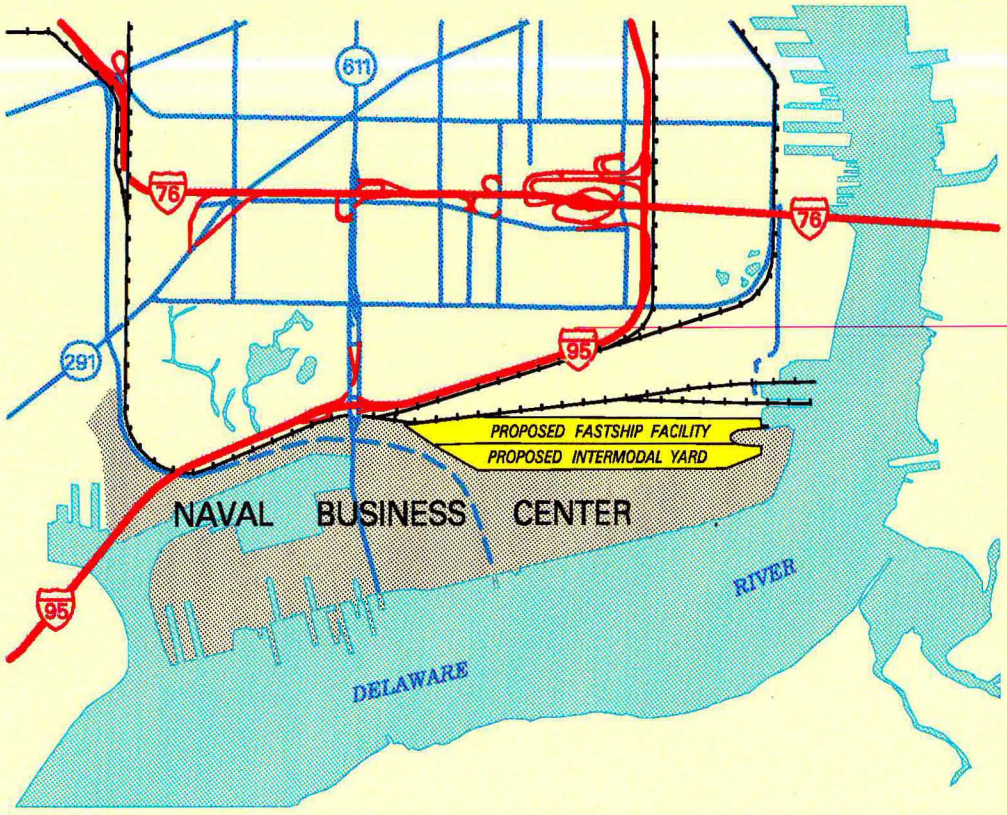
Intermodal Facilities Landside Access

Access to interstate routes from two intermodal facilities proposed for the site of the Philadelphia Naval Base



Delaware Valley
Regional Planning Commission

September 1996

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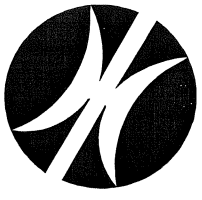
Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency which provides continuing, comprehensive and coordinated planning for the orderly growth and development of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties as well as the City of Philadelphia in Pennsylvania and Burlington, Camden, Gloucester, and Mercer counties in New Jersey. The Commission is an advisory agency which divides its planning and service functions among the Office of the Executive Director, the Office of Public Affairs, and three line Divisions: Transportation Planning, Regional Planning, and Administration. DVRPC's mission for the 1990s is to emphasize technical assistance and services and to conduct high priority studies for member state and local governments, while determining and meeting the needs of the private sector.



The DVRPC logo is adapted from the official seal of the Commission 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 flowing through it. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey. The logo combines these elements to depict the areas served by DVRPC.

DELAWARE VALLEY REGIONAL PLANNING COMMISSION

Publication Abstract

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ABSTRACT

This report documents problems associated with landside access to two facilities proposed for the former Philadelphia Naval Base (currently being redeveloped and marketed under the name "Philadelphia Naval Business Center").

The report also designates the most appropriate highway routes between the proposed FastShip and CSXI intermodal facilities and the surrounding interstate highways.

Recommendations are included which address highway and intersection geometry, traffic control and directional signing improvements along these access routes. As well, area-wide traffic strategies are identified to improve traffic circulation conditions throughout an enlarged activity center area — encompassing South Philadelphia's port facilities district and residential neighborhood, the Food Distribution Center, the Sports Complex as well as the Philadelphia Naval Business Center.

Costs for the recommended improvements are provided, as is a candidate capital improvement program.

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1 EXECUTIVE SUMMARY

This report presents the findings of an evaluation of truck access to and from the former Philadelphia Naval Base. The evaluation addresses the near term needs of two proposed intermodal freight terminals to be located in a tract in the northeastern portion of the site — *FastShip Atlantic* and *CSX Intermodal* (estimated to begin operations as early as 1999 and 1998, respectively, and be fully operational by 2004). The study also presents a long term evaluation to complement redevelopment and marketing of the site, currently referred to as the "Philadelphia Naval Business Center".

The proposed FastShip and CSXI projects reflect the substantial growth of intermodalism in the shipping industry. FastShip, in particular, represents a bold, new initiative in intermodalism. While the vessels are smaller than other container ships, their use in transporting time-sensitive high-value products serves a niche market — being much faster than conventional ships and much cheaper than air cargo. The CSXI facility represents a relocation and modernization of their container operation located at Snyder Avenue.

There is already a concentration of intermodal freight facilities operating near the site. These include the Packer Avenue Marine Terminal, Ameriport Intermodal Transfer Facility, the Food Distribution Center and UPS Distribution Center. Taken together, and including the Sports Complex, the area provides a major focal point of employment, service and cultural activities representing a regional activity center within DVRPC's Year 2020 planning effort.

The addition of the two proposed facilities will strengthen the appeal of this area, and combined with the existing facilities, will generate significant automobile, truck and rail traffic. Consequently, the study presents ways of accommodating the truck traffic to and from the proposed intermodal facilities consistent with the objective of moving freight efficiently.

The analysis focuses on highway connections between the proposed intermodal terminals, within the Philadelphia Naval Business Center, and the nearby interstate highway network (I-76 and I-95). The evaluation is also responsive to access needs and

impacts related to surrounding major activities which share the study area's highway infrastructure (notably: the Sports Complex, the Food Distribution Center and South Philadelphia's port district and residential neighborhood).

In the evaluation, primary and alternate highway access routes for trucks between the proposed intermodal facilities and the surrounding interstate highways are recommended. These include Broad Street, Penrose Avenue, 26th Street, Pattison Avenue, Front Street, 7th Street and Darien Street. Traffic engineering, directional signing and area-wide traffic management strategies have also been identified for ameliorating existing and projected future deficiencies along the set of access routes.

As a final component of the study, a Candidate Transportation Capital Improvement Program (CIP) has been prepared to address the near term mobility needs of FastShip and CSXI and the longer term needs of the Philadelphia Naval Business Center. The complete 20 year capital program is shown in Table 7 (page 64 in the main body of this report). It includes 21 individual projects at a total program cost of $62,922,000. A summary of the CIP is shown below.

SUMMARIZED
CANDIDATE TRANSPORTATION CAPITAL IMPROVEMENT PROGRAM

STAGING / COST ESTIMATE (000's)

IMPROVEMENT CATEGORY	Immed. Term	Near Term	Medium Term	Long Term	Totals
Intersection / Highway	$ 6,360	$ 5,232	$ 36,400	$ 12,000	$ 59,992
Directional Signing	$ 15	$ 75	---	---	$ 90
Area-wide Strategies ("ITS" projects)	---	$ 2,620	---	$ 220	$ 2,840
Totals	$ 6,375	$ 7,927	$ 36,400	$ 12,220	$ 62,922

Immediate term improvements are defined as those which are necessary to accommodate initial operations at the intermodal freight terminals (1998) and those which have funding. Near term improvements are those seen necessary to accommodate full operations at the proposed intermodal terminals (2004). Medium term improvements are projected to be required to serve continuing development within the Philadelphia Naval Business Center and will be necessary at roughly 30 percent of site build-out (2010). Long term improvements will serve full build-out of the Philadelphia Naval Business Center and are estimated to be required at 50 percent of the business park's build-out (2015).

The objective of the capital improvement program is to present the set of study recommendations and costs in priority fashion for possible inclusion in the regional Transportation Improvement Program and/or for use in seeking alternative sources of financing.

A few additional points about the CIP need mentioning. First, the set of immediate term improvements are almost entirely funded (refer to the last page of Table 7 on page 66). Second, the improvements slated for the immediate and near terms will not only benefit FastShip and CSXI. They will also benefit present occupants and those who may soon occupy the business center. Third, longer term beneficiaries of the improvements within the CIP exceed FastShip, CSXI and the Philadelphia Naval Business Center. The identified improvements will also benefit truck and traffic flows associated with the Sports Complex, the Food Distribution Center, South Philadelphia's port district and residential neighborhood, as well as through travellers.

In conclusion, the two proposed intermodal facilities at the former Philadelphia Naval Base would add a significant freight center with highly advanced operations to the local goods movement transportation network. Their creation coincides with the emerging importance and status afforded intermodal facilities by both the private and public sectors, and highlights the need to design convergent transportation modes of equal quality and capacity. Tantamount to realizing the full potential of the facilities and the Philadelphia Naval Business Center is — the vigilant sharing of roles and responsibilities in implementing the transportation capital improvement program prescribed in this report.

Finally, grateful acknowledgement is given to this study's Steering Committee (which included representatives of the PIDC, the DRPA, PennDOT, the Philadelphia Department of Streets and the Foundation for Architecture) and to the Delaware Valley Goods Movement Task Force — for their on-going planning activities, in these broad matters, and for the specific contributions, provided in the conduct of this study. □

2 INTRODUCTION

In September 1995, the Philadelphia Naval Base was closed and a large part of the League Island site was turned over to the City of Philadelphia for reuse. The Philadelphia Industrial Development Corporation (PIDC) is leading efforts to reuse the site for purposes beneficial to the residents of the city and region. The site redevelopment effort is being marketed under the name "Philadelphia Naval Business Center"[1]. At completion, which may take as many as 30 years, the property has the potential of yielding approximately 12.5 million square feet of multi-use development space, supporting as many as 17,600 jobs according to the *Community Reuse Plan*[2].

Among current and near-term plans for the Philadelphia Naval Business Center are construction of two intermodal container facilities in the northeastern portion of the site — one for *FastShip Atlantic* and one for conventional intermodal activity operated by *CSX Intermodal* (CSXI). The Delaware River Port Authority (DRPA), PennDOT, NJDOT and the FHWA have provided funds to evaluate access from these facilities to the nearby interstate highway system. This report summarizes the Delaware Valley Regional Planning Commission's (DVRPC) phased investigation of the situation. DVRPC's work effort identifies circulation problems experienced in the area, conducted in Phase I (funding provided by DRPA), and recommends improvements to assure rapid access for trucks travelling to and from the proposed intermodal facilities performed in Phase II (made possible by funding provided by PennDOT, NJDOT and the FHWA).

The proposed FastShip and CSXI projects reflect the substantial growth of intermodalism in the shipping industry. FastShip, in particular, represents a bold, new initiative in intermodalism.

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[1] *Philadelphia Naval Business Center* is the name under which the property is currently being marketed and is being used in this report as a means of signifying the site's resurging vitality. It is advised that the name is subject to change.

[2] *League Island — An Environment of Innovation*, City of Philadelphia, September 1994.

There is already a concentration of intermodal freight facilities operating near the site. These include the Packer Avenue Marine Terminal, Ameriport Intermodal Transfer Facility, the Food Distribution Center and UPS Distribution Center. Taken together, and including the Sports Complex, the area provides a major focal point of employment, service and cultural activities representing a regional activity center within DVRPC's Year 2020 planning effort.

The addition of the two proposed facilities will strengthen the appeal of this area, and combined with the existing facilities, will generate significant automobile, truck and rail traffic. The center enjoys excellent access and connections with two interstate highway corridors radiating from it — Interstate 95 (I-95) and Interstate 76 (I-76). Most of the truck traffic will be bound for either I-76 or I-95 for quick access to destinations north, east, south and west from the site.

Ultimately, the study presents ways of accommodating the truck traffic to and from the proposed intermodal facilities consistent with the objective of moving freight efficiently. Traffic engineering and management strategies are suggested which are sensitive to three local conditions. First, as part of the Philadelphia Naval Business Center, the City of Philadelphia needs to offer congestion-free access to other as-yet undeveloped sites. Second, the recent addition of the CoreStates Center creates a third major sports and entertainment facility hosting events and drawing large numbers of cars into the neighborhood. Third, the interests of the residents of South Philadelphia need to be considered.

Work Program

The phased work program divides the study into six activities.

Phase I:

1. Establish and maintain contacts with the major interests in the area through the auspices of DRPA.

2. Collect and document relevant information on the sites and surrounding highways from existing sources and from field views. These include an area base map, proposed site plans, traffic information and studies, aerial photography of existing conditions, and projections of truck traffic in the area.

3. Designate routes between the gates of the existing and proposed intermodal facilities and ramps to and from the two major interstate

routes and other destinations. Superimpose new traffic on existing conditions and display points of potential congestion and delay.

Phase II:

4. Identify measures to improve truck ingress and egress between the site and the interstate highway system, including highway directional signing, traffic operations and/or traffic management improvements. Provide improvement costs where applicable.

5. Formulate candidate transportation improvement program.

6. Present study undertakings and findings to the Delaware Valley Goods Movement Task Force and the DVRPC Regional Transportation Committee.

The Report

Section 3 of the report describes the neighboring land uses and the impact of these land uses upon the proposed facility and *vice versa*. Section 4 describes each facility and presents assumptions regarding the level of activity envisioned. Section 5 details the primary and alternate access routes to and from the interstate highways to the north, south, east and west. Section 6 identifies points of congestion along the access routes and suggests improvement actions to ameliorate FastShip and CSXI's access problems in the near term and the Philadelphia Naval Business Center's needs for the longer term future. In Section 7, the recommendations are formulated into a candidate transportation capital improvement program. □

3 THE NEIGHBORHOOD

The area of South Philadelphia surrounding the proposed FastShip and CSXI facilities is a mix of large-scale industrial and entertainment / recreation facilities and small-scale residential uses. The area is a major transportation hub with the convergence of two interstate highways, the Walt Whitman Bridge, railroad main lines and yards, intermodal facilities and numerous maritime terminals. Philadelphia International Airport is only three miles away via Interstate 95. The map on page 15 shows the area around the proposed facilities.

The Philadelphia Naval Base

The Navy will retain a portion of the Base, west of Broad Street, for ancillary uses such as the Naval Surface Warfare Center and the mothballing of ships. The remaining portion of the Base will be turned over to the City of Philadelphia for the purpose of redevelopment — creating the Philadelphia Naval Business Center.

The City is actively seeking new uses for the site. The Philadelphia Naval Business Center has been divided into four major categories of (re)use: commercial, distribution, light industrial and the shipyard. A number of companies, in addition to FastShip and CSXI, have expressed interest in developing part of the Philadelphia Naval Business Center. Among those interested is Metro Machine of Virginia, which has begun negotiations to repair ships and to build portions of double-hulled tankers west of Broad Street in the shipyard portion of the Base.

The proposed FastShip and CSXI facilities will occupy a tract in the northeastern portion of the Philadelphia Naval Business Center on the site formerly occupied by the Mustin Field Naval Air Station at the Philadelphia Naval Base.

Upon completion, the Philadelphia Naval Business Center is projected to contain 12.5 million square feet of varied development and 17,600 employees. Substantial vehicular activity is projected to be generated as a consequence of these thresholds. On an average weekday as many as 7,000 vehicles will enter the completed Philadelphia Naval Business Center during the am peak

hour. An equal number will exit during the pm peak hour[3]. Approximately 3,000 daily truck deliveries are also estimated at build-out, based upon the size and projected uses within the site[4].

One of the improvements the City has identified for the Philadelphia Naval Business Center is a new internal roadway, League Island Boulevard. The roadway will connect the eastern portion of the business center at Broad Street (PA 611) with 26th Street. From these site access points, connection with the nearby interstate highways will be accomplished.

The conceptual design for, and the estimated traffic characteristics of, League Island Boulevard are as follows:

I. Between Broad Street and the proposed intermodal facilities, three lanes by direction (32,000 ADT)[5];
II. Between the intermodal facilities and Porter Avenue / Mustin Boulevard, two lanes by direction (16,500 ADT);
III. Between Porter Avenue / Mustin Boulevard and Delaware Avenue, two lanes by direction (2,200 ADT);
IV. Between 26th Street and Broad Street, two lanes by direction (19,000 ADT).

Beyond providing for the efficient collection and distribution of Philadelphia Naval Business Center traffic volume, League Island Boulevard will also be beneficial as a means of avoiding special event congestion around the Sports Complex and containing the business center's impacts from the South Philadelphia residential neighborhood.

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[3]*League Island Boulevard and Intersection with Broad Street - Schematic and Preliminary Design*, City of Philadelphia, February 22, 1996, Draft.

[4]Truck trip generations estimated from rates obtained from *Transportation and Traffic Engineering Handbook*, ITE, 1982, p. 294 and *Transportation and Land Development*, ITE, 1988, p. 204.

[5]Cross sections and projected ADT's assume full build-out of the Naval Business Center (source: *League Island Boulevard and Intersection with Broad Street - Schematic and Preliminary Design*, City of Philadelphia, February 22, 1996, Draft.).

Other Shipping Facilities

The majority of the City's maritime terminals are located in the vicinity of the two proposed facilities. Packer Avenue Marine Terminal, a 106-acre facility directly south of the Walt Whitman Bridge, is the largest maritime terminal in the area. Access to this facility is from Old Delaware Avenue via a connection to Delaware Avenue at Packer Avenue. Other major terminals with access from Columbus Boulevard / Delaware Avenue and Old Delaware Avenue include Pier 96/98 Annex (automobiles), Pier 82/84 (fruit and cocoa), and Pier 78/80 (paper products). All these facilities are owned by the Philadelphia Regional Port Authority and leased to private operators.

Two major intermodal facilities are also in the area. Ameriport, adjacent to the Packer Avenue Marine Terminal, provides transfer capabilities for three major railroads: Conrail, CP Rail and CSXI. Conrail is now providing scheduled double-stacked service to Ameriport. CSXI also operates an intermodal yard at Columbus Boulevard and Snyder Avenue. In addition, Conrail owns and operates the Greenwich Yards, which is a large storage yard directly north of the proposed FastShip facility. Pier 122 (iron ore) is located on this property and is entered from Old Delaware Avenue. A UPS shipping facility located on Oregon Avenue is another major traffic generator in the area. Just west of the UPS facility, on the south side of Oregon Avenue, is the Conrail Flexi-Flo facility which accommodates bulk commodities.

Truck traffic associated with the maritime terminals is rather heavy but is spread throughout the day, usually in non-peak periods. In 1994, there were approximately 600 truck trips per day associated with the maritime terminals located in this vicinity. Truck traffic is heaviest on Front Street, Old Delaware Avenue and Columbus Boulevard / Delaware Avenue. Truck traffic associated with the other shipping facilities in the vicinity uses the Walt Whitman Bridge / Packer Avenue ramps at Front Street for Interstate 95 access and the 7th Street / Packer Avenue interchange at Darien Street for Interstate 76 access. Therefore, under normal circumstances, traffic to/from the South Philadelphia ports will not interfere with the access and egress of the two proposed intermodal facilities.

The Food Distribution Center

The Food Distribution Center is comprised of a number of warehousing operations located primarily between Packer Avenue and I-95 and Front Street and Darien Street. A significant amount of truck traffic is generated by this facility. Trucks oriented to this facility also use the Packer Avenue interchanges for Interstate 95 and Interstate 76 access.

A major traffic problem in this area is the large number of double-parked trucks. This is a particular obstacle on 7th Street. In many cases it is difficult for tractor trailers to maneuver around the illegally parked trucks.

South Philadelphia Sports Complex

The area around Broad Street and Pattison Avenue is home to the South Philadelphia Sports Complex. The Sports Complex is comprised of Veterans Stadium, home of the Philadelphia Phillies and the Philadelphia Eagles; the Spectrum, an arena used for the Philadelphia Wings games, concerts and special events; and the recently opened CoreStates Center, which is the new home for the Philadelphia Flyers and the Philadelphia 76ers and also serves as the venue for concerts and other special events.

Approximately six million spectators attend events at the Sports Complex each year. There are approximately 18,000 parking spaces in the vicinity of the Sports Complex. Typically, this supply of parking accommodates event attendance levels of 44,000. In addition, SEPTA provides special event service to the Sports Complex on the Broad Street Subway which terminates at Pattison Avenue.

Congestion associated with the Sports Complex generally occurs when events with attendance levels exceeding the parking capacity are held. This occurs approximately twenty-five times a year. A study was undertaken in Spring 1990, to specifically address the congestion around the Sports Complex. Some of the findings of the report have been adopted. One project underway will interconnect signals and create additional median openings along Broad Street in the vicinity of the Spectrum. Additional parking is also being sought for the Sports Complex. Notably, a

potential supply has been identified as part of the potential redevelopment and reuse of the Philadelphia Naval Hospital site.

Since the same interchanges can be used to access both the FastShip and CSXI facilities and the Sports Complex, the potential for truck traffic being impacted by events being held at the Sports Complex is consequential.

Residential Areas and Parks

Parks and residential areas are the other predominant land uses in the area. Franklin D. Roosevelt Park and Golf Course is occasionally used for concerts and other special events. It is also used for spill-over parking for events at the Sports Complex when event attendance exceeds 44,000 people.

The area between I-76 and Pattison Avenue and Broad Street and 26th Street is primarily residential with some small-scale commercial uses interspersed. Excessive truck traffic is not compatible with residential areas. Therefore, every effort should be made to preserve and protect the residential areas and parks from truck traffic. □

Figure 1: Map of the Site

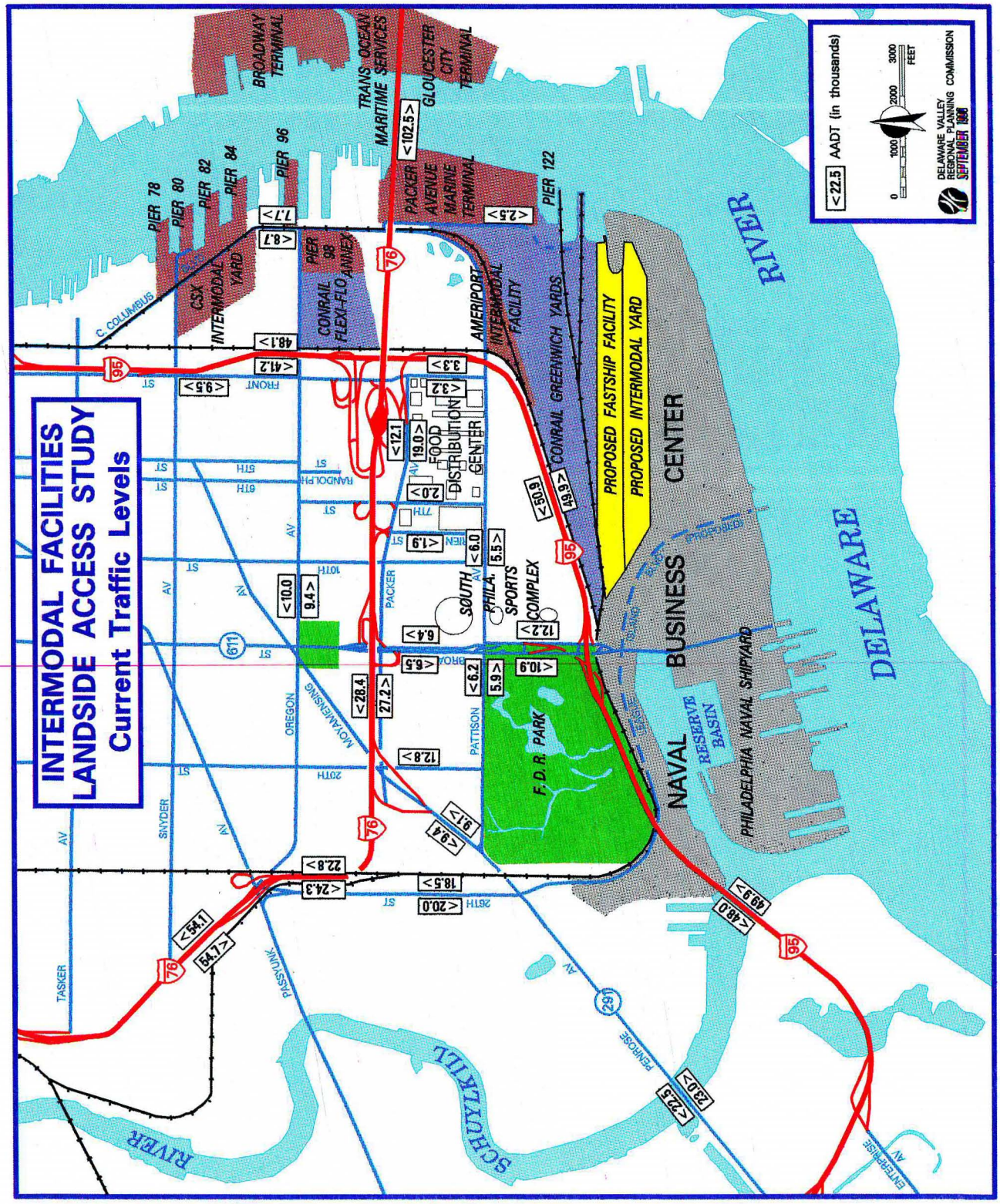


Figure 2: Aerial View of the Site in 1995

4 THE FACILITIES

Two major intermodal facilities are proposed for the northeastern portion of the Philadelphia Naval Business Center. The site is immediately adjacent to Conrail's Greenwich Railyard.

Although the share of container traffic by rail is growing, each facility can be assumed to generate significant truck traffic hauling containers, particularly during initial stages of the operation.

Description of the Proposed Facilities

FastShip Atlantic

FastShip Atlantic of Reston, Virginia proposes to build a terminal to serve state-of-the-art container vessels. The service will operate between Philadelphia and Zeebrugge, Belgium. Philadelphia will be the only port-of-call on the Atlantic seaboard. The ships can operate at a top speed of 45 knots, about twice the speed of other container ships. Loading and unloading time will be minimized through the use of unique air-cushioned trains. Although the vessels are smaller than other container ships, their use in transporting time-sensitive high-value products serves a niche market — being much faster than conventional ships and much cheaper than air cargo.

While still in negotiations, the current development configuration is shaped as an elongated rectangle containing 87 acres. At the eastern end is the ship dock and at the western end is the gate for landside vehicles. In the middle, transfers of containers occur between the air-cushioned trains used to unload containers and rail cars and truck trailers.

CSX Intermodal

CSXI of Jacksonville, Florida proposes to construct a conventional intermodal facility to replace one at Snyder Avenue, about two miles away. When the new facility is constructed, CSXI operations at Ameriport and the Snyder Avenue yard will cease and container operations will be consolidated at the new site.

The new CSX intermodal terminal will occupy an approximate 100-acre site directly south of the FastShip facility. It will consist of six 4,300-foot loading tracks and adjacent truck roads and container and trailer storage areas.

Traffic Impacts of the Two Terminals

FastShip Atlantic

FastShip Atlantic envisions service beginning in 1999. Initially a ship will arrive around midnight three times a week with 850 containers. Service will eventually be expanded to five days a week[6]. Containers will be unloaded immediately and transferred to trucks and rail cars. Seventy-five percent of the containers (638) will depart by truck and twenty-five percent (212) by rail. Ships will depart in the morning with 850 containers. 638 containers will arrive by truck; the other 212 containers will arrive by rail. There will be an additional 42 empty, or one-way truck trips, for both arrivals and departures. It is assumed the gate will open during a 12-hour period, for example, from 10 pm to 10 am, on days when ships arrive and depart[7].

Due to the unique operating characteristics of FastShip, a simplifying assumption has been made: all of the arriving trucks are assumed to come from outside of the region and to use one of the interstate routes which lead to the vicinity of the FastShip Terminal. A similar assumption was made for departing trucks. There will be approximately 42 empty, or one-way truck trips, for both arrivals and departures.

The proportion of the 680 arrivals and departures using I-95 North and South and I-76 East and West is based on an analysis of the United States and Canadian population residing within the 500 mile "catchment area" of the route[8]. 500 miles represents one-day

[6]Project timing and activity levels are subject to change.

[7]Cargo projections and truck / rail mode split data provided by Vickerman Zachary Miller (VZM).

[8]44% of the US and Canadian population living within 500 miles would logically be reached by beginning a trip on I-76 West. Other percentages are 37% via I-95 North, 18% via I-95 South and 1% via I-76 East.

delivery by truck. The number of truck movements implied by this analysis is shown in Table 1.

Table 1: FastShip Arrivals and Departures by Route

↓ 246 arrive from	I-95 North (New York and New England)	246 depart to ↑
↑ 119 arrive from	I-95 South (Washington and the South)	119 depart to ↓
→ 306 arrive from	I-76 West (Pittsburgh and the Midwest)	306 depart to ←
← 9 arrive from	I-76 East (Camden and New Jersey)	9 depart to →

CSX Intermodal

Initial operation of the new CSXI facility is projected to begin in 1998 and reach planned operating capacity in 2004. At that time, CSXI assumes that 1,180 containers will arrive at the facility each day and an equal number will depart[9]. Half (590) are assumed to arrive by truck and half by rail[10].

Of the containers arriving or departing by truck, almost all will have origins and destinations outside the Delaware Valley and will access one of the nearby major interstate routes[11], as shown in Table 2.

The remaining containers (16 arrivals and 16 departures) are assumed to have local origins and destinations and will not use any of the interstate routes.

[9]Project timing and activity levels are subject to change.

[10]Estimated activity levels and mode split data for the CSXI site were furnished by CSXI.

[11]The proportion of trucks using the nearby interstate routes is based upon information supplied to VZM by Packer Avenue Marine Terminal. 49% of trucks are bound to/from I-95 North, 25% I-76 West, 20% I-95 South, and 3% I-76 East. 3% are bound for local destinations and do not use an interstate route.

Table 2: CSXI Arrivals and Departures by Route

↓ 290 arrive from	I-95 North (New York and New England)	290 depart to ↑
↑ 120 arrive from	I-95 South (Washington and the South)	120 depart to ↓
→ 148 arrive from	I-76 West (Pittsburgh and the Midwest)	148 depart to ←
← 16 arrive from	I-76 East (Camden and New Jersey)	16 depart to →

Combined Impacts

Figures 3 and 4 show the combined number of tractor-trailer arrivals and departures, respectively, anticipated from the FastShip and CSXI Terminals by time-of-day. Arrivals for FastShip are concentrated during the first hour of gate operation and again in the 1 to 4 am period. FastShip departures peak during the five-hour period between 3 and 8 am. CSXI arrivals are concentrated between 9 am and 7 pm. Departures from the CSXI facility will occur primarily between 7 am and 3 pm.

The hours during which the highest combined truck traffic activity for both terminals will be experienced are between 10 pm and 10 am. During these hours, total truck activity (ins plus outs — for all directions of travel) will exceed 100 trips during each hour. Peak truck activity will take place between 2 am and 7 am, times when ambient traffic levels are below average. Over this time span, 170 to 200 total truck trips per hour are anticipated. During the remaining hours of the day expected truck traffic levels generated to and from the intermodal facilities will range between 30 to 100 total truck trips per hour. □

Figure 3: FastShip and CSXI Truck Arrivals by Time-of-Day

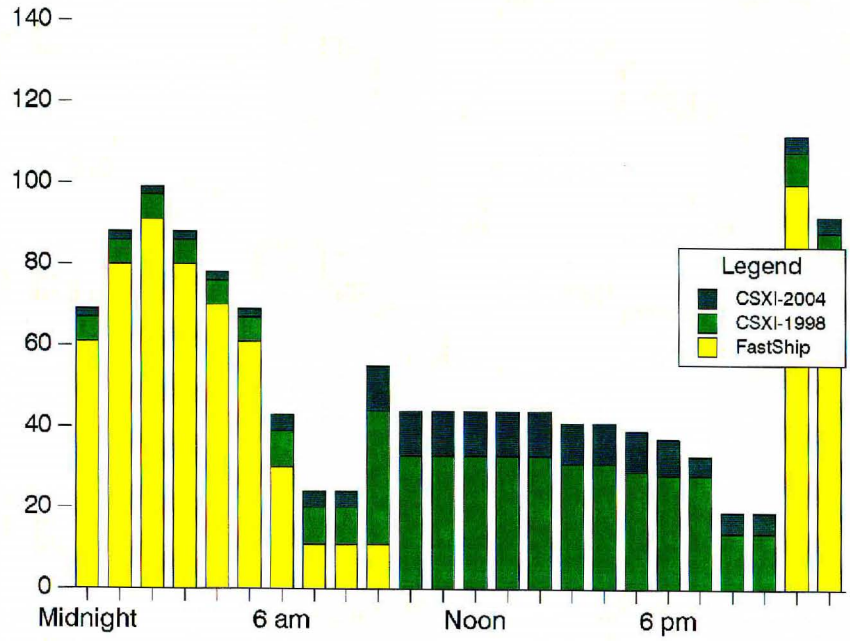
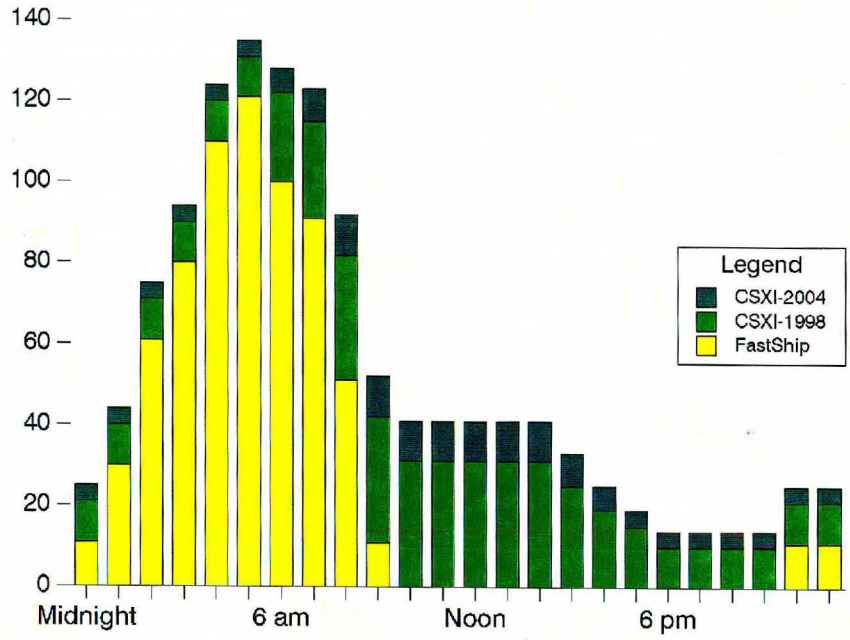


Figure 4: FastShip and CSXI Truck Departures by Time-of-Day



5 ACCESS ROUTES

The proposed FastShip and CSXI facilities have the potential for superb access to the region's interstate system. Interstate 95 (I-95) and Interstate 76 (I-76), which provide passage to all points in the country, lie within one mile of the proposed sites. New York City, Boston, New England, and portions of Canada can be reached via I-95 North. I-95 South serves the southern Atlantic Coast region. The bulk of the western United States and Canada can be reached via I-76 West, and South Jersey can be reached from I-76 East.

Freeway Characteristics

I-95 contains three lanes in each direction in the vicinity of the FastShip site. It provides for all movements at the Walt Whitman Bridge / Packer Avenue (at Front Street) and Broad Street interchanges and at several locations around Philadelphia International Airport. I-95 carries approximately 50,000 southbound and 50,000 northbound vehicles daily in the vicinity of the proposed facilities.

I-76 is a two-lane by direction freeway with full interchanges at Broad Street and at Packer Avenue / 7th Street (at Darien Street) and partial interchanges at Penrose / Moyamensing Avenue and 26th Street. In the area of the Broad Street interchange, approximately 56,000 vehicles a day use I-76, with an even split between eastbound and westbound flow.

I-76 is carried over the Delaware River into New Jersey by the Walt Whitman Bridge, a seven lane structure offering six travel lanes with directional flow determined by prevailing traffic conditions (the seventh lane is always used as a buffer lane). The Walt Whitman Bridge toll plaza is located on the Philadelphia side of the river. The round trip fare is collected during the westbound portion of the trip. This segment of I-76 was built during the 1950s by the Delaware River Port Authority (DRPA) as an approach to the Walt Whitman Bridge.

As part of phase I of the Walt Whitman Corridor Improvement Project, the DRPA has recently reconfigured several ramps between Broad Street and Front Street to provide better access, a

higher design speed, improved sight distances and additional distance for merging or diverging along the interstate. Within the next two years, the DRPA will begin the next phase of that project — to upgrade the ramps and pavement between the 26th Street / Passyunk Avenue and Moyamensing Avenue interchanges. That work is anticipated for completion in the year 2000.

Table 3 shows the functional classification, number of lanes and traffic volumes of the major roads in the vicinity of the two proposed facilities.

Table 3: Inventory of Major Roads in Vicinity of Proposed Facilities

Street	Functional Classification	Lanes by Direction	Average Annual Daily Traffic
Interstate 95	Freeway	3	48.1 to 49.9(NB) 41.2 to 50.9(SB)
Interstate 76	Freeway	2	27.2(EB) 28.4(WB)
Broad Street	Arterial	4	12.2(NB) 10.9(SB)
Pattison Avenue	Arterial	2	5.5 to 5.9(EB) 6.0 to 6.2(WB)
Columbus Blvd	Arterial	2	7.7(NB) 8.7(SB)
Penrose Avenue	Arterial	2	23.0(EB) 22.5(WB)
26th Street	Arterial	2	18.5(NB) 20.0(SB)
Packer Avenue	Arterial	3	19.0(EB) 12.1(WB)
Oregon Avenue	Arterial	2	9.4(EB) 10.0(WB)
Front Street	Arterial	2	3.3 (NB) 3.2 (SB)
7th Street	Local	2	2.0 (NB) 2.0 (SB)
Darien Street	Local	1	1.9 (NB) 1.9 (SB)
10th Street	Local	3	no count available
Old Delaware Ave	Local	2	1.3 (NB) 1.3 (SB)

Access To and From Freeways

All feasible routes for each ingress and egress movement on both of the interstates were identified (e.g., I-95 South arrivals and departures, I-95 North arrivals and departures, etc.). The routes lead either to Broad Street or to the proposed League Island Boulevard via 26th Street. These locations provide the only public entry points to the site and both will be gated and secured. The 26th Street gate will serve as the primary ingress / egress point for trips oriented south and west of the site. The Broad Street gate will be the focus for trips to/from the north and east.

Each route was judged using several criteria to determine the optimal routing. Time was considered the most important factor. Several timed runs were made for each alternative route to calculate an average time.

The remaining performance measures included: *reliability* — the consistent, dependable performance of a route determined by estimating the potential for congestion or other conflicts; *mobility* — the value of time lost due to congestion, rated by evaluating the level-of-service of the different routes; and *quality of life* — gauged by assessing the impact of the various routes on residential areas and parks.

The two best alternatives for most movements were selected and designated as the primary and the secondary route. In each pairing, the secondary route is typically longer, and would only be used when an incident blocks access via the primary route or when congestion in the vicinity of the Sports Complex warrants route flexibility.

Each of the primary and alternative movements are shown on the accompanying maps. Field investigations were conducted to determine potential geometric (e.g., sharp turns) and operational (e.g., congestion) problems, which are noted on the maps. □

Figure 5: Interstate 95 Southbound to Intermodal Facilities

Primary: Broad Street (PA 611) interchange
via Broad Street

Alternative: Walt Whitman Bridge/Packer Avenue interchange
at Front Street
via Front Street, Pattison Avenue and Broad Street

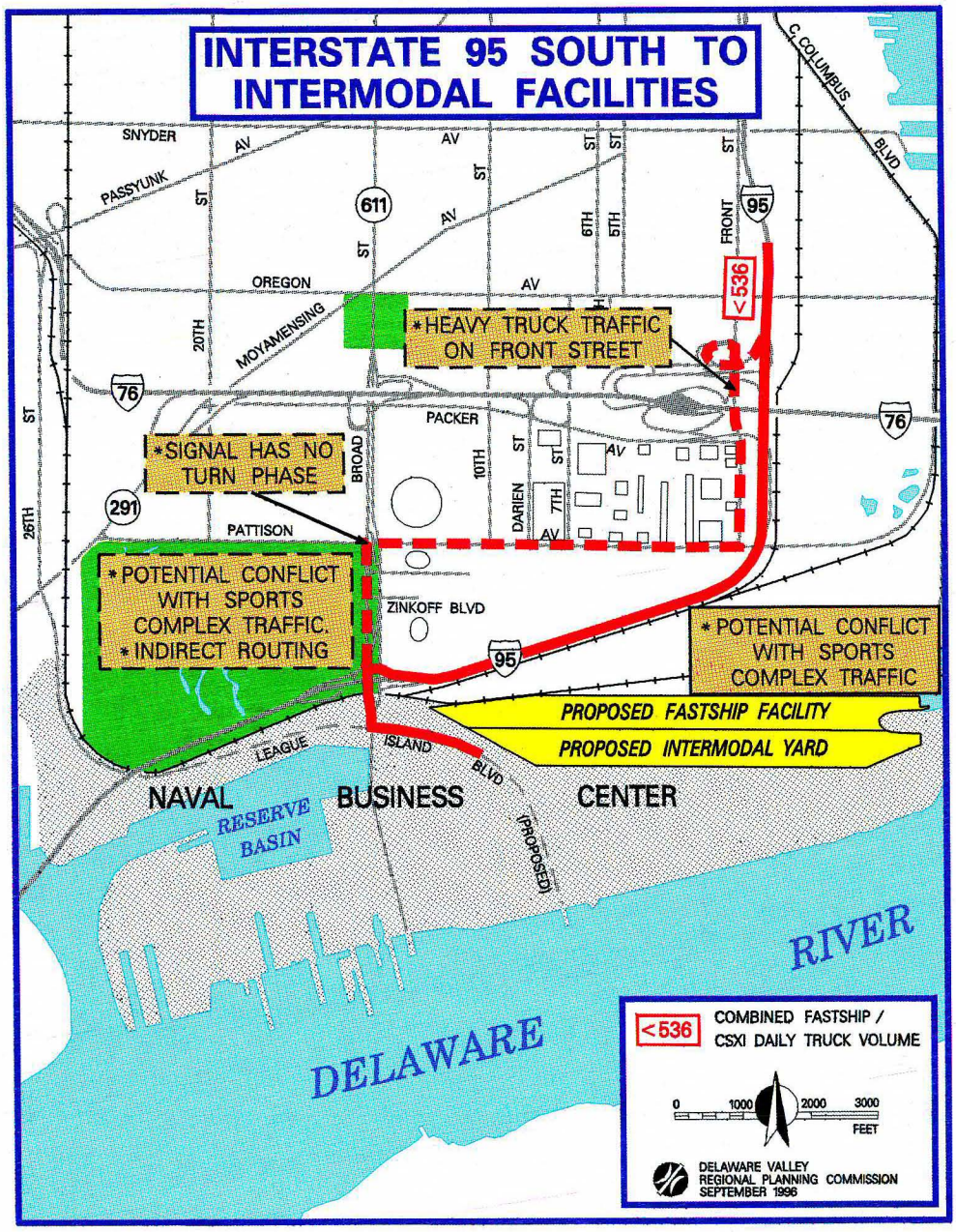


Figure 6: Intermodal Facilities to Interstate 95 Northbound

Primary: Broad Street (PA 611) interchange
via Broad Street

Alternative: Walt Whitman Bridge/Packer Avenue interchange at Front Street
via Broad Street, Pattison Avenue and Front Street

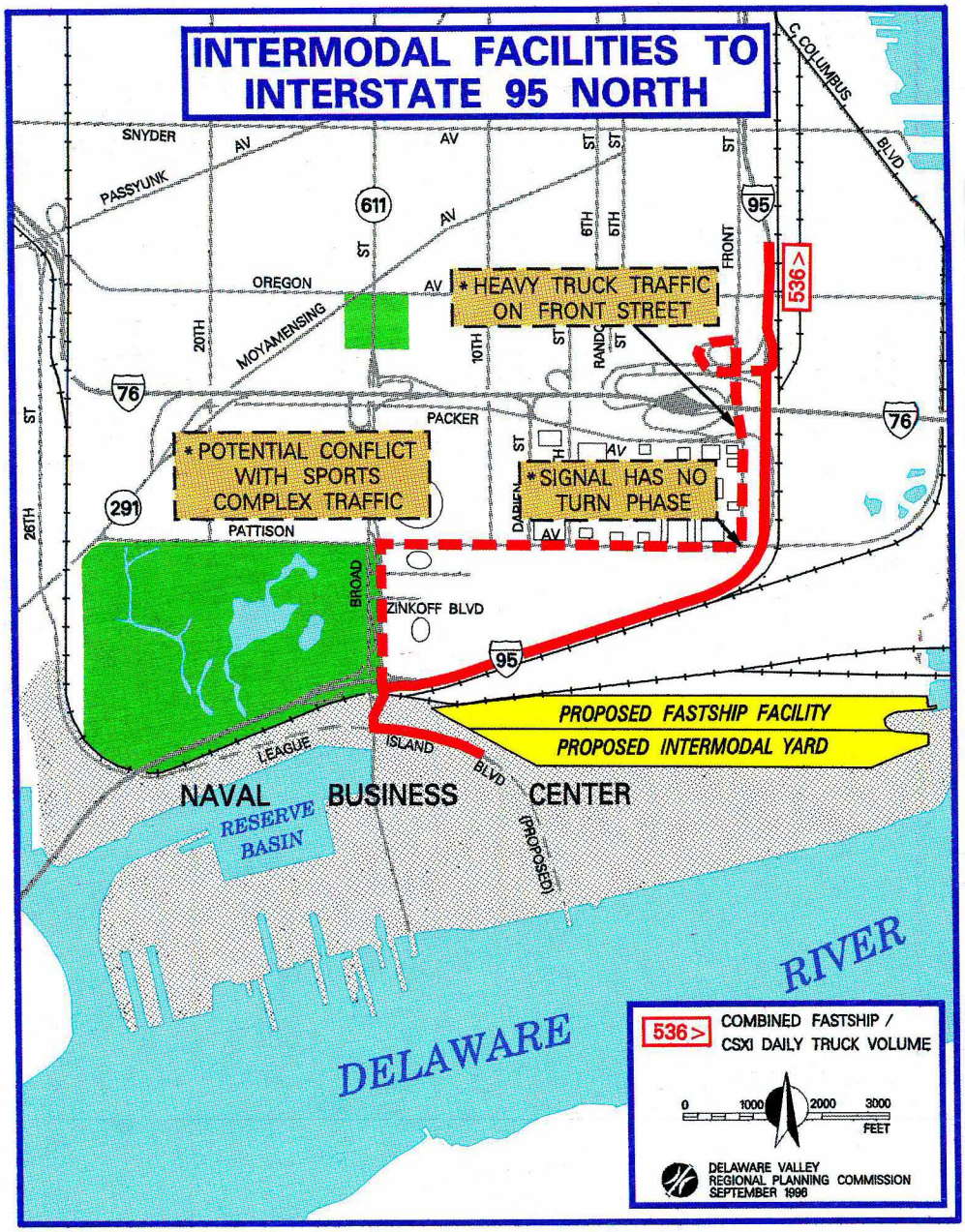


Figure 7: Interstate 95 Northbound to Intermodal Facilities

Primary: Central Philadelphia interchange (PA 291)
via the George Platt Memorial Bridge and 26th Street

Alternative: Broad Street (PA 611) interchange
via Zinkoff Boulevard cut-through and Broad Street

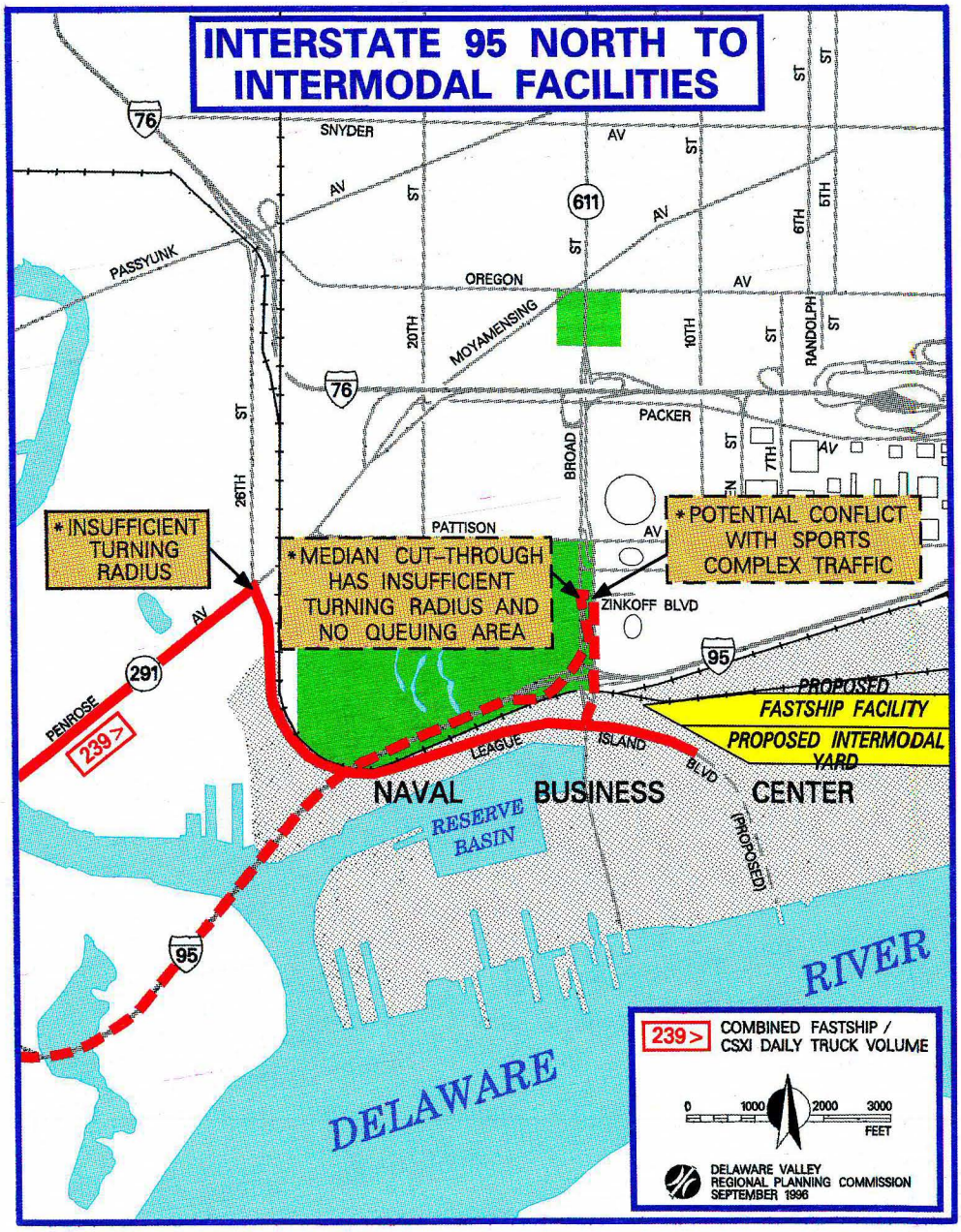


Figure 8: Intermodal Facilities to Interstate 95 Southbound

Primary: Penrose Avenue (PA 291) interchange via 26th Street and Penrose Avenue

Alternative: Broad Street (PA 611) interchange via Broad Street and Zinkoff Boulevard cut-through

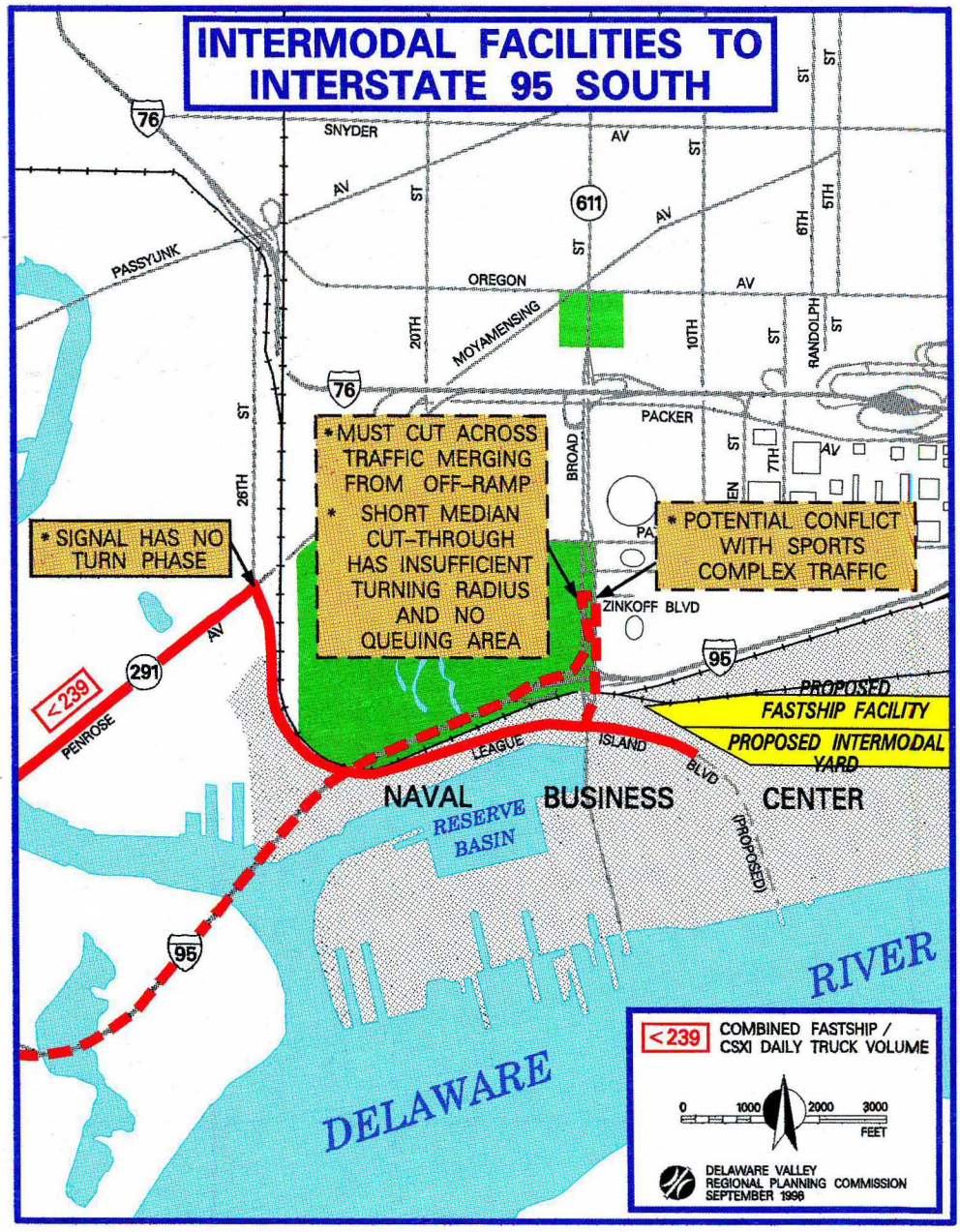


Figure 9: Interstate 76 Westbound to Intermodal Facilities

Primary: Walt Whitman Bridge to I-95 Southbound
via Broad Street

Alternative: Seventh Street interchange
Seventh Street, Pattison Avenue and Broad Street

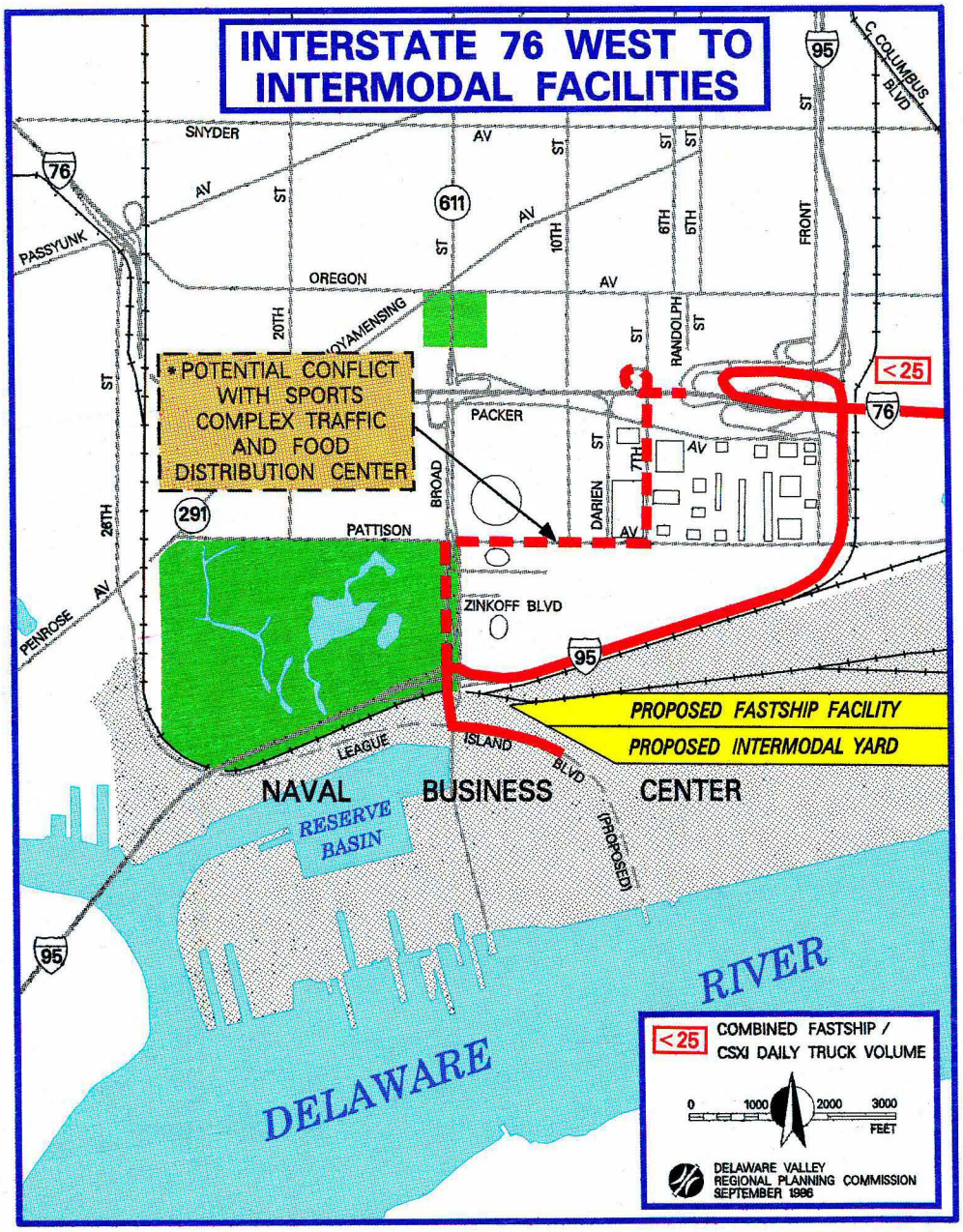


Figure 10: Intermodal Facilities to Interstate 76 Eastbound

Primary: I-95 Northbound to Walt Whitman Bridge
via Broad Street

Alternative: I-76 Eastbound interchange at Darien Street/Packer Avenue
via Broad Street, Pattison Avenue and Darien Street

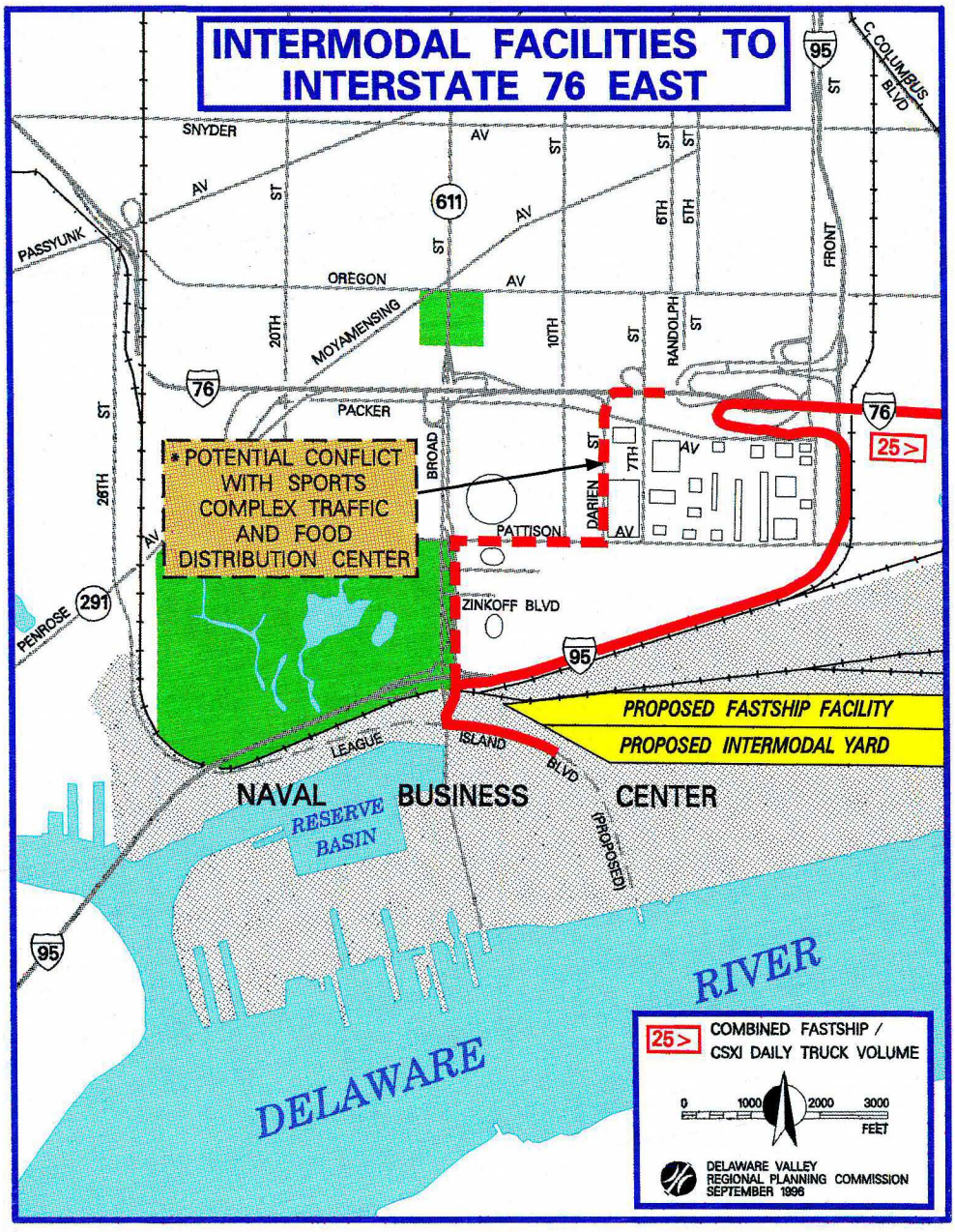


Figure 11: Interstate 76 Eastbound to Intermodal Facilities

Primary: Penrose Avenue (PA 291) interchange at Passyunk Avenue
via 26th Street

Alternative: None

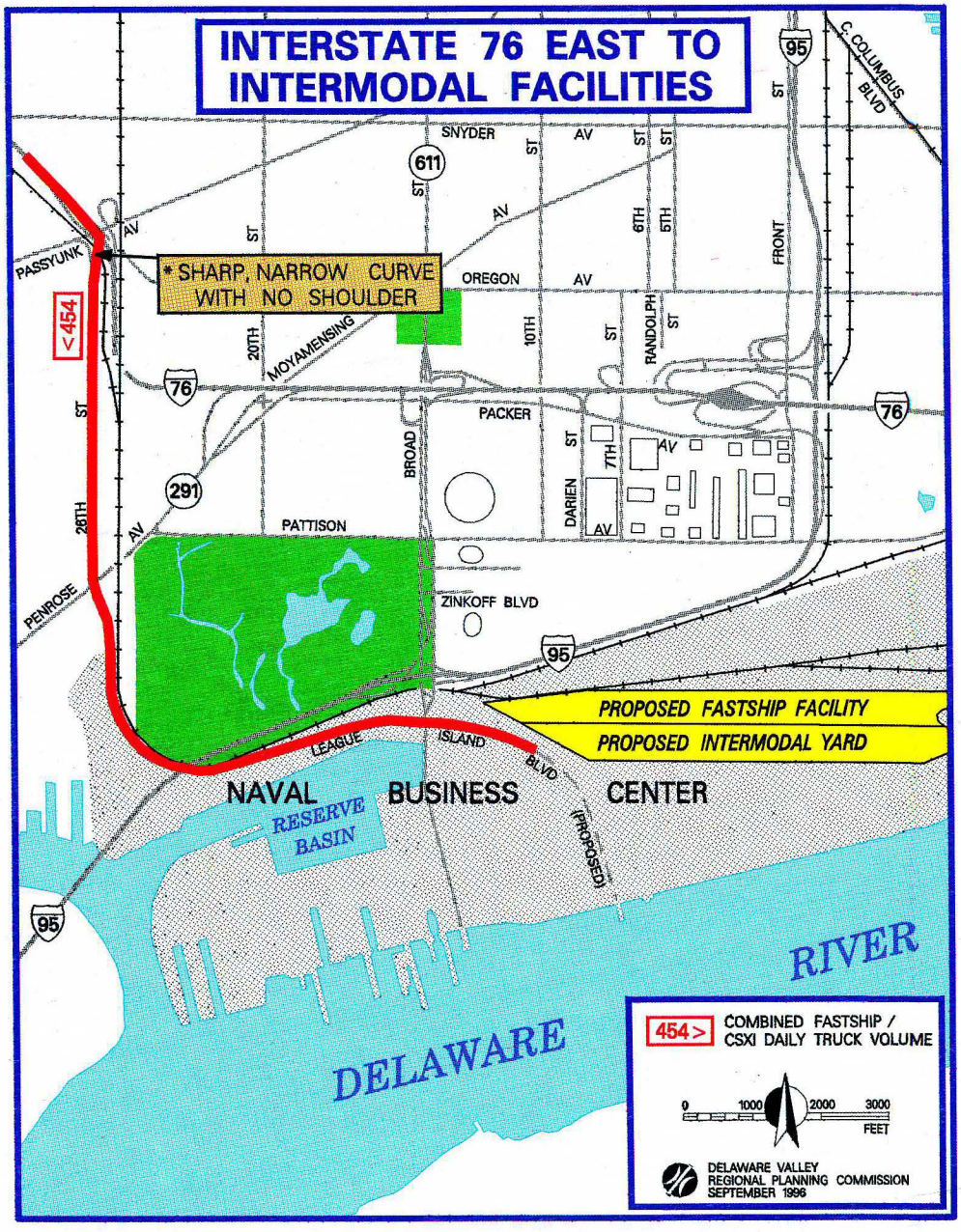
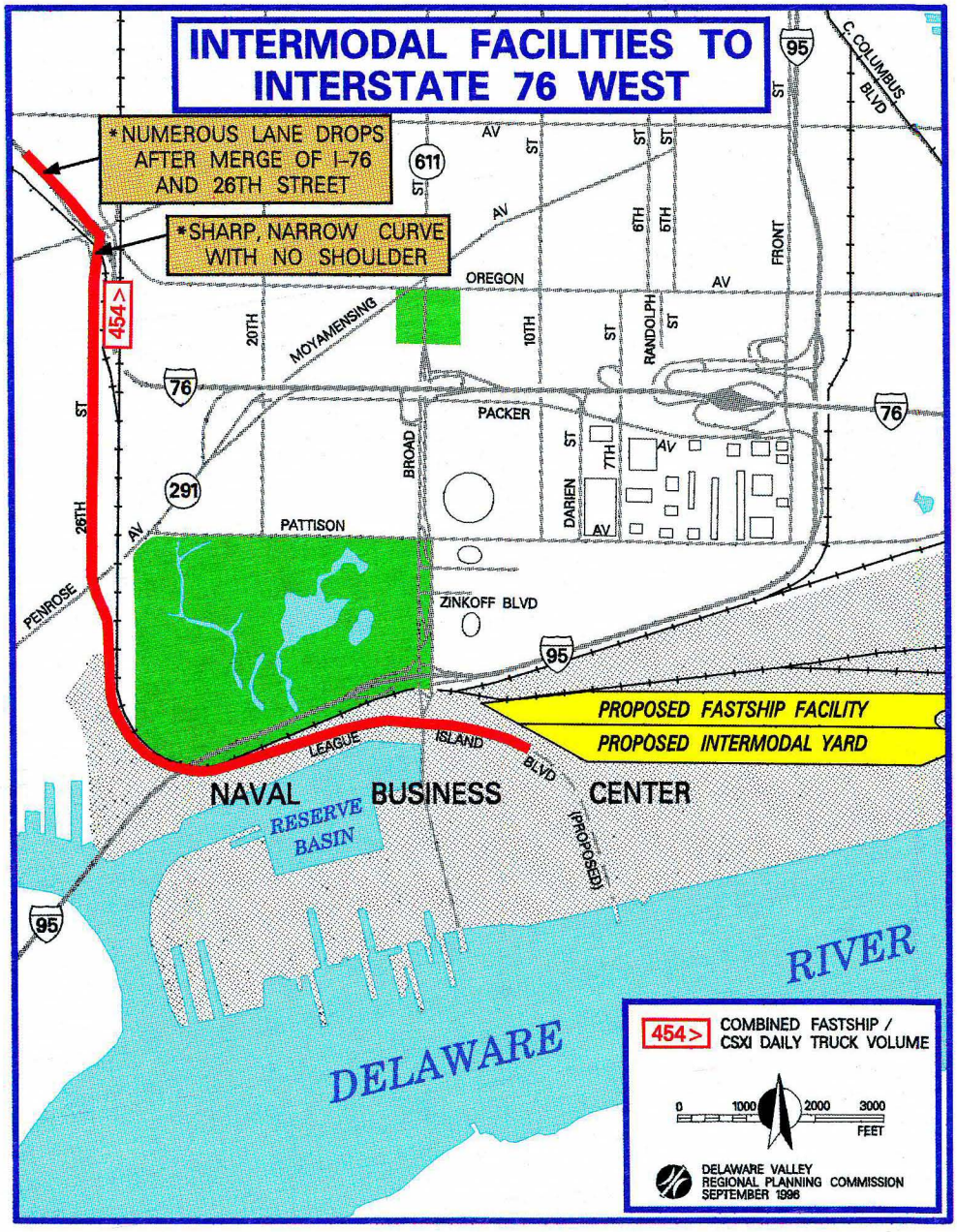


Figure 12: Intermodal Facilities to Interstate 76 Westbound

Primary: Passyunk Avenue/26th Street interchange via 26th Street

Alternative: None



6 FINDINGS

The proposed facilities are basically well-sited for the purpose of accessing the interstate highway system.

The study has assumed the creation of a League Island Boulevard, for the proposed facilities, on the alignment found in the *Community Reuse Plan*, providing an internal site connection between the gated entrances at Broad Street and 26th Street. In addition to benefitting internal traffic circulation and distribution, League Island Boulevard provides an additional external access point which will lessen the effects of Sports Complex traffic congestion upon the Philadelphia Naval Business Center's traffic flow. Similarly, the link reduces the likelihood that Philadelphia Naval Business Center truck traffic will impact the residential neighborhoods and public park areas bordering Broad Street and Pattison Avenue.

Analyses of the suggested access routes indicates three general categories of interference likely to impact ingress and egress of FastShip and CSXI truck traffic. These include:

1 Deficient arterial street conditions encountered between the site and the interstate highway system.
2 Inadequate or inconsistent directional signing along the interstates and arterials.
3 Area-wide congestion resulting from the nature and scale of neighboring uses.

Improvements addressing the problem locations were identified, coordinated with operating personnel (e.g., representatives of the PIDC, the DRPA, PennDOT, the Philadelphia Department of Streets and the Foundation for Architecture) and are discussed in the following section.

Problems and Solutions

Arterial Street Network

Broad Street, Pattison Avenue, 26th Street, Front Street, and other arterial streets in the vicinity are broad and have adequate capacity at most times. Usually little delay is encountered with the

exception of congestion occurring before and after sports and entertainment events.

The maps in Section 5 have identified problems of concern to truck operators, and those problems determined as a consequence of field surveys performed for this study. To a great degree, the existing problem locations are places where roadway geometry and/or intersection traffic control conditions compound truck maneuvers.

In addition, there are a series of traffic conditions which are expected to arise or exacerbate given build-out of the Philadelphia Naval Business Center and operations at the new CoreStates Center. Traffic engineering solutions have been identified and recommended to address existing and future problems and are presented in Table 4. The recommendations are also illustrated on Figure 13.

Directional Signing

The quality of the directional signing is uneven in the area surrounding the proposed and existing intermodal facilities. Signing along interstate highways should identify the uses within the activity center from a regional perspective and direct site oriented traffic to the most appropriate interchange. Local and arterial street signing should guide traffic between the interchange and each major use's driveway.

Presently, the Sports Complex enjoys the most far reaching and cohesive highway signing scheme in the area. Signs along both directions of I-95 and I-76 direct Sports Complex traffic to the Broad Street interchanges. Some signing exists for the US Naval Base (via Broad Street from I-95 north and south), the Packer Marine Terminal (via the Walt Whitman Bridge / Packer Avenue interchange from I-95 north and south), the Port of Philadelphia (via Packer Avenue from eastbound I-76), and the Food Distribution Center (via Walt Whitman Bridge / Packer Avenue from southbound I-95). From these examples, it can be seen that regional signing to most of the activity center's main attractions is incomplete.

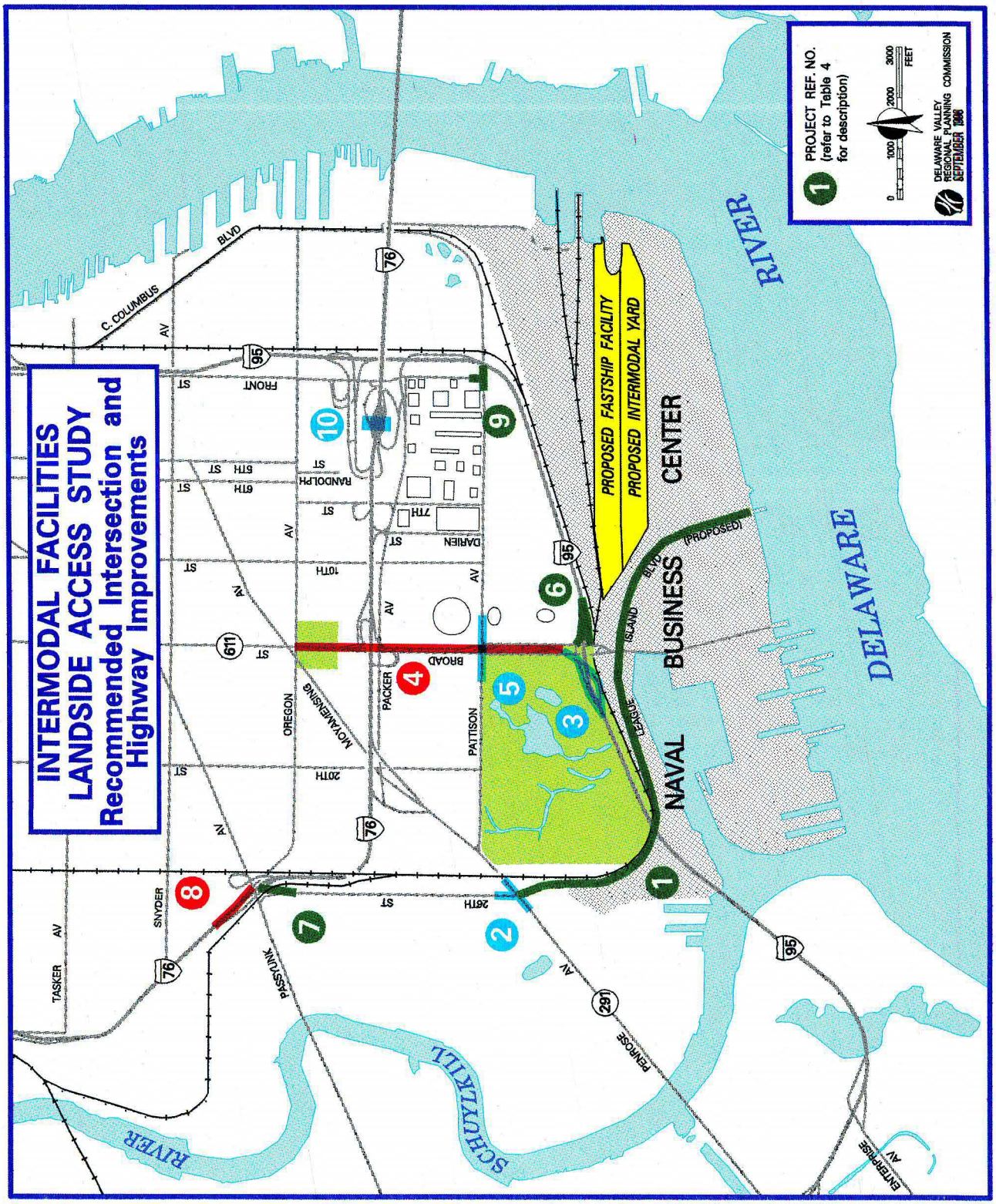
Table 4: Recommended Intersection and Highway Improvements

#	Location	Description	Near Term Improvements to serve FastShip & CSXI	Long Term Improvements to serve Naval Business Center
	NAVAL BUSINESS CENTER AREA			
1	Naval Business Center's cross-site internal roadway linking 26th Street and Broad Street.	In concert with 26th St., south of Penrose Ave., the proposed site's collector/ distributor road (League Island Boulevard) will provide for efficient dispersion of site traffic to/from I-95 South and I-76 West via 26th Street and to/from I-95 North and I-76 East via Broad Street.	Upgrade 26th St. and construct League Island Boulevard	
2	Penrose Avenue (PA 291) and 26th Street intersection.	Tight right-turning radius on the southwest corner. Traffic signal phasing does not give priority to traffic movement to/from League Island Boulevard.	As this will be a major gateway to the Naval Business Center, complete intersection reconstruction and traffic signal update is recommended.	Build a flyover ramp from the Platt Bridge to 26th Street North, removing I-76 traffic from the intersection.
3	Broad Street and I-95 Ramps to and from the South/Zinkoff Blvd.	Weaving inbound Sports Complex and outbound Naval Business Center traffic. U-turning inbound and outbound Naval Business Center traffic through a median break having an insufficient storage area for all users and inadequate turning radius for tractor trailers.	Designate Primary Access Route from/to the south via Platt Bridge, PA 291 and 26th Street.	Construct supplementary I-95 South ramps that intersect Broad Street opposite the I-95 North ramps/Terminal Avenue (i.e., reconstruct to a diamond interchange).
4	Broad Street traffic signal interconnect and new median openings.	Poor traffic progression and lack of efficient ingress and egress for activity centers.	Coordinate 10 existing signalized intersections along Broad Street between Oregon Ave. and I-95. Provide new North Access Rd. median opening on South Broad St. serving the Spectrum between Pattison Ave. and Zinkoff Blvd. Signalize and coordinate.	

Table 4: Recommended Intersection and Highway Improvements

#	Location	Description	Near Term Improvements to serve FastShip & CSXI	Long Term Improvements to serve Naval Business Center
5	Broad Street and Pattison Avenue intersection.	Left turning traffic from westbound Pattison Avenue has small storage area and no protected turn phasing.	Monitor. Potential traffic signal update.	
6	Broad Street and I-95 North Interchange.	Insufficient ramp capacity to accommodate full build-out of the Naval Business Center.		Widen existing ramps to and from the north to two lanes.
	NEIGHBORING AREA PROPOSALS			
7	26th Street Curve, under Passyunk Avenue just east of I-76.	Sharp curve through narrow portal.	Provide advance curve warning and reduced speed limit signs, flashing curve warning device and larger speed limit signs for both directions of travel along 26th Street.	
8	I-76 Westbound, west of Passyunk Avenue/26th Street interchange.	Westbound lane drop from six to three lanes results in congestion.	Monitor.	Monitor.
9	Front Street and Pattison Avenue intersection.	Poor lane striping on Front Street.	Re-stripe intersection.	
10	Walt Whitman Bridge Toll Plaza.	Westbound traffic delay in queues approaching toll booths.	Employ electronic toll and traffic management (ETTM) technologies using automated vehicle identification (AVI) "smart cards" for non-stop access through toll plaza.	

Figure 13: Recommended Intersection and Highway Improvements



Trailblazer signs along the arterial and local highways to the major destinations and/or the interstates are intermittently present or are in poor condition. Coordination and consistency of signage on interstates and other state-owned arterials and signage on city-owned streets needs to be agreed to and acted upon by PennDOT, DRPA and the City.

Upgraded interstate signing plans are being prepared by the DRPA as part of their Walt Whitman Corridor Improvement Project. Similarly, PennDOT has acknowledged a willingness to supplement its existing interstate signing leading to the interchanges serving the activity center.

The PIDC has already initiated steps necessary to improve local and arterial street signage. A planning grant from the PIDC, the Phillies organization and Spectacor (operators / co-owners of the Spectrum and the CoreStates Center, as well as the Philadelphia 76ers and the Philadelphia Flyers sports franchises) has enabled the City to create a *Direction Philadelphia* sign network for the Sports Complex District. As prepared by the Foundation for Architecture, the comprehensive trailblazer signing plan incorporates the Philadelphia Naval Business Center, the Sports Complex, the Port Facilities, the Food Distribution Center, F.D.R. Park and the American Swedish Historical Museum. The plan is in the final stages of development and is expected to be constructed by the end of 1997.

The Foundation's plan for updating local and arterial street signing is comprehensive and thoughtful. Moreover, there is good agreement between the *Direction Philadelphia* spine network and the signing needs of the Philadelphia Naval Business Center.

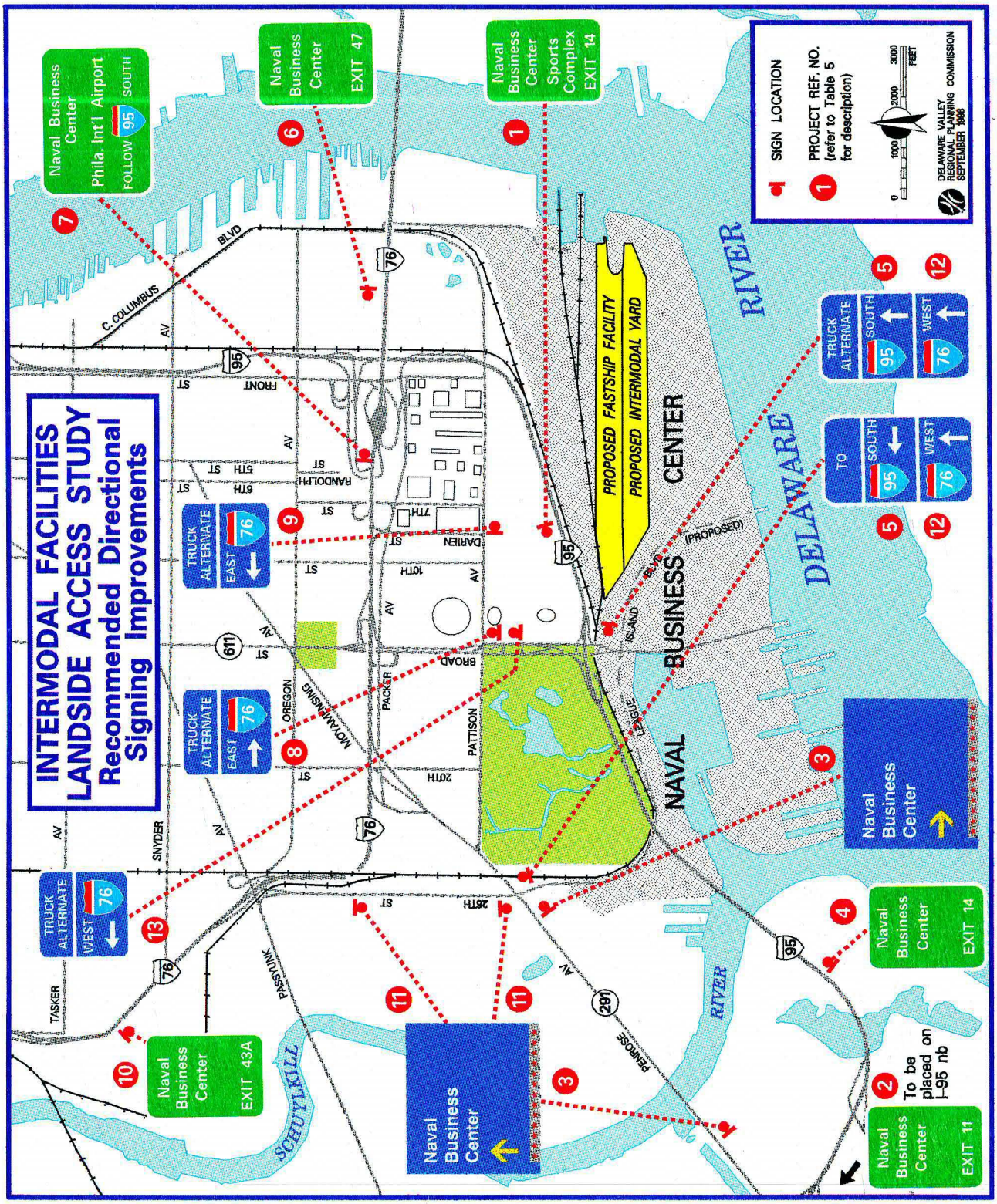
DVRPC's study recommendations (summarized in Table 5 and illustrated on Figure 14) enhance the network established by the Foundation to ensure adequate signage is provided along the primary access routes for the trucks arriving and departing the FastShip and CSXI intermodal facilities[12]. Additionally, the evaluation assumes the Philadelphia Naval Business Center is a destination warranting interstate signage. Our recommendations,

[12]Signing recommendations assume continuous cross site access is available via League Island Boulevard or by existing internal streets.

Table 5: Recommended Directional Signing Improvements

Direction	Primary Route	Alternate Route
From the North	**1.** Change I-95 sign legend (1) to -- "Naval Business Center".	None
To the North	None - agreement with existing signing.	None
From the South	**2.** Add "Naval Business Center" sign (1) on I-95 directing approaching traffic to use -- Central Phila. / Platt Bridge EXIT 11. **3.** Extend *Direction Philadelphia* signing to the west leg of the PA 291 and 26th Street intersection -- Add "right turn arrow".	**4.** Change I-95 sign legend (1) approaching Broad Street to -- "Naval Business Center".
To the South	**5.** Add South I-95 "Truck" trailblazer signs along League Island Boulevard from Broad Street to the south leg of the PA 291 and 26th Street intersection -- Add "left arrow" for I-95 South.	None
From the East	**6.** Add "Naval Business Center" signs (2) on Walt Whitman Bridge directing approaching traffic to use -- I-95 EXIT 47. **7.** Supplement exit ramp signing with a sign directing "Naval Business Center" traffic to follow I-95 South.	None
To the East	None - agreement with existing signing.	**8.** Supplement *Direction Philadelphia* Alternate I-76 East trailblazer signs via Broad Street northbound to Pattison Avenue eastbound with -- "Truck" sign legends. **9.** Track *Direction Philadelphia* trailblazer plan eastward along Pattison Avenue. Add "Truck" signing for I-76 East routing via Darien Street northbound (coincides with existing signed routing and provides traffic relief for Front Street).
From the West	**10.** Add "Naval Business Center" sign (1) on I-76 directing approaching traffic to use Penrose Avenue/Intl Airport exit -- EXIT 43A. **11.** Extend *Direction Philadelphia* signing northward on 26th Street -- Add "straight arrow" on 26th Street southbound approach to Penrose Avenue.	None
To the West	**12.** Add West I-76 "Truck" trailblazer signs along League Island Boulevard from Broad Street to the south leg of the PA 291 and 26th Street intersection -- Add "straight arrow" for I-76 West.	**13.** The *Direction Philadelphia* Alternate I-76 West trailblazer signs from Broad Street northbound to Pattison Avenue/Moyamensing Avenue westbound and 26th Street northbound should be supplemented with "Truck" legends to keep wayward trucks out of the South Philadelphia's residential neighborhood. **{NOTE: This is not a cited alternate route for the Naval Business Center.}**

Figure 14: Recommended Directional Signing Improvements



therefore, also address the Philadelphia Naval Business Center's signing requirements along the study area's interstate highways.

Area-wide Concerns

Initially area-wide traffic congestion impacting FastShip and CSXI truck movements will be attributable to the nature and scale of the Philadelphia Naval Business Center's neighboring uses. The Sports Complex, the Food Distribution Center, and South Philadelphia's port facilities and residential neighborhood generate substantial traffic levels and share the same roadway infrastructure.

Strategies available to mitigate area-wide causes of congestion include: effective site planning in the case of the Philadelphia Naval Business Center; comprehensive street and highway directional signing; and communications improvements collectively referred to as Intelligent Transportation Systems (ITS).

I. Site Planning

Much discussion has been paid throughout this report to the Philadelphia Naval Business Center site and the careful preparation of its conceptual plan. Foremost among these qualities are the site's proximity to the interstate highway network and its provision of the League Island Boulevard / 26th Street connection. Further, comprehensive traffic planning efforts have been undertaken to provide the Philadelphia Naval Business Center with an efficient plan for ingress and egress to full development. Traffic improvements addressing the site plan and its area-wide impacts have been included in Table 4 and Figure 13.

II. Highway and Street Signing

Systematic signing for each major use within the activity center will be an effective means of segregating and dispersing traffic, thereby lessening area-wide traffic impacts. Comprehensive highway and destination directional signing has been employed in the recommended signed routing plans for the proposed FastShip and CSXI intermodal facilities. These strategies represent a low-cost action for containing cross impacts with the Sports Complex, Food Distribution Center and South Philadelphia's residential neighborhood and ports district.

Suggested signing improvements responding to area-wide congestion concerns have been fully described in the preceding part of this section. The resulting recommended strategies are contained in Table 5 and illustrated on Figure 14.

III. Intelligent Transportation Systems

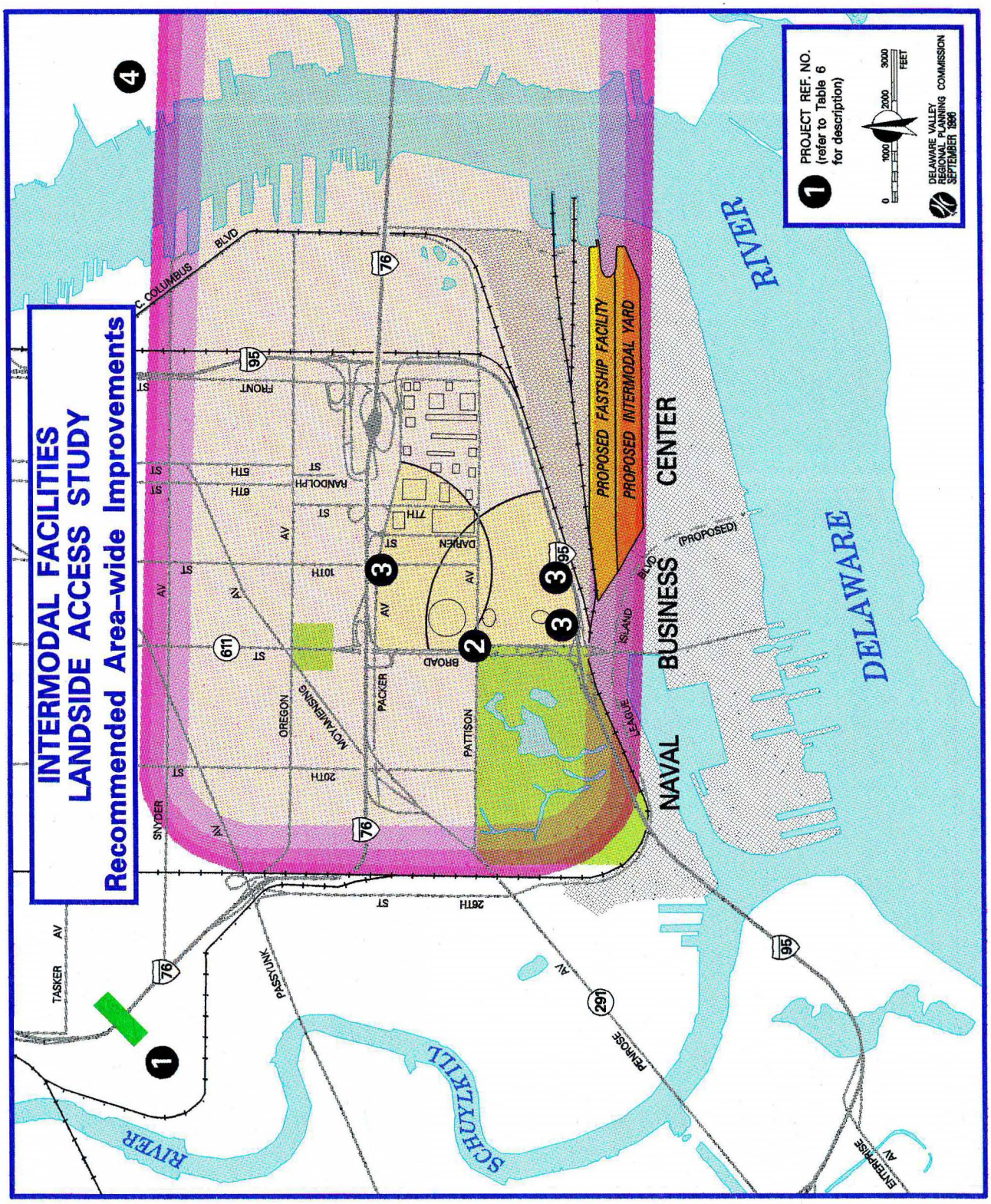
An assortment of communication technologies, both formal and informal, are in varying states of readiness as aids in managing traffic conditions surrounding the Philadelphia Naval Business Center. Suggested area-wide improvement strategies are summarized on Table 6 and illustrated on Figure 15. Supporting narratives for the recommendations follow the table.

Table 6: Recommended Area-wide Improvement Strategies

#	Improvement Description
1	Complete PennDOT's I-676 TIMS Program. Retro-fit an eastbound display into the I-76 VMS sign structure to be located east of the University Avenue interchange (note: the sign structure is currently proposed as part of the I-676 TIMS package with a westbound display).
2	Expand capability of mobile satellite receiver van — to receive remote video.
3	Install cameras and satellite dishes atop Sports Complex information towers (3). Integrate with mobile receiver van / traffic command center.
4	Coordinate Highway Advisory Radio efforts / announcements between DRPA, Spectacor and CB frequencies.
5	Promote Sports Complex pre-trip travel advisory service through the Comcast organization.

As part of the initial testing of its regional Traffic and Incident Management System (TIMS) program, PennDOT has installed closed circuit television cameras at twelve locations along I-95 in advance of and through Central Philadelphia. The limits are the Philadelphia International Airport, to the south, and the Vine Expressway (I-676), to the north. A camera and satellite dish are in place at the Broad Street interchange.

Figure 15: Recommended Area-wide Improvements



The cameras are operated remotely from the PennDOT District 6-0 Traffic Control Center (TCC), in St. Davids, and are capable of panning, tilting and zooming to better focus on and detect traffic conditions. The video images taken by the cameras are transmitted (via phone lines and/or satellite dish) to the TCC, wherein an operator determines whether problems exist on the freeway and what action is necessary.

In the event of an emergency, due to accidents or severe traffic congestion, the operator in the TCC communicates with an emergency response team (i.e., the police and PennDOT staff). Immediate action is taken on two fronts. One, clear the cause of the congestion. The other, advise approaching drivers of downstream blockages and available alternates to reduce the total delays encountered.

To alert approaching motorists two pairs of Variable Message Signs (VMS) are located on I-95 — one pair is south of the airport, and one pair is south of the Betsy Ross Bridge. Messages displayed on the VMS signs to the south could suggest using the Platt Bridge as an alternate northbound route. Messages displayed for southbound travellers might advise using the Walt Whitman Bridge / Packer Avenue exit at Front Street as an alternate approach route to the Sports Complex if the Broad Street interchange is tied-up.

Based upon the relative merits of the testing program and funding availability, PennDOT may extend its TIMS network to include the remainder of I-95 and the remaining regional freeways — I-76, I-676, I-476 and I-276. In-pavement loop detectors, ramp meters and highway advisory radio transmitters are potential additional elements being considered in the expanded TIMS program. The complete program could take as many as ten years and $100,000,000 to fulfill.

One recommended enhancement to the complete TIMS program, emanating from this study's investigations, involves retrofitting a proposed VMS sign structure spanning I-76 east of the University Avenue interchange[13] with an eastbound display. In this manner, if

[13]The VMS structure is proposed as part of PennDOT's regional TIMS improvements targeted for the Vine Expressway (I-676).

severe traffic conditions exist along I-76, approaching Sports Complex traffic could be advised to use 26th Street as an alternate approach to Broad and Pattison.

PennDOT is supplementing its fixed I-95 TIMS program with a mobile satellite receiver. Akin to the ubiquitous news van — the mobile unit is capable of one-way satellite transmission of video images from remote highway locations to the TCC in St. Davids. Remote images and any actions taken to address severe traffic conditions are verbally described / communicated to personnel in the mobile unit, by cellular phone, from the TCC in St. Davids.

Application of the technology was successfully tested in the midst of the Sports Complex — during the 1996 Major League All Star baseball game on Tuesday, July 9, 1996 at Veteran's Stadium. The mobile unit served as a traffic command post in the heart of the Sports Complex. PennDOT personnel in the TCC verbally communicated traffic conditions along I-95, and any corrective actions that were taken to reduce freeway congestion (e.g., posted VMS messages) to the PennDOT staff member(s) in the mobile unit. In turn, supervisory personnel with the traffic detail of the Philadelphia Police Department, who were also in the mobile unit, were appraised of external traffic conditions as they were occurring / changing. Communication between the mobile traffic command post and the traffic cop on the street ensued via police radio.

Roundly applauded as a good first effort, this technology test allowed coordination and communication which heretofore was not attainable. Police traffic control actions within the Sports Complex were conducted with better awareness and in anticipation of external traffic conditions. A shortcoming in the experiment, however, was cited. The use of police radio significantly slowed the rate of communication between the traffic cops and the mobile traffic command post. To improve these lines of communication, cellular telephones for use by the police traffic control unit are being sought.

A logical next step in improving the mobile receiving unit's capability — in situations similar to the All Star game experiment described above — is to provide simultaneous reception of the remote camera images seen in the TCC (for example conditions on I-95) within the mobile receiving unit.

Another "smart" technology which has application over the wide activity center is Highway Advisory Radio (HAR). This mode of communicating supplements all signing plans for the area.

DRPA is presently using HAR, as part of its Walt Whitman Bridge Corridor Improvement Project. Travellers within one mile of the bridge can tune into 530 AM for updates on traffic patterns and conditions approaching and crossing the bridge. From this information alternate travel arrangements may be considered by the driver. The DRPA plans on continuing this service after its corridor project is completed.

An informal version of HAR regularly takes place between truckers — via CB radio. These channels of communication render directional signing along the set of secondary access routes unnecessary.

The Spectacor organization is also examining the possibility of obtaining a FCC license for the purpose of HAR broadcasting. It is anticipated that announcements for upcoming events at the Spectrum and the CoreStates Center, and stadium area traffic and parking conditions will be part of the broadcasts.

Broadcasting ranges and potential emergency announcement requirements preclude sharing very limited AM band broadcasting frequencies. At the very least, however, coordination should take place among the systems and should be broadened to include conditions surrounding events scheduled by the Philadelphia Eagles and Philadelphia Phillies organizations.

Lastly, in the realm of "smart highways" are the opportunities presented by the Veteran's Stadium information tower (adjacent to I-76, at 10th Street and Packer Avenue) and two information towers which have been proposed as part of the CoreStates Center arena project (adjacent to I-95: at Broad Street, and at 11th Street). The towers present a potential CCTV camera vantage point for the local streets and parking lots within the Sports Complex area. Satellite hook-up with the TCC, and the mobile satellite receiver van / traffic command post (assuming its readiness to receive remote video) would complete the inventory of hardware necessary for traffic surveillance and control.

Display panels on the information towers could include updated traffic, parking and local street routing information received from the traffic command post. In effect the towers could function as a variable message sign for the fringe areas of the Sports Complex district — "deployed" before and after major sporting and entertainment events. □

7 IMPROVEMENT PROGRAM

A candidate transportation capital improvement program has been formulated to address the mobility needs within the study area (Table 7). The candidate program assigns priorities based upon the volume of FastShip and CSXI trucks expected to be served by the improvement, the cost of the improvement, and the estimated schedule of the improvement. The intent of the program is to present the array of recommendations and costs in priority fashion for possible inclusion in the regional Transportation Improvement Program (TIP) and/or for use in seeking alternative sources of financing.

The TIP is the culmination of the regional transportation planning process. As a document it includes projects that are consistent with national, state, regional, county and municipal policies, plans and programs. The most relevant federal law which guides the TIP is the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. It is the federal authorization bill for highways and transit.

Within the candidate transportation capital improvement program, project staging is defined in four time intervals. The immediate term covers projects which are required in advance of the proposed FastShip and CSXI terminals (1998) and the projects for which funding is in-hand. The near term program of improvements are desired to accommodate full operations at the proposed intermodal terminals (2004). Medium term improvements are required to serve continuing development within the Philadelphia Naval Business Center and are estimated at about 30 percent of site build-out (2010). Finally, the long term set of improvements are required to serve full build-out of the site and are estimated to be needed at approximately 50 percent of the Philadelphia Naval Business Center's build-out (2015)[14].

[14]Build-out thresholds of the Philadelphia Naval Business Center warranting these improvements were obtained from information contained within the *Community Reuse Plan*. Estimated horizon dates (2010 and 2015) assume continuous and uniform development of the business center's plan.

Table 7: Candidate Transportation Capital Improvement Program

Improvement Description	Staging / Cost Estimate (000's) Immed. Term	Near Term	Med. Term	Long Term
Intersection / Highway Improvements				
26th Street Upgrade/League Island Boulevard Construction:				
- East of Broad Street	$ 5,000 (EDA Funded)	$ 5,000		
- West of Broad Street			$ 3,000	
Broad Street & I-95 South Ramps/ Zinkoff Boulevard	NA (Signing Strategy)			
Penrose Avenue (PA 291) & 26th Street - Intersection Upgrade	$ 510 (Funded)			
Broad Street Median Opening & Traffic Signal Interconnect	$ 850 (In Construction)			
Broad & Pattison Avenue Intersection - Traffic Signal Update		$ 200		
26th Street Curve - Signing Improvements		$ 12		
I-76 Westbound at 26th Street/ Passyunk Avenue Merge - Monitor		NA (Monitor)	NA (Monitor)	NA (Monitor)
Front and Pattison Avenue - Restripe Intersection		$ 20		
E-Z Pass at Walt Whitman Bridge Toll Plaza	NA (in development)			

Table 7: Candidate Transportation Capital Improvement Program
(cont.)

Improvement Description	Staging / Cost Estimate (000's) Immed. Term	Near Term	Med. Term	Long Term
26th Street/Penrose Avenue - Construct Flyover			$ 13,400	
Reconstruct I-95 and Broad Street Interchange:				
- North Ramps				$ 12,000
- South Ramps			$ 20,000	
Directional Signing Improvements				
City - *Direction Philadelphia* Signing Program Enhancements	$ 15			
DRPA - Walt Whitman Bridge Corridor Signing		$ 25		
PennDOT - Interstate Signing I-76 & I-95		$ 50		
Area-wide Improvement Strategies				
Complete PennDOT's I-676 TIMS Program		$ 2,300 (On the TIP)		
- Retrofit I-76 VMS sign structure with Eastbound Display		$ 300		
Expand Mobile Receiver Van technology to receive remote video				$ 70

Table 7: Candidate Transportation Capital Improvement Program
(cont.)

Improvement Description	Staging / Cost Estimate (000's) Immed. Term	Near Term	Med. Term	Long Term
Install Cameras and Satellite Dishes atop Sports Complex Information Towers (3) & Integrate with Mobile Receiver Van				$ 150
Coordinate Highway Advisory Radio efforts/announcements between DRPA, Spectacor, Eagles, Phillies and CB Frequencies		$ 10		
Promote Sports Complex Pre-Trip Travel Advisory Service through the Comcast Organization		$ 10		
Total Improvement Program	$ 6,375	$ 7,927	$ 36,400	$ 12,220
funded	$ 6,360	---	---	---
unfunded	$ 15	$ 7,927	$ 36,400	$ 12,220

Implementation Goals

In many respects the candidate improvements (in relation to the site of proposed intermodal facilities, the Philadelphia Naval Business Center and the enlarged activity center) closely reflect the intents of ISTEA and DVRPC's planning goals. Furthermore, the proposed redevelopment project and its candidate improvement program contain five common ingredients with the TIP's project ranking criteria, including:

1 supporting economic activity;
2 improving the mobility of people and goods;
3 supporting land use plans and goals;
4 preserving and modernizing key elements of the existing system, and;
5 mitigating congestion.

Funding Guidelines

Of the set of highways identified in the program all, save 26th Street south of PA 291 and League Island Boulevard, are functionally classified at levels which provide for the use of federal highway funds. All, with the same exceptions noted above, are National Highway System (NHS) roadways. The NHS is an interconnected system of principal arterial routes and important highway linkages with major passenger and freight intermodal terminals. Projects on the National Highway System network are eligible for funding under a special category within the federal-aid program — also called the NHS program. NHS routes and funding aim to enhance personal mobility, serve commerce, support economic growth, and increase the Nation's competitiveness.

The CSXI's present facility at Snyder Avenue has recently been recommended to Congress as one of a set of regionally significant intermodal freight terminals warranting highway connection to the NHS. The relocation of this terminal to the Philadelphia Naval Business Center suggests that the roadways serving the Philadelphia Naval Business Center may warrant special consideration as future additions to the NHS. This position would be further enhanced with the addition of the FastShip Terminal and continued development within the proposed business center.

A review of the eligibility criteria for warranting NHS highway connections suggests that it must be an existing intermodal facility, wherein the principal connecting highway route serves more than 100 trucks per day in each direction. Clearly, that threshold will be exceeded by the trucks generated by the relocated CSXI and the proposed FastShip terminals alone (590 and 680 daily directional truck trips, respectively). Upon full development of the Philadelphia Naval Business Center, as many as 3,000 directional truck trips could be generated on a daily basis.

The existence of the security gates at the entrances may present an impediment to adding the site roadways to the NHS or other designated federal-aid highway system. As a consequence, opportunities for assistance from traditional federal funding sources may be narrower, with the gates, than if unrestricted access were allowed.

It would appear that federal-aid, through NHS funding sources, is a likely possibility for many of the program's projects from a variety of perspectives. On the other hand, additional categories of Federal Highway Administration (FHWA) funds are also available to the region for implementing the candidate improvements. Notable among these sources, are: Federal-Aid Interstate (FAI), Surface Transportation Program (STP) and Congestion Mitigation and Air Quality Program (CMAQ) funds.

In the final analysis, the annual development of the TIP is a highly competitive and complex process. Project inclusion, is a necessary initial step toward implementation, and will depend upon individual project ranking and selection, funding availability and priority setting by local government. Ultimately, project construction will require multi-jurisdictional support from both the public and private sectors.

Further guidance in the matters of securing federal-aid funding can be obtained by contacting the Assistant Executive Director for Transportation Planning at DVRPC.

Conclusions

Some very positive attributes are inherent within the candidate transportation capital improvement program which should be advocated in the project development process. They are:

1 The immediate term improvement program is almost completely funded.
2 The set of near term improvements address the access needs of the proposed FastShip and CSXI intermodal terminals, and will also benefit any additional use which now or may soon occupy the Philadelphia Naval Business Center.
3 On a longer term basis, projects on the candidate transportation capital improvement program will serve continuing development within the Philadelphia Naval Business Center; contribute toward the access needs of its neighboring uses, and; benefit the mobility of through travellers in the area.

One observation drawn from a review of the candidate improvement program requires immediate attention / resolution. The timing of the initial operating year(s) of the proposed intermodal facilities coincides with the second stage of DRPA's ramp and pavement upgrade along the Walt Whitman Bridge Corridor (the improvement is anticipated to begin in 1998 and be completed in 2000). The roadway project involves reconstructing I-76 between 26th Street and Moyamensing Avenue and will result in lane reductions through the construction zone. During the construction an anticipated alternate route for I-76 traffic will include 26th Street and Moyamensing Avenue via the 26th Street and Penrose Avenue intersection.

The City and DRPA should coordinate to ensure that construction of the 26th Street and Penrose Avenue intersection improvement precedes both the Walt Whitman Bridge Corridor Improvement and the occupancy and operation of FastShip and CSXI. Additionally, the 26th Street and Penrose Avenue intersection's design should be compatible with the needs of the 26th Street / League Island Boulevard improvement — able to serve normal users, Philadelphia Naval Business Center traffic and displaced expressway traffic (for the short term).

In addition to the projects contained in the capital improvement program, the foregoing study has also identified the following planning and promotional activities which should be pursued to provide improved truck circulation and mobility conditions throughout the area.

1 A study performed — to determine whether new or expanded truck rest facilities are warranted to accommodate the high volume of trucks generated by the ports, Food Distribution Center and other area terminals as well as the projected needs of the developing Philadelphia Naval Business Center.

2 A trucker's brochure and map produced — detailing interchanges and routes to attractions and destinations specific to the Philadelphia metropolitan area (Philadelphia Naval Business Center, Sports Complex, Ports of Philadelphia and Camden — Packer Avenue Marine Terminal, Tioga Marine Terminal, Ameriport, etc.), distributed at Pennsylvania and New Jersey weigh stations and truck rest stops.

As a final conclusion, it should be emphasized that a comprehensive intermodal strategy for the South Philadelphia activity center should ultimately incorporate complementary maritime and rail improvements to assure maximized operating efficiencies and complete the landside access function. □