

## I-95 Interchange Enhancement and Reconstruction

# I-95 EXPRESSWAY INTERCHANGES SECTIONS GIR/VINE AND AFC TRAFFIC STUDY - SUPPLEMENT NUMBER 3



OCTOBER 2011

*Prepared for Pennsylvania  
Department of Transportation by*





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By**

**Delaware Valley Regional Planning Commission  
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Philadelphia, PA 19106-1520**

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The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great region even greater. Shaping the way we live, work, and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region leading the way to a better future.



The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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## **EXECUTIVE SUMMARY**

This supplemental report prepared by the Delaware Valley Regional Planning Commission (DVRPC) presents updated and coordinated year 2030 traffic forecasts for the four Section AFC (Ann Street to Frankford Creek) alternatives still being considered in the Federal Highway Administration Point of Access (POA) Study for the I-95 Interchange and Mainline Reconstruction Project. These alternatives include: the No-Build, Minimum Build, Full Diamond at Allegheny Avenue, and Split Diamond Interchange which includes southbound ramps to and from I-95 at Allegheny Avenue and northbound on-and off-ramps at Castor Avenue. These forecasts are based on coordinated underlying assumptions: 1) 2030 design year based on Board adopted DVRPC socioeconomic forecasts; 2) include Delaware Avenue/Christopher Columbus Boulevard condominium and casino-generated volumes; and 3) eliminate the Delaware Avenue Extension temporary detour road.

For each alternative, three sets of forecasts are provided: 1) 2030 Average Daily Traffic Volumes, 2) 2030 AM and PM peak hour freeway, ramp, and interchange turning movement volumes, and 3) 2030 AM and PM peak hour turning movement volumes for selected study area intersections.

Also, the pedestrian crosswalk, bicycle, and vehicular turning movement counts within the North Delaware Avenue/Beach Street intersection at East Columbia Avenue taken during the 2010 Shad Fest are included and analyzed in this report. Shad Fest was held in Penn Treaty Park on April 24, 2010. These counts were taken to measure pedestrian crosswalk and bicycle volumes associated with a large attendance event at the park. These counts, when combined with 2030 projections of the vehicular intersection turning movements, will ensure that the pedestrian and bicycle provisions in the Section GIR Phase 3 design for this critical intersection can safely serve large event pedestrian street crossings and bicycle trips given casino trip generation and other vehicular traffic growth.





## I. INTRODUCTION

This supplemental technical report presents updated and coordinated year 2030 traffic forecasts for the four Section AFC alternatives still being considered in the Federal Highway Administration (FHWA) Point of Access (POA) Study of the I-95 Section AFC (Ann Street to Frankford Creek) Interchange and Mainline Reconstruction Project. These alternatives include: the No-Build, Minimum Build, Full Diamond at Allegheny Avenue, and Split Diamond Interchange, which includes southbound ramps to and from I-95 at Allegheny Avenue and northbound on- and off-ramps at Castor Avenue. Year 2030 projections for all four of these alternatives had been previously prepared by DVRPC staff as part of the Section AFC traffic study. However, the underlying assumptions for these projections evolved as the study progressed over time. FHWA requested that DVRPC prepare supplemental traffic projections for these four alternatives based on the same underlying assumptions: 1) 2030 design year based on DVRPC Board adopted socioeconomic forecasts; 2) inclusion of the Delaware Avenue/Christopher Columbus Boulevard condominium and casino generated traffic in the forecasts; and 3) elimination of the Delaware Avenue Extension temporary detour road.

Three sets of forecasts are provided for each alternative: 1) 2030 Average Daily Traffic Volumes, (AADT), 2) 2030 AM and PM peak hour freeway, ramp, and interchange turning movement volumes, and 3) 2030 AM and PM peak hour turning movement forecasts for selected study area intersections. This data is provided for input for the POA study being prepared by the design consultant.

Also included in this report are pedestrian crosswalk, bicycle, and vehicular turning movement counts taken within the North Delaware Avenue/Beach Street intersection with East Columbia Avenue during the 2010 Shad Fest. Shad Fest was held on April 24, 2010, in Penn Treaty Park, located adjacent to the Lower Kensington and Fishtown sections of Philadelphia. In addition, 2030 projections of the vehicular intersection turning movements, representative of traffic generated by the SugarHouse Casino and proposed condominium developments, are included. These forecasts will ensure that the pedestrian and bicycle provisions included in the Section GIR Phase 3 design for this critical intersection can safely serve pedestrian crosswalk volumes and bicycle trips associated with large Penn Treaty Park events, given casino and other traffic growth on Delaware Avenue.

This report supplements the 2025 traffic forecasts in the initial traffic study reports for I-95 Section GIR, entitled *I-95 Girard Avenue and I-676 Vine Expressway Interchanges, Section GIR Traffic Study*, published in June 2005; and the initial report for Section AFC, entitled *I-95 Section AFC (Ann Street to Frankford Creek) Interchange Traffic Study*, May 2006. It also supplements, *I-95 Expressway Interchanges Sections GIR/Vine and AFC Traffic Study - Supplement Number 1*, published in November 2008 and *I-95 Expressway Interchanges Sections GIR/Vine and AFC Traffic Study - Supplement Number 2*, published in February 2010. As described in the initial study and Supplement Numbers 1 and 2 reports, a focused simulation was conducted, where the traffic zones in the study area were subdivided into smaller zones to better reflect the highway network and land use characteristics of the study area. The model's highway network within the study area was reviewed and enhanced as needed. These section GIR and AFC forecasts assume the opening of

SugarHouse Casino, along with the proposed condominium and commercial developments along the Delaware Riverfront. The forecasts also assume the preferred I-95 Interchange designs for sections VINE, BSR/BRI, and CPR. The basic modeling assumptions and forecasting methodology, as well as 2025 traffic forecasts for seven GIR alternatives, are described in the June 2005 report. The May 2006 report also includes the modeling methodology and presents forecasts for nine AFC construction alternatives. These travel simulations were conducted with the TRANPLAN modeling software.

The November 2008 Supplement Number 1 Report describes the casino, condominium, and commercial developmental assumptions and the 2030 DVRPC Board adopted socioeconomic forecasts, presents the 2030 Traffic Forecasts for “Build Option 7 with proposed Delaware Avenue Extension” for Section GIR and “Alternative 5 – Diamond Interchange with proposed Delaware Avenue Extension” for Section AFC, and presents 2030 pedestrian and bicycle travel forecasts for North Christopher Columbus Boulevard and North Delaware Avenue. The 2010 Supplement Number 2 report presents facility design assumptions for Sections GIR and AFC under Alternative 10 AADT, AM and PM peak hour turning movement forecasts, and pedestrian forecasts are presented.

Chapter II of this report includes a description of the four Section AFC alternatives included in the FHWA Point of Access (POA) Study and presents the updated 2030 forecasts for 2030 AADT link and AM and PM peak hour roadway and neighborhood turning movements for signalized intersections within the study area. These forecasts are presented on a series of 12 figures, three for each alternative.

Chapter III of this supplemental report presents the results of the 2010 Shad Fest counting effort. Included is an overview of the place of residence and travel mode taken from a companion post card survey of the 2010 Shad Fest conducted by the New Kensington Community Development Corporation. A detailed description of the traffic/pedestrian/bicycle counting methodology is also presented, together with an analysis of the counted pedestrian crosswalk, bicycle lane, and vehicular turning movements collected during the 2010 Shad Fest held in Penn Treaty Park. Also provided in Chapter III are projected 2030 peak hour intersection vehicular turning movements assuming construction of the preferred I-95 interchange designs for sections GIR and AFC and the opening of the SugarHouse Casino and proposed residential condominium developments along North Delaware Avenue and Christopher Columbus Boulevard. This data may be used for intersection design purposes and eventual construction under Section GIR Phase 3. Appendix A of this supplemental report includes the detailed counts of pedestrian crossings, park entrances, bicycle lane volumes, and vehicular traffic turning movements summarized by 15-minute interval for the duration of Shad Fest event from 10:30 AM to 6:00 PM.

DVRPC uses state of the practice methods to determine the effect of various improvements on traveler behavior and system function. These include highway volumes, travel times, and modal splits of various alternatives. Alternative selection is a complex task including these and many other factors. This report does not endorse or recommend any specific alternative or project. Only projects that are included in DVRPC’s Transportation Improvement Program (TIP) or Long-Range Plan are officially endorsed by DVRPC.

## **II. COORDINATED 2030 TRAFFIC VOLUME PROJECTIONS UNDER FHWA POINT OF ACCESS (POA) STUDY SECTION AFC ALTERNATIVES**

This section presents a brief description of the four I-95 Section AFC (Ann Street to Frankford Creek) interchange and mainline reconstruction alternatives included in the FHWA Point of Access (POA) study. The highway network model used to project 2030 Section AFC traffic volumes under the four POA alternatives included the planned casinos and condominium developments along North Delaware Avenue and Christopher Columbus Boulevard and also assumed the preferred alternative mainline and ramp improvement in the other four I-95 interchange improvement study areas. That assumes major reconstructions of the Section GIR (Girard Avenue interchange without Delaware Avenue Extension), BRI (Betsy Ross Bridge), BSR (Bridge Street/Aramingo Avenue interchanges), and CPR (Cottman/Princeton). The exact improvements and specifications included in these interchange reconstructions are given in the POA studies for these I-95 interchanges.

Previously, 10 alternative interchange configurations for I-95 Section AFC were studied. The four options for the Section AFC interchange reconstruction POA are No-Build (Alternative 1), Minimum Build (Alternative 8A), Full Diamond (Alternative 2), and Split Diamond (Alternative 10). The proposed Delaware Avenue Extension across Conrail property (also called the “temporary relief road”) is removed from all four alternatives in favor of a temporary I-95 lane closure relief road immediately adjacent to the I-95 embankment. A brief description of each alternative follows:

### **A. No-Build (Alternative 1)**

For Section AFC, the No-Build assumes reconstruction of the I-95 mainline, the existing Allegheny/Castor Avenue interchange ramps, and the Betsy Ross Bridge viaduct in the current configuration. Exceptions include a fifth utility lane added to the I-95 mainline northbound from the Allegheny Avenue off-ramp to the Betsy Ross Bridge Viaduct off-ramp and a fifth utility lane added to I-95 Southbound from the Allegheny Avenue southbound off-ramp to the Girard Avenue Interchange.

### **B. Minimum Build (Alternative 8A)**

Within Section AFC, the Minimum Build Alternative 8A is the same as the No-Build, except that the fifth I-95 southbound utility lane is extended northwards to the Betsy Ross Bridge on-ramp. In this alternative, I-95 southbound also continues as five lanes all the way through the Allegheny Avenue Interchange to the Girard Avenue Interchange. This widening of I-95 southbound is needed to better serve heavy traffic entering the expressway from the two lane combined Betsy Ross Bridge/Adams Avenue connector and the relocated Aramingo Avenue southbound on-ramp.

### **C. Full Diamond at Allegheny Avenue (Alternative 2)**

The Full Diamond Interchange design relocates the existing I-95 northbound off-and on-ramps so that all movements to and from I-95 are consolidated onto a single diamond interchange connected to Allegheny Avenue between Richmond and Bath streets. The northbound off-ramp terminus is relocated from Westmoreland Street to Allegheny Avenue and the northbound on-ramp is relocated from Castor to Allegheny Avenue. This alternative allows access to the Betsy Ross Bridge via the relocated Allegheny Avenue northbound on-ramp and encourages local street traffic exiting from I-95 northbound to use Allegheny Avenue rather than Westmoreland Street.

## D. Split Diamond (Alternative 10)

The Split Diamond is the preferred interchange design for I-95 Section AFC. It was developed to mitigate projected Level of Service (LOS) problems associated with the I-95 northbound ramps at Allegheny Avenue under the Full Diamond Alternative and to avoid Conrail owned land acquisition problems associated with the Diamond Alternative's I-95 NB off-ramp. The Full (widened) Diamond Alternative was studied previously in Supplement Number 1 of this report series, dated November 2008. The proposed I-95 Northbound off and on-ramps were moved from Allegheny Avenue north to Castor Avenue. Access to the Betsy Ross Bridge will be redirected to a slip ramp from the Castor Avenue on-ramp to the approaches to the Betsy Ross Bridge. The proposed Delaware Avenue Extension across Conrail property (also called the "temporary relief road") was removed from Alternative 10 in favor of a temporary I-95 lane closure relief road immediately adjacent to the I-95 embankment.

## E. Coordinated 2030 Traffic Volume Projections under the FHWA (POA) Study Section AFC Alternatives

This section of the report presents 12 figures that display forecasted 2030 traffic volumes for the four Section AFC options being considered in the POA analysis. Three figures are provided for each alternative: 1) current and 2030 forecasted Average Daily Traffic Volumes, 2) 2030 AM and PM peak hour freeway, ramp, and interchange turning movement volumes, and 3) 2030 AM and PM peak hour turning movement volumes for 30 signalized arterial and local street roadway intersections within the Section AFC Study Area.

These projected volumes reflect the 2030 DVRPC Board adopted population and employment forecasts and trip generation from the proposed/existing SugarHouse, Foxwoods, Parx, and Harrah's Chester casinos, as well as proposed condominium and commercial developments along Christopher Columbus Boulevard and North Delaware Avenue. The traffic forecasts assume construction of the traffic improvements contained in the DVRPC Year 2030 Regional Transportation Plan, including the preferred I-95 improvement alternatives for the Girard Avenue, Betsy Ross Bridge/Bridge Street, and Cottman/Princeton interchanges.

### 1. No-Build (Alternative 1) Traffic Forecasts

**Figure 1** displays the current traffic counts and 2030 No-Build Alternative link traffic forecasts for the I-95 Section AFC study area. The number posted under the line representing the roadway represents the current traffic count, and the number posted over the line represents the corresponding 2030 No-Build forecast. **Figure 2** presents the forecasted AM and PM peak hour I-95 mainline and ramp volumes and turning movement forecasts for I-95 within the study area. For the mainline, ramp, and turning movement forecasts, the number to the left of the slash represents the 2030 AM peak hour forecast and the number to the right of the slash represents the forecasted 2030 PM peak hour turning movements. Similarly, **Figure 3** includes AM and PM peak hour turning movement forecasts for 30 signalized arterial and local road intersections within the I-95 Section AFC study area under the No-Build Alternative. Taken together, **Figures 1 through 3** give a comprehensive 2030 traffic forecast for I-95, the freeway ramps, and the supporting arterial collector/distributor roadway network within the Section AFC Study Area.

**Figure 1. Section AFC Current and 2030 No-Build (Alternative 1) Average Daily Traffic Volumes**

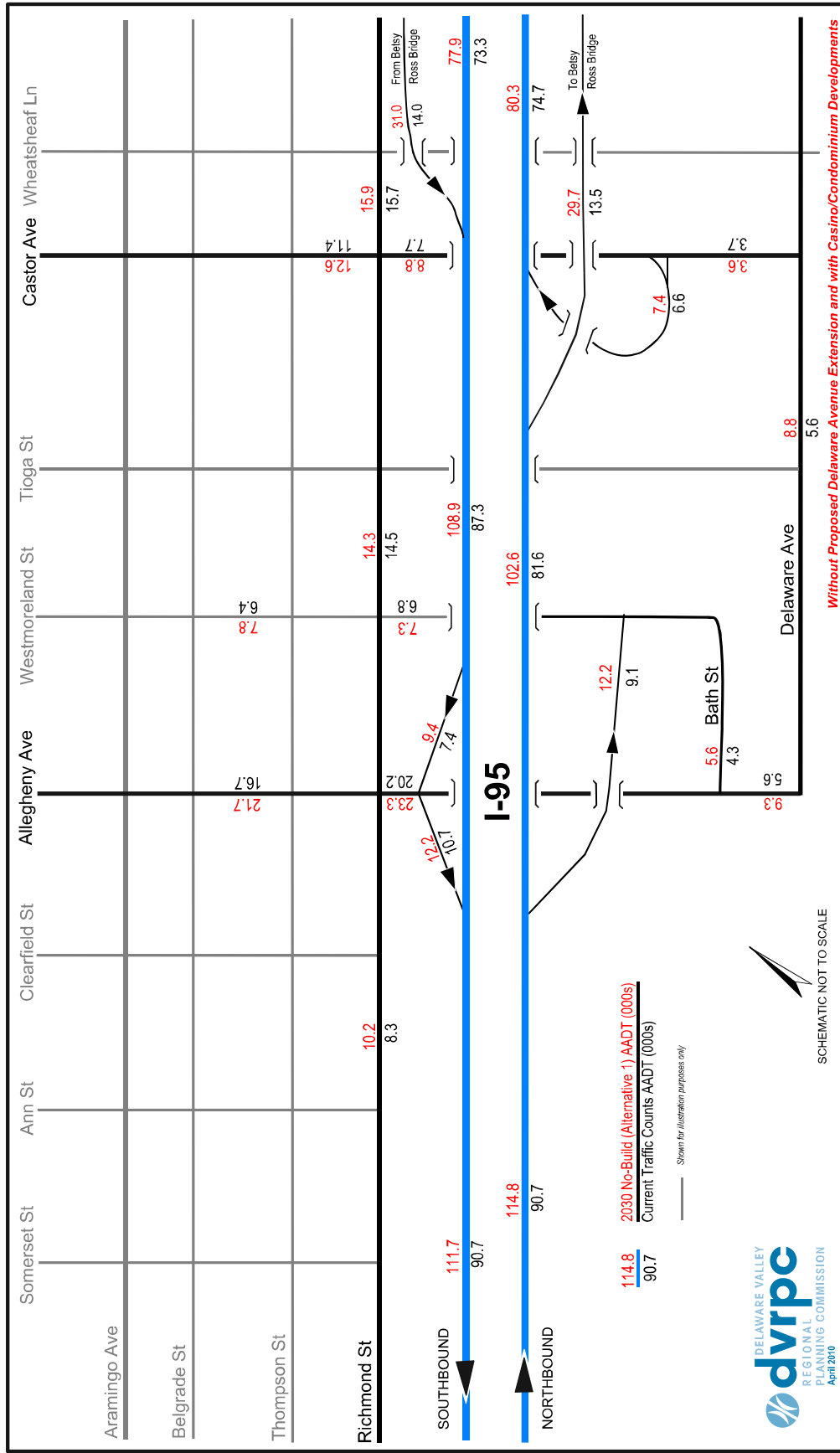


Figure 2. Section AFC 2030 No-Build (Alternative 1) AM/PM Peak Hour Traffic Volumes

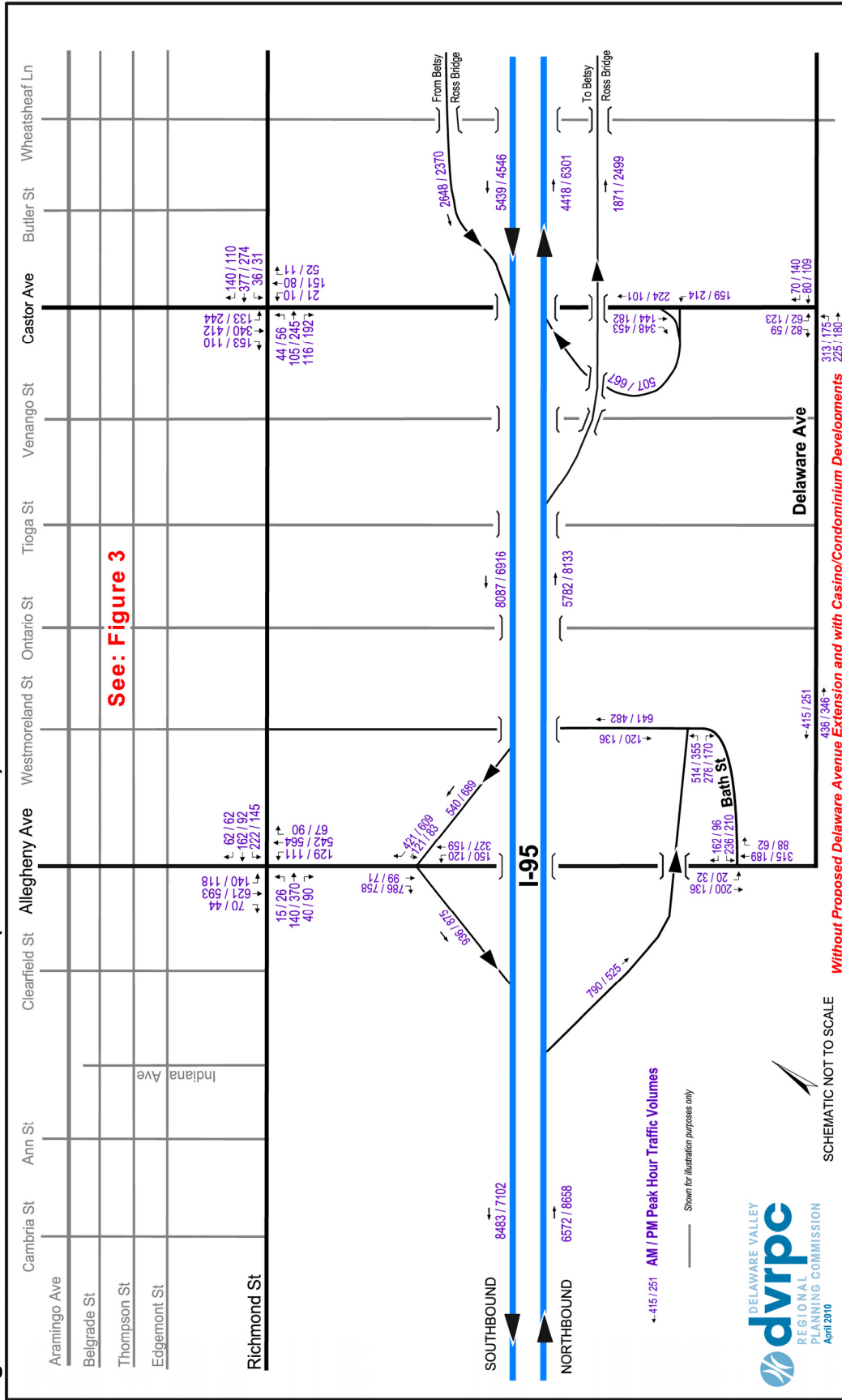


Figure 3. Section AFC 2030 No-Build (Alternative 1) AM/PM Peak Hour Traffic Volumes (Inset)

	Cambria St	Ann St	Clearfield St	Allegheny Ave	Westmoreland St	Ontario St	Tioga St	Venango St	Castor Ave	Butler St	Wheatstheaf Ln
Aramingo Ave	489/704 9/11	886/650 15/32	50/74 662/647	25/42 848/673 16/15	81/140 732/605 1/5	222/952 767/660 282/204	55/91 383/1142 130/121	104/00 1593/1176 66/40	125/282 128/188 307/168	71/59 2070/1228 31/54	50/59 984/1381 53/68
Cedar St			47/51 428/138 13/16	5/7 39/20 32/20	31/28 498/81 16/10	13/25 576/1178 9/16	25/28 677/1417 24/15	35/73 669/1541 40/23	76/138 610/1318 94/208	57/54 819/1524 16/58	2/3 871/1906 19/13
Gaul St			14/19 64/152 32/33	14/19 543/474 38							
Belgrade St			28/37 363/309 26/48	41/43 126/197 42/43	35/32 310/306 121/102						
Thompson St			28/42 341/103 21/36	44/45 590/664 69/157							
Edgemont St			16/23 387/236	51/58 671/742 98/141							
Richmond St			15/84 180/552	62/62 530/539 81/98							

Without Proposed Delaware Avenue Extension and with Casino/Condominium Developments



140 / 370 → AM / PM Peak Hour Traffic Volumes

SCHEMATIC NOT TO SCALE

## **2. Minimum Build (Alternative 8A) Traffic Forecasts**

**Figures 4 through 6** present a comprehensive 2030 traffic forecast for I-95, the freeway ramps, and the supporting arterial collector/distributor roadway network within the Section AFC Study Area under the Minimum Build Alternative

## **3. Full Diamond at Allegheny (Alternative 2) Traffic Forecasts**

**Figure 7** presents the current and forecasted 2030 Average Daily Traffic Volumes under the Full Diamond alternative. **Figure 8** shows the 2030 AM and PM peak hour freeway ramp and interchange turning movement volumes, and **Figure 9** shows the 2030 AM and PM peak hour turning movement volumes for 30 signalized arterial and local roadway intersections within the Section AFC Study Area.

## **4. Split Diamond (Alternative 10) Traffic Forecasts**

**Figure 10** presents current and 2030 forecasted traffic volumes under Alternative 10 (Split Diamond) for the Section AFC. **Figure 11** presents AM and PM peak hour freeway, ramp, and interchange volumes, and **Figure 12** includes turning movement forecasts of 30 signalized street intersections within the study area.



**Figure 4. Section AFC Current and 2030 Minimum Build (Alternative 8A) Average Daily Traffic Volumes**

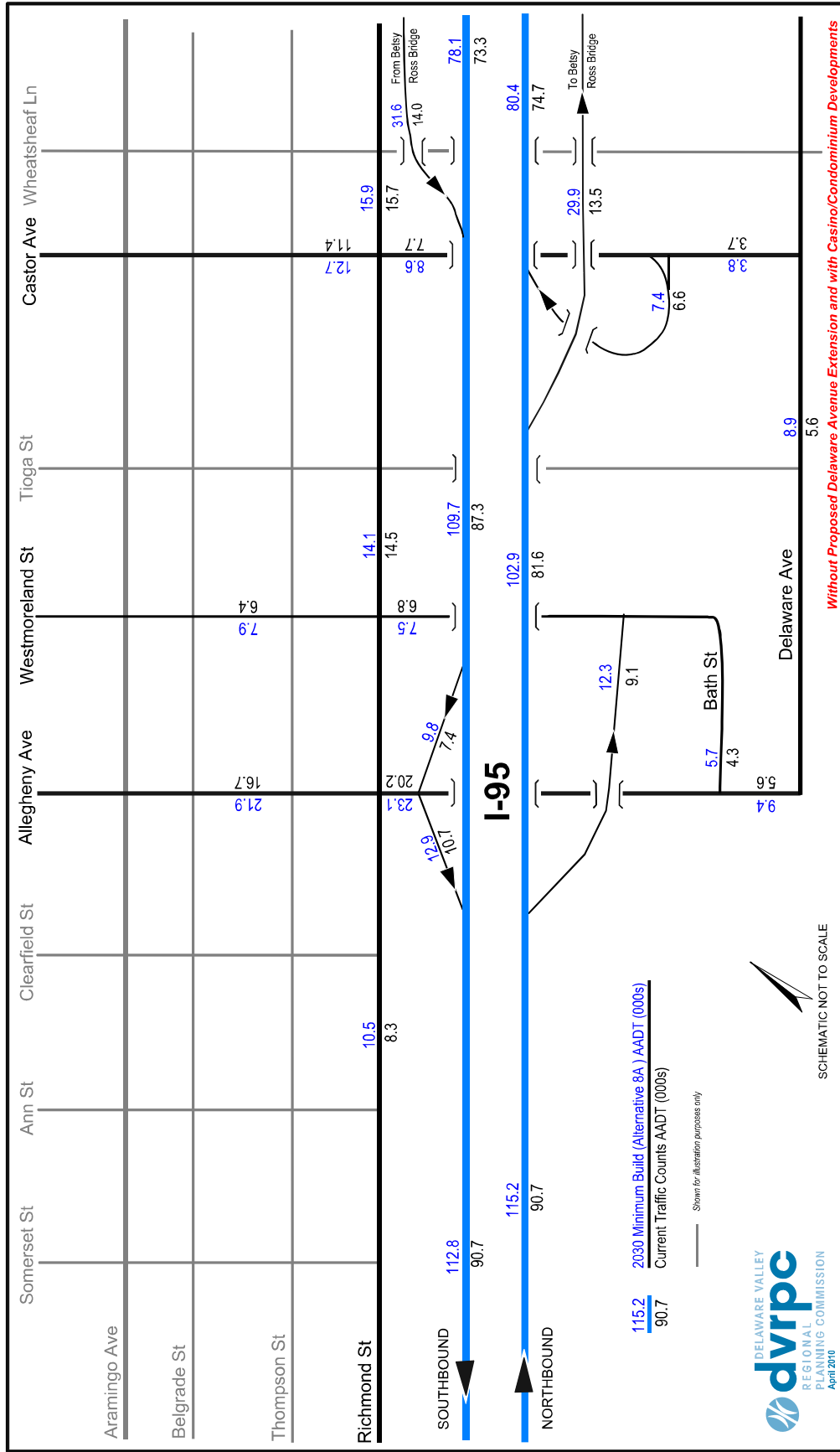
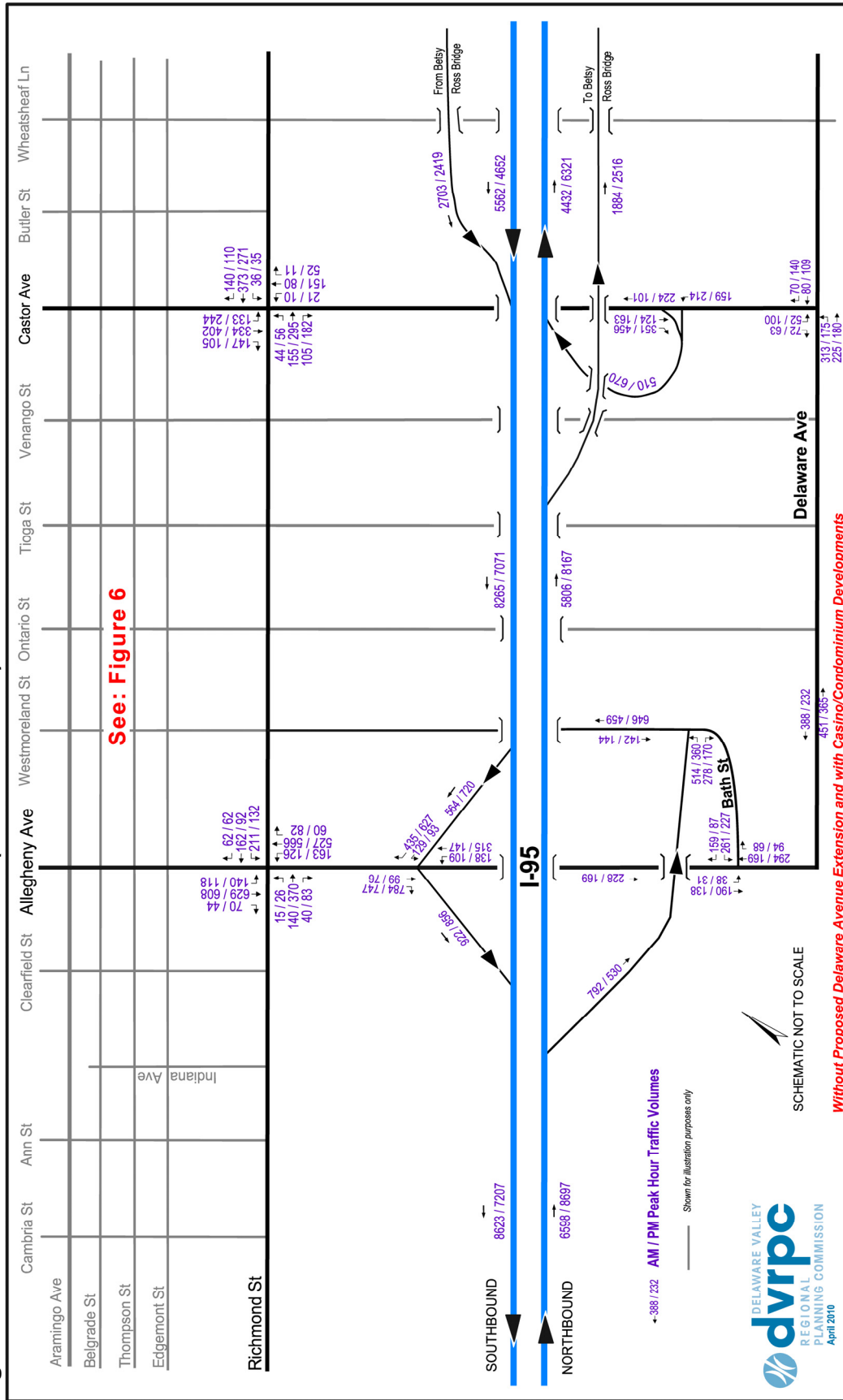


Figure 5. Section AFC 2030 Minimum Build (Alternative 8 A) AM/PM Peak Hour Traffic Volumes



**Figure 6. Section AFC 2030 Minimum Build (Alternative 8 A) AM/PM Peak Hour Traffic Volumes (Inset)**

	Cambria St	Ann St	Clearfield St	Allegheny Ave	Westmoreland St	Ontario St	Tioga St	Venango St	Castor Ave	Butler St	Wheatstheat Ln
Aramingo Ave	463/669 9/11	47/151 405/706 15/16	25/42 8/10/650 32/46	50/74 826/625	81/40 10/5 10/16	222/382 30/637 282/284	56/81 132/1121 130/121	103/92 157/1155 86/40	53/89 173/1054 71/57	116/90 162/1005 307/188	116/90 162/1005 307/188
Cedar St		47/151 405/706 15/16	25/42 8/10/650 32/46	50/74 826/625	81/40 10/5 10/16	222/382 30/637 282/284	56/81 132/1121 130/121	103/92 157/1155 86/40	53/89 173/1054 71/57	116/90 162/1005 307/188	116/90 162/1005 307/188
Gaul St											
Belgrade St	47/127 21/48	344/270 42/41	28/37 352/302 26/48	54/41 53/572	41/43 42/43	53/32 301/259 118/99	25/68 605/1388 24/11	59/119 7/13 304/301 34/22	197/185 451/382	797/1487 16/98	797/1487 16/98
Thompson St	241/431 79/26 31/16	28/42 239/35 10/33	140/118 629/608 70/4	54/36 594/668	46/36 544/519	339/188 30/29	339/188 30/29	144/146 411/307 13/17	133/244 147/105 334/402	140/110 373/271 36/35	140/110 373/271 36/35
Edgemont St											
Richmond St		433/291	16/29 380/246	623/748 55/40	17/26 16/14	527/686 60/126	527/686 60/126	32/13 11/9	144/146 411/307 13/17	140/110 373/271 36/35	140/110 373/271 36/35

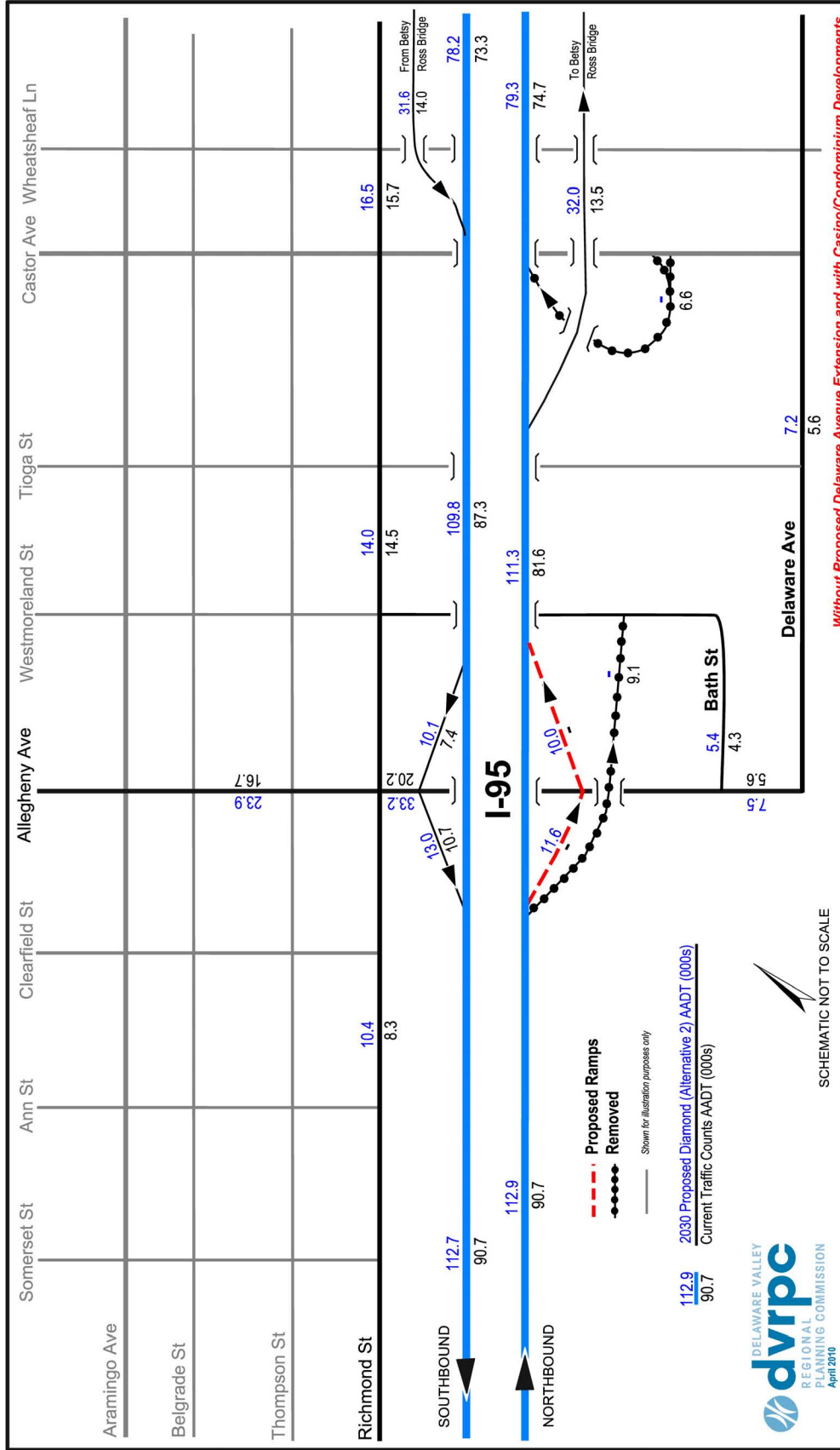
Without Proposed Delaware Avenue Extension and with Casino/Condominium Developments



265 / 486 → AM / PM Peak Hour Traffic Volumes

SCHEMATIC NOT TO SCALE

Figure 7. Section AFC Current and 2030 Proposed Diamond (Alternative 2) Average Daily Traffic Volumes



SCHEMATIC NOT TO SCALE

Without Proposed Delaware Avenue Extension and with Casino/Condominium Developments

**Figure 8. Section AFC 2030 Proposed Diamond (Alternative 2) AM/PM Peak Hour Traffic Volumes**

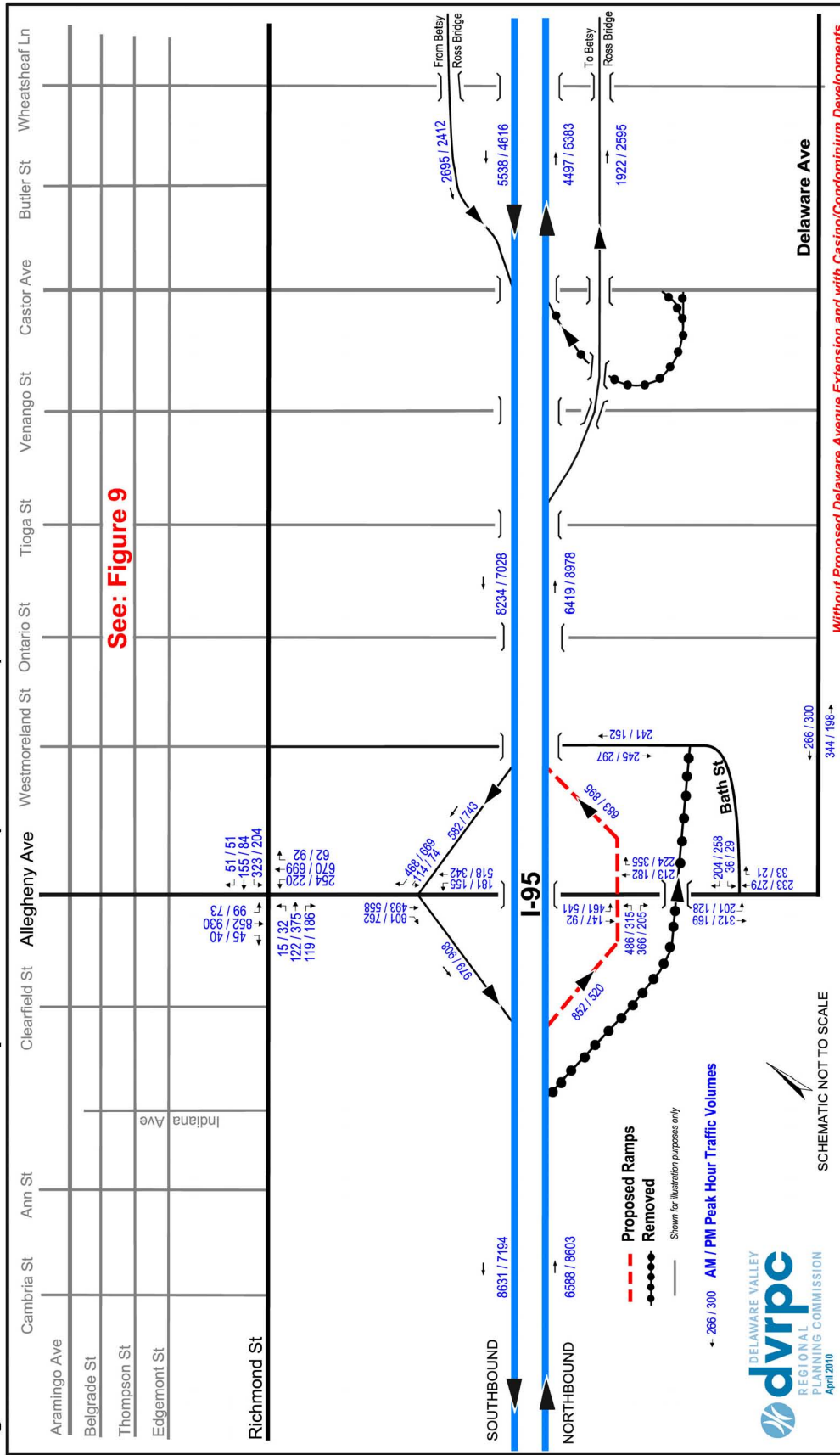


Figure 9. Section AFC 2030 Proposed Diamond (Alternative 2) AM/PM Peak Hour Traffic Volumes (Inset)

	Cambria St	Ann St	Clearfield St	Allegheny Ave	Westmoreland St	Ontario St	Tioga St	Venango St	Castor Ave	Butler St	Wheatstheaf Ln
Aramingo Ave	485/700 9/11	887/658 15/32	50/74 19/45	50/74 19/45	863/656 15/32	50/74 19/45	863/656 15/32	50/74 19/45	863/656 15/32	50/74 19/45	863/656 15/32
Cedar St											
Gaul St											
Belgrade St											
Thompson St											
Edgemont St											
Richmond St											

Without Proposed Delaware Avenue Extension and with Casino/Condominium Developments



250 / 507 → AM / PM Peak Hour Traffic Volumes

**Figure 10. Section AFC Current and 2030 (Alternative 10) Average Daily Traffic Volumes**

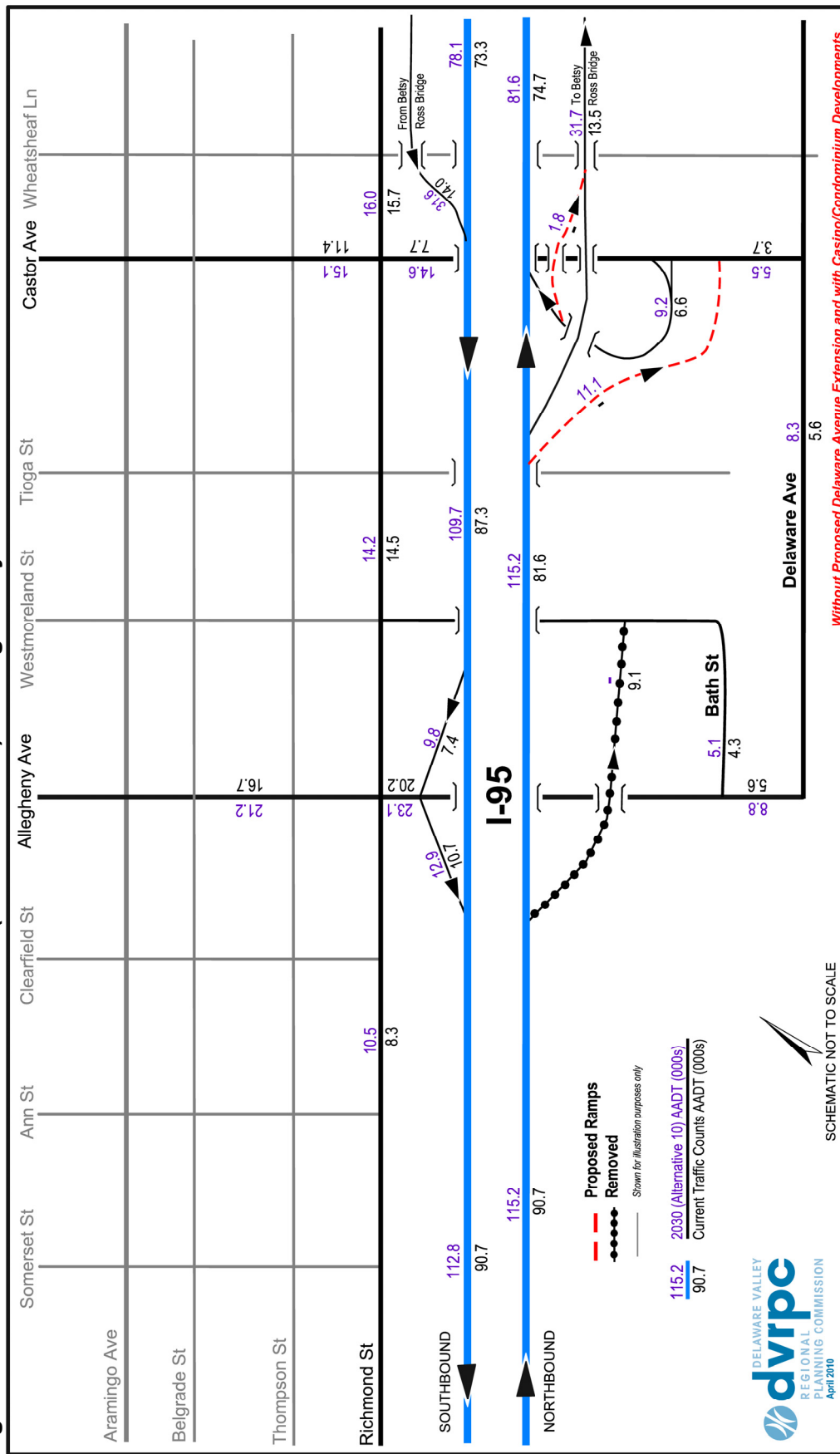


Figure 11. Section AFC 2030 (Alternative 10) AM/PM Peak Hour Traffic Volumes

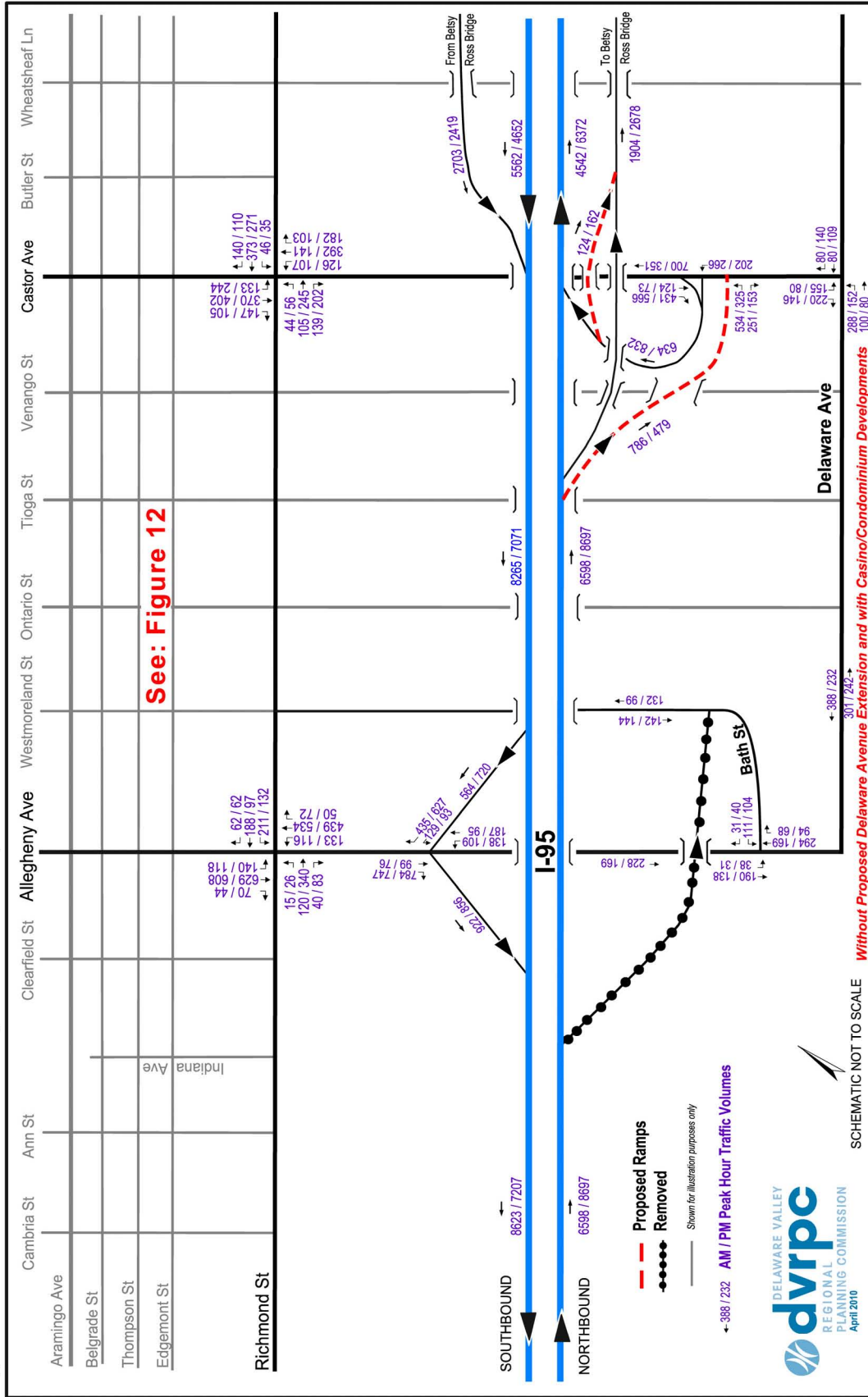




Figure 12. Section AFC 2030 (Alternative 10) AM/PM Peak Hour Traffic Volumes (Inset)

	Cambria St	Ann St	Clearfield St	Allegheny Ave	Westmoreland St	Ontario St	Tioga St	Venango St	Castor Ave	Butler St	Wheatstheaf Ln
Aramingo Ave	463/669 9/11	50/54 452/681	25/12 510/650 16/15	512 381/713 52/20	222/352 230/204 12/7	99/158 99/158 47/158	32/45 83/98 98/105 152/172	57/66 172/318 27/56	116/90 200/187 308/170	18/45 64/88 9/63 72/52	47/27 18/16 18/24 193/207 31/54
Cedar St			15/16 405/700 15/16	19/44 470/547 39/86 310/131 70/111	31/28 31/28 16/10	15/25 40/83 15/25	23/42 83/98 98/105 152/172	35/73 657/1523 40/25	159/178 599/1300 95/211	57/54 797/1487 16/56	28/83 50/59 53/60 840/1565 19/13
Gaul St			14/19 64/152 32/33	565/590 21/39 518/477 11/28	480/786 16/10	40/83 40/83 15/25	32/45 83/98 98/105 152/172	35/73 657/1523 40/25	159/178 599/1300 95/211	57/54 797/1487 16/56	28/83 50/59 53/60 840/1565 19/13
Belgrade St	47/27 21/48	42/41 344/270	28/37 52/302 26/48	41/43 126/197 42/43	453/572 52/41 301/289 110/89	15/45 529/496	32/45 83/98 98/105 152/172	35/73 657/1523 40/25	159/178 599/1300 95/211	57/54 797/1487 16/56	28/83 50/59 53/60 840/1565 19/13
Thompson St	79/34 241/431 31/16	74/73 100/106	38/27 62/110	45/36 594/688	484/500 33/53	90/76 59/119	32/45 83/98 98/105 152/172	35/73 657/1523 40/25	159/178 599/1300 95/211	57/54 797/1487 16/56	28/83 50/59 53/60 840/1565 19/13
Edgemont St			34/91 20/55	62/74 185/97 186/141	101/92 185/97 186/141	15/46 17/12 4/28	32/45 83/98 98/105 152/172	35/73 657/1523 40/25	159/178 599/1300 95/211	57/54 797/1487 16/56	28/83 50/59 53/60 840/1565 19/13
Richmond St			26/32 31/17	140/118 629/608 70/44	17/26 265/486 16/14	4/21 4/21 32/32	32/45 83/98 98/105 152/172	35/73 657/1523 40/25	159/178 599/1300 95/211	57/54 797/1487 16/56	28/83 50/59 53/60 840/1565 19/13

SCHEMATIC NOT TO SCALE

120/340 → AM / PM Peak Hour Traffic Volumes

Without Proposed Delaware Avenue Extension and with Casino/Condominium Developments





### **III. PEDESTRIAN CROSSWALK, BICYCLE, AND VEHICULAR COUNTS AND DESIGN HOUR DATA**

Counts, taken during the 2010 Shad Fest, are required to ensure that the pedestrian/bicycle park access designs are adequate to serve the large numbers of persons in attendance at Penn Treaty Park during special events. The pedestrian volume forecasts prepared by DVRPC in the “GIR/VINE and AFC Traffic Study Supplement Number 2” (February 2010) measure average weekday volumes, which are much smaller than those that occur during special events. This may lead to park access problems for pedestrians and bicyclists, especially crossing North Delaware Avenue, during large-attendance events. Also, North Delaware Avenue at this location is a major access route between the I-95 Girard Avenue Interchange and the SugarHouse Casino. It is expected to sustain significant volume increases from casino and new condominium traffic.

Two types of special event attendee data were identified at this meeting: 1) special event attendee counts and travel/residence/demographic data and 2) pedestrian/bicycle crosswalk and vehicular turning movement count data for intersection design. The count data was collected on Saturday, April 24, 2010, continuously between the hours of 10:30 AM and 6:00 PM, summarized by 15-minute intervals.

#### **A. Special Event Attendance, Travel Mode, Residence, and Demographic Data**

The planning community, event organizers, and private-sector sponsors have interest in the total attendance statistics, as well as breakdowns by residential location, travel mode, and other demographic data describing persons attending events. DVRPC staff collected total park entrance counts and the New Kensington Community Development Corporation (NKCDC), the event sponsors, conducted an on-site questionnaire-based survey to ascertain the distributions of residential location, travel mode, and other demographic and marketing information. In this report, which is focused on providing intersection design data for Penn Treaty Park access, tabulations of the NKCDC survey are focused on residence location and travel mode of those persons attending Shad Fest.

Concerts, festivals, and other organized activities of varying sizes occur at Penn Treaty Park throughout the spring, summer, and fall. Park entrance person counts may be useful to scale the detailed crosswalk count information collected at Shad Fest to represent smaller or larger Penn Treaty Park events, for purposes of evaluating the performance of traffic signal systems, crosswalks, bicycle lanes, and provisions for vehicular traffic. It is possible to count persons entering the park by foot and bicycle at the two Beach Street gates, but a breakdown of those persons arriving by transit and automobile cannot be directly ascertained because parking and transit access/egress occurs off-site. The park entrances may overestimate attendees because some persons may enter and exit more than once and be double counted. The main focus of this effort is to collect detailed intersection pedestrian, bicycle, and vehicular movement count data for a large event to aid in designing traffic signals, crosswalks, and provisions for vehicular movements for persons accessing the park or passing by.

## **B. Crosswalk Pedestrian, Bicycle, and Vehicular Turning Movement Counts Data**

Crosswalk pedestrian and bicycle volumes by direction and vehicular (cars and trucks) turning movement counts were collected for all crosswalks and approach/egress roadways included in the combined North Delaware Avenue, Columbia Avenue, Beach Street, and East Allen Street intersection complex depicted in **Figure 13**. Specifically, the following locations were counted:

### 1. *Crosswalk Pedestrian Volumes by Direction:*

- E. Columbia Avenue across N. Delaware Avenue on the south side
- E. Columbia Avenue across N. Delaware Avenue on the north side
- E. Allen Street/N. Delaware Avenue across E. Columbia Avenue
- E. Columbia Avenue across E. Allen Street
- N. Delaware Avenue across E. Columbia Avenue (on park side of street)
- Beach Street across Columbia Avenue

### 2. *Bicycle Lanes: (See Figure 17)*

- Northbound on the Delaware River side of N. Delaware Avenue into E. Columbia Avenue
- Southbound N. Delaware Avenue from the north into E. Columbia Avenue

### 3. *Vehicular Turning Movement Counts:*

*(Please note that Beach Street between N. Delaware and E. Columbia Avenues (in front of the park) was closed to through traffic during Shad Fest)*

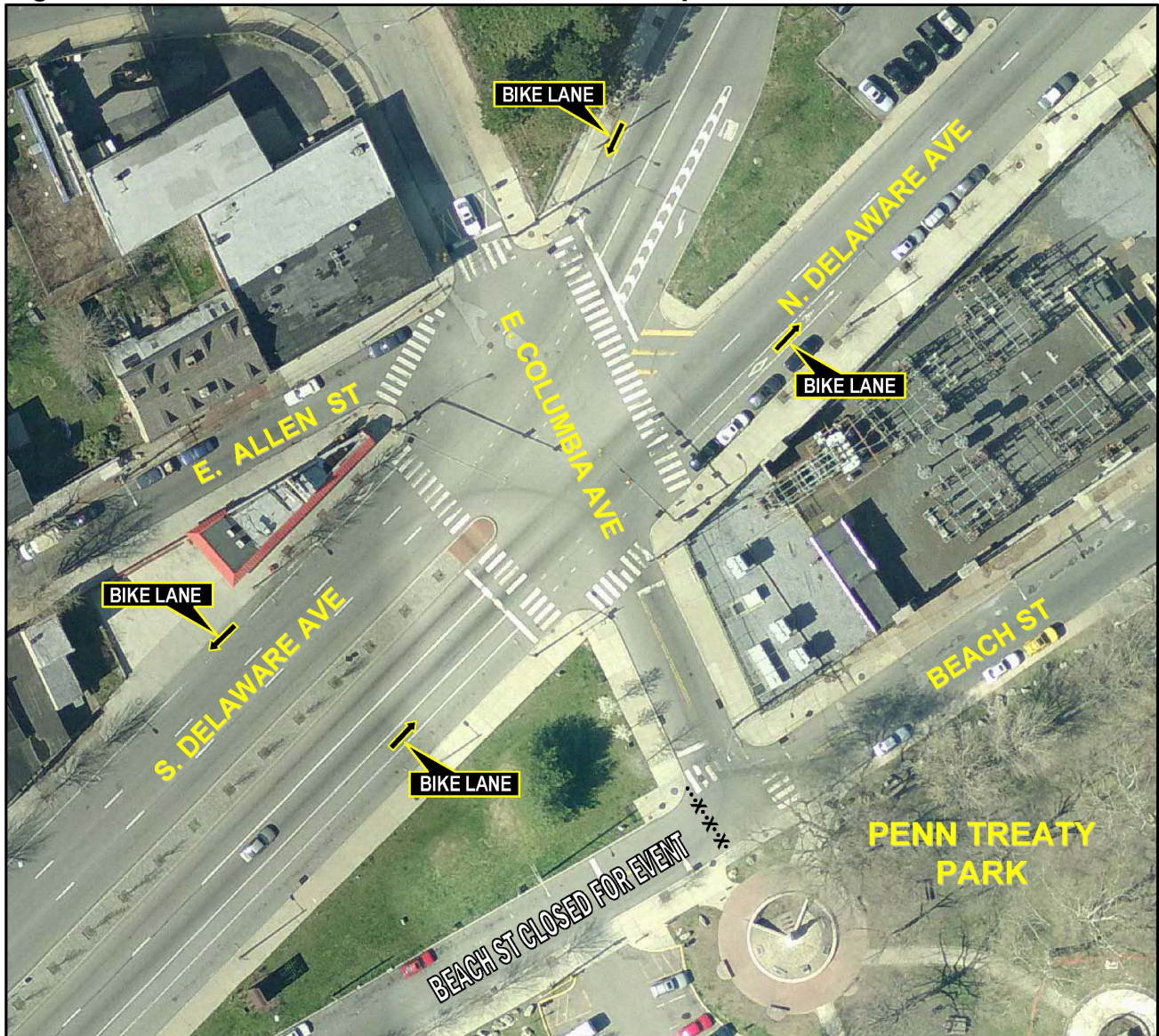
North Delaware Avenue northbound into:

- N. Delaware Avenue northbound (straight through)
- E. Columbia Avenue eastbound into park (right turn)
- Allen Street southbound (left turn)

N. Delaware Avenue southbound into:

- N. Delaware Avenue southbound (straight through)
- E. Columbia Avenue eastbound into park (left turn)
- Allen Street southbound (bear right)

Figure 13. Shad Fest Combined Intersection Complex



E. Columbia Avenue eastbound at N. Delaware Avenue into:

- E. Columbia Avenue eastbound (straight through)
- Allen Street southbound (hard right turn)
- N. Delaware Avenue southbound (right turn)
- N. Delaware Avenue northbound (left turn)

E. Columbia Avenue eastbound at Beach Street into:

- Beach Street northbound (left turn)
- Penn Treaty Park entrance (straight through)
- Beach Street southbound (right turn)

E. Columbia Avenue westbound at N. Delaware Avenue:

- Allen Street southbound (bear left)
- N. Delaware Avenue southbound (left turn)
- N. Delaware Avenue northbound (right turn)

### C. Place of Residence and Penn Treaty Park Access Travel Mode

As noted above, the New Kensington Community Development Corporation (NKCDC) conducted an on-site postcard survey during the 2010 Shad Fest. Among the questions included in the survey were zip code, residence, and the mode (walk, bicycle, SEPTA, or drive) used to travel to the festival. These selected results are included in this DVRPC report to provide a larger perspective on the DVRPC counts that will be used to design the pedestrian access improvements to Penn Treaty Park.

**Table 1** provides a tabulation of the county/state of residence from the NKCDC survey. The vast majority (92 percent) Shad Fest attendees live in Philadelphia. About four percent live in other Pennsylvania counties and some two percent of Shad Fest attendees live in New Jersey and New York, each.

**Table 1. County/State of Residence**

Philadelphia	92%
Other Pennsylvania Counties	4%
New Jersey	2%
New York	2%
<b>Total</b>	<b>100%</b>

Source: DVRPC April 2010

Shad Fest postcard survey had 125 responses. This is not a big enough sample to perform statistically significant analysis of attendees by zip code. For this reason, the survey residence responses were tabulated by County Planning Area (CPA), which are shown in **Figure 14**. Each CPA comprises a number of individual zip codes, giving the tabulation more statistical significance, especially beyond the immediate area of Penn Treaty Park.

**Table 2** provides a tabulation of the percentage of Shad Fest attendees by CPA, and neighborhoods. Almost 60 percent of Shad Fest attendees live in the immediate Philadelphia neighborhoods of Bridesburg, Kensington, Fishtown, and Richmond. Center City Philadelphia residences are a somewhat distant second, with 13 percent of event attendees. Five percent or more of Shad Fest attendees reside in four additional CPAs – North Philadelphia (nine percent), South Philadelphia (six percent), Germantown/Chestnut Hill (five percent), and Near Northeast Philadelphia (five percent).

**Table 2. CPA and Neighborhood of Residence of the Philadelphia Shad Fest Attendees**

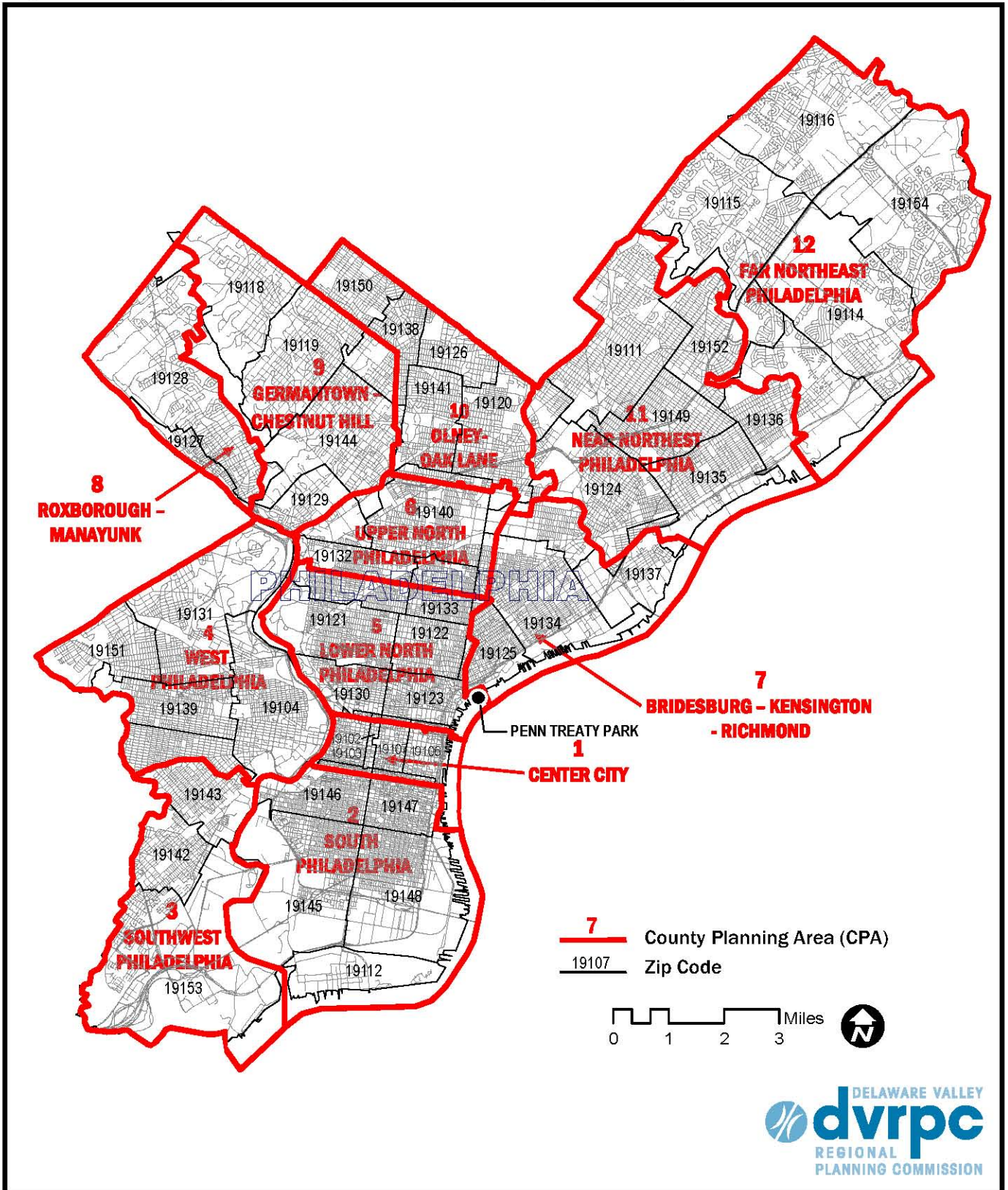
CPA	Neighborhood	Percentage
7	Bridesburg - Kensington - Richmond*	59%
1	Center City	13%
6	Upper North Philadelphia	9%
2	South Philadelphia	6%
9	Germantown - Chestnut Hill	5%
11	Near Northeast Philadelphia	5%
12	Far Northeast Philadelphia	2%
-	Other	1%
	<b>Total</b>	<b>100%</b>

\* Includes Fishtown neighborhood

Source: DVRPC April 2010

A breakdown of the transport modes used to travel to Shad Fest into walk, bicycle, SEPTA, and drive is given in **Table 3**. Respondents are summarized by two categories: those who live in nearby neighborhoods (CPA 7) and all survey responses. The motivation for this stratification is residential distance from Penn Treaty Park, a major determinant of the probability of walking. Some 58 percent of nearby neighborhood residents walked to Shad Fest, compared to 35 percent overall. The 23 percent reduction in walking is accounted for by increases in SEPTA (six to 16 percent) and drive (22 to 35 percent). It is interesting to note that bicycle had the same percentage (14 percent) for immediate neighborhoods and overall. Travel distance is much less of a factor for bicycle travel within Shad Fest service area – about five miles or less radial distance from the Penn Treaty Park.

Figure 14. Philadelphia County Planning Areas (CPA) and Zip Codes





**Table 3. Means of Transportation to Shad Fest by Place of Residence**

Travel Mode	Bridesburg/Kensington Richmond (CPA 7)	All Attendees
Walk	58%	35%
Bicycle	14%	14%
SEPTA	6%	16%
Drive	22%	35%
<b>Total</b>	<b>100%</b>	<b>100%</b>

Source: DVRPC April 2010

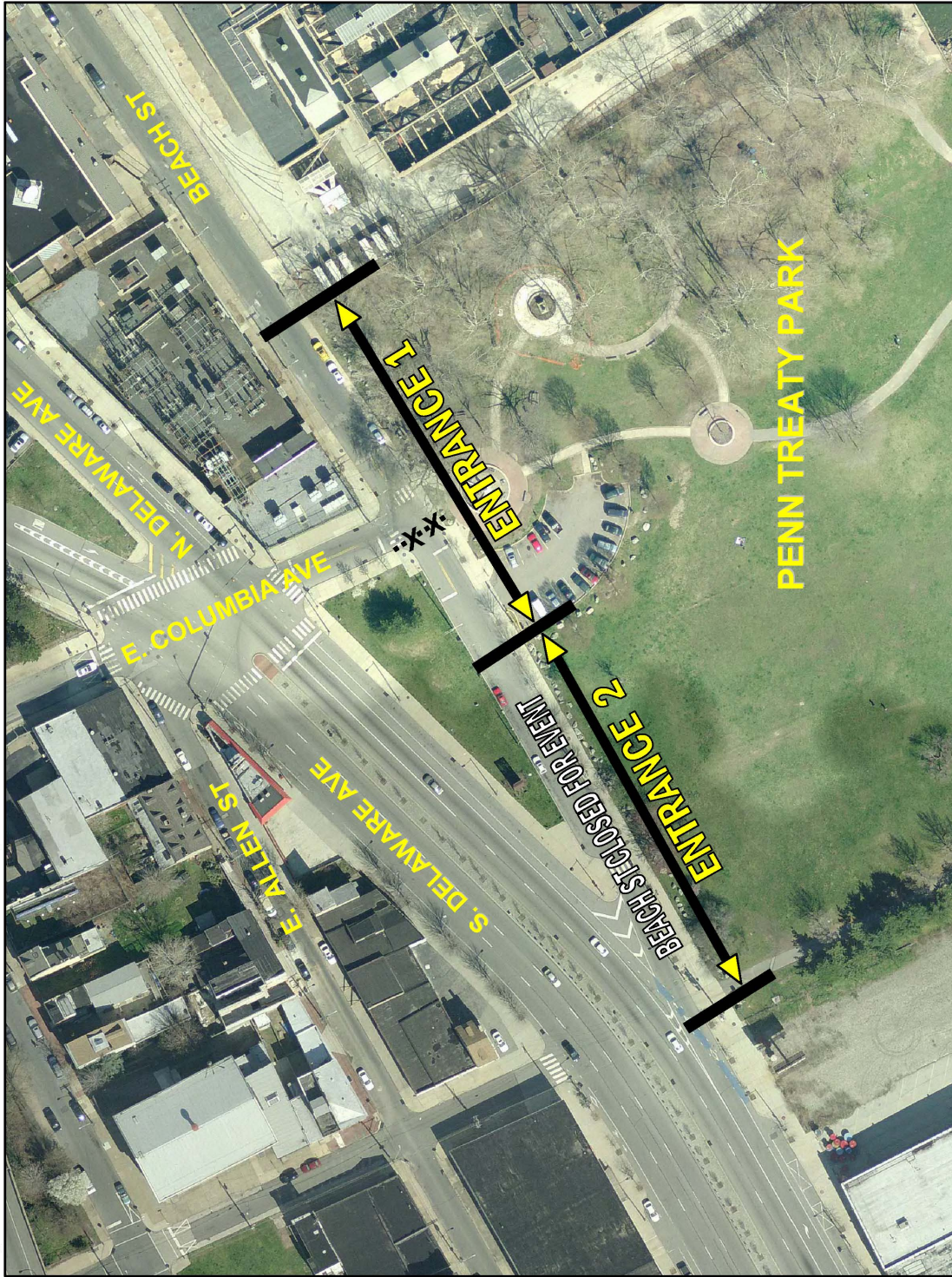
Virtually everyone who drove to Shad Fest parked on the street outside of the park or in one of several nearby lots. Ease of access to the car promotes multiple entries to Penn Treaty Park because these persons may walk back and forth to the car several times to retrieve or drop off personal items. Each trip to the car generates an additional park walk entry that is counted by DVRPC staff located at the park entrances.

#### **D. The Temporal Distribution of Shad Fest Entrances to Penn Treaty Park**

DVRPC stationed two staff persons at the entrances to Penn Treaty Park to count the number of persons entering the park during Shad Fest. Park entrances were counted between 10:30 AM and 6:00 PM and tabulated by 15 minute intervals. As noted above, there is the possibility of entering the park anywhere along Beach Street between the PECO power plant on the north and the southern entrance opposite Marlborough Street. Many, if not most, persons entered the park through the main entrance opposite East Columbia Avenue. To more accurately count all persons entering the park, Beach Street was divided up into sectors, as shown in *Figure 15*. The staff person counting the main entrance (Entrance #1) was responsible for the sector between the fence on the south side of the park parking lot northwards to the fence around the power plant. Entrance #2 included the sector from the Marlborough Street entrance to the parking lot fence. Due to the diversity of park entrance locations and walk routes and the high volume of pedestrians during the peak periods, there is tendency to over count park entrances. Some persons entering the park may be double counted. It is not always possible to recognize each person distinctly and determine whether he/she has already been counted.

There are two sources of error when interpreting park entrance person counts and Shad Fest attendance. As noted in Section C, persons who drive to Shad Fest may return to their car parked nearby two or more times, all of which are counted as park entrances. Second, counting personnel may be somewhat overwhelmed by the numbers of persons approaching the park entrances, especially during peak periods, resulting in double counting some individuals while missing others. It is difficult to make an exact estimate of the resultant attendance over counting, although analysis of the event total pedestrian crosswalk and bicycle lane counted volumes given in Appendix A indicates that about 8,000 to 9,000 persons in total attended Shad Fest. This is the attendance estimate that should be used to scale the design hour crosswalk and bicycle lane volumes given in Section E to different sized Penn Treaty Park events.

Figure 15. Shad Fest Penn Treaty Park Entrances 1 and 2



Appendix A, **Table A-1** presents tabulations by 15-minute intervals of the park entrance counts at Entrance #1 and Entrance #2 and the total for both entrances. From 10:30 AM to 6:00 PM, 7,158 persons entering the park were counted at Entrance #1, and 4,066 at Entrance #2, for an event total of 11, 224 park person entrances. This total includes double counting of about 2,500 persons.

### **E. Design Hour Pedestrian Crosswalk and Bicycle Lane Volumes**

For the sum of both entrances, the peak hour (2,293 persons) occurred between 2:00 PM and 3:00 PM. However, the design hour for the pedestrian crosswalk volumes both to and from the park, **Tables 4 through 7**, occurred between 3:00 PM and 4:00 PM. During this hour, significant numbers of persons were leaving Shad Fest, and this more than counterbalances the drop in park entrances (1,880 persons).

Hourly pedestrian crosswalk and vehicular turning movement count distributions were discussed with the traffic design consultants, and 3:00 PM to 4:00 PM was selected as the design hour for intersection design purposes. The count tabulations that follow are for the design hour, although 15-minute subtotals for the duration of Shad Fest are included in Appendix A.

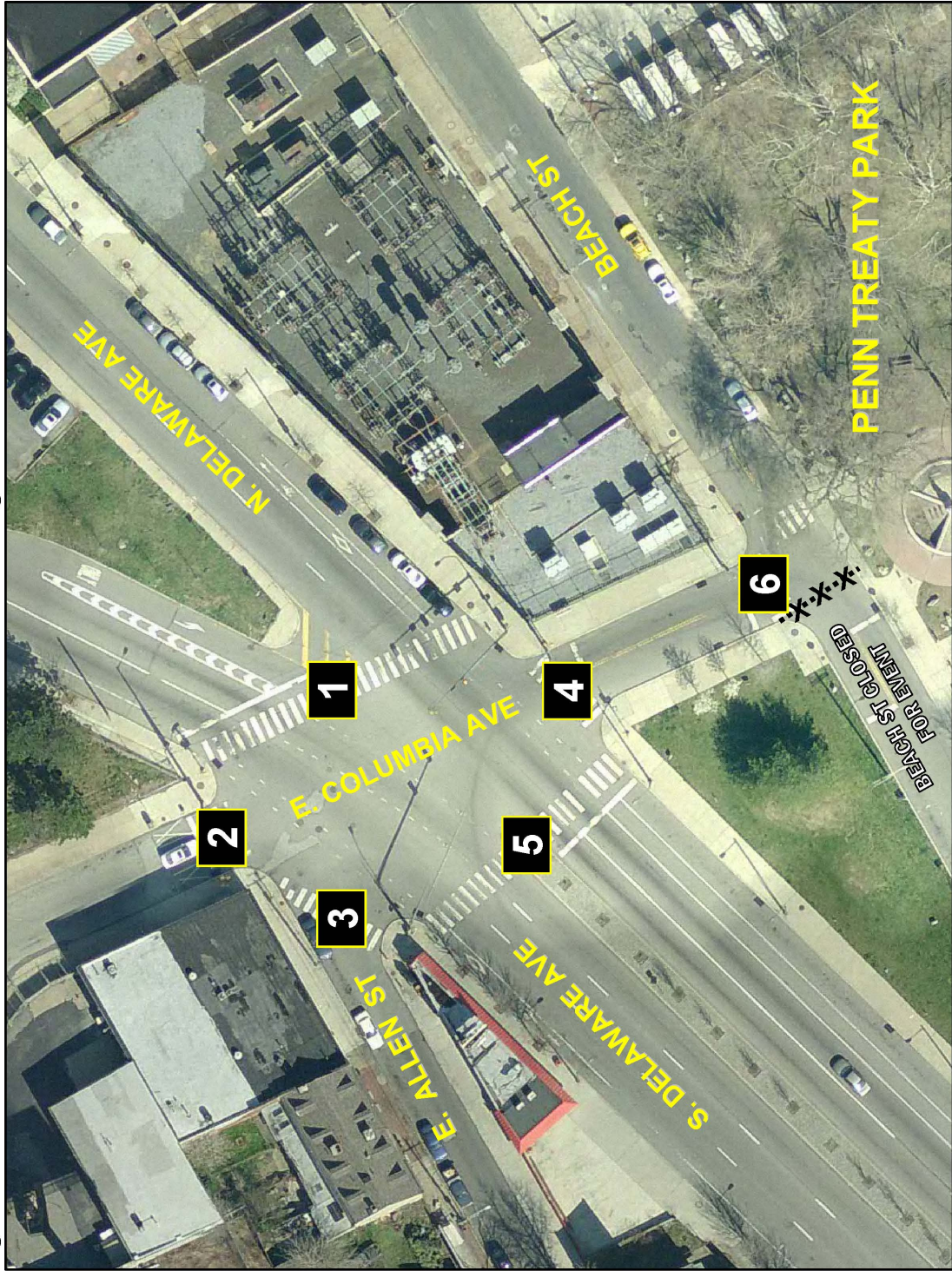
The design for the combined East Columbia Avenue/North Delaware/East Allen Street/Beach Street intersection is based primarily on safely accommodating pedestrian crosswalk volumes of persons destined to and coming from Shad Fest given conflicting vehicular volumes.

Generally, pedestrian and bicycle crossings of North Delaware Avenue to/from the 2010 Shad Fest went well. The traffic signal, pedestrian phase, and countdown timers installed after the 2009 Shad Fest were helpful, but large groups of pedestrians crossing North Delaware Avenue still could not completely clear the crosswalk in the 22 seconds allotted before the traffic light turned green for vehicular travel. This led to conflicts where aggressive motorists tried to maneuver around persons still on the crosswalk.

A major factor in this relatively safe and trouble-free intersection performance is that Saturday vehicular volumes are much less than (about half of) weekday peak hour traffic – mitigating potential pedestrian/traffic conflicts. Furthermore, the SugarHouse Casino was not opened for business when the count data was collected. Additional casino-generated traffic on North Delaware Avenue must be considered in evaluating potential intersection designs. Counted and projected 2030 vehicular turning movement volumes are included in Section G to assist in the design effort.

Crosswalks are indexed numerically in **Figure 16**. This figure provides a reference (Crosswalk Numbers 1 through 6) to the design hour count data in **Tables 4 through 7**. For purposes of analysis, the crosswalks are categorized by park access function – inbound to park, outbound from park, and East Columbia Avenue (crossings orthogonal to park access).

Figure 16. Shad Fest Pedestrian Count Locations 1 Through 6



**Table 4** presents design hour pedestrian crosswalk counts, tabulated by 15-minute increments, for crosswalk movements inbound to Shad Fest (see **Figure 16**, Crosswalk Reference numbers 1, 5, and 3). Inbound pedestrian crossings include North Delaware Avenue eastbound, both on the north and south sides of East Columbia Avenue and East Allen Street southbound. During the design hour, the south North Delaware Avenue crosswalk serves more eastbound person crossings than the north side (398 versus 286 persons), and the East Allen Street crosswalk another 224 persons, for a total of 908 inbound person crossings that must be accommodated within the intersections during the design hour.

**Table 4. Design Hour Inbound Pedestrian Counts for Crosswalk Numbers 1, 5 and 3**

Time Period	Crosswalk Number 1*	Crosswalk Number 5*	Crosswalk Number 3*	Subtotal Inbound Crosswalks
	Delaware Ave N Crosswalk EB	Delaware Ave S Crosswalk EB	Allen St Crosswalk SB	
3:00-3:15 PM	99	139	68	306
3:15-3:30 PM	79	122	47	248
3:30-3:45 PM	46	67	52	165
3:45-4:00 PM	62	70	57	189
<b>Total</b>	<b>286</b>	<b>398</b>	<b>224</b>	<b>908</b>

\* Indicates location as shown on Figure 16

Source: DVRPC April 2010

Outbound pedestrian street crossings (see **Table 5**) are somewhat larger than inbound volumes in the design hour (1,075 versus 908 persons). Outbound volumes are the westbound movements on the same three crosswalks as park inbound crossings. As with inbound volumes, the Delaware Avenue south crosswalk is favored over the north crosswalk (502 versus 386 pedestrians).

Taken together, the inbound and outbound crosswalk volumes constitute significant numbers of pedestrians (almost 2,000) to be accommodated by the crosswalk design and signal system during the design hour.

**Table 5. Design Hour Outbound Pedestrian Counts for Crosswalk Numbers 1, 5, and 3**

Time Period	Crosswalk Number 1*	Crosswalk Number 5*	Crosswalk Number 3*	Subtotal Outbound Crosswalks
	Delaware Ave N Crosswalk WB	Delaware Ave S Crosswalk WB	Allen St Crosswalk NB	
3:00-3:15 PM	91	132	42	265
3:15-3:30 PM	66	147	67	280
3:30-3:45 PM	111	103	42	256
3:45-4:00 PM	118	120	36	274
<b>Total</b>	<b>386</b>	<b>502</b>	<b>187</b>	<b>1,075</b>

\* Indicates location as shown on Figure 16

Source: DVRPC April 2010

**Table 6** presents the design hour pedestrian counts associated with the three East Columbia Avenue crosswalks (see **Figure 16**, Crosswalk Reference Numbers 2, 4, and 6). These pedestrian volumes tend to be much smaller than those counted for the North Delaware Avenue crosswalks (313 versus 1,983 crossing per hour), but still must be accommodated within the overall intersection pedestrian crosswalk design and signal timing plan. The East Columbia Avenue crosswalk pedestrian counts are also tabulated by 15-minute interval for input into intersection design software.

**Table 6. Design Hour Pedestrian Counts for Crosswalks Numbers 4, 6, and 2**

Time Period	Crosswalk Number 4** Columbia Ave Crosswalk at Delaware Ave NB		Crosswalk Number 6** Columbia Ave Crosswalk Op. Park Entrance 2*		Crosswalk Number 2** Columbia Ave Crosswalk at Allen St		Subtotal Columbia Ave Crosswalks
	NB	SB	NB	SB	NB	SB	
3:00-3:15 PM	23	20	17	3	7	2	72
3:15-3:30 PM	9	7	9	6	13	4	48
3:30-3:45 PM	18	16	14	18	14	11	91
3:45-4:00 PM	46	8	14	6	15	13	102
<b>Total</b>	<b>96</b>	<b>51</b>	<b>54</b>	<b>33</b>	<b>49</b>	<b>30</b>	<b>313</b>

\*\* Indicates location as shown on Figure 16

\* Indicates location as shown on Figure 15

Source: DVRPC April 2010

An overall summary of design hour pedestrian crosswalk volumes counted between 3:00 PM and 4:00 PM during the 2010 Shad Fest are presented in **Table 7**. Overall, there are 2,296 pedestrian design hour street crossings that must be accommodated by the crosswalk and traffic signal design. The maximum 15-minute subtotal (306 persons) for inbound crossings occurs between 3:00 and 3:15 PM. The outbound maximum (280) person crossings occurs between 3:15 and 3:30 PM, and the maximum 15-minute total for East Columbia Avenue crosswalks (102) occurs between 3:45 and 4:00 PM.

**Table 7. Summary of Design Hour Total Pedestrian Crosswalks Counts**

Time Period	Subtotal Columbia Ave Crosswalks	Subtotal Inbound Crosswalks	Subtotal Outbound Crosswalks	Total All Crosswalks
3:00-3:15 PM	72	306	265	643
3:15-3:30 PM	48	248	280	576
3:30-3:45 PM	91	165	256	512
3:45-4:00 PM	102	189	274	565
<b>Total</b>	<b>313</b>	<b>908</b>	<b>1,075</b>	<b>2,296</b>

Source: DVRPC April 2010

These pedestrian street-crossing volumes are very heavy, but the intersection design must also accommodate 2030 design hour projected intersection vehicular turning movements, which are opposed to the pedestrian crossings. 2030 vehicular projections, including traffic from the recently opened SugarHouse Casino and normal background traffic growth, are included in Section F.

Pedestrian crossings are not projected to 2030; rather, anticipated attendance for Penn Treaty Park events may be used to factor the crosswalk counts in **Tables 4 through 7** above using the ratio of anticipated attendees to the 8,500 Shad Fest attendance presented in Section E above.

North Delaware Avenue is striped for a curbside bicycle lane in both the northbound and southbound directions. **Figure 17** displays the location of the bicycle counts summarized on **Table 8**. The northbound bicycle count location (denoted by “A”) is immediately south of East Columbia Avenue, and the southbound count location (“B”) just north of East Columbia Avenue. According to the counts, 35 bicycles were counted in the bike lanes during the design hour – 21 from the south and 14 from the north. Almost all of these bike trips were destined to the park, but did not use the crosswalks. Rather, bicycles turned into the park using the vehicular roadways. The post card survey found that 14 percent Shad Fest attendees commuted by bicycle (about 250 event total bicycle trips, of which 155 used the bike lanes) see Appendix A, **Table A-6**. About 40 percent of bicycle trips traveled to the park without using the bike lanes.

**Table 8. Summary of Design Hour Total Bicycle Counts for Locations A and B**

Time Period	Delaware Avenue Northbound Bicycle Count A*	Delaware Avenue Southbound Bicycle Count B*	Total All Bicycle Lanes
3:00-3:15 PM	12	4	16
3:15-3:30 PM	2	1	3
3:30-3:45 PM	1	2	3
3:45-4:00 PM	6	7	13
<b>Total</b>	<b>21</b>	<b>14</b>	<b>35</b>

\* Indicates location as shown on Figure 17

Source: DVRPC April 2010

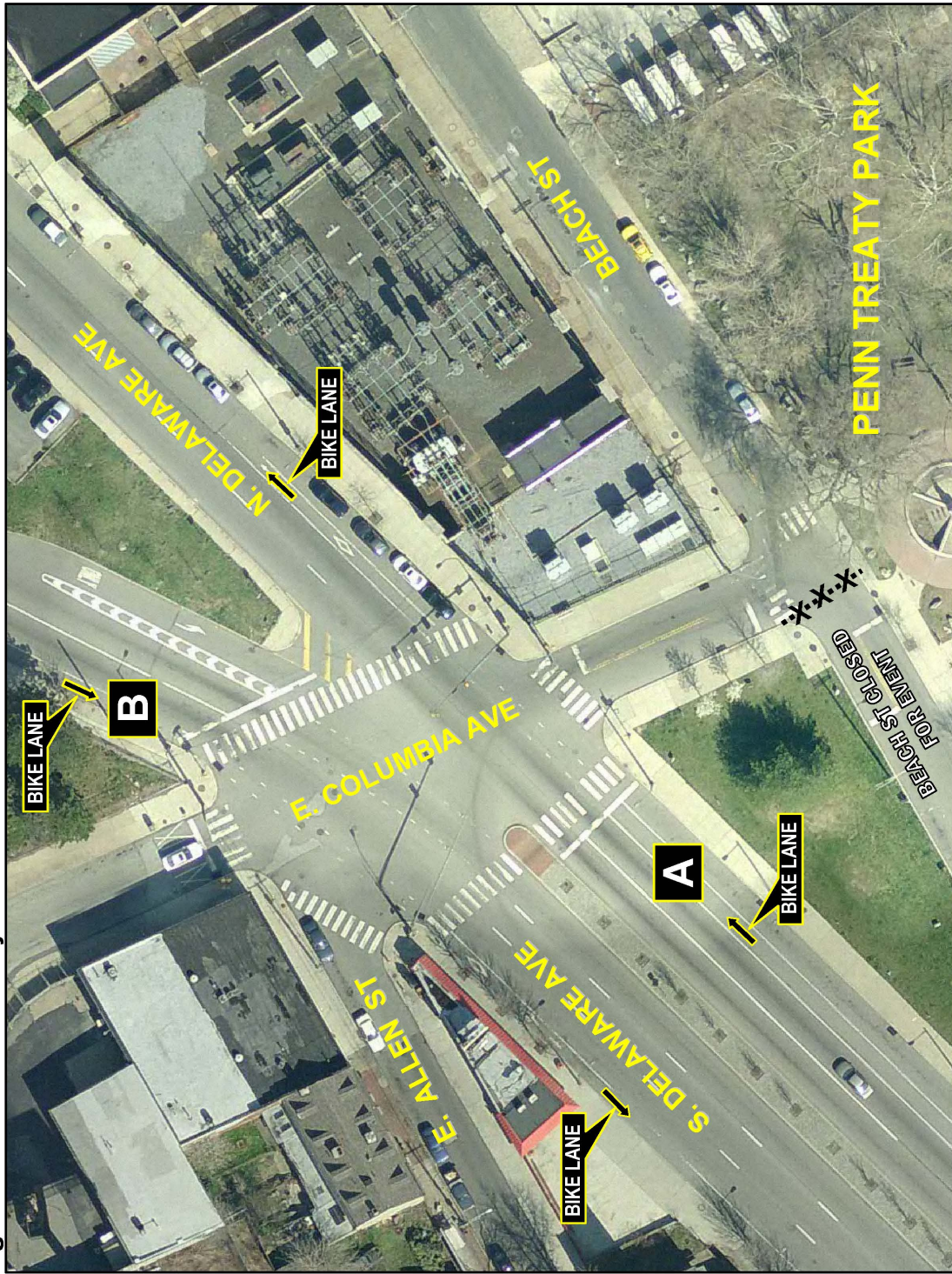
## F. Design Hour Counted and Forecasted 2030 Vehicular Turning Movement Volumes

The design for the East Columbia Avenue/North Delaware Avenue/East Allen Street intersection must accommodate existing and projected vehicular traffic and turning movements, as well as pedestrian and bicycle travel accessing events at Penn Treaty Park. As noted above, extensive counts for traffic movements within this intersection were collected by DVRPC staff during the 2010 Shad Fest. The 2030 turning movement projections assume that the SugarHouse Casino is opened for business.

## G. Shad Fest Turning Movement Counts

**Table 9** displays the counted vehicular turning movements within this intersection, tabulated by 15-minute intervals, during the design hour (3:00 PM to 4:00 PM). The lion’s share of North Delaware Avenue northbound traffic (94 percent) went straight through the intersection, continuing north on North Delaware Avenue, with most of the remainder of traffic (five percent) turning right onto East Columbia Avenue eastbound to access the park. Similarly, southbound North Delaware Avenue traffic proceeded predominately through the intersection (79 percent), with about 14 percent turning left toward the park and seven percent bearing obliquely right onto East Allen Street.

Figure 17. Shad Fest Bicycle Lane Locations A and B





**Table 9. Counted Design Hour Vehicular Traffic Turning Movements**

Time Period	Delaware Ave NB				Delaware Ave SB				Columbia Ave EB				Columbia Ave WB				Total
	L	S	R	A*	L	S	R	A*	L	S	R	A*	L	S	R	A*	
3:00-3:15 PM	0	165	7	1	14	93	0	10	21	1	8	5	15	0	6	0	345
3:15-3:30 PM	0	205	10	4	18	90	0	4	20	2	8	3	18	0	4	0	384
3:30-3:45 PM	0	161	13	1	19	80	0	14	33	1	10	3	23	0	9	0	366
3:45-4:00 PM	0	175	11	2	11	92	0	6	23	2	11	7	17	0	6	0	361
<b>Total</b>	<b>0</b>	<b>706</b>	<b>41</b>	<b>8</b>	<b>62</b>	<b>355</b>	<b>0</b>	<b>34</b>	<b>97</b>	<b>6</b>	<b>37</b>	<b>18</b>	<b>73</b>	<b>0</b>	<b>25</b>	<b>0</b>	<b>1,456</b>

\* A indicates Allen Street Turns

Source: DVRPC April 2010

East Columbia Avenue eastbound predominately turns left onto North Delaware Avenue northbound (61 percent), right onto North Delaware Avenue southbound (23 percent), and hard right onto East Allen Street (11 percent). Only a few (four percent) vehicles proceed straight through the intersection to Beach Street and the park entrance. The opposite direction (westbound) of East Columbia Avenue turns predominately left (75 percent) onto North Delaware Avenue southbound with the other 25 percent turning right onto North Delaware Avenue northbound. No vehicles beared right onto East Allen Street because Beach Street in front of the park was closed to traffic during Shad Fest.

#### H. 2030 Projections of Saturday Afternoon Design Hour Vehicular Turning Movements

Counted highway and intersection turning movement volumes associated with North Delaware Avenue outside of the park entrance for 2010 Shad Fest, which took place on a Saturday, are about one-half that of a typical average weekday peak hour volume. This is one cause for the observed relative lack of conflicts between cars, pedestrians, and bicyclists. Saturday afternoon traffic volumes may be expected to continue to grow in the future, especially with the opening of SugarHouse Casino, which will significantly increase North Delaware Avenue traffic.

After the reconstruction of the Girard Avenue Interchange, almost all casino traffic to and from I-95 will be routed via North Delaware Avenue in front of Penn Treaty Park. Therefore, provision for pedestrian/bicycle access to major events at the park should be based on projected 2030 traffic turning movements rather than current counts.

The DVRPC travel simulation does not produce forecasts of Saturday afternoon traffic volumes. The traffic studies prepared by Gennett Fleming for the SugarHouse Casino considered only weekday traffic, although the study did include background traffic growth factors and the distribution of casino traffic to North Delaware Avenue.

The traffic study for the proposed Foxwoods Casino did prepare estimates of Saturday afternoon casino trip generation. Since at build-out, the Foxwoods and SugarHouse casinos will be similar in size (number of slot machines, etc.), for purposes of this analysis, the Foxwoods Saturday afternoon peak hour trip generation rates are used as a proxy for SugarHouse and distributed using factors from the SugarHouse Casino Traffic Study as follows:

- Annual growth rate for background traffic – 1.00 percent per year.
- Saturday afternoon peak hour traffic (about 1:00 PM) – 966 vehicles entering the casino parking lot and 595 vehicles exiting the casino.
- Sixty percent of SugarHouse Casino traffic will be to or from the north, or about 580 peak hour vehicles to SugarHouse from the north, and 360 peak hour casino vehicles exiting to the north.

These factors were applied to the counted design hour vehicular turning movements within these intersections given in **Table 9** shown previously to produce the 2030 Saturday afternoon forecasted design hour vehicular traffic turning movements presented in **Table 10**.

**Table 10. 2030 Saturday Afternoon Forecasted Design Hour Vehicular Traffic Turning Movements \*\***

Time Period	Delaware Ave NB				Delaware Ave SB				Columbia Ave EB				Columbia Ave WB				Total
	L	S	R	A*	L	S	R	A*	L	S	R	A*	L	S	R	A*	
3:00-3:15 PM	0	277	12	2	17	228	0	12	25	1	20	6	37	0	7	0	643
3:15-3:30 PM	0	344	17	7	22	220	0	5	24	2	20	4	44	0	5	0	713
3:30-3:45 PM	0	270	22	2	23	196	0	17	40	1	24	4	56	0	11	0	665
3:45-4:00 PM	0	294	18	3	13	225	0	7	28	2	27	8	42	0	7	0	676
<b>Total</b>	<b>0</b>	<b>1,186</b>	<b>69</b>	<b>13</b>	<b>74</b>	<b>869</b>	<b>0</b>	<b>41</b>	<b>116</b>	<b>7</b>	<b>91</b>	<b>22</b>	<b>179</b>	<b>0</b>	<b>30</b>	<b>0</b>	<b>2,697</b>

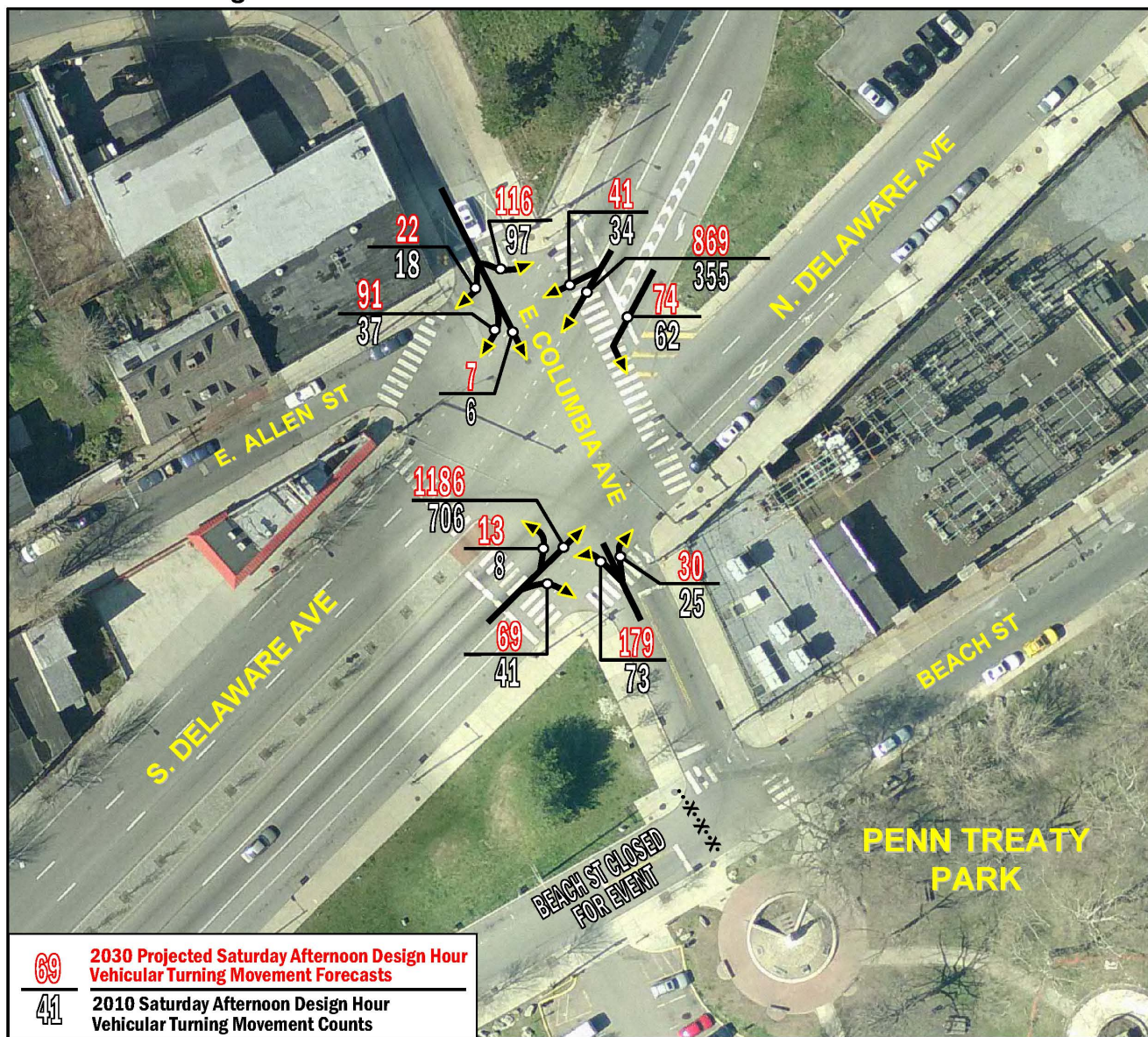
\* A indicates Allen Street Turns

\*\*Assumes that SugarHouse Casino Phase II Development Plan is completed and opened for business

Source: DVRPC April 2010

**Figure 18** compares counted with 2030 forecasted Saturday afternoon design hour vehicular turning movement forecasts. The 2030 projections of traffic turning movements within the North Delaware Avenue/East Columbia Avenue/East Allen Street/Beach Street intersection outside of Penn Treaty Park are significantly higher because of casino traffic, especially the North Delaware Avenue through movements, which provide I-95 access to the SugarHouse Casino. Design hour southbound through traffic is increased from 355 to 869 vehicles, and northbound through vehicles are increased from 706 to 1,186 vehicles. North Delaware Avenue traffic directly conflicts with pedestrian and bicycle crossings and may be used for intersection design purposes.

Figure 18. Shad Fest Current and 2030 Projected Saturday Afternoon Design Hour Vehicular Turning Movement Forecasts





## APPENDIX A SHAD FEST EVENT COUNTS - PARK ENTRANCES, PEDESTRIAN CROSSWALKS, BICYCLE LANES, AND VEHICULAR TURNING MOVEMENTS

**Table A-1. Shad Fest Park Entrance Person Counts (walk)**

Time Period	S. Columbia Avenue Park Entrance 1*	Beach Street Park Entrance 2*	Total Entrances	
10:30-10:45 AM	42	26	68	
10:45-11:00 AM	132	68	200	
11:00-11:15 AM	133	153	286	
11:15-11:30 AM	256	186	442	
11:30-11:45 AM	243	249	492	
11:45-12:00 AM	319	220	539	
12:00-12:15 PM	240	247	487	
12:15-12:30 PM	275	86	361	
12:30-12:45 PM	277	83	360	
12:45-1:00 PM	323	68	391	
1:00-1:15 PM	284	101	385	
1:15-1:30 PM	297	159	456	
1:30-1:45 PM	302	188	490	
1:45-2:00 PM	417	109	526	
2:00-2:15 PM	410	163	573	
2:15-2:30 PM	426	203	629	
2:30-2:45 PM	371	153	524	
2:45-3:00 PM	373	194	567	
3:00-3:15 PM	403	168	571	<b>Design Hourly Total 1,880</b>
3:15-3:30 PM	297	199	496	
3:30-3:45 PM	241	156	397	
3:45-4:00 PM	246	170	416	
4:00-4:15 PM	239	156	395	
4:15-4:30 PM	211	159	370	
4:30-4:45 PM	103	123	226	
4:45-5:00 PM	107	105	212	
5:00-5:15 PM	61	73	134	
5:15-5:30 PM	49	56	105	
5:30-5:45 PM	44	33	77	
5:45-6:00 PM	37	12	49	
<b>Total</b>	<b>7,158</b>	<b>4,066</b>	<b>11,224</b>	

\* Indicates location as shown on Figure 15

Table A-2. Pedestrian Crosswalk Volumes for Crosswalks Numbers 1 and 5

Time Period	Crosswalk Number 1*		Crosswalk Number 5*		Design Hourly Total 502
	Delaware Ave N Crosswalk		Delaware Ave S Crosswalk		
	EB	WB	EB	WB	
10:30-10:45 AM	7	0	3	3	
10:45-11:00 AM	13	1	16	6	
11:00-11:15 AM	29	3	22	2	
11:15-11:30 AM	25	8	49	11	
11:30-11:45 AM	48	8	39	1	
11:45-12:00 AM	57	12	48	8	
12:00-12:15 PM	54	62	48	10	
12:15-12:30 PM	50	8	52	14	
12:30-12:45 PM	99	20	63	41	
12:45-1:00 PM	87	18	59	44	
1:00-1:15 PM	73	36	60	29	
1:15-1:30 PM	81	37	63	71	
1:30-1:45 PM	61	48	97	44	
1:45-2:00 PM	109	39	112	88	
2:00-2:15 PM	115	46	86	96	
2:15-2:30 PM	69	89	119	85	
2:30-2:45 PM	80	87	103	111	
2:45-3:00 PM	74	81	107	95	
3:00-3:15 PM	99	91	139	132	
3:15-3:30 PM	79	66	122	147	
3:30-3:45 PM	46	111	67	103	
3:45-4:00 PM	62	118	70	120	
4:00-4:15 PM	14	93	86	131	
4:15-4:30 PM	54	70	58	76	
4:30-4:45 PM	54	94	29	150	
4:45-5:00 PM	34	68	30	107	
5:00-5:15 PM	11	133	23	115	
5:15-5:30 PM	20	85	24	124	
5:30-5:45 PM	5	48	3	74	
5:45-6:00 PM	0	47	6	31	
<b>Total</b>	<b>1,609</b>	<b>1,627</b>	<b>1,803</b>	<b>2,069</b>	

\* Indicates location as shown on Figure 16

Source: DVRPC April 2010

**Table A-3. Pedestrian Crosswalk Volumes for Crosswalks Numbers 2 and 3**

Time Period	Crosswalk Number 2* Columbia Ave Crosswalk at Allen St		Crosswalk Number 3* Allen St W Crosswalk		
	NB	SB	NB	SB	
10:30-10:45 AM	1	2	4	1	
10:45-11:00 AM	2	2	7	4	
11:00-11:15 AM	2	4	3	7	
11:15-11:30 AM	0	1	0	25	
11:30-11:45 AM	0	7	0	10	
11:45-12:00 AM	1	4	0	19	
12:00-12:15 PM	5	0	4	28	
12:15-12:30 PM	5	3	8	30	
12:30-12:45 PM	14	5	17	51	
12:45-1:00 PM	3	1	29	22	
1:00-1:15 PM	17	2	18	46	
1:15-1:30 PM	6	8	36	28	
1:30-1:45 PM	2	2	8	39	
1:45-2:00 PM	4	5	24	73	
2:00-2:15 PM	11	3	32	25	
2:15-2:30 PM	8	2	28	34	
2:30-2:45 PM	1	7	28	61	
2:45-3:00 PM	3	12	55	40	
3:00-3:15 PM	7	2	42	68	<b>Design Hourly Total 224</b>
3:15-3:30 PM	13	4	67	47	
3:30-3:45 PM	14	11	42	52	
3:45-4:00 PM	15	13	36	57	
4:00-4:15 PM	5	3	73	69	
4:15-4:30 PM	4	8	37	44	
4:30-4:45 PM	7	7	111	17	
4:45-5:00 PM	6	8	53	21	
5:00-5:15 PM	3	4	78	12	
5:15-5:30 PM	4	7	92	16	
5:30-5:45 PM	0	0	36	2	
5:45-6:00 PM	0	0	16	5	
<b>Total</b>	<b>163</b>	<b>137</b>	<b>984</b>	<b>953</b>	

\* Indicates location as shown on Figure 16

Table A-4. Pedestrian Crosswalk Volumes for Crosswalks Numbers 4 and 6

Time Period	Crosswalk Number 4* Columbia Ave Crosswalk at Delaware Ave NB		Crosswalk Number 6* Columbia Ave Crosswalk Opposite Park Entrance		
	NB	SB	NB	SB	
10:30-10:45 AM	1	2	1	2	
10:45-11:00 AM	0	5	2	3	
11:00-11:15 AM	0	4	0	0	
11:15-11:30 AM	5	4	2	2	
11:30-11:45 AM	0	4	11	5	
11:45-12:00 AM	4	3	1	5	
12:00-12:15 PM	2	5	6	2	
12:15-12:30 PM	5	1	2	0	
12:30-12:45 PM	6	4	1	2	
12:45-1:00 PM	12	2	2	5	
1:00-1:15 PM	4	8	0	1	
1:15-1:30 PM	21	4	5	11	
1:30-1:45 PM	6	6	14	7	
1:45-2:00 PM	8	7	0	8	
2:00-2:15 PM	12	12	8	12	
2:15-2:30 PM	11	11	13	18	
2:30-2:45 PM	12	15	8	14	
2:45-3:00 PM	27	10	8	1	
3:00-3:15 PM	23	20	17	3	<b>Design Hourly Total 33</b>
3:15-3:30 PM	9	7	9	6	
3:30-3:45 PM	18	16	14	18	
3:45-4:00 PM	46	8	14	6	
4:00-4:15 PM	17	9	18	7	
4:15-4:30 PM	17	13	17	8	
4:30-4:45 PM	26	12	41	5	
4:45-5:00 PM	20	5	22	3	
5:00-5:15 PM	43	7	32	2	
5:15-5:30 PM	9	6	20	6	
5:30-5:45 PM	19	0	23	5	
5:45-6:00 PM	7	1	17	5	
<b>Total</b>	<b>390</b>	<b>211</b>	<b>328</b>	<b>172</b>	

\* Indicates location as shown on Figure 16

Source: DVRPC April 2010



Table A-5. Pedestrian Crosswalk Volume Summaries

Time Period	Columbia Ave Crosswalks	Inbound to Park Crosswalks	Outbound from Park Crosswalks	Total All Crosswalks	
10:30-10:45 AM	9	11	7	27	
10:45-11:00 AM	14	33	14	61	
11:00-11:15 AM	10	58	8	76	
11:15-11:30 AM	14	99	19	132	
11:30-11:45 AM	27	97	9	133	
11:45-12:00 AM	18	124	20	162	
12:00-12:15 PM	20	130	76	226	
12:15-12:30 PM	16	132	30	178	
12:30-12:45 PM	32	213	78	323	
12:45-1:00 PM	25	168	91	284	
1:00-1:15 PM	32	179	83	294	
1:15-1:30 PM	55	172	144	371	
1:30-1:45 PM	37	197	100	334	
1:45-2:00 PM	32	294	151	477	
2:00-2:15 PM	58	226	174	458	
2:15-2:30 PM	63	222	202	487	
2:30-2:45 PM	57	244	226	527	
2:45-3:00 PM	61	221	231	513	
3:00-3:15 PM	72	306	265	643	<b>Design Hourly Total 2,296</b>
3:15-3:30 PM	48	248	280	576	
3:30-3:45 PM	91	165	256	512	
3:45-4:00 PM	102	189	274	565	
4:00-4:15 PM	59	169	297	525	
4:15-4:30 PM	67	156	183	406	
4:30-4:45 PM	98	100	355	553	
4:45-5:00 PM	64	85	228	377	
5:00-5:15 PM	91	46	326	463	
5:15-5:30 PM	52	60	301	413	
5:30-5:45 PM	47	10	158	215	
5:45-6:00 PM	30	11	94	135	
<b>Total</b>	<b>1,401</b>	<b>4,365</b>	<b>4,680</b>	<b>10,446</b>	

Source: DVRPC April 2010

Table A-6. Bicycle Lane Volumes

Time Period	Delaware Avenue Northbound Bicycle Count A*	Delaware Avenue Southbound Bicycle Count B*	Total Bicycle Lanes	
10:30-10:45 AM	0	1	1	
10:45-11:00 AM	0	0	0	
11:00-11:15 AM	2	1	3	
11:15-11:30 AM	5	1	6	
11:30-11:45 AM	0	1	1	
11:45-12:00 AM	6	0	6	
12:00-12:15 PM	2	4	6	
12:15-12:30 PM	4	2	6	
12:30-12:45 PM	0	2	2	
12:45-1:00 PM	4	2	6	
1:00-1:15 PM	3	1	4	
1:15-1:30 PM	2	3	5	
1:30-1:45 PM	0	3	3	
1:45-2:00 PM	6	2	8	
2:00-2:15 PM	7	3	10	
2:15-2:30 PM	4	4	8	
2:30-2:45 PM	7	3	10	
2:45-3:00 PM	0	0	0	
3:00-3:15 PM	12	4	16	<b>Design Hourly Total 35</b>
3:15-3:30 PM	2	1	3	
3:30-3:45 PM	1	2	3	
3:45-4:00 PM	6	7	13	
4:00-4:15 PM	6	3	9	
4:15-4:30 PM	4	0	4	
4:30-4:45 PM	3	1	4	
4:45-5:00 PM	0	1	1	
5:00-5:15 PM	5	1	6	
5:15-5:30 PM	3	5	8	
5:30-5:45 PM	1	1	2	
5:45-6:00 PM	1	0	1	
<b>Total</b>	<b>96</b>	<b>59</b>	<b>155</b>	

\* Indicates location as shown on Figure 17

Source: DVRPC April 2010

**Table A-7. Vehicular Turning Movement Counts**

Time Period	Delaware Ave				Delaware Ave				Columbia Ave				Columbia Ave				Total Vehicle Counts
	Northbound				Southbound				Eastbound				Westbound				
	L	S	R	A*	L	S	R	A*	L	S	R	A*	L	S	R	A*	
10:30-10:45 AM	0	91	8	4	8	54	0	2	17	8	11	2	8	0	5	0	218
10:45-11:00 AM	0	97	17	0	19	67	0	7	22	6	8	1	13	0	3	0	260
11:00-11:15 AM	0	129	16	6	13	46	0	15	15	4	7	4	8	0	8	0	271
11:15-11:30 AM	0	140	6	4	18	65	0	9	10	5	2	0	5	0	2	0	266
11:30-11:45 AM	0	121	11	6	18	71	0	9	18	4	4	5	12	0	7	0	286
11:45-12:00 AM	0	113	15	1	8	70	0	7	23	6	10	0	18	0	4	0	275
12:00-12:15 PM	0	147	13	4	8	62	0	7	26	4	13	1	13	0	4	0	302
12:15-12:30 PM	0	169	9	2	17	81	0	9	27	3	8	6	16	0	7	0	354
12:30-12:45 PM	0	156	9	2	14	82	0	10	23	3	9	3	9	0	6	0	326
12:45-1:00 PM	0	178	5	6	13	86	0	11	28	4	8	1	8	0	7	0	355
1:00-1:15 PM	0	179	18	1	11	95	0	13	26	2	11	1	16	0	11	0	384
1:15-1:30 PM	0	192	10	3	22	102	0	7	24	6	14	3	11	0	5	0	399
1:30-1:45 PM	0	190	3	1	23	117	0	13	32	4	13	3	19	0	3	0	421
1:45-2:00 PM	0	194	7	4	9	102	0	16	18	3	10	4	18	0	9	0	394
2:00-2:15 PM	0	181	6	3	22	84	0	15	33	5	14	10	17	0	8	0	398
2:15-2:30 PM	0	197	6	4	17	105	0	14	16	4	3	7	12	0	7	0	392
2:30-2:45 PM	0	165	6	2	20	95	0	8	24	2	8	5	12	0	7	0	354
2:45-3:00 PM	0	185	4	4	12	107	0	6	22	0	10	10	20	0	7	0	387
3:00-3:15 PM	0	165	7	1	14	93	0	10	21	1	8	5	15	0	6	0	346
3:15-3:30 PM	0	205	10	4	18	90	0	4	20	2	8	3	18	0	4	0	386
3:30-3:45 PM	0	161	13	1	19	80	0	14	33	1	10	3	23	0	9	0	367
3:45-4:00 PM	0	175	11	2	11	92	0	6	23	2	11	7	17	0	6	0	363
4:00-4:15 PM	0	204	11	3	16	65	0	8	31	3	4	9	20	0	9	0	383
4:15-4:30 PM	0	173	6	2	17	86	0	10	17	0	7	6	14	0	3	0	341
4:30-4:45 PM	0	177	3	2	14	93	0	7	31	2	8	3	16	0	8	0	364
4:45-5:00 PM	0	180	4	1	9	80	0	2	23	1	9	1	9	0	4	0	323
5:00-5:15 PM	0	146	2	2	15	75	0	5	32	0	6	2	29	0	4	0	318
5:15-5:30 PM	0	170	6	3	11	76	0	2	23	1	10	5	21	0	4	0	332
5:30-5:45 PM	0	137	4	1	11	79	0	7	19	0	16	4	4	0	4	0	286
5:45-6:00 PM	0	145	5	5	6	68	0	5	23	2	10	2	12	0	1	0	284
<b>Total</b>	<b>0</b>	<b>4,862</b>	<b>251</b>	<b>84</b>	<b>433</b>	<b>2,468</b>	<b>0</b>	<b>258</b>	<b>700</b>	<b>88</b>	<b>270</b>	<b>116</b>	<b>433</b>	<b>0</b>	<b>172</b>	<b>0</b>	<b>10,135</b>

Design  
Hourly  
Total  
1,462

\* A indicates Allen Street Turns

Source: DVRPC April 2010



# Abstract

**Report Title:** I-95 Interchange Enhancement and Reconstruction  
I-95 Expressway Interchanges, Sections GIR/VINE and AFC Traffic Study -  
Supplement Number 3

**Publication Number:** 10066

**Date Published:** October 2011

**Geographic Area Covered:** Delaware Expressway (I-95), Allegheny Avenue, Castor Avenue, Richmond Street, North Delaware Avenue, Lower Northeast Philadelphia, Bridesburg, Fishtown, Kensington, Richmond, and additional neighborhoods of Northern Liberties and Old City in Philadelphia

**Key Words:** 2010 Shad Fest, Penn Treaty Park, New Kensington Community Development Corporation (NKCDC) survey, Federal Highway Administration (FHWA) Point of Access (POA) study, Traffic Volumes, vehicular intersection turning movements, Pedestrian Crosswalk Volumes, AM and PM Peak Hour Traffic Volumes, Travel Forecasts, I-95 Delaware Expressway, Allegheny Avenue Interchange, Castor Avenue Interchange, North Delaware Avenue, East Columbia Avenue, Beach and Allen streets, Girard Avenue, Richmond Street, Castor Avenue, Christopher Columbus Boulevard, SugarHouse Casino, and Delaware Riverfront, Philadelphia

**Abstract:** This supplemental technical report presents updated and coordinated year 2030 traffic forecasts for the four Section AFC alternatives still being considered in the FHWA Point of Access (POA) analysis for the I-95 Section AFC Ann Street to Frankford Creek interchange and mainline reconstruction project. These alternatives include: the No-Build, Minimum Build, Full Diamond Interchange at Allegheny Avenue, and Split Diamond Interchange at Allegheny Avenue and Castor Avenue. These forecasts are based on the same underlying assumptions, that is: 1) 2030 design year and Board Adopted DVRPC socioeconomic forecasts; 2) include Delaware Avenue/Christopher Columbus Boulevard condominium and casino generated volumes; and 3) eliminate the Delaware Avenue Extension (temporary detour road). Also, the pedestrian crosswalk, bicycle, and vehicular turning movement counts within the North Delaware Avenue/Beach Street intersection at East Columbia Avenue taken during the 2010 Shad Fest held in Penn Treaty Park are included and analyzed in this report; as are 2030 vehicular intersection turning movement projections, including the SugarHouse Casino traffic generation. These pedestrian and bicycle counts and vehicular movement projections provide design data for access to Penn Treaty Park.

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