in the analysis, but do recommend the right turn lane striping to improve safety and operations.

It should be noted that TPD modified three of the inputs on the SYNCRHO analysis to reflect conditions also observed in the field aside from the modeling of the intersection. TPD increased the lane utilization factor from 0.97 to 0.99 based on observations that both lanes were utilized equally during the peak time. TPD also increased the intersection peak hour factor by .02 for all time periods since we have introduced over 400 vehicles through the intersections during all time periods. Lastly, TPD eliminated the bus blockage factor on the northbound Broad Street approach to the intersection to reflect the relocation of those stops to other locations that do not impact the intersection.

SECTION IX – WARRANT ANALYSIS

A. Auxiliary Turn Lane Analysis

TPD evaluated auxiliary turn lane warrants at the critical study area intersections. The warrant analysis was conducted according to the methodologies contained in Chapter 11 of PennDOT's *Publication 46*. The auxiliary lane warrant analysis information is contained in **Appendix K**.

B. Preliminary Traffic Signal Warrant Analysis

TPD conducted a preliminary traffic signal warrant analysis at the intersection of Callowhill Street and N. 15th Street in accordance with PennDOT Publication 212, *Official Traffic Control Devices*, Subchapter D, "Highway Traffic Signals". The preliminary traffic signal warrant analysis information is contained in **Appendix L**.

SECTION X – ALTERNATIVE ACCESS SCENARIOS

TPD was requested to investigate alternative access scenarios to include converting Callowhill Street to allow for two-way traffic in the vicinity of the site and also two options for creating additional access ramps to Callowhill Street from the adjacent I-676 Interchange.

A. Callowhill Street 2-Way Option

TPD investigated the feasibility of converting Callowhill Street to two-way traffic between N. 16th Street and N. Broad Street in order to improve traffic circulation for the site. Based upon our analysis, no conclusions or recommendations of this report are changed.

The primary benefit of this option is the ability to have site traffic exit out to either N. 15th Street or N. Broad Street via Callowhill Street rather than only travel north on N. 16th Street or west on Callowhill Street. The most significant impact realized when modifying Callowhill Street to two-way traffic is the increased delay at the intersection with N. Broad Street, where the overall intersection service degrades due to the reduction of capacity and the introduction of conflicting turning movements.

A potential issue of converting Callowhill Street to two-way traffic would be the installation of a traffic control device for traffic exiting the site. Assuming the site is designed to allow for exiting movements onto Callowhill Street, exiting traffic will conflict with vehicular traffic, in addition to large numbers of pedestrian traffic. Therefore, the installation of either a traffic signal or all-way stop control is expected to be required, which could result in queuing along Callowhill Street that would impact operations at the adjacent intersections (N. 15th and N. 16th Streets).

B. I-676 and Callowhill Street Access Ramps

TPD investigated the feasibility of creating an access to Callowhill Street from the I-676 Broad Street Interchange, located between N. 15th and N. 16th Streets. In an effort to understand the issues / benefits surrounding these potential improvements, TPD researched portions of the Delaware River Port Authority (DRPA) *Benjamin Franklin Bridge West Side Mitigation Study*, prepared by McCormick Taylor & Associates, in addition to the site analysis performed as part of this study. The following are TPD's findings and recommendations.

I-676 Off-Ramp Only

Benefits:

- The I-676 Off-Ramp experiences most of its traffic usage during the morning peak hour time period; therefore, there is generally available capacity during the afternoon and evening peaks for additional, site-related traffic on this ramp.
- This alternative may reduce queuing on the ramp from I-676 during the morning peak hour time period as it eliminates the need for some vehicles to travel through the N. 15th Street and Vine Street Local intersection.
- With fewer vehicles required to turn onto N. 15th Street, operations are anticipated to generally improve at the N. 15th Street and Vine Street Local intersection.
- Site-related traffic using this alternative ramp would be able to gain entrance to the site via the anticipated traffic signal at the terminus with Callowhill Street, thus eliminating the need for some vehicles to travel through the N. 16th Street and Vine Street Local intersection. It is anticipated that this alternative would improve operations at the critical Vine Street Local study area intersections.

Issues:

- Installation of a traffic control device at the terminus with Callowhill Street could result in queuing issues between the adjacent signals at N. 15th and N. 16th Streets. Additionally,

pedestrian traffic at this location would likely need to be restricted for certain movements at the new interchange to maximize safety and ensure sufficient green time for vehicular traffic.

- Signage along I-676 would need to be modified to identify the new access.
- Traffic currently utilizing the I-676 Ramp to 22nd Street may decide to use this newly created access and therefore add additional vehicles to the Broad Street Interchange.

If this ramp option is pursued, TPD recommends a Point of Access Study be prepared to determine if the construction of this ramp is a viable option.

I-676 On and Off-Ramp

TPD evaluated an option to provide for both on and off-ramp access to Callowhill Street at this location. With the anticipated installation of a traffic control device at the terminus with Callowhill Street and the addition of site-related vehicular and pedestrian traffic, it is TPD's opinion that queuing along Callowhill Street would be a significant issue. The site would need to be designed to accommodate both ingress and egress traffic at this Callowhill Street location. Additionally, with the current on-ramp access to N. 16th Street, the overall benefit is perceived to be minimal, other than for site-related traffic. This could be further evaluated as part of a Point of Access Study, if pursued for the I-676 Off-Ramp.

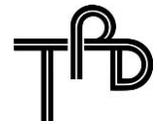
SECTION IX – SUMMARY AND CONCLUSIONS

Based on the results of the transportation impact study, TPD offers the following conclusions:

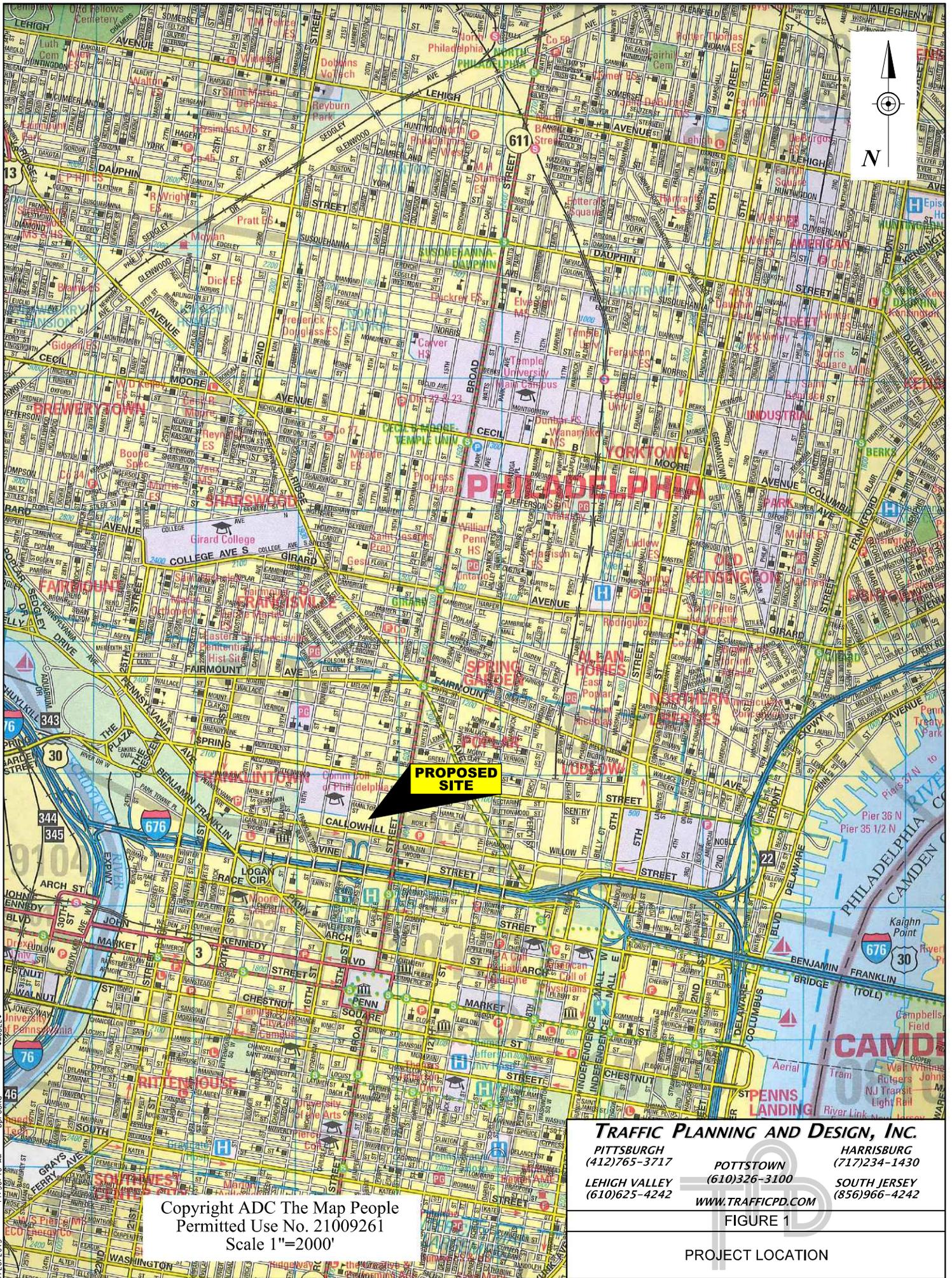
- Upon full build-out, the proposed development is expected to generate the following trips:
 - Friday P.M. Peak Hour: 1,064 new vehicle-trips (592 entering, 472 exiting), 1,343 mass transit trips, and 347 pedestrian trips, during the weekday P.M. peak hour.
 - Friday Evening Peak Hour: 1,271 new vehicle-trips (714 entering, 557 exiting), 1,424 mass transit trips, and 368 pedestrian trips, during the weekday P.M. peak hour.
 - Saturday Evening Peak Hour: 1,365 new vehicle-trips (718 entering, 647 exiting), 1,544 mass transit trips, and 398 pedestrian trips, during the weekday P.M. peak hour.

It should be noted that these trip totals include employees of the complex and local patrons who live and work in Center City and the surrounding neighborhoods.

- The proposed site is served by numerous multi-modal facilities to include regional rail, and it is anticipated that a significant percentage of its visitors will utilize them.
- TPD has identified roadway improvements summarized in Table 8 to be completed in conjunction with the proposed development.
- With the recommended improvements, all study area intersections will operate at acceptable LOS D operations or better, have a less than 10 second increase in delay, or have marginal level of service degradations. Therefore, it is our opinion the PennDOT criteria will be satisfied.



-
- Based upon TPD's analysis, with provision of the roadway improvements anticipated for the development of the proposed 400 North Broad Street site, it is our opinion adequate accommodations for vehicles, pedestrians, mass transit, and bicycles can be provided for the site.



Copyright ADC The Map People
 Permitted Use No. 2109261
 Scale 1"=2000'

TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717
 LEHIGH VALLEY (610)625-4242
 POTTSTOWN (610)326-3100
 WWW.TRAFFICPD.COM
 HARRISBURG (717)234-1430
 SOUTH JERSEY (856)966-4242

FIGURE 1

PROJECT LOCATION



THE PROVENCE

PHILADELPHIA, PENNSYLVANIA

Steelman PartnersSM



TOWER INVESTMENTS, INC.

TRAFFIC PLANNING AND DESIGN, INC.

*PITTSBURGH
(412)765-3717*

*POTTSTOWN
(610)326-3100*

*LEHIGH VALLEY
(610)625-4242*

WWW.TRAFFICPD.COM

*HARRISBURG
(717)234-1430*

*SOUTH JERSEY
(856)966-4242*

FIGURE 2A

SITE PLAN



The Provence

Site Plan

TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717
 LEHIGH VALLEY (610)625-4242
 POTTS TOWN (610)326-3100
 HARRISBURG (717)234-1430
 SOUTH JERSEY (856)966-4242
 WWW.TRAFFICPD.COM

FIGURE 2B

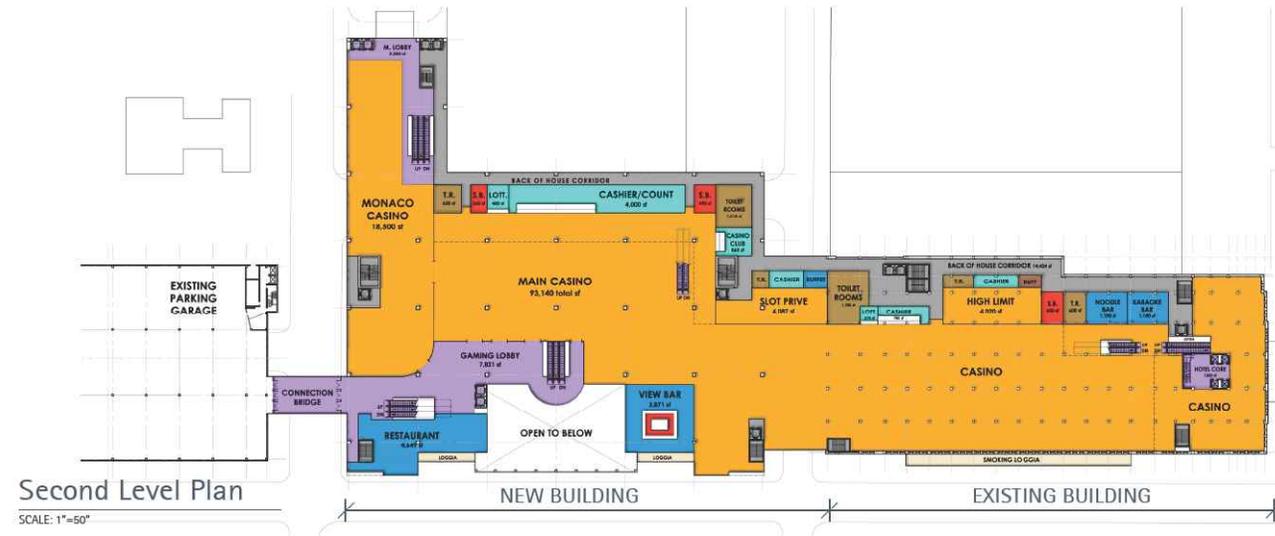
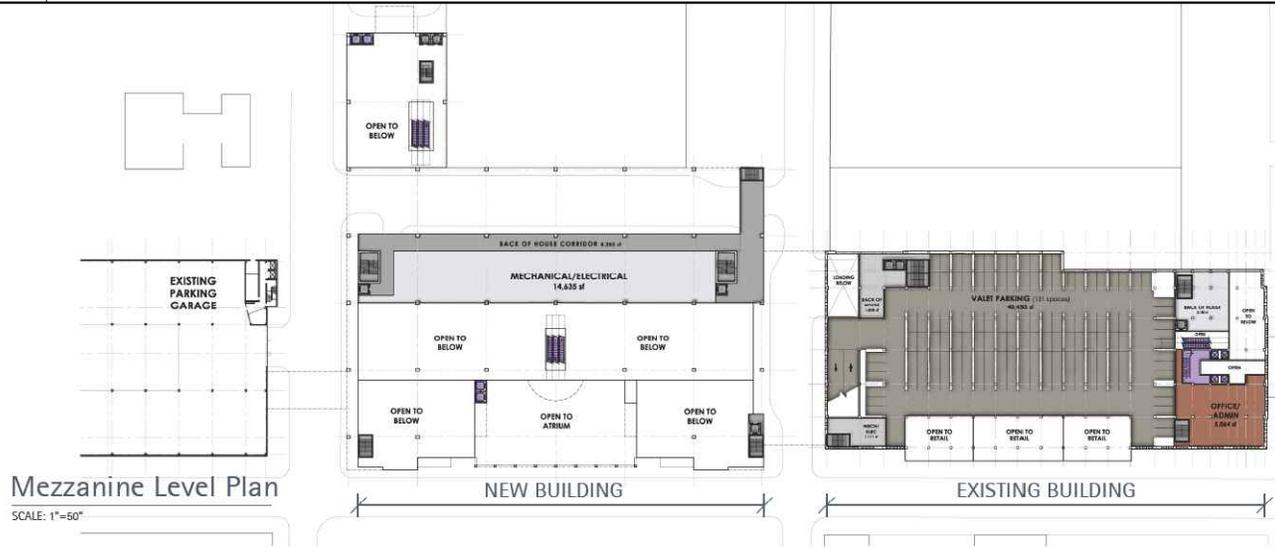
SITE PLAN



The Provence

TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717
 LEHIGH VALLEY (610)625-4242
 POTTSWOWN (610)326-3100
 WWW.TRAFFICPD.COM
 HARRISBURG (717)234-1430
 SOUTH JERSEY (856)966-4242

FIGURE 2C
 SITE PLAN



The Provence

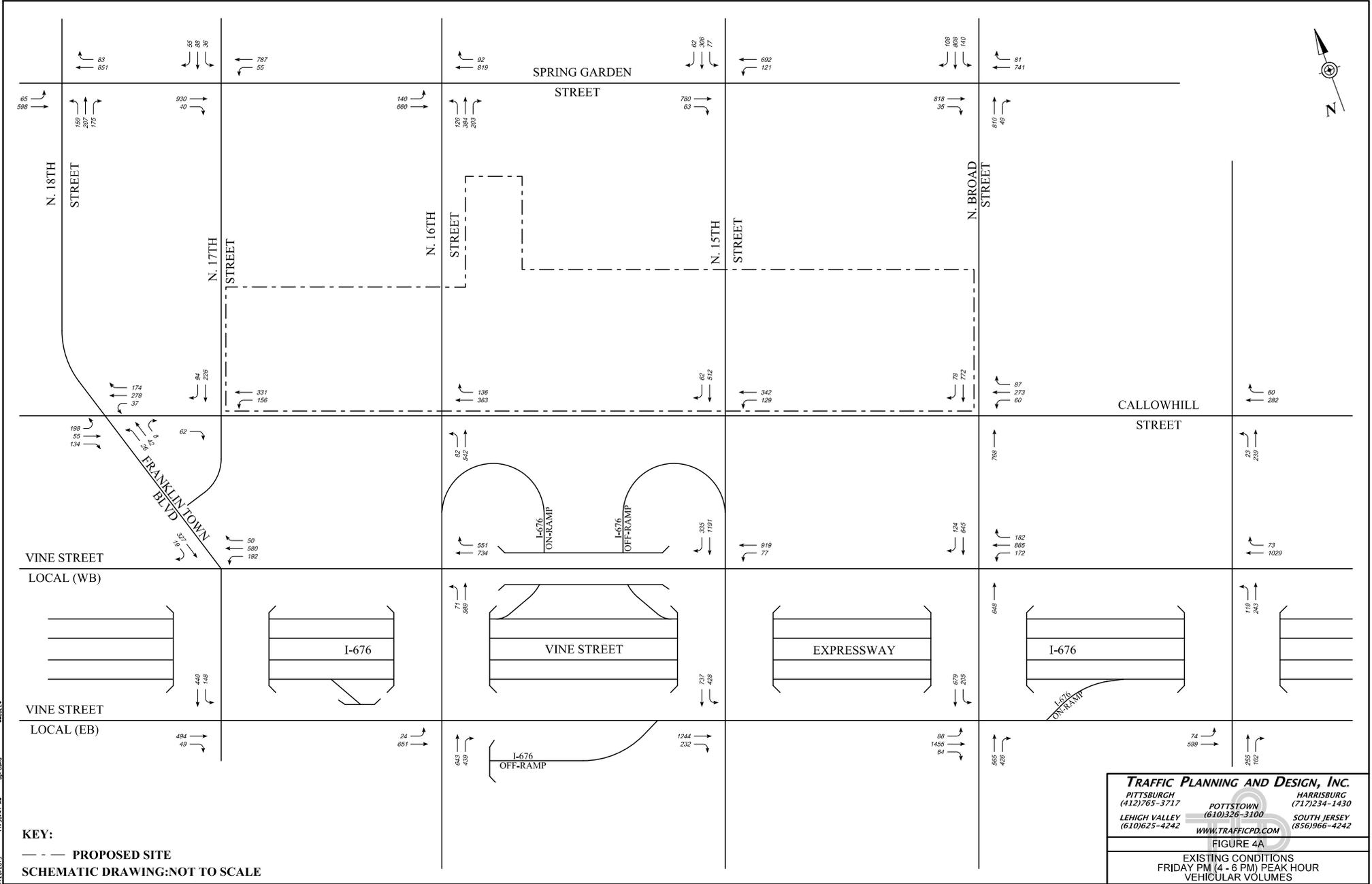
TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717
 LEHIGH VALLEY (610)625-4242
 POTTSTOWN (610)326-3100
 HARRISBURG (717)234-1430
 SOUTH JERSEY (856)966-4242
 WWW.TRAFFICPD.COM

FIGURE 2D

SITE PLAN



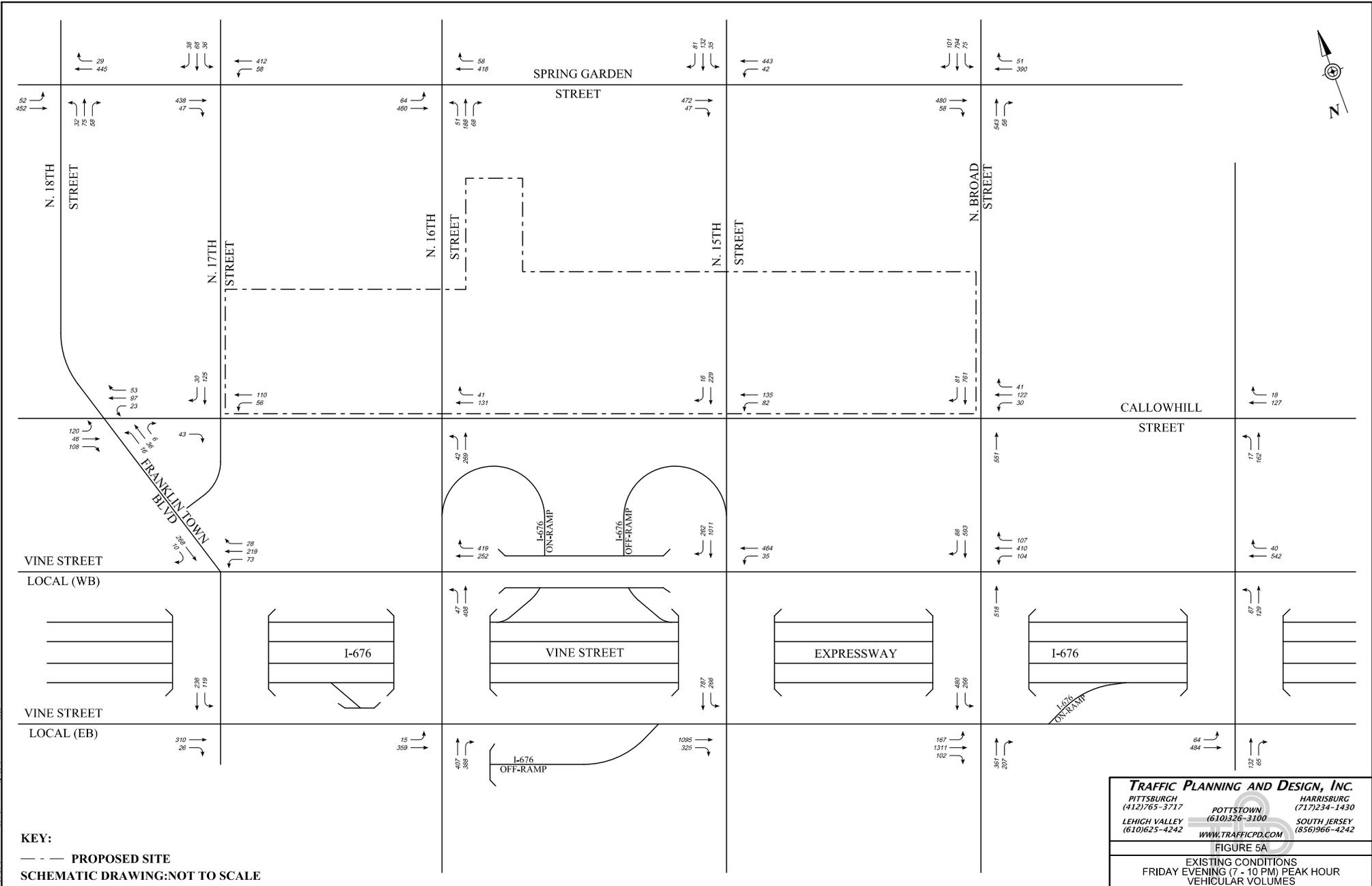
11/18/2010 11:58:41 AM Project: I-676 Corridor Zone Schematic Draft - 1st City Figures - New Site Plan.dwg
 User: J. P. ...
 7/2/2010 11:58:41 AM



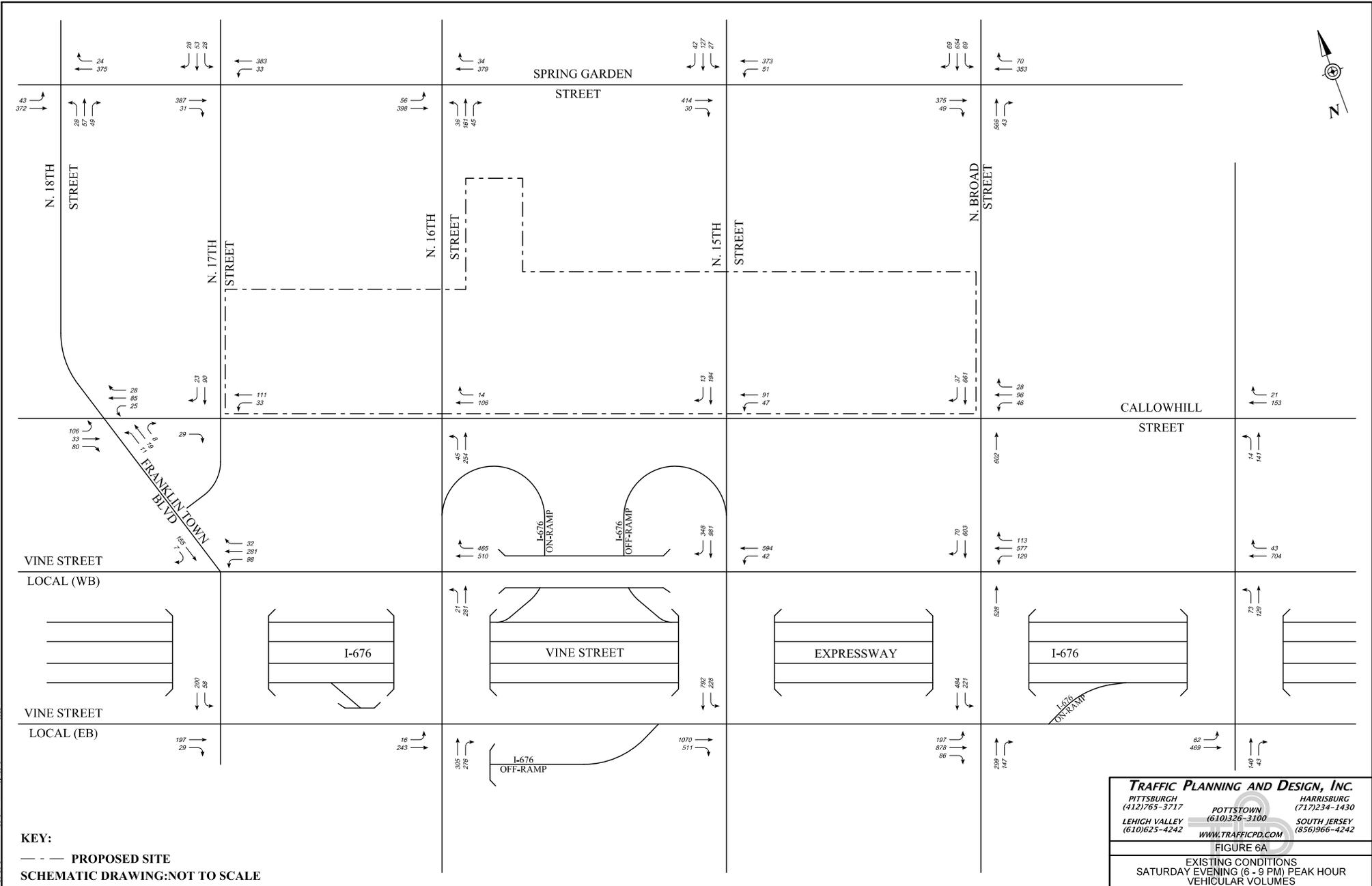
KEY:
 - - - PROPOSED SITE
SCHEMATIC DRAWING: NOT TO SCALE

TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412) 765-3717 HARRISBURG (717) 234-1430
 LEHIGH VALLEY (610) 326-3100 SOUTH JERSEY (856) 966-4242
 WWW.TRAFFICPD.COM

FIGURE 4A
 EXISTING CONDITIONS
 FRIDAY PM (4 - 6 PM) PEAK HOUR
 VEHICULAR VOLUMES



11/18/2010 11:58:42 AM C:\Users\jg\Documents\Traffic\Spring Garden\Spring Garden.dwg
 11/18/2010 11:58:42 AM C:\Users\jg\Documents\Traffic\Spring Garden\Spring Garden.dwg
 11/18/2010 11:58:42 AM C:\Users\jg\Documents\Traffic\Spring Garden\Spring Garden.dwg

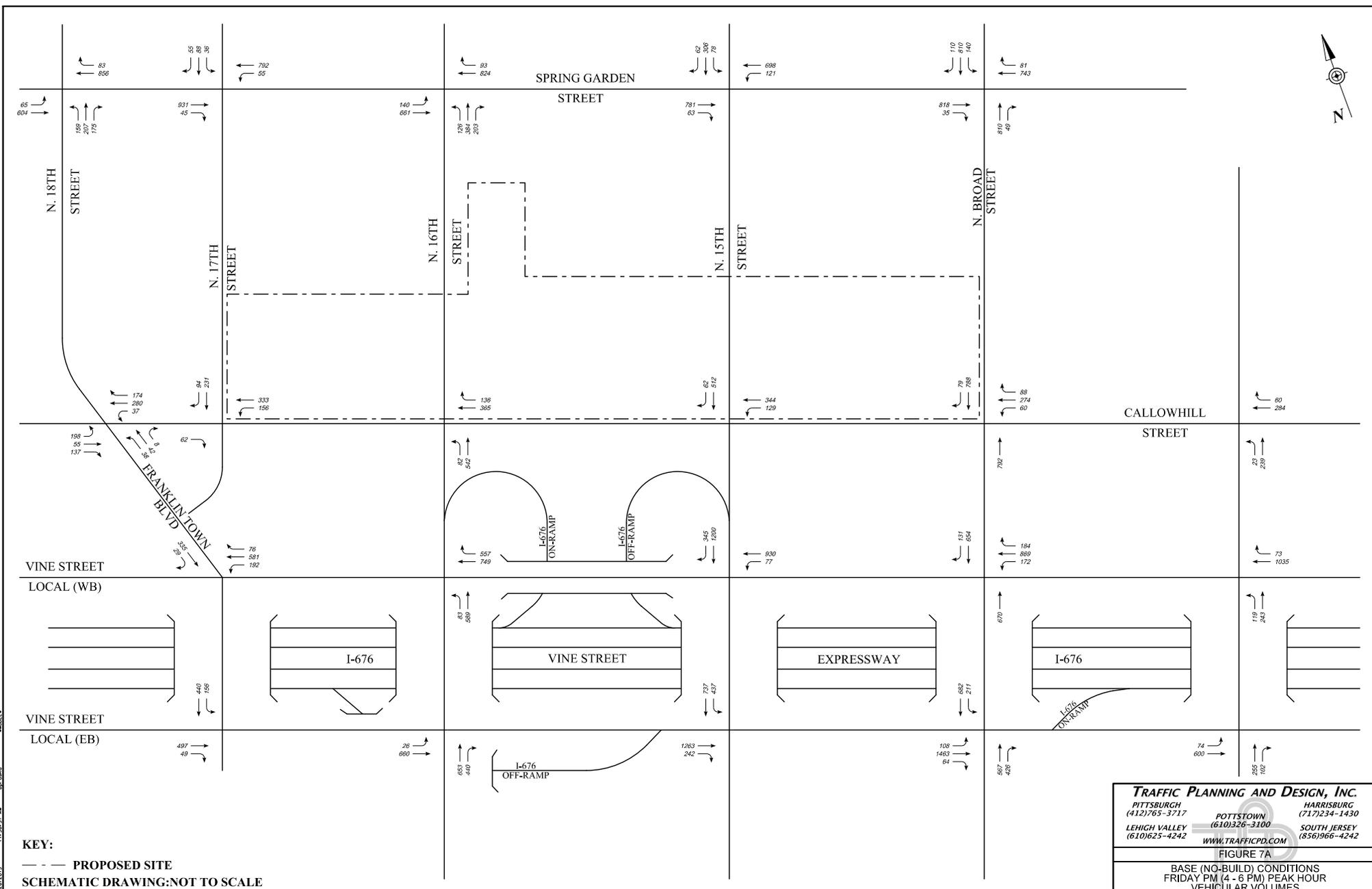


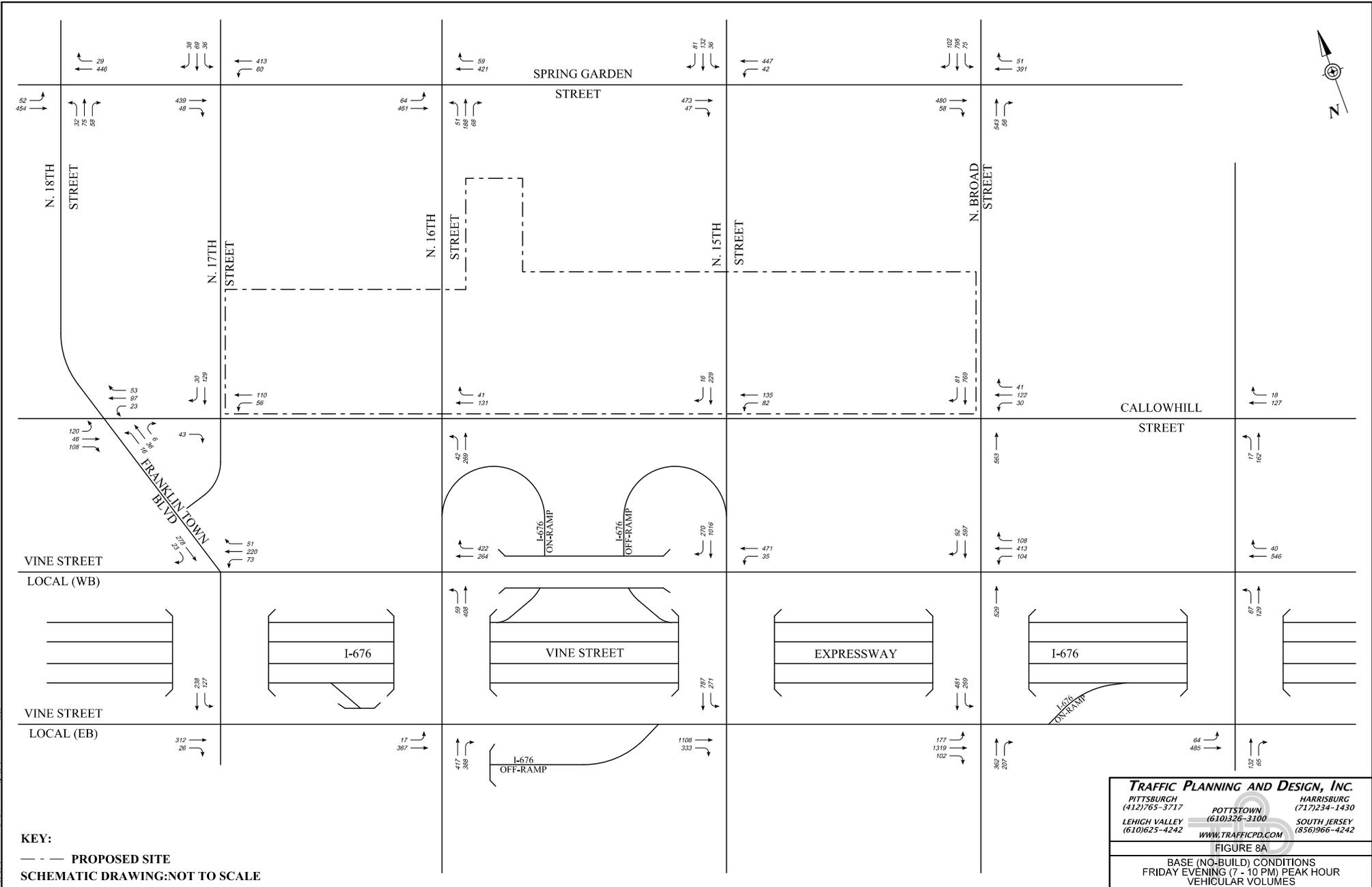
TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717 HARRISBURG (717)234-1430
 POTTSTOWN (610)326-3100
 LEHIGH VALLEY (610)625-4242 SOUTH JERSEY (856)966-4242
 WWW.TRAFFICPD.COM

FIGURE 6A
 EXISTING CONDITIONS
 SATURDAY EVENING (6 - 9 PM) PEAK HOUR
 VEHICULAR VOLUMES

11/15/2011 11:58:11 AM Project: I-676 Corridor Study - Spring Garden - Near State Prison, PA
 7/2/2011 11:58:11 AM

11/15/2018 11:58 AM Project: I-676 Corridor Zone Schematic Draft Figures - New Site Plan.dwg
 User: J. P. ...
 7/2/2013 11:58 AM



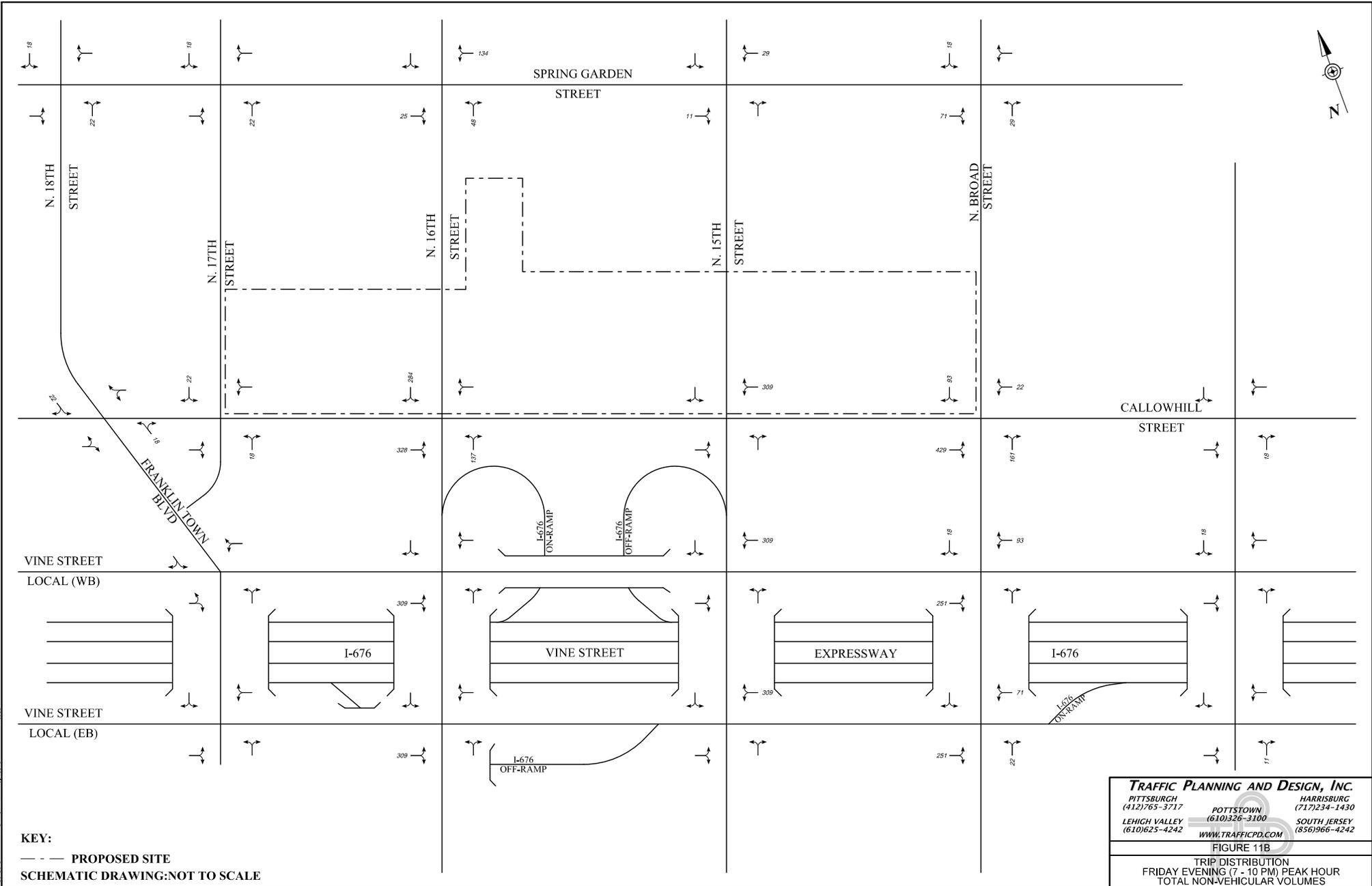


TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717 HARRISBURG (717)234-1430
 LEHIGH VALLEY (610)326-3100 SOUTH JERSEY (856)966-4242
 WWW.TRAFFICPD.COM

FIGURE 8A

BASE (NO-BUILD) CONDITIONS
 FRIDAY EVENING (7 - 10 PM) PEAK HOUR
 VEHICULAR VOLUMES

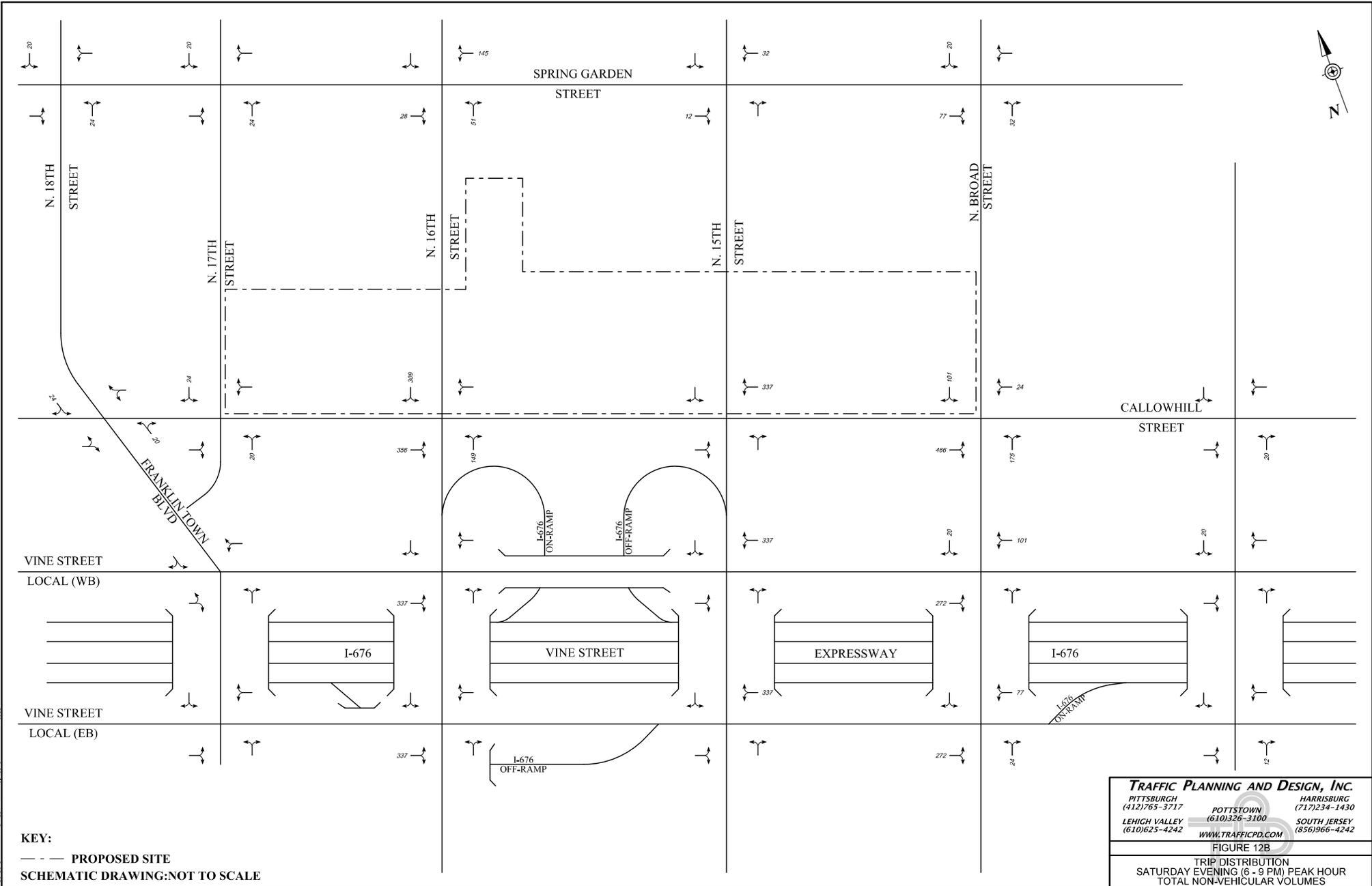
11/11/2014 11:11:11 AM Traffic Planning and Design, Inc. - New Site Plan.dwg
 11/11/2014 11:11:11 AM Traffic Planning and Design, Inc. - New Site Plan.dwg
 11/11/2014 11:11:11 AM Traffic Planning and Design, Inc. - New Site Plan.dwg



TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717 POTTSTOWN (610)326-3100 HARRISBURG (717)234-1430
 LEHIGH VALLEY (610)625-4242 SOUTH JERSEY (856)966-4242
 WWW.TRAFFICPD.COM

FIGURE 11B
 TRIP DISTRIBUTION
 FRIDAY EVENING (7 - 10 PM) PEAK HOUR
 TOTAL NON-VEHICULAR VOLUMES

11/18/2010 1:11:11 PM C:\p11\1100001\fig11b\fig11b.dwg - New Site Plan.dwg
 7/2/2010 11:18:11 AM
 11/18/2010 1:11:11 PM



KEY:
 - - - PROPOSED SITE
SCHEMATIC DRAWING: NOT TO SCALE

TRAFFIC PLANNING AND DESIGN, INC.
 PITTSBURGH (412)765-3717 HARRISBURG (717)234-1430
 LEHIGH VALLEY (610)326-3100 SOUTH JERSEY (856)966-4242
 WWW.TRAFFICPD.COM

FIGURE 12B
 TRIP DISTRIBUTION
 SATURDAY EVENING (6 - 9 PM) PEAK HOUR
 TOTAL NON-VEHICULAR VOLUMES

11/13/2013 11:11:38 AM C:\Users\jgarcia\Documents\Traffic\12B\12B12B.dwg - New Site Plan.dwg
 11/13/2013 11:11:38 AM

