I-95 EXPRESSWAY INTERCHANGES SECTIONS GIR/VINE AND AFC TRAFFIC STUDY- SUPPLEMENT NUMBER 1

November 2008

Prepared for
Pennsylvania Department of Transportation
By
Delaware Valley Regional Planning Commission
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Philadelphia, PA 19106-1520

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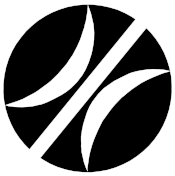

Our logo is adapted from the official DVRPC seal, and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New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

DVRPC is funded by a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. This report was primarily funded by the Pennsylvania Department of Transportation and the Federal Highway Administration (FHWA). The authors, however, are solely responsible for its findings and conclusions, which may not represent the official views or policies of the funding agencies.

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In FYs 04 and 05, DVRPC prepared 2025 traffic forecasts for alternative interchange configurations of the Girard/Vine (GIR) and Allegheny (AFC) interchanges. These forecasts included average daily, peak hour ramp, and turning movement volume forecasts. These forecasts have been transmitted to PennDOT and its consultants for use in the project level planning and design studies. The planned slots casino(s) and major portions of the related proposed condominium developments were not included in the DVRPC traffic study of the I-95 Girard Avenue, I-676 Vine Expressway, and Allegheny Avenue interchanges, completed in June of 2005 and May of 2006, respectively.

This supplemental report documents DVRPC's traffic study and forecasts for the I-95 mainline and Vine Expressway (I-676), Girard Avenue, and Allegheny Avenue interchanges assuming construction of the proposed slots casino(s) and condominium and apartment development along Delaware Avenue, north of Callowhill Street and along Christopher Columbus Boulevard. This study updates the 2025 forecasts prepared by DVRPC in the previous studies to the year 2030 and incorporates traffic from the proposed casino(s) and residential development into the projected link (ADT) volumes and peak hour ramp and intersection turning movement forecasts.

I. INTRODUCTION

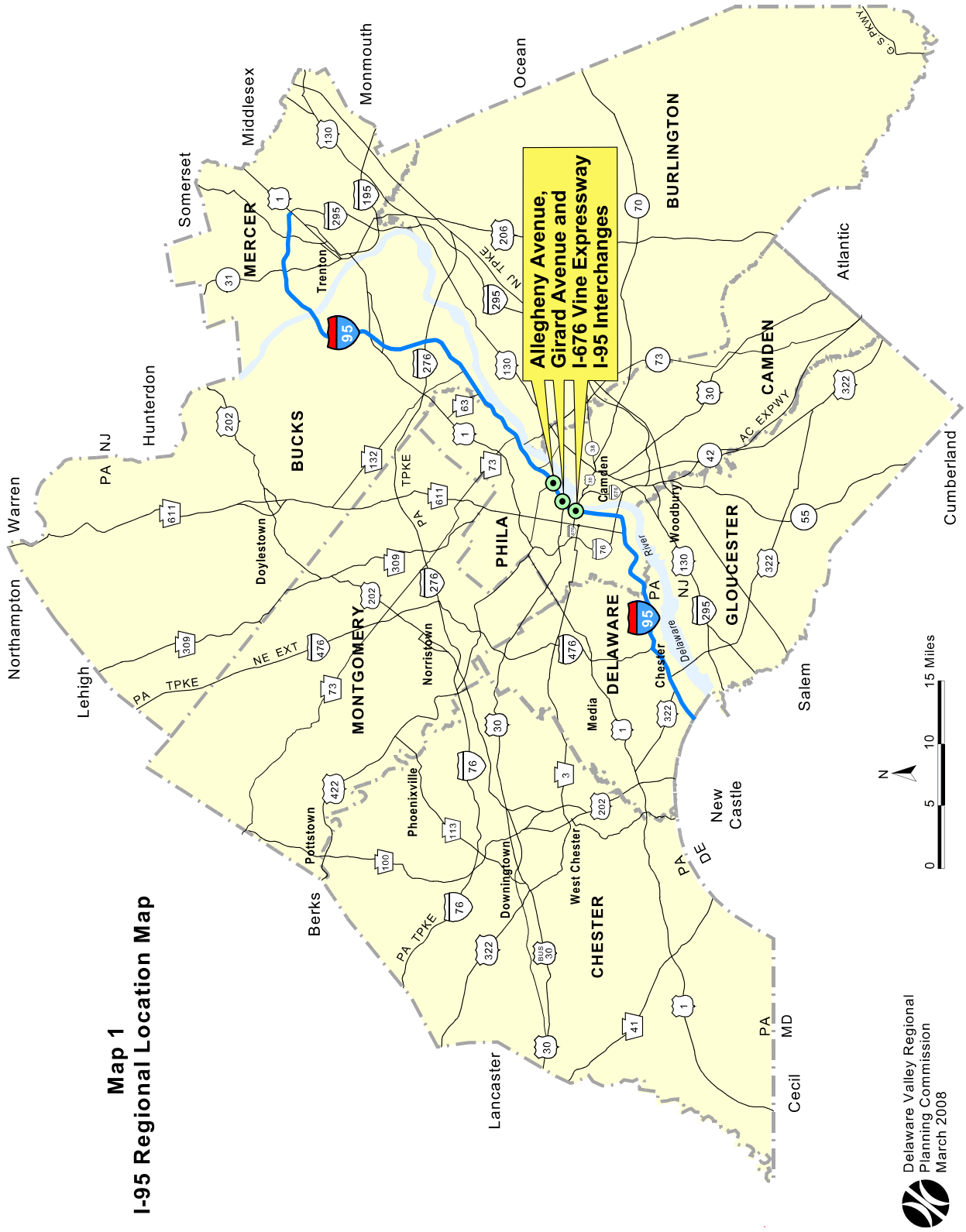
In recent years, pavement, bridges, and overpasses along I-95 have begun to deteriorate, and beginning in 2000 PennDOT began a four-phase series of repairs of I-95 from Center City Philadelphia northward into Bucks County. Planned projects include redesigning the interchanges, rebuilding numerous bridges, and expanding the Intelligent Transportation System (ITS) by installing closed circuit TV cameras, dynamic message signs, and microwave sensors. As part of the I-95 Study, DVRPC has conducted traffic studies in support of upgrading the following interchanges:

- I-676 (Vine Expressway)
- Girard Avenue
- Allegheny/Castor Avenue
- Betsy Ross Bridge
- Bridge Street
- Cottman (PA 73)/Princeton Avenue, and
- PA 132 (Street Road)

In June of 2005 and May of 2006, DVRPC completed 2025 traffic forecasts for the Girard/Vine (GIR) and Allegheny (AFC) interchanges, including average daily, peak hour ramp, and turning movement volume forecasts for a total of 16 alternative interchange configurations. These forecasts were transmitted to PennDOT and its consultants for use in the project-level planning and design studies for the various I-95 sections. Based on these forecasts, PennDOT and its consultants identified preferred alternatives for the Girard and Allegheny Avenue I-95 interchanges and advanced the studies into preliminary design. However, on December 20, 2006, the Pennsylvania Gaming Control Board awarded stand-alone Category 2 slot machine operator's licenses to the SugarHouse and Foxwoods casinos along North Delaware Avenue and Christopher Columbus Boulevard in the City of Philadelphia. The planned slots casino(s) and major portions of the related proposed condominium development were not included in the DVRPC traffic study of the I-95 Girard Avenue, I-676 Vine Expressway, and Allegheny Avenue interchanges.

This supplemental report summarizes traffic forecasts for the preferred build alternatives for the Girard Avenue and Allegheny Avenue interchange complexes along I-95 in the Northern Liberties, Penn Treaty, and Port Richmond sections of Philadelphia, and for the existing I-676 Vine Expressway Interchange adjacent to Center City Philadelphia ***(Map 1)***. It was prepared at the request of the Pennsylvania Department of Transportation (PennDot) and its consultants, who are conducting a point of access/preliminary design studies for the interchange areas. Because large portions of I-95 are being rehabilitated over the next several years, detailed studies of several of the interchanges were conducted as a precursor to any changes. The updated forecasts in this report are prepared for 2030.

The significant traffic forecasts in this study are limited to the I-676, Girard Avenue, and Allegheny Avenue interchanges and their immediate vicinity.


Allegheny Avenue,
Girard Avenue and
I-676 Vine Expressway
I-95 Interchanges
Northampton
Warren
Lehigh
Hunterdon
PA
NJ
Somerset
Middlesex
Monmouth
Ocean
Atlantic
Cumberland
Salem
Cecil
MD
PA
DE
Berks
Lancaster
BUCKS
MERCER
MONTGOMERY
PHILA
DELAWARE
CHESTER
BURLINGTON
CAMDEN
GLOUCESTER
Trenton
Doylestown
Norristown
Pottstown
Phoenixville
Downingtown
West Chester
Media
Chester
Camden
Woodbury
PA TPKE
NE EXT
NJ TPKE
AC EXPWY
Delaware River
Delaware
New Castle
N
0
5
10
15 Miles
Map 1
I-95 Regional Location Map
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The focused travel simulation model, prepared by DVRPC for the previous traffic studies, was updated to include the 2030 socioeconomic projections adopted by DVRPC's Board and travel generated by the proposed casinos and planned condominium development along North Delaware Avenue and Christopher Columbus Boulevard. The model's highway network was reviewed and modified to reflect the preferred alternatives for all seven I-95 interchanges currently under redesign.

The purpose of this report is to document the assumptions, methodology, and forecasts prepared by DVRPC, assuming the implementation of the proposed casinos and condominium developments. Chapter II documents the physical characteristics of the Girard/Vine/Allegheny study area. Included is a description of the land uses and surrounding roadway network, along with a discussion of current traffic volumes and levels of service. The preferred alternatives for the Girard and Allegheny interchanges are described in detail in Chapter III. Chapter IV contains a brief description of the travel forecasting methodology. The regional demographic and employment forecasts and corridor-specific casino and condominium development proposals that form the basis for the updated forecasts are also presented in this chapter. Chapter V presents an analysis of the travel forecasts for the preferred alternatives for the Girard and Allegheny Avenue interchanges. The forecasts represent projected 2030 daily and AM and PM peak hour traffic volumes for I-95 and the adjacent ramps and surrounding roadways.

II. DESCRIPTION OF THE COMBINED STUDY AREA

This supplemental report provides updated traffic forecasts for the combined study area of the Vine Expressway (I-676), Girard Avenue, and Allegheny Avenue interchanges. For this study, traffic forecasts are focused on I-95 and its interchanges. This includes the immediate vicinity of the Vine Expressway Interchange and North Delaware Avenue north of Columbia Avenue and the Girard Avenue Interchange. For the travel simulation model, the limits of the Girard Avenue/Vine Expressway (I-676) - Section GIR portion of the study area ***(Map 2)*** run from the Ben Franklin Bridge northwards to Ann Street in Port Richmond and from the Delaware River westward to 2nd Street in North Philadelphia. In this section, the alignment of I-95 changes from north/south at the Vine Expressway(I-676) interchange to approximately northeast/southwest closer to the Girard Avenue interchange. The routing generally follows the Delaware River. The mainline of the highway is elevated at the north end, but closer to I-676 rests on an embankment. From Laurel Street south the median is occupied by SEPTA's Market Frankford Subway/Elevated line.

The limits of the Allegheny Avenue Section AFC portion of the study area ***(Map 3)*** run for approximately 1.7 miles from a southern boundary at Ann Street to northern limits at the Frankford Creek near the base of the Betsy Ross Bridge. The east-west boundaries are the Delaware River to the east and Aramingo Avenue to the west. In Section AFC, the alignment of I-95 is approximately northeast/southwest, generally following the Delaware River. The mainline of the highway is elevated, and is located between the residential neighborhood of Port Richmond to the west and industrial activities that line the Delaware River on the east. The northern limits of Section AFC are at Frankford Creek within the Betsy Ross Bridge (BRI) interchange. The nearest I-95 interchange to the south is at Girard Avenue, about 0.8 miles from Ann Street.

A. Existing Highway Facilities and Land Use

1. Section GIR/VINE

The original construction of I-95 ***(see Map 4)*** provided four southbound lanes from the Allegheny Interchange, for approximately one mile, to the Girard Interchange. The outermost lane becomes a southbound off-ramp to Girard Avenue, leaving three southbound lanes continuing through the Girard Interchange. The Girard/Aramingo Avenue southbound on-ramp reintroduces the fourth southbound lane. These southbound through lanes continue until the southbound off-ramp to I-676 and Callowhill Street diverges. At this point, the expressway flares out to provide three lanes for through traffic, two lanes to I-676 westbound, and two lanes to Callowhill and 2nd streets ***(Map 5)***. Southbound I-95 continues through the Penn's Landing area on the east side of Center City, a segment rebuilt in the 1990's to improve access to the waterfront and accommodate movements to and from I-676. Three traffic lanes provide for northbound I-95 travel from the southern end of the study area. Traffic from Race Street and Delaware Avenue merge into a single lane on-ramp before joining into the I-95 mainline northbound traffic stream. Eastbound I-676 provides a two lane on-ramp that enters I-95 from the left just north of this merge. Traffic from both I-676 northbound


Map 2. I-95 Expressway Interchange - Section GIR/VINE Traffic Study Area
Legend
I-95 Delaware Expressway
I-676 Vine Expressway
SUGARHOUSE CASINO
Delaware River
Pennsylvania
New Jersey
Philadelphia County
Camden County
Petty Island
Pennsauken Township
CAMDEN
PHILADELPHIA
Delaware Ave
Richmond St
Aramingo Ave
Frankford Ave
Girard Ave
2nd St
North
Spring Garden St
Callowhill St
Ben Franklin
Race St
Christopher Columbus Blvd
Bridge
Girard Ave Sta
Spring Garden St Sta
Market Frankford Subway Elevated Line
SEPTA - R1, R2, R3, R5, R6, R7, R8
95
676
0
0.25
0.5
0.75
1 Mile
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Map 3. I-95 Expressway Interchange - Section AFC Traffic Study Area
PHILADELPHIA
Richmond
DELAWARE RIVER
Pennsylvania
New Jersey
Philadelphia County
Camden County
Frankford Ck
Atlantic City Line
Betsy Ross Bridge
Amtrak - NJ Transit
Conrail
Wheatsheaf La
Butler St
Aramingo Ave
Castor Ave
Venango St
Tioga St
Ontario St
Westmoreland St
Allegheny Ave
Cambria St
Cedar St
Gaul St
Belgrade St
Thompson St
Richmond St
Edgemont St
Bath St
Delaware Ave
Frankford Ave
Kensington Ave
SEPTA - Market-Frankford Subway-Elevated line
Allegheny Station
95
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Delaware Valley Regional Planning Commission
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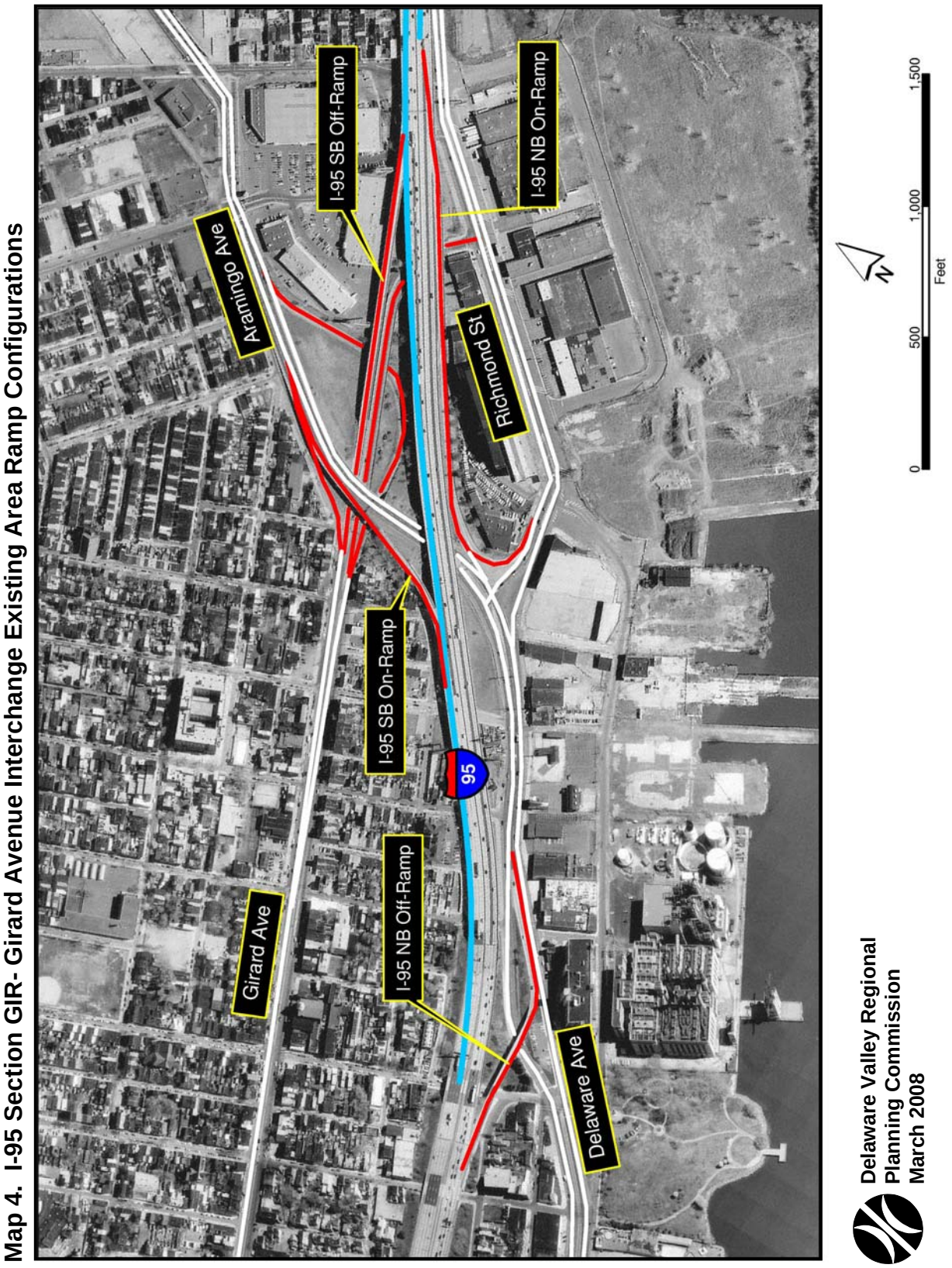

Map 4. I-95 Section GIR- Girard Avenue Interchange Existing Area Ramp Configurations

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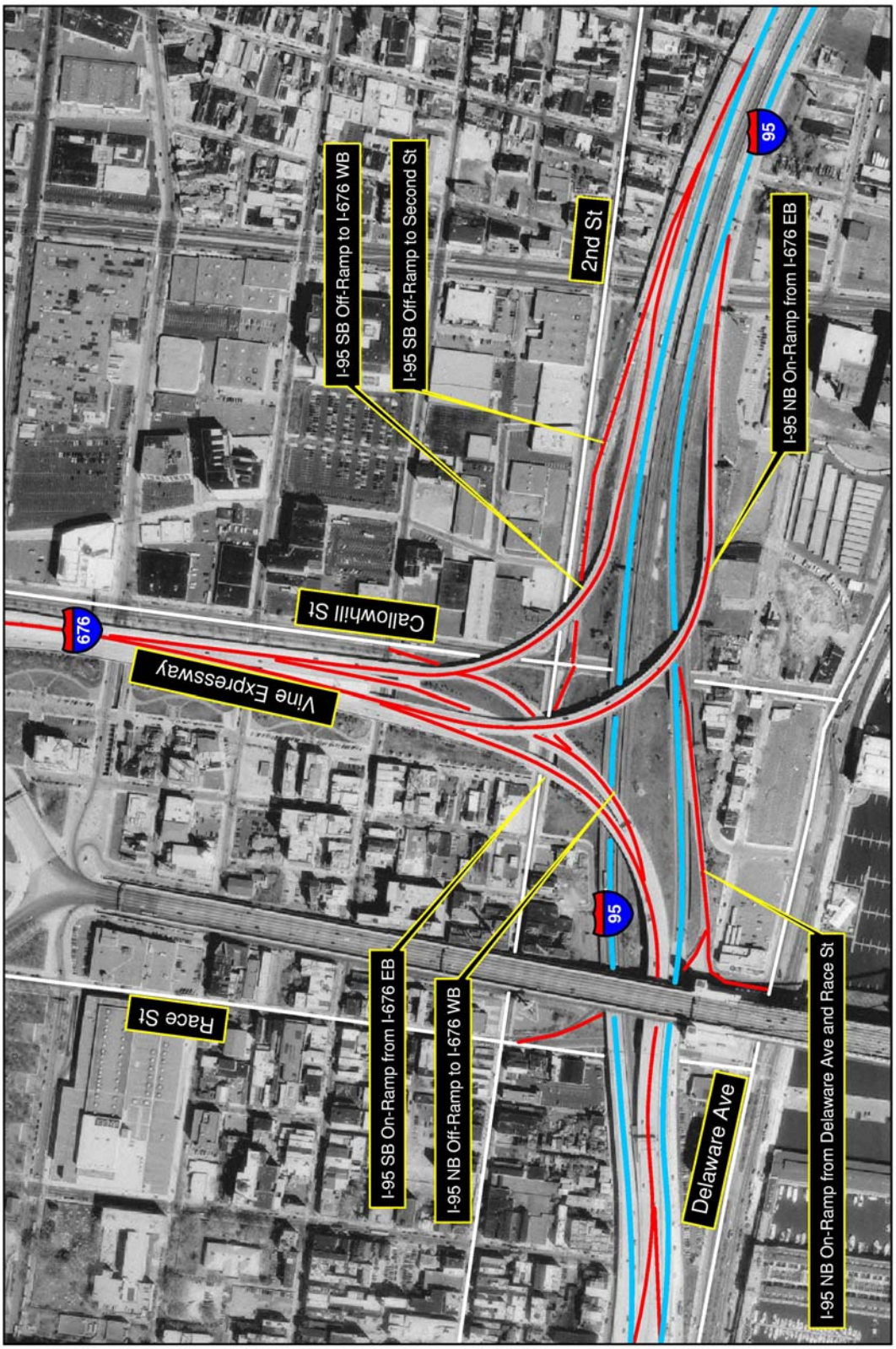
Map 5. I-95 Section VINE- I-676 Vine Expressway Interchange Existing Area Ramp Configurations



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on-ramp lanes continues north and must merge with the three I-95 through lanes of traffic. The outer lane of the ramp merges with the inner lane after the connection with I-95 and the ramp continues north to become the northbound off-ramp to Delaware/Girard avenues. The three lanes of northbound through traffic continue through the Girard Interchange, where a combined northbound on-ramp from Girard and Delaware avenues/Richmond Street provides the fourth lane for travel north.

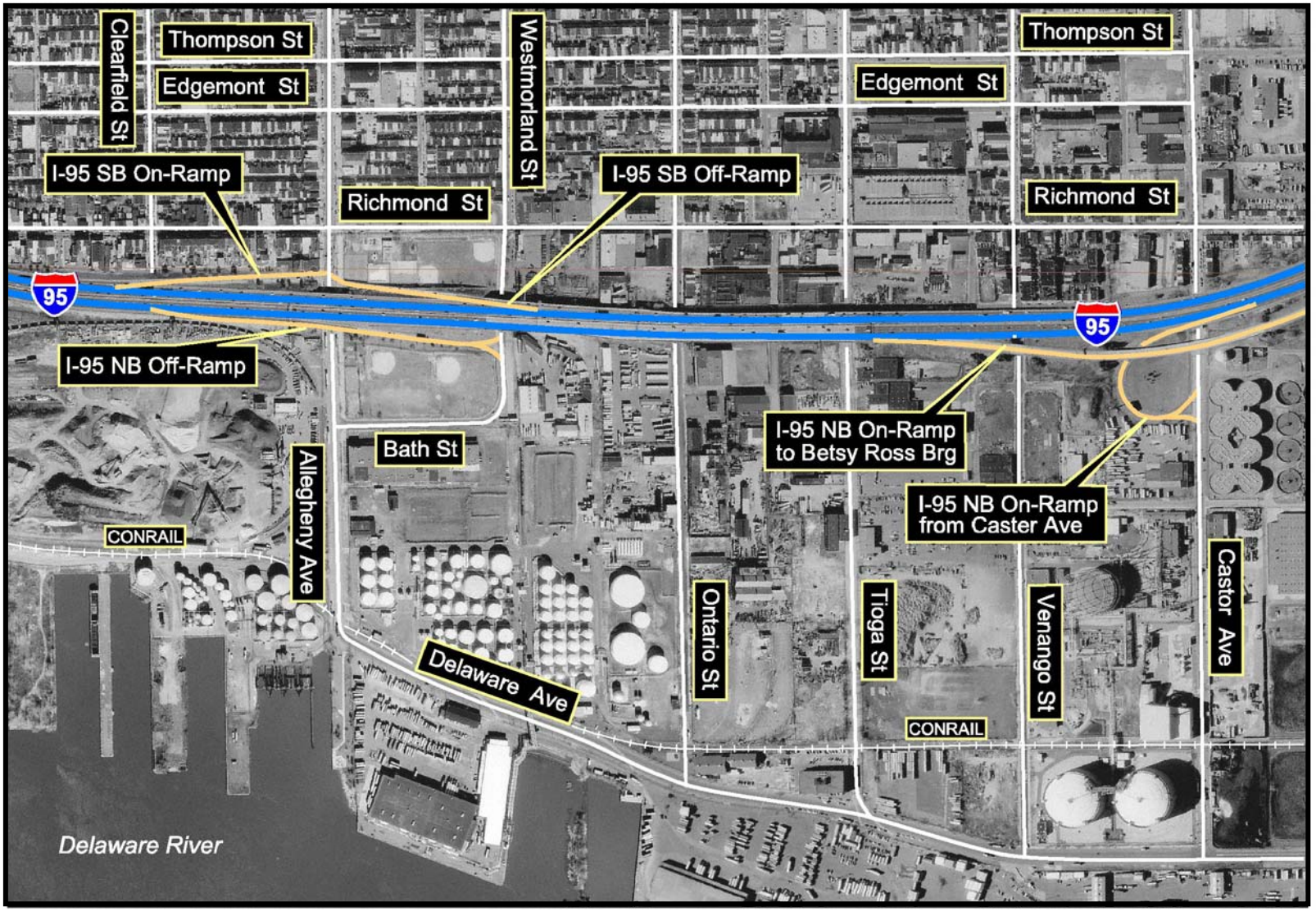
Several major arterials in the vicinity of the Girard Interchange significantly contribute to interchange traffic. Delaware Avenue runs parallel to the expressway from South Philadelphia to the Girard Interchange. To facilitate waterfront redevelopment, this facility has recently been improved north of Vine Street. At the Girard Interchange, Delaware Avenue crosses under I-95 and continues on a course parallel to the west of the expressway as Aramingo Avenue. East of the expressway, Richmond Street serves traffic continuing north from the Delaware Avenue crossing. Girard Avenue originates at an intersection with Richmond Street under the interchange with I-95. Ramps to and from I-95 provide significant traffic to the arterial. From this point Girard Avenue proceeds parallel on the west side of I-95 for three-quarters of a mile before turning west and providing a crosstown route across lower North Philadelphia. Land uses within the Girard end of the study area tend to be predominately residential and light commercial on the western side of I-95 and warehousing and industrial to the east, particularly near the intersection of Delaware Avenue and Richmond Street in and around the Riverside Industrial Park. The west of I-95 Girard Avenue is lined with small scale commercial uses targeted at the local neighborhoods. The neighborhoods on both sides of Girard consist of row houses. Further north, at the intersection of Aramingo Avenue and York Street, is the Aramingo Plaza, an urban shopping center.

2. Section AFC

The main line of I-95 is limited access, four lanes by direction both approaching and departing the Allegheny Avenue/Westmoreland Street interchange. ***Map 6*** displays the existing ramp configurations within the Section AFC traffic study area. The first set of ramps going north on I-95 are the southbound on-ramp from Allegheny Avenue to I-95 and a southbound off-ramp to Allegheny Avenue from I-95. These ramps provide access for Port Richmond and the Tioga Marine Terminal area by users of the Betsy Ross Bridge and I-95 southbound. Next is a northbound off-ramp from I-95 to Westmoreland Street. Access to the riverfront is provided via Bath Street and Allegheny Avenue. Access to the Port Richmond neighborhood is via both Allegheny Avenue and Westmoreland Street. Proceeding north, a two-lane northbound off-ramp diverges from I-95 towards the Betsy Ross Bridge and Aramingo Avenue. This is followed by a northbound on-ramp to I-95 from Castor Avenue, providing access from the Port Richmond neighborhood and waterfront industry to I-95, but with no access to the Betsy Ross Bridge. Traffic bound for the Betsy Ross Bridge must instead use Richmond Street to the north. Finally, at the northern study limits, a southbound on-ramp merges onto I-95 from the Betsy Ross Bridge and Aramingo Avenue.

Major arterials in the study area, running parallel to I-95, include Richmond Street, Aramingo Avenue, and Delaware Avenue. Other parallel roadways include Belgrade Street, Thompson Street,

Map 6. I-95 Section AFC (Ann Street to Frankford Creek) Interchange Existing Area Ramp Configurations



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and Bath Street. The parallel roads vary in configuration. Major arterials such as Richmond Street, Delaware Avenue, and Aramingo Avenue south of Westmoreland Street are one lane by direction. However, Aramingo Avenue north of Westmoreland Street is two lanes in each direction with a continuous left-turn lane. Thompson and Belgrade streets, each a two-lane collector roadway through residential blocks, form a one-way couplet to serve local neighborhood traffic parallel to I-95.

Principal perpendicular arterial roadways directly connected to I-95 include Allegheny Avenue and Castor Avenue, with Westmoreland Street and Wheatsheaf Lane acting as collector roadways for I-95 traffic. Local east-west roads not directly connected to I-95 include Somerset Street, Ann Street, Clearfield Street, and Tioga Street. All perpendicular roadways are configured as two lanes, with Allegheny Avenue having a continuous left-turn lane.

B. Existing Land Uses

Toward the I-676 Vine Expressway end of the Section GIR study area, the land use character on both sides of I-95 transforms. On the east side, along the Delaware River, warehousing and long closed port related uses are increasingly being redeveloped into entertainment, recreational and residential uses. These uses, which tend to distribute trip origins and destinations more evenly around the clock, are transforming not only the character of the area, but the character of the traffic. On the west side of I-95, residential row houses common in the northern portion of the study area give way to warehouses and manufacturing facilities, which are increasingly being transformed or replaced by office uses. Major redevelopment plans exist for the North Delaware Avenue portion of the study area, including the SugarHouse Casino and related shopping, entertainment, and condominium developments.

Land uses within the Section AFC portion of the study area tend to be predominately residential and light commercial on the western side of I-95 and heavy industrial to the east, particularly between Richmond Street and the Delaware River. The Port Richmond neighborhood is very dense, with schools, churches, and a hospital interspersed amongst row houses on the west of I-95. There is a significant auto-oriented retail component along Aramingo Avenue. Prime traffic generators east of I-95 include the Tioga Marine Terminal, warehousing and trucking facilities, chemical storage facilities, and construction suppliers. Industrial/commercial land uses in the study area generate high volumes of truck traffic, much of which is destined for I-95.

C. Current Traffic Volumes

While there has been little new development in the study area since this section of I-95 opened, intensive development has taken place in the greater Northeast Philadelphia, Bucks County, Center City Philadelphia, and Montgomery County in Pennsylvania, and in Mercer, Burlington, and Camden counties in New Jersey. Also, during the same time, main line volumes on I-95 have

increased significantly because of general traffic growth throughout the region. The general overall increase in I-95 traffic volumes makes the related congestion on the I-95 mainline and surrounding street system a recurring issue.

1. Section GIR/VINE

On the main line of I-95, 86,900 vehicles currently approach the Girard Interchange from the north and 85,500 depart the interchange to the north during the average day. On the southern side of the I-676 Vine Expressway Interchange, the corresponding volumes are 41,200 vehicles per day (vpd) departing to the south and 34,500 vpd arriving from the south. The Callowhill Street and I-676 Vine Expressway offer major access into Center City and together bleed off about 40,000 vpd from southbound I-95 ***(see Figure 1)***. The return movement, from Center City, is predominantly handled by the Vine Expressway (I-676), with 35,800 vpd. A northbound on-ramp from Race Street (5,900 vpd) combines with approximately 700 vehicles from Delaware Avenue to provide the remaining northbound traffic from this interchange. At the Girard Interchange, ***(Figure 2)***, the northbound I-95 off-ramp carries 9,300 vpd, while the northbound on-ramp adds 16,700 vehicles from both Delaware Avenue and Girard Avenue to northbound I-95 traffic. Southbound, a volume of 8,900 vpd was counted on the exit to Girard Avenue, while the southbound on-ramp from Aramingo Avenue contributes 10,200 vehicles.

Traffic volumes on study area roadways were also counted. Delaware Avenue south of the Girard Interchange recorded a daily volume of 19,000 vehicles. Of this total, almost 12,000 traveled northbound and slightly over 7,000 traveled southbound. Volume on the west side of the interchange, where Delaware Avenue becomes Aramingo Avenue, was counted at 30,100 vpd. Girard Avenue, south of the interchange with I-95, handles daily traffic of 24,800 vehicles. Along with the 8,900 vpd coming via the southbound I-95 off-ramp, 3,600 vehicles travel along a connection from Aramingo Avenue. Northbound Girard Avenue contributes 2,700 vehicles via a connection to Aramingo Avenue in the shadow of the I-95 Interchange, while the ramp to northbound I-95 carries 6,600 vehicles prior to its merge with ramp traffic from Delaware Avenue and Richmond Street. The connection to Richmond Street, where Girard Avenue terminates, carries 2,100 vehicles in both directions. Volumes on Richmond Street were counted at 11,100 and 10,300 vpd north and south of this connection with Girard Avenue, respectively.

2. Section AFC

Traffic counts were collected on mainline I-95 and all ramps to and from I-95 within the study area. Additional traffic counts were taken on impacted arterials and local roads within the study area, including; Somerset Street, Ann Street, Clearfield Street, Allegheny Avenue, Westmoreland Street, Tioga Street, Castor Avenue, Delaware Avenue, Bath Street, Richmond Street, Thompson Street, Belgrade Street, and Aramingo Avenue. Current Annual Average Daily Traffic Volumes (AADT) are shown in ***Figure 3***.

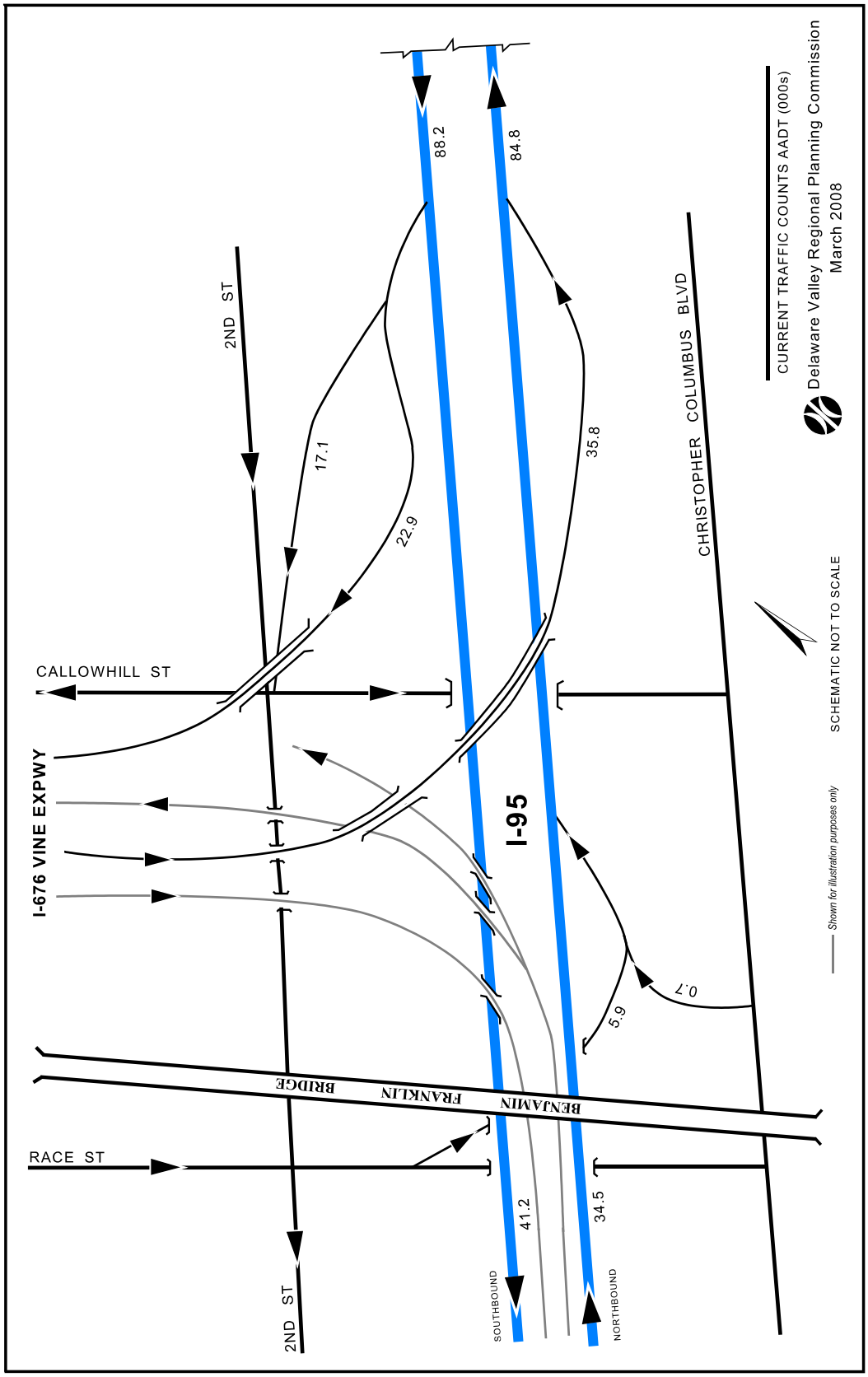


Figure 1. I-95 Expressway Section VINE Interchange - Current Traffic Counts

Figure 2. I-95 Expressway Section GIR Interchange - Current Traffic Counts

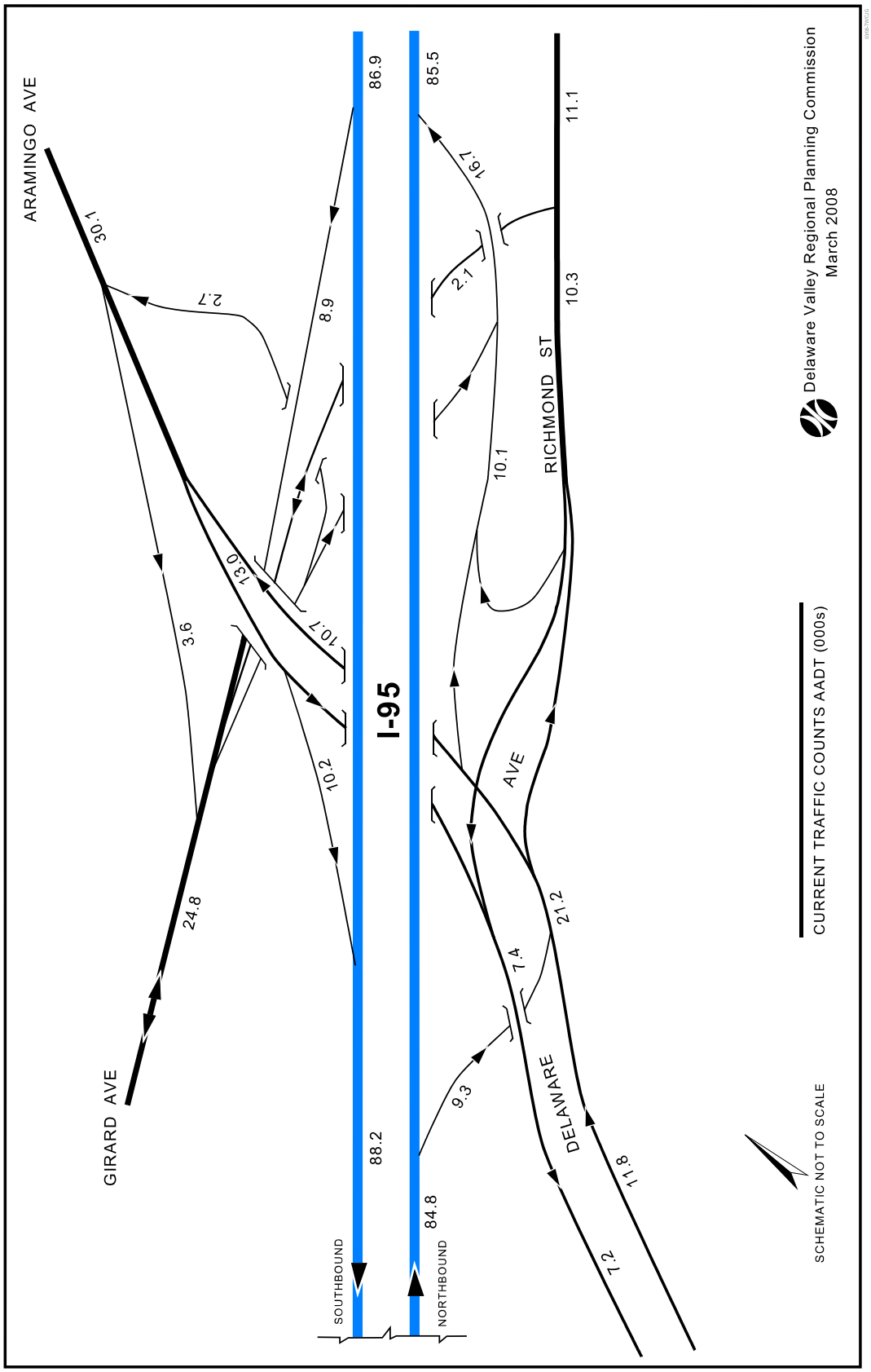
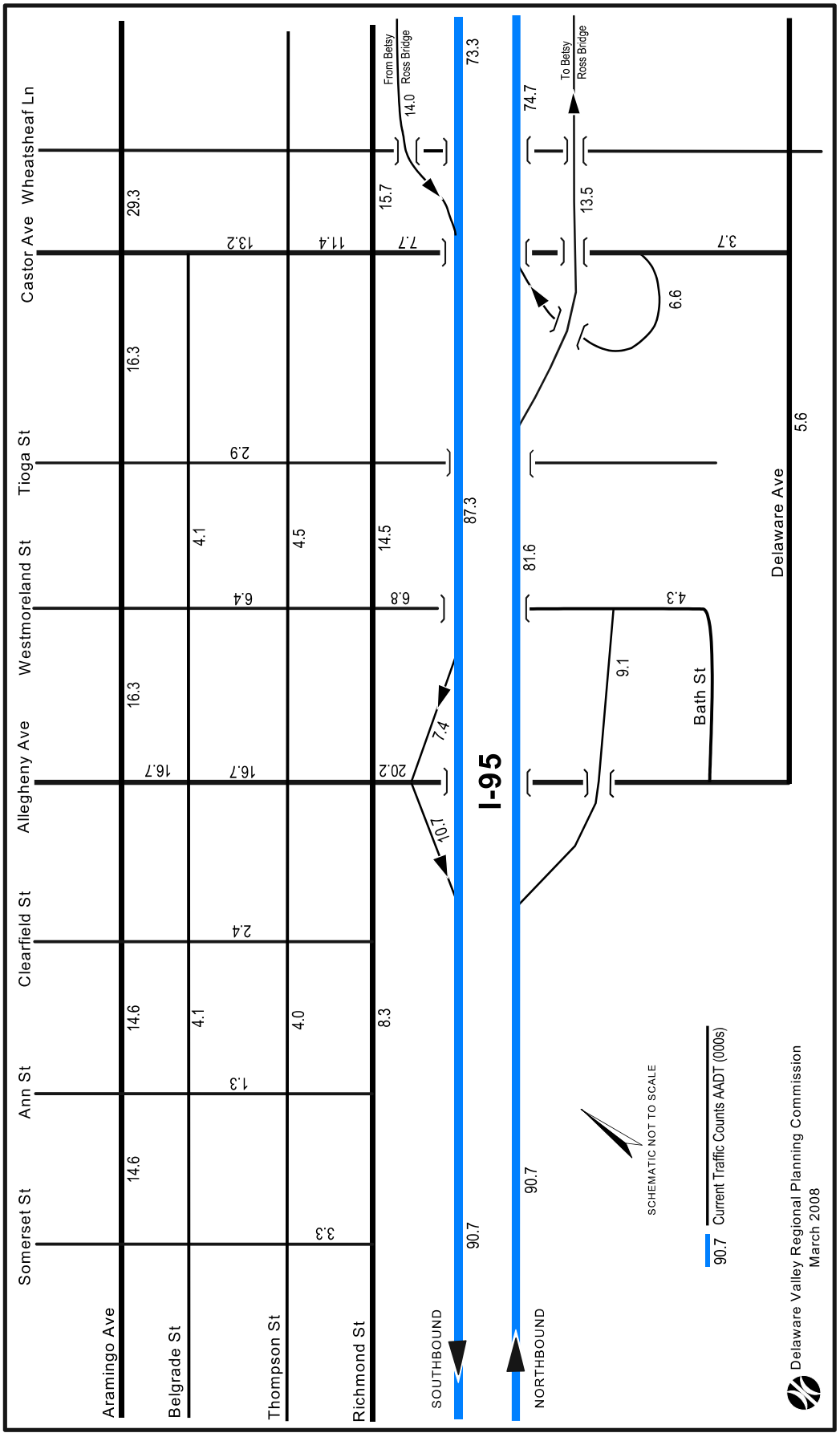


Figure 3. I-95 Expressway Section AFC Interchange - Current Traffic Counts



Usage of the I-95 mainline is currently 90,700 vehicles per day (vpd) in each direction at the southern limit of the study area, for a two-way total of 181,400 vpd. At the study area's northern limit, 148,000 vpd use the mainline of I-95 with an additional 14,000 vpd traversing the I-95 Southbound on-ramps and 13,500 using Northbound off-ramps from and to the Betsy Ross Bridge. These northern limit I-95 volumes are approximately equal by direction, and total 175,500 vpd. Traffic volumes on I-95 through the study area are approaching the capacity of the existing four-lane by direction cross section. Further to the south at Girard Avenue, a lane drop occurs and only three through lanes continue causing a bottleneck in southbound AM peak traffic that propagates upstream through Section AFC. This Southbound congestion is exacerbated by traffic from the Betsy Ross Bridge merging onto the mainline of I-95 at the northern limit of the section. Both Aramingo Avenue and Richmond Street are used as bypass routes by drivers wishing to avoid this congestion.

Current study area traffic count volumes along the adjacent roadways parallel to I-95 range from a high of 29,300 vpd on Aramingo Avenue between Castor Avenue and Wheatsheaf Lane to a low of 4,000 vpd on Thompson Street between Ann and Clearfield streets. Aramingo Avenue is the most-traveled arterial in the study area, never falling below 14,600 vpd. Other heavily traveled roadway segments in the area include Allegheny Avenue (16,700 to 20,200 vpd), Richmond Street (8,300 to 15,700 vpd), and Castor Avenue (3,700 to 13,200 vpd). Collector roadways include Belgrade Street (4,100 vpd), Thompson Street (4,000 to 4,500 vpd), Westmoreland Street (4,300 to 6,800 vpd), and Delaware Avenue (5,600 vpd). Local street traffic counts include Somerset Street (3,300 vpd), Ann Street (1,300 vpd), Clearfield Street (2,400 vpd), and Tioga Street (2,900 vpd).

III. INTERCHANGE IMPROVEMENT ALTERNATIVES

The highway network model used to project 2030 Section GIR and AFC traffic volumes with the planned casino and condominium developments along North Delaware Avenue and Christopher Columbus Boulevard included the preferred alternative mainline and ramp improvement in all seven I-95 interchange improvement study areas. However, the interchange study areas north of Section AFC (Sections BSR (Betsy Ross), BRI (Bridge Street), CPR (Cottman/Princeton) and D001 (Street Road))are located too far from the Delaware Avenue/Christopher Columbus Boulevard development area to be significantly impacted by the planned casino and condominium developments. The Street Road (PA 132) Interchange may be significantly impacted by the Philadelphia Park Casino in Bensalem Township, Bucks County, Pennsylvania. The effect of the Philadelphia Park Casino on the Street Road Interchange projections is being analyzed under a separate study.

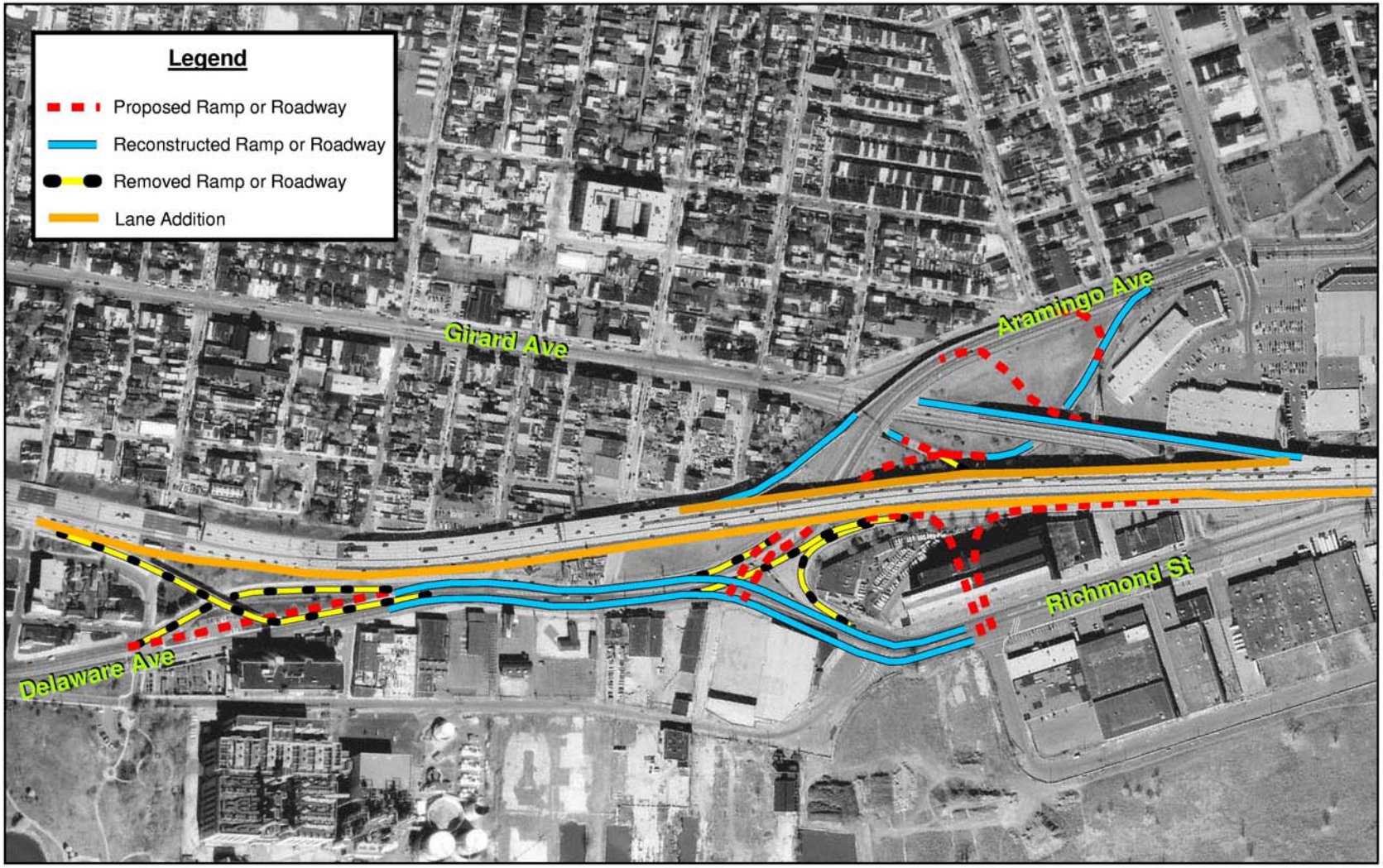
The project objectives that guided the development of the design of the Section GIR and AFC alternatives included improving traffic flows on I-95 by eliminating merge and weave disturbances, reducing adverse neighborhood impacts due to traffic including heavy commercial vehicles on residential streets, and improving intersection performance on the local street network. For both I-95 and the local street network, congestion, noise, and air pollution impacts on the neighborhood are to mitigated as much as possible. Also included were improvements to the safety and capacity of I-95 including better signage and incident management technology, and also, improved access to and from I-95. After study of a total of more than 16 improvement alternatives, the preferred designs were Build Option 7 with Proposed Delaware Avenue Extension for Section GIR and Alternative 5 for Section AFC.

A. Section GIR Build Option 7 - Reconstructed Interchange with Proposed Delaware Avenue Extension

As displayed on ***Map 7***, Build Option 7 with Proposed Delaware Avenue Extension includes the relocation of the I-95 northbound off-ramp to Delaware Avenue to tie in at Richmond Street. At this location, a signalized intersection is created that provides a new entrance for the I-95 northbound on-ramp. Delaware Avenue is reconstructed in the vicinity at the base of the former off-ramp. The current base of the northbound on-ramp at Delaware Avenue and Richmond Street is also removed. This facilitates the realigning of the intersection to a "T" intersection, changing the through movement from Delaware Avenue to Aramingo Avenue, to Delaware Avenue to Richmond Street. This scenario also includes splitting Aramingo Avenue by direction. Aramingo Avenue northbound intersects the current cart-path of the Girard Avenue to Aramingo Avenue movement. The I-95 northbound on-ramp from Girard Avenue is removed. Further north on this new northbound Aramingo alignment, a connection is installed to Aramingo Avenue southbound.

By relocating the I-95 northbound off-ramp, a greater distance is provided for the weaving movements between the I-676 Vine Expressway interchange and this exit, while giving exiting

Map 7. I-95 Section GIR- Girard Avenue Proposed/Reconstructed Interchange Area - Build Option 7 with Proposed Delaware Avenue Extension



Note: Proposed Delaware Avenue Extension is shown on Map 8

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March 2008

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traffic the new option of proceeding south on Delaware Avenue. Splitting Aramingo Avenue by direction removes conflicts between northbound Aramingo Avenue traffic and traffic using the new I-95 southbound ramp to Aramingo Avenue southbound. Girard Avenue access to northbound I-95 is maintained with the removal of the northbound Girard Avenue on-ramp; however, it becomes more circuitous, using Girard Avenue to Richmond Street to the base of the new ramp. The provision of the connection between the new northbound Aramingo Avenue and southbound Aramingo Avenue provides access to the I-95 southbound on-ramp for traffic from the Delaware Avenue waterfront without a reverse movement at Aramingo Plaza.

This build option also includes extending Delaware Avenue to Allegheny Avenue at State Road. The section of Richmond Street between the current Delaware Avenue/Aramingo Avenue intersection and Lehigh Avenue is renamed Delaware Avenue. At Lehigh Avenue, Delaware Avenue diverges onto a new alignment parallel and east of the I-95 viaduct to Allegheny Avenue. The provision of a new Delaware Avenue between Allegheny Avenue and Aramingo Avenue improves traffic flow for trips between these two locations and provides a relief roadway to serve diverted traffic during the reconstruction of the Girard and Allegheny interchanges.

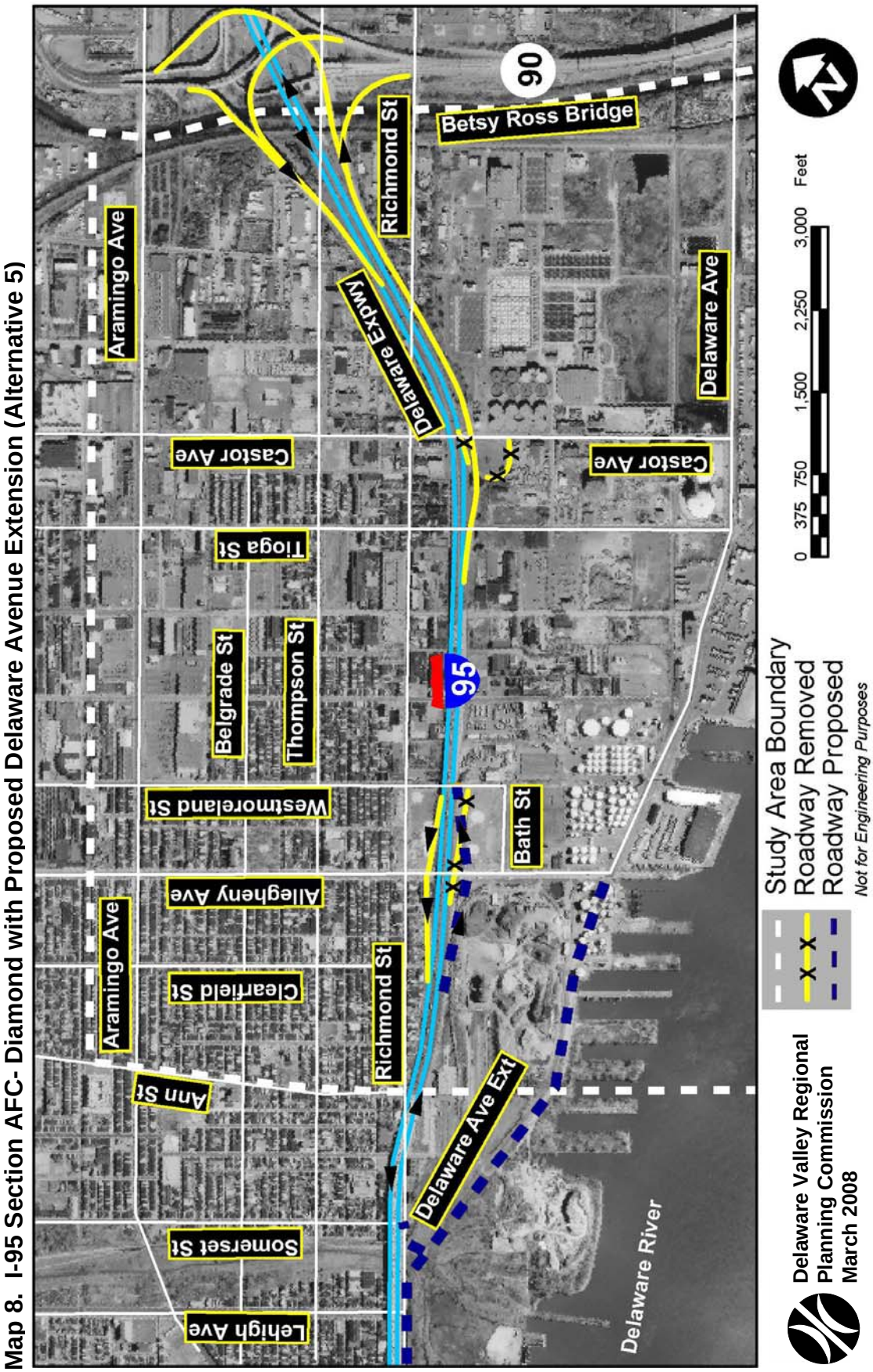
B. Section AFC Allegheny Avenue - Diamond Interchange with Proposed Delaware Avenue Extension (Alternative 5)

The 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 diamond interchange connected to Allegheny Avenue between Richmond Street and Bath Street. The northbound off-ramp terminus is relocated from Westmoreland to Allegheny and the northbound on-ramp from Castor to Allegheny Avenue. This alternative allows access to the Betsy Ross Bridge via the relocated Allegheny Avenue northbound on-ramp and encourages traffic exiting from I-95 northbound to use Allegheny Avenue rather than Westmoreland Street ***(see Map 8)***.

Alternative 5 enhances the Diamond Interchange with the proposed Delaware Avenue Extension. The proposed Delaware Avenue Extension is assumed to be opened to traffic from Richmond Street at Lehigh Avenue to the eastern end of Allegheny Avenue. Existing Richmond Street is reconstructed and realigned and renamed as Delaware Avenue from Girard Avenue to Lehigh Avenue. This alternative determines the impacts of Delaware Avenue on Allegheny Avenue and I-95 assuming an interchange at Allegheny Avenue with access in all directions, including the Betsy Ross Bridge.

C. I-676 Vine Expressway Interchange - Existing Interchange Configuration

The traffic projections prepared for this study assume that the configuration of the Vine Expressway (I-676) interchange with I-95 Expressway, including the off-ramp to Callowhill Street and on-ramp from Race Street/Delaware Avenue, will remain in the current configuration shown on ***Map 5*** (page 11).



Map 8. I-95 Section AFC- Diamond with Proposed Delaware Avenue Extension (Alternative 5)

IV. TRAVEL FORECASTING PROCEDURES AND DEVELOPMENT ASSUMPTIONS

Regional travel simulation models are used to forecast future travel patterns. They utilize a system of traffic zones that follow Census boundaries and rely on demographic and employment data, land use, and transportation network characteristics to simulate trip making patterns throughout the region. A focused simulation process allows the use of DVRPC's regional simulation models but includes a more detailed representation of the study area. Local streets not included in the regional network, but of interest in this study, are added to the highway network. Traffic zones inside the study area are subdivided so that traffic from existing and proposed land use developments may be loaded more precisely on the network. The focusing process increases the accuracy of the travel forecasts within the detailed study area. At the same time, all existing and proposed highways throughout the region and their impact on both regional and interregional travel patterns become an integral part of the simulation process.

DVRPC's travel models follow the traditional steps of trip generation, trip distribution, modal split, and traffic assignment. However, an iterative feedback loop is employed from traffic assignment to the trip distribution step. The feedback loop ensures that the congestion levels used by the models when determining trip origins and destinations are equivalent to those that result from the traffic assignment step. Additionally, the iterative model structure allows trip making patterns to change in response to changes in traffic patterns, congestion levels, and improvements to the transportation system. The focused traffic simulation models prepared by DVRPC staff of the 2005/2006 studies of the I-95 Reconstruction Study interchange improvements were reused for this analysis, after the socioeconomic forecasts were updated to 2030 and the proposed developments for North Delaware Avenue and Christopher Columbus Boulevard were updated. For a more detailed description of this travel forecasting process, see the following DVRPC reports: ***I-95 Girard Avenue and I-676 Vine Expressway Interchanges, Section GIR Traffic Study***, June 2005, and ***I-95 Section AFC (Ann Street to Frankford Creek) Interchange Traffic Study***, May 2006.

Two special enhancements were incorporated into the travel simulation models for this study: (1) development of new casino patron travel models and (2) walk and bicycle travel was also estimated for the North Delaware Avenue/Christopher Columbus Boulevard for pedestrian and bicycle planning purposes using the trip generation rates included in the enhanced DVRPC model.

This study included trip generation reflective of maximum build-out for all four casinos approved by the Pennsylvania Gaming Commission in the Delaware Valley. Trip generation resulting from casino employment, retail establishments, entertainment, and other commercial venues were prepared by the DVRPC trip generation model. Casino patron trip estimates were taken directly from the traffic studies prepared by traffic consultants for the casino developers as part of the application process ***(see Table 1)***. The market area of the planned casinos covers the entire DVRPC region and also includes significant travelers from locations outside of the DVRPC region. For this reason, casino patrons are likely to have significantly different trip distribution characteristics than persons traveling for the traditional purposes of home-based work, home-based nonwork, and non

home based, especially in terms of much higher average trip length and the higher percentage of travel coming from beyond the DVRPC region. The DVRPC trip distribution model that is used to distribute travel to and from Philadelphia International Airport (PHL) is judged to have similar characteristics of landside access. The PHL airport services the entire region and significant areas beyond DVRPC's nine county region. The airport gravity model was adapted to distribute to the casino patron trips.

Table 1. Approved Casino Maximum Buildout Proposals and Casino Patron Trip Generation

Casino	Slot Machines	Employment	Facilities	Commercial sq ft	Hotel Rooms	Casino Patron Daily Person Trip Generation (Friday)
Chester Downs	5,000	1,000	1500 Seat Grandstand	37,000	0	18,200
Foxwoods	5,000	1,780	Pier 60 District	90,000	500	26,000
SugarHouse	5,000	1,300	2500 seat Theater/venue; 20,000 sqft Turf Club	30,000	500	28,970
Philadephia Park	3,000	1,000	1500 Seat Grandstand	0	0	18,200

Transit trips made by casino patrons were separated from total patron trips by DVRPC's home-based nonwork modal split model, which also estimated the average auto occupancy needed to convert auto-oriented patron trips to vehicle (car) trips. Travel associated with non-casino developments along North Delaware Avenue/Christopher Columbus Boulevard were estimated with the DVRPC model.

A. 2030 Socioeconomic Projections

The traffic forecasts included in this document are updated from 2025 to the year 2030 and reflect the current DVRPC socioeconomic forecasts. DVRPC's long-range population and employment forecasts are revised periodically to reflect changing market trends, development patterns, local and national economic conditions, and available data. The updated forecasts reflect all reasonably known current information and the best professional judgement of predicted future conditions. The revised forecasts were adopted by the DVRPC Board in February 2005.

DVRPC uses a multi-step, multi-source methodology to produce its forecasts at the county-level. County forecasts serve as control totals for municipal forecasts, which are disaggregated from county totals. Municipal forecasts are based on an analysis of historical data trends adjusted to account for infrastructure availability, environmental constraints to development, local zoning policy, and development proposals. Municipal population forecasts are constrained using density ceilings and floors. County and, where necessary, municipal input is used throughout the process

to derive the most likely population forecasts for all geographic levels. For a more detailed description of the forecasting process, see the Section AFC and GIR traffic studies referenced previously.

1. DVRPC 2030 Board Adopted Population Forecasts

In these forecasts, the combined GIR/AFC study area was considered to span the Near Northeast, Bridesburg/Kensington/Richmond and Lower North Philadelphia County Planning Areas, while the addition of the I-676 Vine Expressway Interchange adds the Center City County Planning Area in Philadelphia. In 2000, these sections had a population of 512,029 about 34 percent of the total City of Philadelphia population. By 2030, that figure is expected to decline slightly by 0.1 percent, or 529 persons, to 511,500. In 2030, study area population will remain about 34 percent of the total City of Philadelphia population, which will have shrunk 0.8 percent to 1,505,000 residents, as shown in ***Table 2***.

Table 2. Study Area Population Forecasts

Area	2000 Census Population	2030 Population Forecasts	Change Absolute	Change Percent
Center City Philadelphia	49,855	60,500	10,645	21%
Lower North Philadelphia	125,875	117,500	-8,375	-6.7%
Bridesburg/Kensington/Richmond	94,434	90,000	-44,334	-4.7%
Near Northeast Philadelphia	241,865	243,500	1,635	0.7%
City of Philadelphia	1,517,550	1,505,000	-12,550	-0.8%

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2. DVRPC 2030 Board Adopted Employment Forecasts

In 2000, the county planning areas in the study area had employment of 426,701, or 58 percent of the City of Philadelphia total employment. By 2030, that figure is expected to grow by over six percent, to 439,344, with growth in Center City employment more than compensating for losses in the Lower North Philadelphia and Bridesburg/Kensington/Richmond county planning areas. Study area employment will increase by three percent, but will remain about 58 percent of the city's total, which also will grow by three percent ***(see Table 3)***.

Table 3. Study Area Employment Forecasts

Area	2000 Census Employment	2030 Employment Forecasts	Change Absolute	Change Percent
Center City Philadelphia	265,838	287,687	21,849	8.2%
Lower North Philadelphia	63,288	57,423	-5,865	-9.3%
Bridesburge/Kensington/Richmond	27,903	24,354	-3,549	-12.7%
Near Northest Philadelpha	69,672	69,880	208	0.3%
City of Philadelphia	741,397	763,176	21,779	2.9%

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Overall, the study area is projected to remain stable in terms of the DVRPC 2030 population projections and there is little change in the 2030 forecasts from the 2025 projections used the previous studies referenced above. The study area is projected to grow slightly in terms of employment in the DVRPC Board -Adopted projections. Again, there is little change in the 2030 forecasts from the 2025 projections used the previous studies referenced above. However, neither the Board-Adopted population nor employment projections included the planned casino and condominium projects that were not available in 2005 when the projections were adopted. These developments are a result of the recommendations of the Pennsylvania Gaming Control Board, which awarded stand-alone Category 2 slot machine operators licenses to the SugarHouse and Foxwood casinos along North Delaware Avenue and Christopher Columbus Boulevard in Philadelphia. The planned slots casino(s) and major portions of the related proposed condominium development were not included in the previous DVRPC traffic study of the I-95 Girard Avenue, I-676 Vine Expressway, and Allegheny Avenue interchanges.

3. Planned Casino and Condominium Developments

DVRPC's 2005 traffic study assumed additional development along North Delaware Avenue based on the proposals that were in place in 2002. Since that time, all of the planned residential and commercial developments assumed in that forecast have been built, except for the planned World Trade Center complex proposed for the westside of North Christopher Columbus Boulevard at Vine Street.

Current development plans for the Philadelphia Central Waterfront are dominated by the SugarHouse and Foxwoods casinos. However, large numbers of condominiums and significant amounts of commercial development are also planned. Site plans on file at the Philadelphia City Planning Commission are summarized by Traffic Analysis Zone (TAZ) in ***Table 4*** and shown on ***Map 9*** (page 31).

Table 4. Development Assumptions for Delaware Avenue and Christopher Columbus Boulevard Study Area

TAZ	Development	Res. Units	Adj. Res. Units	Office Sq Ft.	Office Employees	Retail sq ft	Retail Employees	Hotel Rooms	Hotel Employees	Slots	Casino Employees
194	Schmidt's Garage	248		1,200	6						
	subtotal 194	248	126	1,200	6						
1397	1101 N. Delaware Avenue	67	34								
1397	Penn's Point	67	34								
	subtotal 1397	134	68								
239	SugarHouse Casino					30,000	42			5,000	1,300
	subtotal 239		0			30,000	42			5,000	1,300
241	SugarHouse Condos	780						500	285		
	subtotal 241	780	395					500	285		
1396	Bridgeman's View	990	502	97,000	485	94,600	132	177	101		
1396	Waterfront Square	950	481								
	subtotal 1396	1,940	983	97,000	485	94,600	132	177	101		
181	Trump Tower	263	133								
181	700 N. Delaware Avenue	1,050	532								
	subtotal 181	1,313	665								
180	101 Sky	57	29								
	subtotal 180	57	29								
197	World Trade Center	265	134	2,362,000	11,810	120,000	168	177	101		
197	Marina View Tower	197	100								
	subtotal 197	462	234	2,362,000	11,810	120,000	168	177	101		
	Subtotal North of Vine	4,934	2,500	2,460,200	12,301	244,600	342	854	487	5,000	1,300
51	The National at Old City*	412	412								
49	Americana	80	80			45,000	63				
52	New Market Pavalion	192	192								
61	Dockside II	250	250								
61	Bridgeport*	200	200								
61	Pier 34	230	230								
61	Columbus and Catherine	276	276								
	subtotal 61	956	956								
70	Riverview Plaza Shopping Center*					90,000	126				
	subtotal 70	276	276			90,000	126				
71	Foxwood Condos	200	200					500	285		
72	Foxwood Casino/Pier 60					90,000	126			5,000	1,780
90	Home Depot*					180,000	252				
90	Walmart*					157,500	221				
90	Pier 70 (Super Fresh, Old Navy,etc)*					161,450	226				
	Subtotal 90					588,950	825				
89	Target Shopping Center*					240,000	336				
89	Marshall's*					26,000	36				
89	Ikea*					220,000	308				
89	Best Buy Shopping Center*					200,000	280				
89	Lowes*					150,000	210				
	Subtotal 89					836,000	1,170				
	Subtotal South of Vine	1,840	1,840	0	0	1,649,950	2,310	500	285	5,000	1,780
	Grand Total	6,774	4,340	2,460,200	12,301	1,894,550	2,652	1,354	772	10,000	3,080

*Largely built

4. Condominium Developments

In total, there are 4,934 new condominium residential units listed in ***Table 4*** for Delaware Avenue/Christopher Columbus Boulevard north of Vine Street and 1,840 new condominium units along Christopher Columbus Boulevard south of Vine Street. In discussions with the Philadelphia City Planning Commission, the 4,934 new units north of Vine were judged to be excessive and well beyond likely condominium market potential for this area.

For this reason, the number of new condominium units north of Vine Street was reduced to 2,500. Rather than eliminate or downsize individual development proposals, the condominium reduction adjustment was applied at the TAZ level. While the actual development specifications, when constructed, may be somewhat different than the TAZ totals shown in ***Table 4***, these differences will not significantly affect the Girard Avenue or Vine Expressway (I-676) interchange traffic projections documented in this report.

After discussions with the City Planning Commission, the proposed condominium developments along Christopher Columbus Boulevard south of Vine Street, were not adjusted, except to remove the proposed Pier 40 and Liberty Landing (at Washington Street) developments. These proposals were eliminated because they are unlikely to be built.

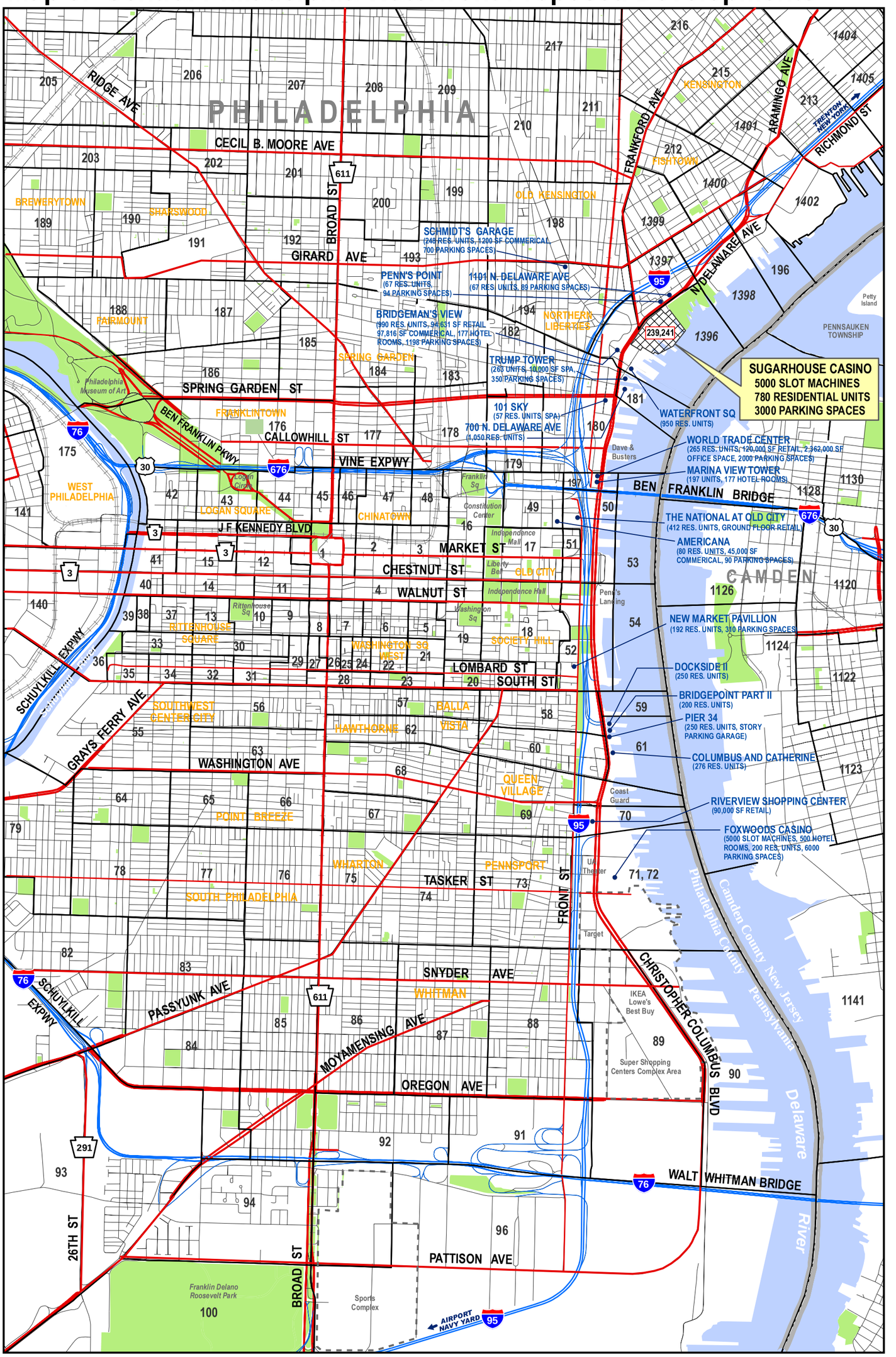
5. Commercial Developments

Along Christopher Columbus Boulevard, south of Snyder Avenue, a great deal of big box retail development has occurred since 2002. The major stores included in these developments are listed in ***Table 4*** (page 29), and ***Map 9***. These new retail establishments are for the most part constructed and opened for business.

6. Casino Developments

Table 1 (page 26) presents a summary of the full build-out of all four casino proposals and patron trip generation estimates collected for use in this study from the developer traffic studies. SugarHouse, Foxwoods, and Chester Downs are all approved for ultimate build-out of 5,000 slot machines. Philadelphia Park's proposal called for 3,000 slot machines at ultimate build-out. Except for Philadelphia Park, the casino developments also contained significant supporting entertainment, commercial/retail/restaurant, and hotel components. These supporting development proposals are also included in this traffic study.

Map 9. Central Philadelphia Waterfront Proposed Developments



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March 2008

100 — 90 Traffic Analysis Zones (TAZ's)
1402 — Study Area Split Traffic Analysis Zones (TAZ's)
• — Proposed and Potential Development

0 0.5 1 Miles

Table 4 (page 29) also presents a more detailed listing of the supporting development associated with the SugarHouse and Foxwoods casinos and condominiums. For purposes of travel simulation, the SugarHouse and Foxwoods casino sites were each divided into two TAZs, one representing the gambling floor and the other the supporting commercial and residential development. This separation allows the DVRPC model to simulate travel from the commercial/residential uses separately from casino patrons. The DVRPC model is appropriate to simulate travel from residential and commercial land uses, but enhanced procedures are required to simulate casino patron travel patterns. However, the study area for this analysis is primarily impacted by travel associated with the SugarHouse Casino and Northern Delaware Avenue/North Christopher Columbus Boulevard condominium and commercial development. Detailed summaries of 2030 simulated trip generation, modal split, and the resulting highway and transit trips patterns follows.

B. 2030 Projected Northern Delaware Avenue/Christopher Columbus Boulevard Travel Patterns

A summary of 2030 trip generation for the SugarHouse Casino assuming full build-out of the Casino plan submitted to the Pennsylvania Gaming Commission in March 2006 is given in ***Table 5***. On an average 2030 weekday, the slots casino is projected to attract 28,970 vehicular patron trips. Casino workers will account for another 2,799 vehicular trips and the related condo, entertainment, and commercial venues an additional 4,079 trips for a total average weekday vehicular trip generation of 35,848. Vehicular means travel made as auto driver, auto passenger, or public transit. Walk and bicycle trips are not included. These vehicular totals are expressed as trip attractions - the sum of origins and destinations. That is, trips originating at the casino site destined for elsewhere plus trips from locations outside of the casino site destined for the SugarHouse facility.

Table 5. 2030 Average Weekday Person Trip Generation for SugarHouse Development

DVRPC Traffic Study			
Casino Slots Patrons*	Employee Work Trips	Condos/Entertainment Venue/Turf Club/Hotel	Total Person Trip Generation
28,970	2,799	4,079	35,848

* Updated Traffic Impact Analysis -- SugarHouse, Gannett Fleming and Urban Systems, October 13, 2006, Table 7-2, Page 7-3

Projected 2030 Casino and Northern Delaware Avenue/North Christopher Columbus Boulevard travel by auto and public transit is summarized in ***Table 6***. The proximity of the SugarHouse Casino site to the Girard Avenue Station of the SEPTA Market-Frankford Subway Elevated Line results in significant public transit usage, especially for casino work trips where 24 percent of employees use public transit to commute to work. Casino gaming patrons, residents, and persons attracted to the commercial venues on the site are much more auto dependent (7.3 percent transit overall) than workers, but still produce more than triple the number of transit work trips attracted to the casino site. The auto occupancy of persons traveling to and from the casino by auto is projected to be 1.8 persons per auto, significantly decreasing the number of automobiles to be accommodated by the supporting street and highway network.

Table 6. 2030 Vehicular Generation Modal Split and Auto Occupancy for North Delaware Avenue/Christopher Columbus Boulevard Corridor

Development	HBW Transit	HBW Person	Percent Transit	Total Transit	Total Person	Percent Transit	Total Vehicle**	Avg. Auto Occupancy
SugarHouse Development	671	2,799	24.0%	2,609	35,848	7.3%	18,348	1.8
Total Delaware Ave./Columbus Blvd North of Vine Expwy (I-676)*	**12,845**	**33,341**	**38.5%**	**24,496**	**110,906**	**22.1%**	**67,925**	**1.3**

* Includes existing and proposed development.
** Includes truck and taxi trips.

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C. Northern Delaware Avenue/Christopher Columbus Boulevard Total Travel Patterns

Table 6 also presents estimates of total auto and public transit travel for Northern Delaware Avenue and Northern Christopher Columbus Boulevard as a whole. The dense, highly concentrated pattern of condominium development provides a travel environment similar to Center City Philadelphia. Overall, it will produce110,906 person trips (origins + destinations), of which 33,341 are commuting trips to and from work. Similar to Center City, the Transit Share for work trips is 38.5 percent and 22.1 percent overall. The overall auto occupancy for Northern Delaware Avenue is 1.3 persons per vehicle.

D. Northern Delaware Avenue/Christopher Columbus Boulevard Walk and Bicycle Trips

The Center City character of Northern Delaware Avenue and Christopher Columbus Boulevard also promotes significant reliance on walking and bicycles as a mode of travel. ***Tables 7 and 8*** present preliminary estimates of walk, bicycle, and walk to transit trips by Traffic Analysis Zone (TAZ) in the Northen Delaware Avenue/Christopher Columbus Boulevard Corridor. These estimates also include walk, bicycle, and transit travel emanating from existing Philadelphia Central Business District (CBD) development abutting the west side of I-95. Traffic zones 180, 194, 197,1396, and

Table 7. 2030 Average Weekday Walk to Transit Trips

Walk to Transit Trips			
		Walk to Transit Travel Origins + Destination	
TAZ	New Development Type	Home-Based Work Transit Trips	All Purposes Transit Trips
239/241	Casino/condo/retail/entertainment/hotel [1]	671	2,609
194	Condo/office	1,142	2,476
1397	Condo	242	626
1396	Condo/office/retail/hotel	986	1,445
181	Condo	297	941
180	Condo	2,464	4,402
197	Condo/office/retail/hotel[2]	7,043	11,997
Subtotal	**Delaware Avenue/Christopher Columbus Blvd. North of Vine Expwy (I-676)**	**12,845**	**24,496**

[1]Nongaming portion of SugarHouse

[2]Includes office and commercial developement of the proposed World Trade Center.

Table 8. 2030 Average Weekday Walk and Bicycle Trips

Walk and Bicycle Trips					
		Walk and Bicycle Travel Origins + Destination			
TAZ	New Development Type	Home-Based Work Walk Trips	All Purposes Walk Trips	Home-Based Work Bicycle Trips	All Purposes Bicycle Trips
239/241	Casino/condo/retail/entertainment/hotel [1]	343	2,054	21	124
194	Condo/office	517	4,155	32	252
1397	Condo	166	1,181	10	71
1396	Condo/office/retail/hotel	537	3,982	33	242
181	Condo	268	2,120	31	53
180	Condo	520	3,180	91	190
197	Condo/office/retail/hotel[2]	1,463	6,766	86	404
Subtotal	**Delaware Avenue/Christopher Columbus Blvd. North of Vine Expwy (I-676)**	**3,814**	**23,438**	**304**	**1,336**
Grand Total		**16,659**	**47,934**	**304**	**1,336**

[1]Nongaming portion of SugarHouse

[2]Includes office and commercial developement of the proposed World Trade Center.

1397 contain significant amounts of Center City development west of I-95. Walk to and from transit trips are primarily associated with the Girard and Spring Garden SEPTA Market-Frankford Subway Elevated Line Stations, and the 2nd and Market Street Station of the Line, whichever is closer. However, Northern Delaware Avenue/Christopher Columbus Boulevard is also served by SEPTA bus routes 25 and 43, and these routes will receive a small percentage of Northern Delaware Avenue/Christopher Columbus Boulevard walk to and from transit trips. Overall, there are 24,496 walk to transit trips of which 2,609 are associated with the SugarHouse Casino Development in ***(Table 7)***.

Traffic zone estimates of trips made entirely by the walk and bicycle modes are presented in ***Table 8***. Travel by walk is very significant, with 23,438 trips made on an average 2030 weekday, of which 3,814 represent commuting to and from work. A significant number of bicycle trips are also made within the Northern Delaware Avenue/Christopher Columbus Boulevard redevelopment area on an average weekday: 1,336 in total, of which 304 represent work travel.

The tentative nature of individual condominium developments make TAZ level walk and bicycle travel estimates subject to revision as the North Delaware Avenue/Christopher Columbus Boulevard corridor development plans are finalized. However, this uncertainty does not affect the I-95 mainline, ramp, and roadway forecasts presented in the following section of this report. For detailed traffic forecasts, the study area extends southward as far as Columbia Avenue, well to the north of the SugarHouse Casino site and planned developments analyzed in ***Tables 7and 8***.

V. PROJECTED 2030 PREFERRED ALTERNATIVE TRAFFIC VOLUMES SECTIONS VINE, GIR, AND AFC

This section of the supplemental report presents the updated 2030 traffic forecasts for I-95 Interchange Improvement Sections VINE, GIR, and AFC. These updated projections were prepared with the casino and condominium proposals documented in Chapter IV. For interchange design purposes, projections are provided for 2030 Average Daily (AADT) link traffic volumes and for 2030 AM and PM peak hour ramp and intersection turning movements. For analytical purposes, traffic volumes are also provided for the 2025 forecasts from the previous study and current traffic counts the AADT link volume figures and tables.

A. Section VINE

Projected 2030 AADT link traffic volumes for Section Vine are presented in ***Figure 4*** and ***Table 9.*** These forecasted traffic volumes assume that the I-95 Girard Avenue Interchange is reconstructed according to Build Option 7 with Proposed Delaware Avenue Extension. This option has been reconfigured, as required, to provide convenient and comprehensive access to and from I-95 to the SugarHouse development site and many of the proposed new North Delaware Avenue condominiums that are clustered in the vicinity of the casino. For this reason, the effect of the proposed casino development on the Vine Expressway (I-676) ramps to Delaware Avenue is relatively minor – an increase on 1,100 daily vehicles (5.3 percent) on the Callowhill southbound off-ramp and an increase of 400 daily vehicles on the I-95 northbound on-ramp from Winter Street.

The increase on the I-95 mainline at Vine Expressway (I-676) is much larger: 2,800 daily vehicles (5 percent) southbound and 1,800 daily vehicles (3.6 percent) northbound. This increase in I-95 traffic reflects the impact of the Foxwoods Casino and Christopher Columbus Boulevard development, as well as the SugarHouse and North Delaware Avenue development proposals.

Figure 5 presents updated 2030 AM and PM peak hour ramp and turning movement forecasts representative of traffic conditions with the proposed casino and related developments.

B. Section GIR

Figure 6 and ***Table 10*** contain 2030 projected AADT link traffic volumes for I-95 Section GIR. ***Figure 7*** presents updated Section GIR 2030 AM and PM peak hour ramp and turning movement forecasts representative of traffic conditions with the proposed casino and related developments.

As one might expect, the primary AADT traffic impacts of the North Delaware Avenue/Christopher Columbus Boulevard casino, condominium, and related developments is concentrated on the Girard

Figure 4. I-95 Expressway Section VINE Interchange - Current, 2025, and 2030 Average Daily Traffic Volumes with Casino/Condominium Developments

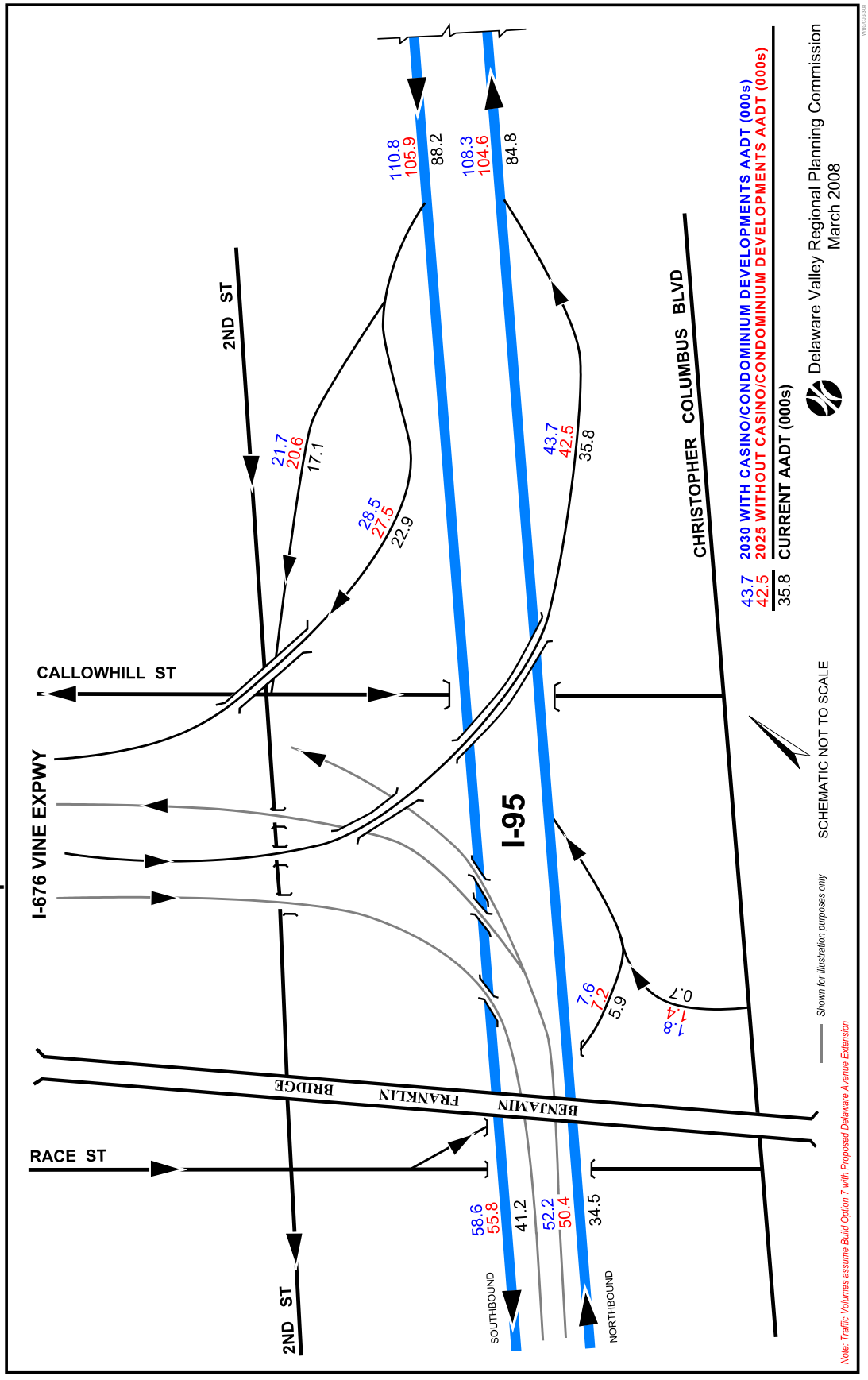

Table 9. Current, 2025 and 2030 Build Option 7 with Proposed Delaware Avenue Extension Average Daily Traffic Volumes - Section VINE

Location	Current Traffic Count AADT (000s)	Build Option 7 with Proposed Delaware Ave Extension: 2025 without Casino/Condo Developments AADT (000s)	Change from Traffic Count Diff.	% Diff.	2030 with Casino/Condo Developments AADT (000s)	Change from 2025 Diff.	% Diff.
I-95 SB south of I-676 Vine Expwy/Callowhill St off-ramp	41.2	55.8	14.6	35%	58.6	2.8	5%
I-95 NB south of Race St on-ramp	34.5	50.4	15.9	46%	52.2	1.8	4%
I-95 SB off-ramp to Callowhill St	17.1	20.6	3.5	21%	21.7	1.1	5%
I-95 SB off-ramp to I-676 Vine Expwy	22.9	29.5	6.6	29%	30.5	1.0	3%
I-95 NB on-ramp from I-676 Vine Expwy	35.8	45.6	9.8	27%	46.7	1.1	2%
I-95 NB on-ramp from Race St	5.9	7.2	1.3	23%	7.6	0.4	6%
I-95 NB on-ramp from Winter St	0.7	1.4	0.7	96%	1.8	0.4	29%
Total	**158.1**	**210.5**	**52.4**	**33%**	**219.1**	**8.6**	**4%**

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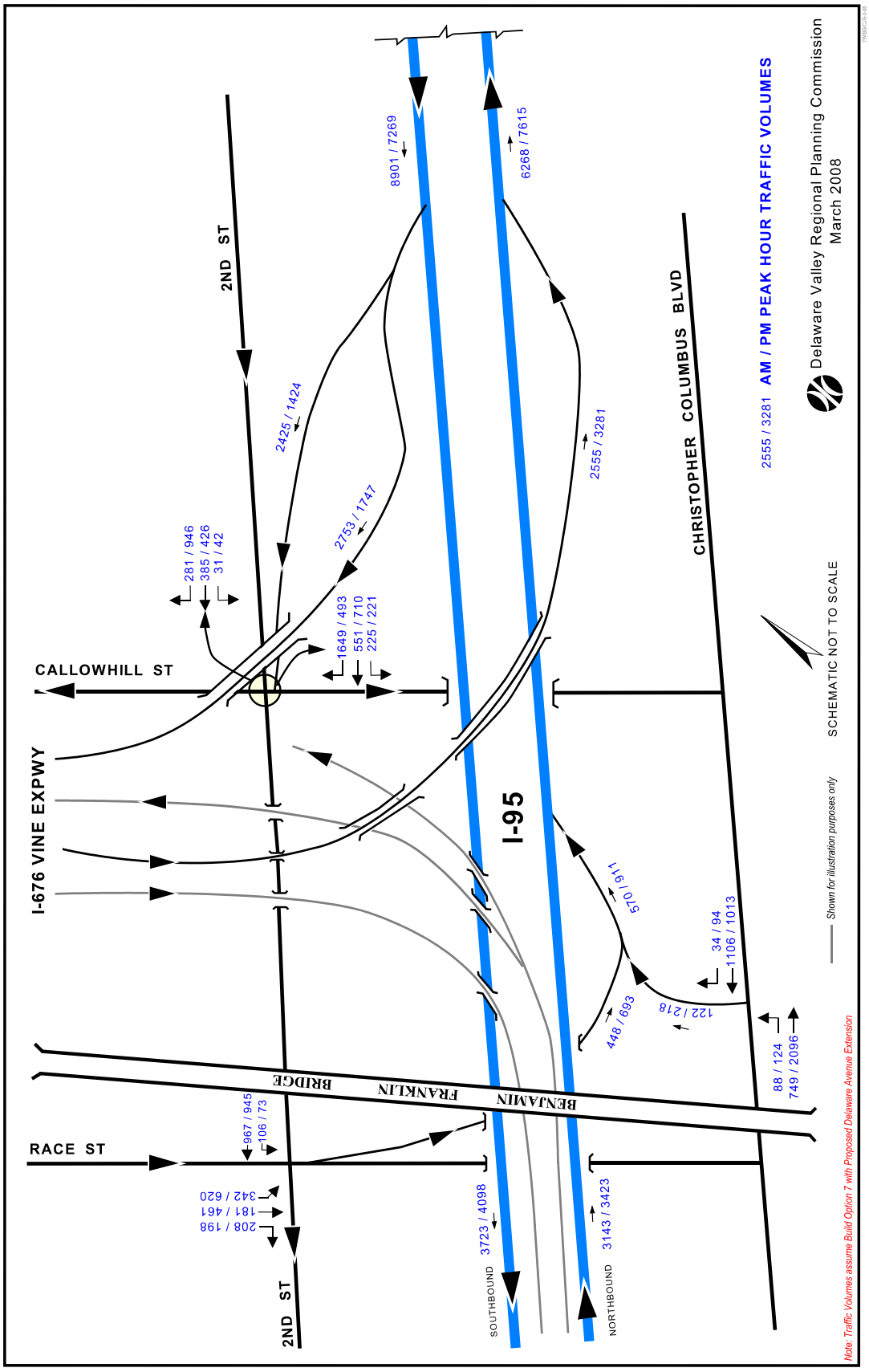
Avenue Interchange ramps that serve traffic to and from Delaware Avenue. The percentage increase for these ramps range from 20.9 percent for the I-95 southbound on-ramp from Aramingo/Delaware Avenues to 200 percent for the associated slip ramp that feeds traffic from Delaware Avenue to the I-95 southbound on ramp. The slip ramp that feeds traffic to Delaware Avenue from the I-95 southbound off-ramp increases 96.7 percent as a result of North Delaware Avenue/Christopher Columbus Boulevard trip generation. The increase resulting from the proposed casino and condominium traffic on I-95 mainline AADT traffic is larger north of the Girard Interchange than to the south: 4,400 vpd (4.1 percent) in the northbound lanes and 6,500 vpd (6.2 percent) southbound versus 3,700 vpd (3.5 percent) northbound and 4,900 vpd (4.6 percent) southbound. As in the Vine Expressway Interchange (I-676), these I-95 mainline increases reflect the impact of both North Delaware Avenue and Christopher Columbus Boulevard development proposals.

The increase resulting from the proposed casino and condominium traffic on I-95 mainline AADT traffic is larger north of the Girard Interchange than to the south: 4,400 vpd (4.1 percent) in the northbound lanes and 6,500 vpd (6.2 percent) southbound versus 3,700 vpd (3.5 percent) northbound and 4,900 vpd (4.6 percent) southbound. As in the Vine Expressway Interchange (I-676), these I-95 mainline increases reflect the impact of both North Delaware Avenue and Christopher Columbus Boulevard development proposals.

The Girard Avenue Interchange is complex and within it traffic volume increases are tabulated and retabulated in various ways. As one might expect, Delaware Avenue just south of the Girard Interchange receives the greatest impact of the casino and related development. In both directions, the increase versus the previous 2025 forecasts is 14,200 vpd, or 48 percent. Most of this increase is associated with the Girard Avenue Interchange, because just north of this interchange, traffic increase is reduced to 2,200 vpd, or about 10 percent over the 2025 forecasts on Richmond Street. Just west of the interchange complex, Girard Avenue is projected to increase by 3,200 vpd, or 9.9 percent. This roughly 10 percent increase in neighborhood traffic reflects local trip origins being attracted to SugarHouse Casino and related developments.

Figure 5. I-95 Expressway Section VINE Interchange – 2030 AM / PM Peak Hour Traffic Volumes with Casino/Condominium Developments



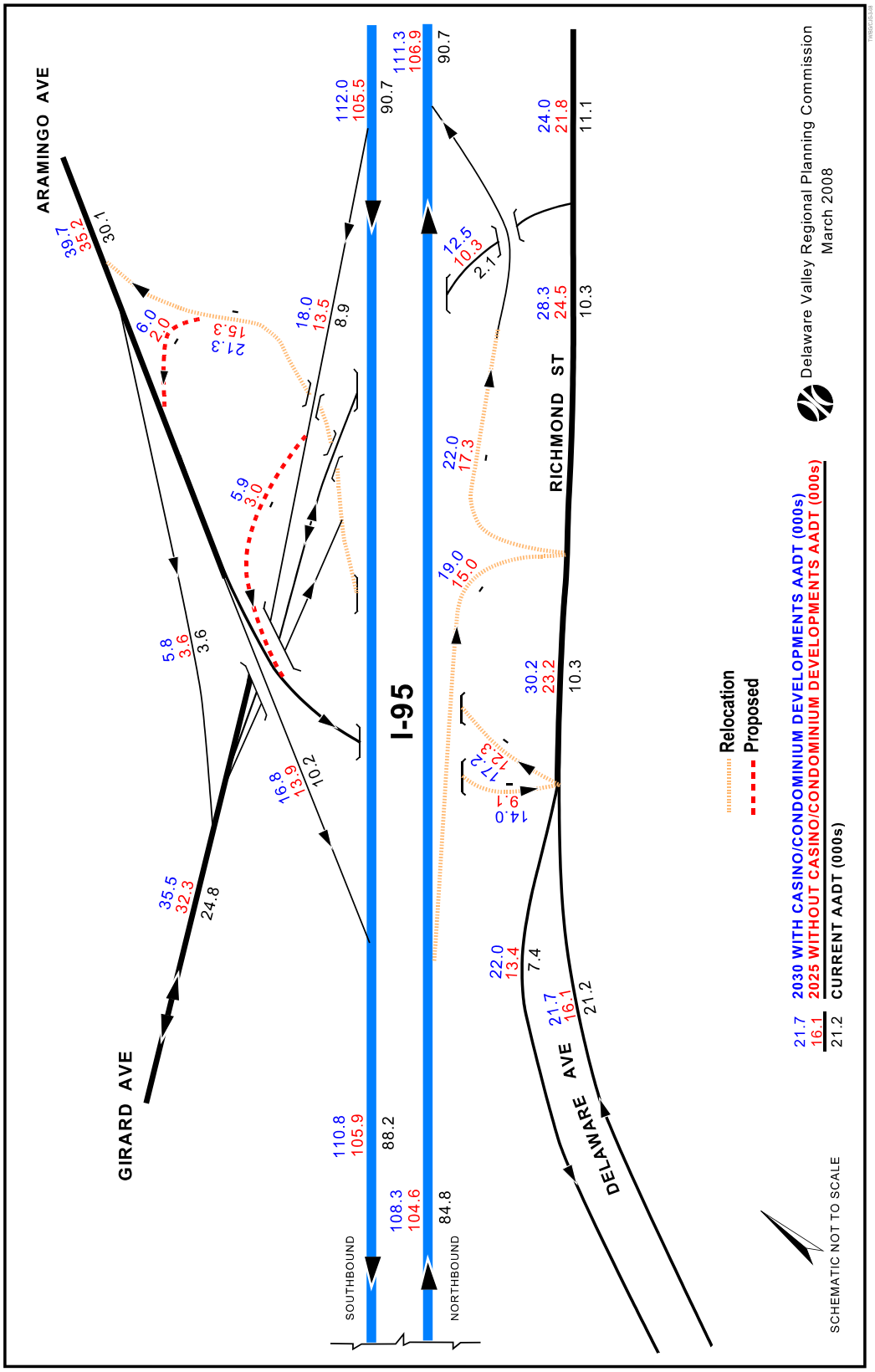
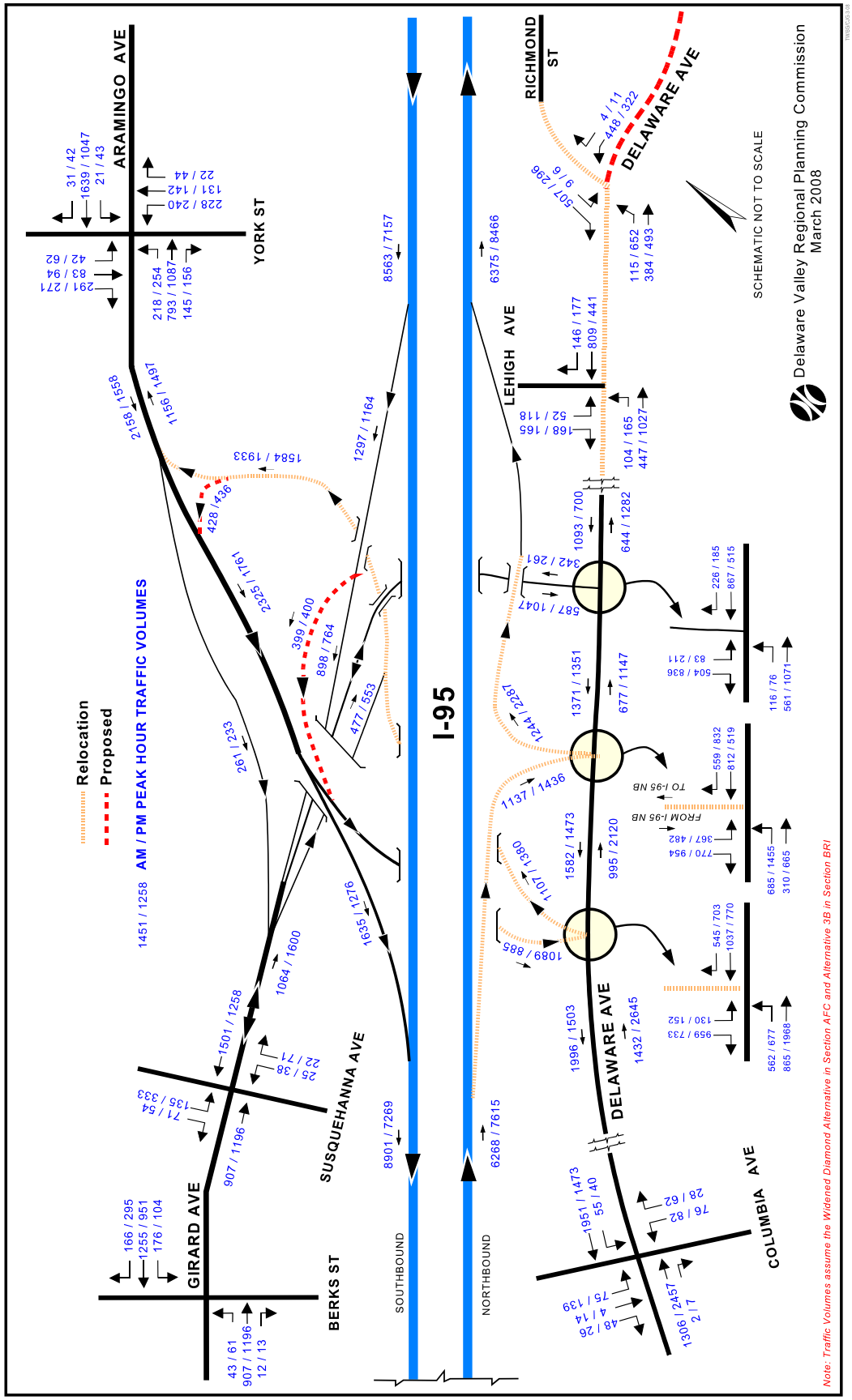


Figure 6. I-95 Expressway Section GIR Interchange – Build Option 7 with Proposed Delaware Avenue Extension - Current, 2025, and 2030 Average Daily Traffic Volumes with Casino/Condominium Developments

Table 10. Current, 2025, and 2030 Build Option 7 with Proposed Delaware Avenue Extension Average Daily Traffic Volumes - Section GIR

Location	Current Traffic Count AADT (000s)	Build Option 7 with Proposed Delaware Ave Extension					
		2025 without Casino/Condo Developments			2030 with Casino/Condo Developments		
		Change from Traffic Count			Change from 2025		
		AADT (000s)	Diff.	% Diff.	AADT (000s)	Diff.	% Diff.
I-95 NB Girard Ave to Allegheny Ave	90.7	106.9	16.2	18%	111.3	4.4	4%
I-95 SB Girard Ave to Allegheny Ave	90.7	105.5	14.8	16%	112.0	6.5	6%
I-95 NB Girard Ave to Vine Street	84.8	104.6	19.8	23%	108.3	3.7	4%
I-95 SB Girard Ave to Vine Street	88.2	105.9	17.7	20%	110.8	4.9	5%
I-95 NB off-ramp to Delaware Ave	9.3	15.0	5.7	61%	19.0	4.0	27%
I-95 NB on-ramp from Delaware Ave/Richmond St	10.1	17.3	7.2	71%	22.0	4.7	27%
I-95 SB off-ramp to Girard/Aramingo Aves	8.9	13.5	4.6	51%	18.0	4.5	33%
I-95 SB off-ramp to Girard Ave	—	10.5	—	—	12.1	1.6	15%
I-95 SB off-ramp to Aramingo/Delaware Aves	—	3.0	—	—	5.9	2.9	97%
I-95 SB on-ramp from Aramingo Ave	10.2	13.9	3.7	36%	16.8	2.9	21%
Delaware Ave - NB North of existing NB I-95 off-ramp	21.2	16.1	-5.1	-24%	21.7	5.6	35%
Delaware Ave - SB North of existing NB I-95 off-ramp	7.4	13.4	6.0	81%	22.0	8.6	64%
Delaware Ave -North of Girard Ave	11.1	21.8	10.7	96%	24.0	2.2	10%
Girard Ave - South of interchange	24.8	32.3	7.5	30%	35.5	3.2	10%
Girard Ave - NB Connection to Aramingo Ave	2.7	15.3	12.6	457%	21.3	6.0	39%
Girard Ave - Connection to Richmond St	2.1	10.3	8.2	390%	12.5	2.2	21%
Aramingo Ave - NB over Girard Ave	10.7	12.3	1.6	15%	17.2	4.9	40%
Aramingo Ave - SB over Girard Ave	13.0	9.1	-3.9	-30%	14.0	4.9	54%
Aramingo Ave.- South of York St	30.1	35.2	5.1	17%	39.7	4.5	13%
Aramingo Ave.- SB connection to Girard Ave	3.6	3.6	0.0	0%	5.8	2.2	61%
Richmond St - North of Aramingo Ave	10.3	23.2	12.9	126%	30.2	7.0	30%
Richmond St - South of Girard Ave	10.3	24.5	14.2	139%	28.3	3.8	16%
Richmond St - North of Girard Ave	11.1	21.8	10.7	96%	24.0	2.2	10%
Total	**551.5**	**735.0**	**170.0**	**31%**	**832.4**	**97.4**	**13%**

Figure 7. I-95 Expressway Section GIR Interchange – Build Option 7 with Proposed Delaware Avenue Extension - 2030 AM / PM Peak Hour Traffic Volumes with Casino/Condominium Developments



C. Section AFC

2030 projected AADT link traffic volumes for I-95 Section AFC assuming the proposed casinos and condominium developments are given in ***Figure 8*** and ***Table 11***. These projected traffic volumes assume construction of Build Alternative 5 (Full Diamond Interchange) with the proposed Delaware Avenue Extension. ***Figure 9*** presents updated Section AFC 2030 AM and PM peak hour ramp and turning movement forecasts representative of traffic conditions with the proposed casino and related developments.

Because of the more convenient location of the Girard Interchange with respect to North Delaware Avenue and the greater distance of Section AFC from the casino development site, interchange and neighborhood traffic impacts are greatly reduced. Projected traffic volumes tend to flow to Section AFC via the planned Delaware Avenue Extension, which is projected to experience traffic increases of 2,000 vpd, or 21.7 percent, as a result of casino and condominium traffic. Almost all of this traffic increase is associated with the I-95 Allegheny Avenue ramps. Traffic increases on Richmond Street and Allegheny Avenue tend to be small (6 percent or less) and mostly reflect neighborhood trip origins traveling to the North Delaware Avenue casino complex via Delaware Avenue Extension and the Allegheny Avenue to Girard Avenue interchange I-95 routing.

The moderate traffic increases on the I-95 mainline noted at Girard Avenue as described above continue into and through the Allegheny Avenue Interchange. Between Allegheny and Castor avenues, these increases amount to 4,600 vpd. (4.3 percent) northbound and 6,200 vpd. (6.0 percent) southbound.

Figure 8. I-95 Expressway Section AFC Interchange – Diamond with Proposed Delaware Avenue Extension (Alt. 5) - Current, 2025, and 2030 Average Daily Traffic Volumes with Casino/Condominium Developments

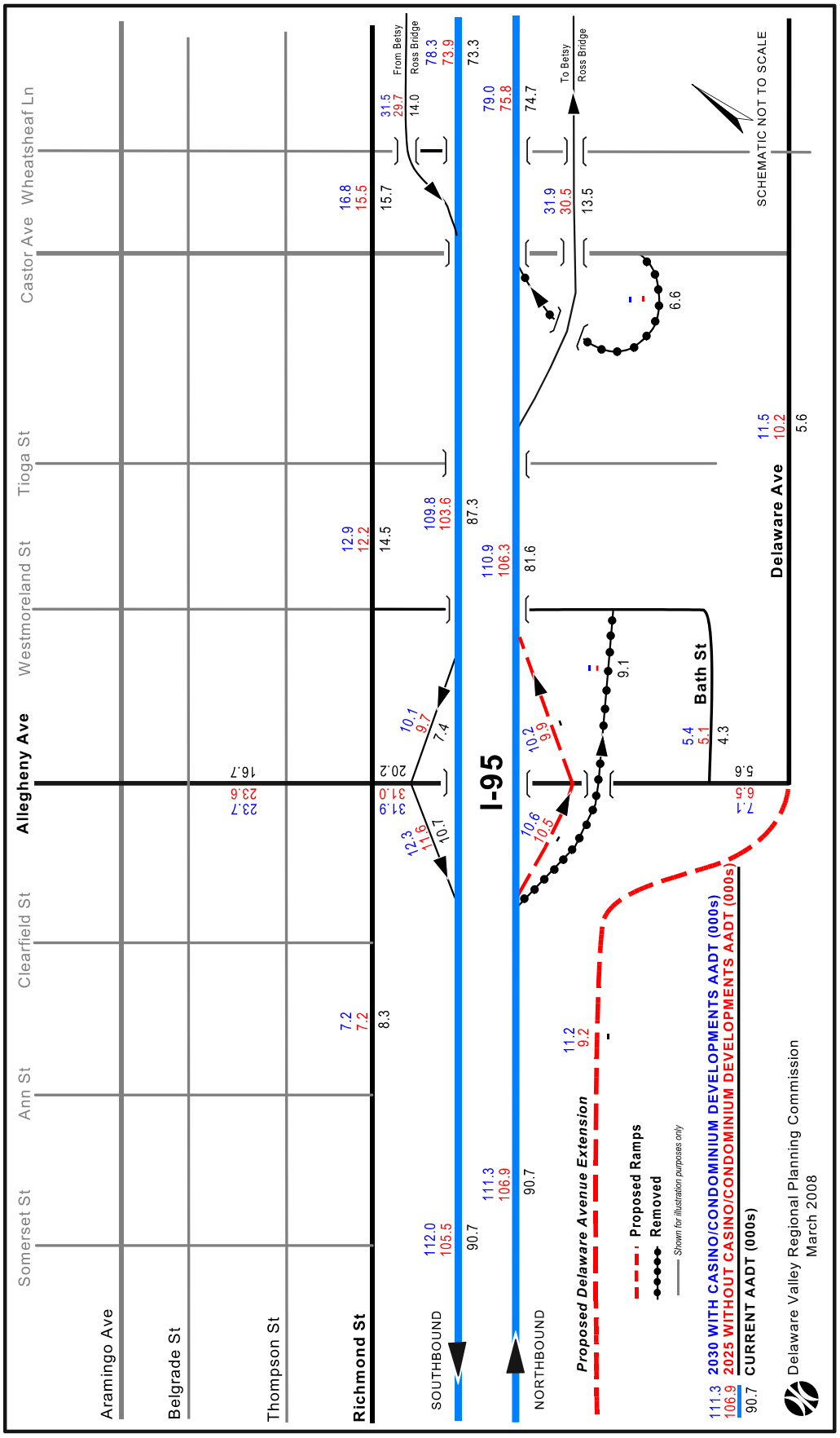
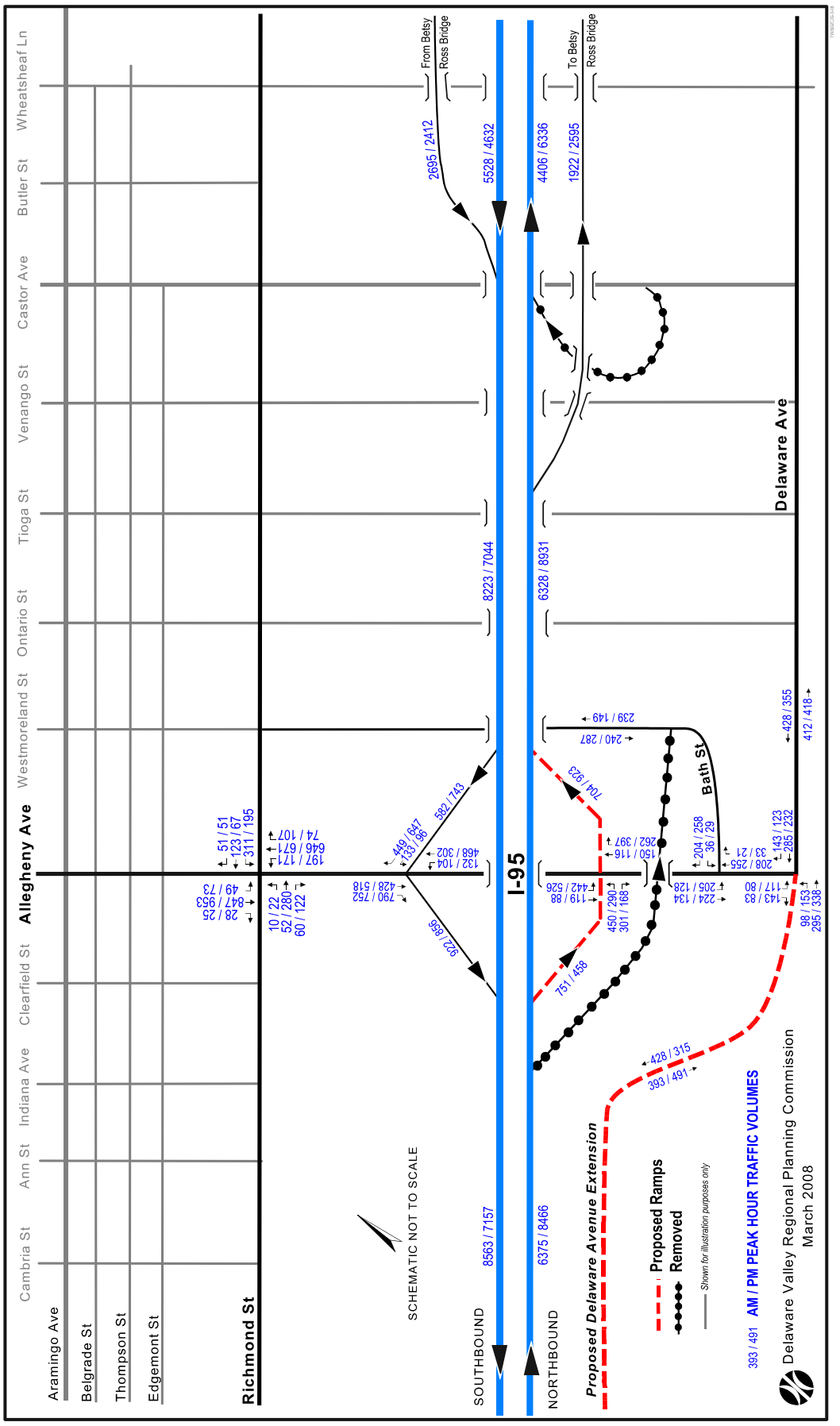


Table 11. Current, 2025 and 2030 Diamond with Proposed Delaware Avenue Extension Average Daily Traffic Volumes - Section AFC

Location	Current Traffic Count AADT (000s)	Diamond with Proposed Delaware Ave Ext. 2025 without Casino/Condo Developments AADT (000s)	Change from Traffic Count Diff.	% Diff.	2030 with Casino/Condo Developments AADT (000s)	Change from 2025 Diff.	% Diff.
I-95 NB Aramingo Ave to Allegheny Ave	90.7	106.9	16.2	18%	111.3	4.4	4%
I-95 SB Aramingo Ave to Allegheny Ave	90.7	105.5	14.8	16%	112.0	6.5	6%
I-95 NB Allegheny Ave to Castor Ave	81.6	106.3	24.7	30%	110.9	4.6	4%
I-95 SB Allegheny Ave to Castor Ave	87.3	103.6	16.3	19%	109.8	6.2	6%
I-95 NB Betsy Ross Bridge to Castor Ave	74.7	75.8	1.1	1%	79.0	3.2	4%
I-95 SB Betsy Ross Bridge to Castor Ave	73.3	73.9	0.6	1%	78.3	4.4	6%
I-95 NB off-ramp to Westmoreland St or Allegheny Ave	9.1	10.5	1.4	16%	10.6	0.1	1%
I-95 SB on-ramp from Allegheny Ave	10.7	11.6	0.9	8%	12.3	0.7	6%
I-95 SB off-ramp to Allegheny Ave	7.4	9.7	2.3	32%	10.1	0.4	4%
I-95 NB on-ramp from Castor Ave or Allegheny Ave	6.6	9.9	3.3	51%	10.2	0.3	3%
I-95 NB off-ramp to Aramingo Conn & Betsy Ross Bridge	13.5	30.5	17.0	126%	31.9	1.4	5%
I-95 SB on-ramp from Aramingo Conn & Betsy Ross Brdg	14.0	29.7	15.7	112%	31.5	1.8	6%
Allegheny Ave - Belgrade St to Thompson St	16.7	23.6	6.9	41%	23.7	0.1	0%
Allegheny Ave - Richmond St to I-95 SB ramps	20.2	31.0	10.8	53%	31.9	0.9	3%
Allegheny Ave - Bath St. to Delaware Ave	5.6	6.5	0.9	16%	7.1	0.6	9%
Westmoreland St - I-95 to Bath St	4.3	5.1	0.8	19%	5.4	0.3	6%
Richmond St - Ann to Clearfield Sts	8.3	7.2	-1.1	-13%	7.2	0.0	0%
Richmond St - Westmoreland to Tioga Sts	14.5	12.2	-2.3	-16%	12.9	0.7	6%
Richmond St - Castor Ave to Wheatsheaf Ln	15.7	15.5	-0.2	-1%	16.8	1.3	8%
Delaware Ave - Allegheny Ave to Venango St	5.6	10.2	4.6	82%	11.5	1.3	13%
Delaware Ave - Allegheny Ave to Richmond St	—	9.2	—	—	11.1	1.9	21%
Total	**650.5**	**794.4**	**134.7**	**21%**	**835.5**	**41.1**	**5%**

Figure 9. I-95 Expressway Section AFC Interchange – Diamond with Proposed Delaware Avenue Extension (Alt. 5) - 2030 AM / PM Peak Hour Traffic Volumes with Casino/Condominium Developments



I-95 Interchange Enhancement and Reconstruction
I-95 Expressway Interchanges Sections GIR/VINE and AFC Traffic Study - Supplement Number 1

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Geographic Area Covered: Delaware Expressway (I-95), Allegheny Avenue, Delaware Avenue, Girard Avenue, I-676 Vine Expressway, and Lower Northeast Philadelphia, which included neighborhoods of Fishtown, Kensington, and Port Richmond, and additional neighborhoods of Northern Liberties and Old City in Philadelphia

Key Words: Traffic Volumes, Peak Hour Traffic, Travel Forecast, I-95, Delaware Expressway, Allegheny Avenue, Proposed Delaware Avenue Extension, Girard Avenue, Aramingo Avenue, Richmond Street, Castor Avenue, I-676 Vine Expressway, Christopher Columbus Boulevard, SugarHouse Casino, and Philadelphia

ABSTRACT
This supplemental report documents DVRPC's traffic study and forecasts for the I-95 mainline and Vine Expressway (I-676), Girard Avenue, and Allegheny Avenue interchanges assuming construction of the proposed slots casino(s) and condominium and apartments development along Delaware Avenue and Christopher Columbus Boulevard. This study updates the 2025 forecasts prepared by DVRPC in the June 2005 and May 2006 traffic studies to 2030 and incorporates traffic from the casino(s) and additional condominium development along Delaware Avenue into the projected link (ADT) volumes and peak hour ramp and intersection turning movement forecasts.

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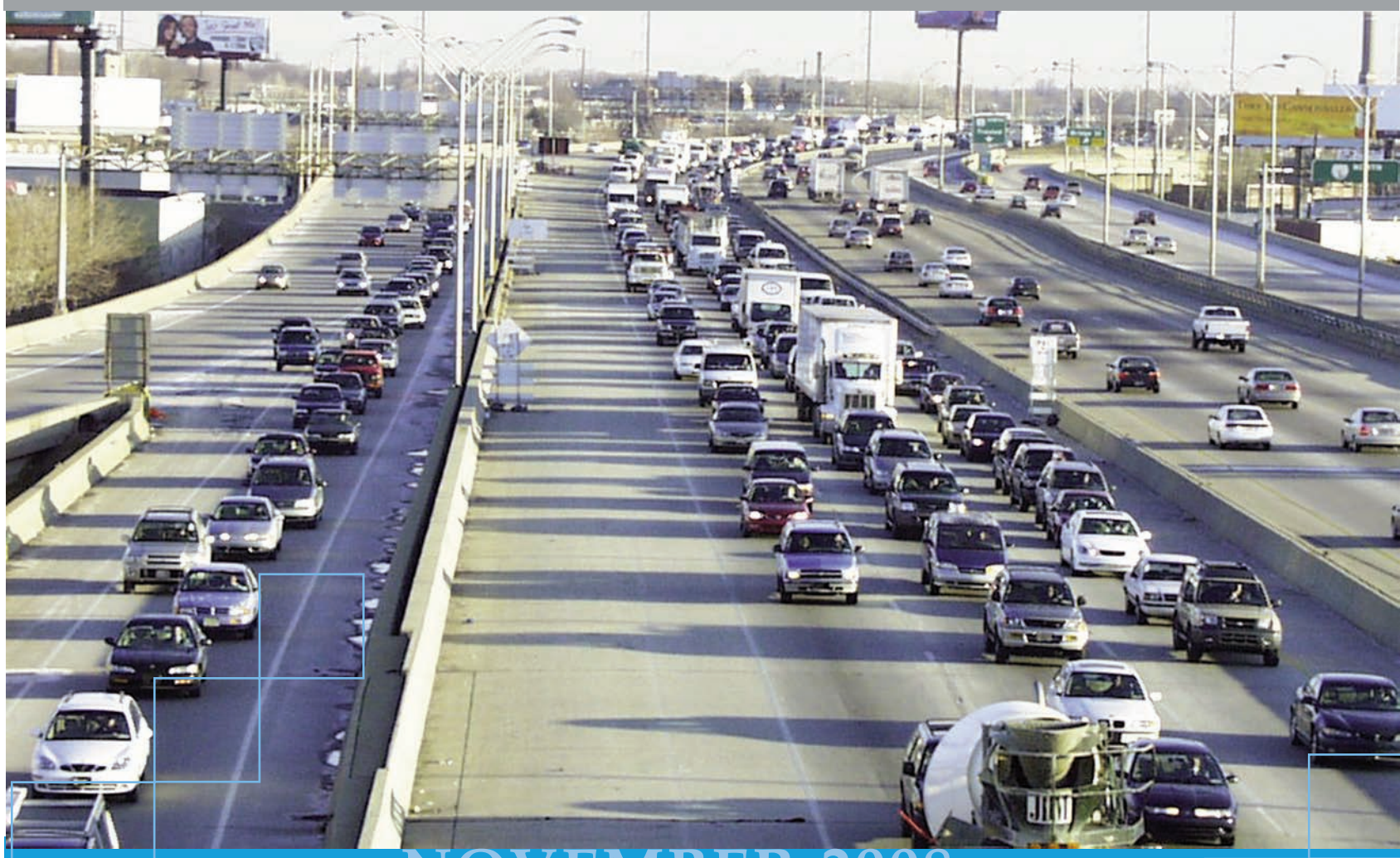
I-95 Interchange Enhancement and Reconstruction

I-95 EXPRESSWAY INTERCHANGES SECTIONS GIR/VINE AND AFC TRAFFIC STUDY - SUPPLEMENT NUMBER 1



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