Southern New Jersey to Philadelphia Transit Study

FINAL REPORT

October, 2005

Delaware River Port Authority

STV

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EXECUTIVE SUMMARY

STUDY DESCRIPTION

The Southern New Jersey to Philadelphia Transit Study is sponsored by the Delaware River Port Authority (DRPA) and the Port Authority Transit Corporation (PATCO). DRPA manages and provides transportation services and facilities across the Delaware River and invests in the economic growth of Southeastern Pennsylvania and Southern New Jersey. PATCO operates a 14.2-mile heavy rail line between Lindenwold, New Jersey and Center City Philadelphia.

This feasibility study is being conducted to assess the need for transit improvements in four areas and develop potential transit opportunities for each of those areas:

- **Southern New Jersey** – a commuter-based market with many daily commutes to Philadelphia, includes Northern Cumberland County, a majority of Gloucester County and portions of Atlantic, Camden and Salem Counties
- **Camden Waterfront** – an employment and entertainment center along the Delaware River
- **Market West (Center City Philadelphia)** – the largest job center in the region
- **Philadelphia Waterfront** – an employment and entertainment center along the Delaware River

The study area is an approximately 700-square-mile area, 46 miles long and 20 miles wide, extending from Millville, New Jersey, to Center City Philadelphia (see **Figure ES-1**). The study area includes Cumberland, Gloucester, Salem, Atlantic and Camden Counties in New Jersey and Philadelphia County in Pennsylvania.

This study represents the initial phase of the planning development process shown in **Figure ES-2**, for major transit investments that intend to seek federal funds for design and construction. The entire process, from the beginning planning stages to start-up and operation of a new system, can require 6-10 years depending on overall project complexity, environmental impacts and funding availability. Next steps include a formal Alternatives Analysis, Draft Environmental Impact Study, Preliminary Engineering, Final Design and ultimately construction.

Figure ES-1: Study Area

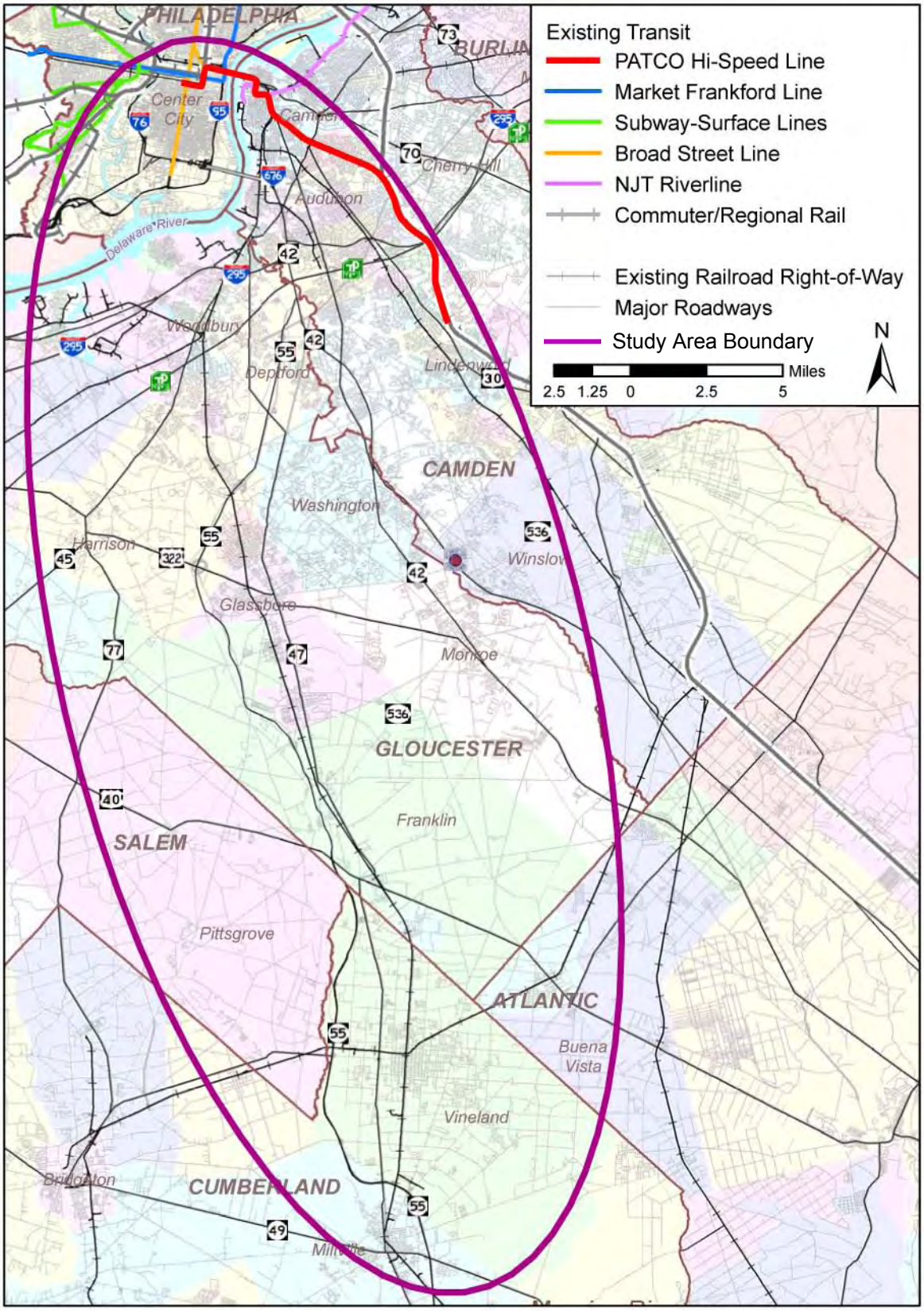
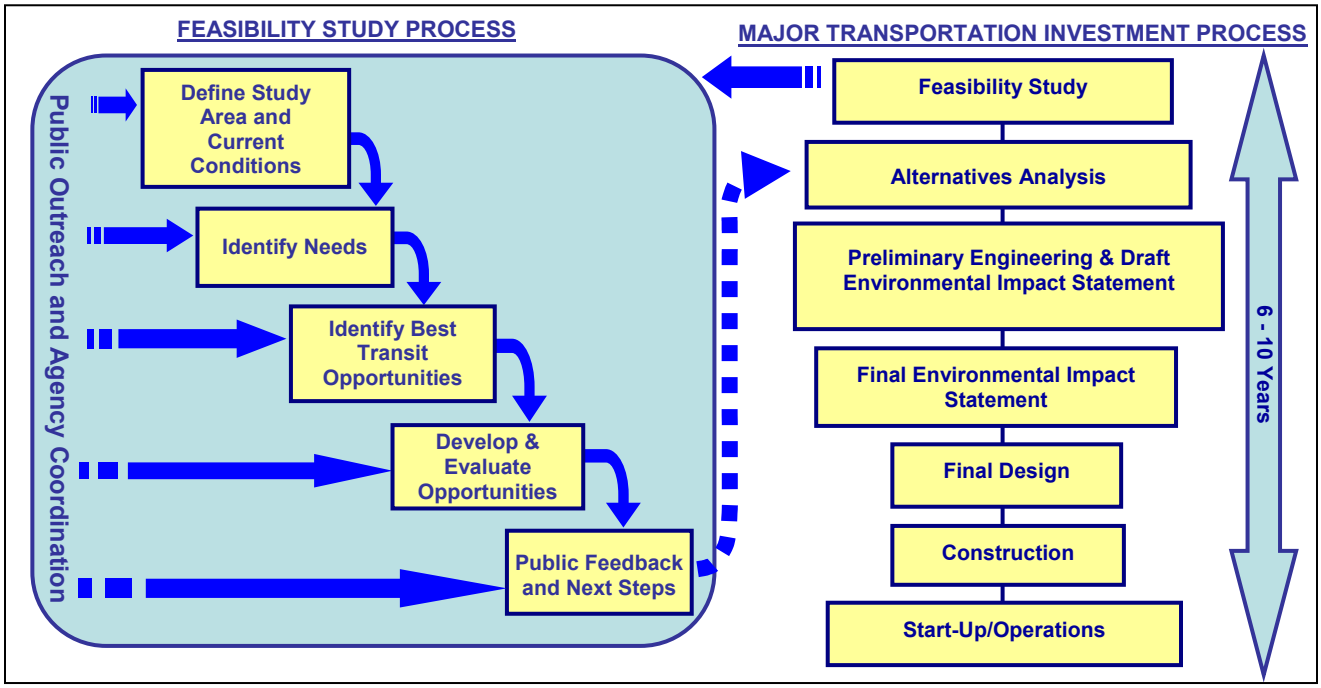


Figure ES-2: Planning Development Process



PUBLIC OUTREACH AND AGENCY COORDINATION

Throughout the study, efforts were made to reach out to stakeholders and members of the general public to ensure that the study focused on the areas most important to them. Sixty-seven outreach meetings were held (see **Table ES-1**), with an attendance of over 470 at the open houses alone.

Table ES-1: Public Outreach Meetings

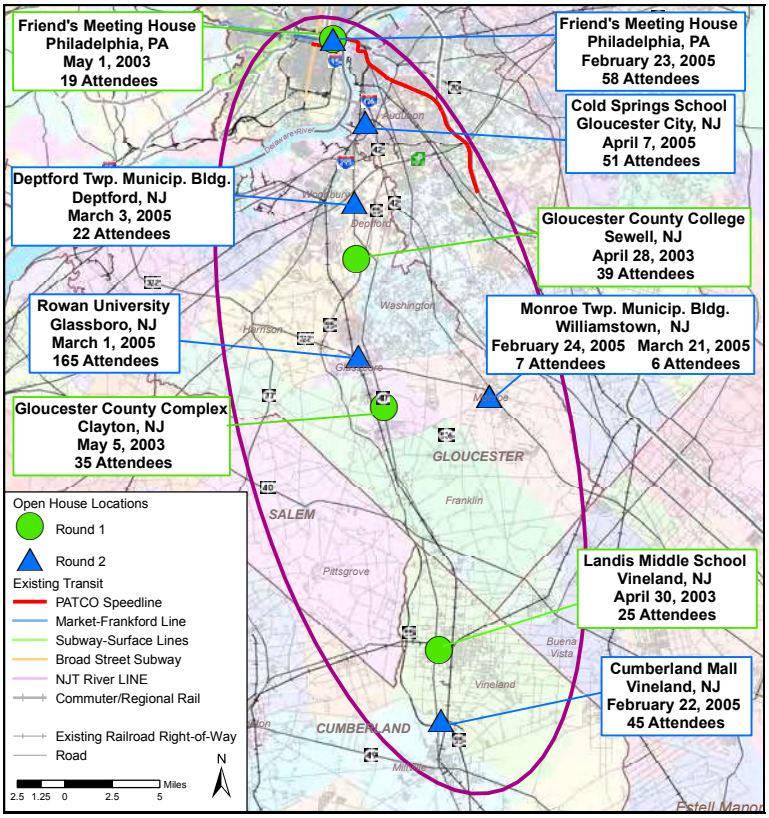
Type of Meeting	Number of Meetings
Public Open Houses	11
Targeted Outreach	35
Elected Officials Briefings	7
Regional Transportation Forum	1
Assessment Steering Group (ASG)	11
Assessment Advisory Group (AAG)	2
Total Meetings	*67*

Open houses, which were open to all members of the public, were held in two rounds, one at the beginning of the study – to feed the study's statement of needs – and one at the end of the study – to gain feedback on the study results to steer future studies. Locations of the open houses were spread through the study area (see **Figure ES-3**) to allow residents from many areas an opportunity to learn about the study and express their views.

In addition to the 11 open houses, 35 stakeholder interviews were held in which key individuals or organizations were interviewed either one-on-one or in small groups, and elected officials were briefed on the study seven times. The study also coordinated with an Advisory Steering

Group (ASG) – members of the DRPA and PATCO, and an Advisory Assessment Group (AAG) – members of area planning organizations, transit operators, transportation agencies and other stakeholders.

Figure ES-3: Public Open House Locations



Round 1 of public outreach yielded 441 written comments from the general public, elected officials and stakeholders. Most of the comments focused on the Southern New Jersey portion of the study area. Many comments discussed the congestion on Southern New Jersey roadways and the lack of a practical alternative to driving. It was also noted that although the Southern New Jersey area is developing rapidly, the transportation network is not developing along with it. Some praised the economic benefits a new, quality rail service could bring to Southern New Jersey. Others expressed a desire to retain the rural character of Southern New Jersey and contain sprawl despite the population increase expected in the near future.

Comments received on the Pennsylvania side included lack of service from Center City to the Delaware Riverfront and West Philadelphia. Some felt it was necessary to have a connection from Penn's Landing and Center City to South Philadelphia to gain access not only to the sports complex but to shopping areas along Columbus Boulevard. Comments were also received regarding a combined fare structure making transfers between PATCO and SEPTA seamless.

Residents supported an investment in public transportation, but noted that a new transit service must be reliable, fast, offer frequent service, have a right-of-way separate from roadway congestion and be incorporated into the area in a way that does not disturb its present character. Additionally, a new transit service should offer convenient transfers to existing transit services, like the River LINE, SEPTA services, and if possible, the Northeast

Corridor/Amtrak. Roughly one-quarter of the comments related to a specific alignment possibilities.

Round 2 of public outreach dealt primarily with several transit alternatives developed through this study. The 221 comments received in round 2 are discussed subsequent to the short list of alternatives (see **Conclusions** section).

EXISTING CONDITIONS

The study area includes a wide variety of land uses, from dense urban areas in Center City Philadelphia and downtown Camden to older, pre-war towns and new sprawling suburban developments in Southern New Jersey. The older, pre-automobile development patterns in Philadelphia and Camden Counties support high population densities, particularly in Center City, North, South and West Philadelphia, the City of Camden and its neighboring municipalities. Similarly, employment is focused in the City of Philadelphia, the City of Camden, and neighboring municipalities.

Estimates from the Delaware Valley Regional Planning Commission (DVRPC) project steady population growth in all portions of the study area by the year 2025, with the exception of Philadelphia and Camden Counties (see **Table ES-2**). Employment estimates project increases in all counties of the study area by the year 2025 (see **Table ES-3**). The greatest number of new jobs (48,000) is expected in Philadelphia County – more than twice that expected in any of the other counties. The greatest percentage increase in jobs (37.7 percent) is expected in Atlantic County. As a whole, the study area is expected to see a population increase of 78,100 persons (6.9 percent) and an increase of 104,400 jobs (13.5 percent).

Table ES-2: Population Estimates

Section of Study Area*	'97 or '00**	2025	# Change	% Change
SJTPO				
Atlantic County	18,400	21,200	+ 2,800	15.1%
Cumberland County	120,900	148,000	+ 27,100	22.4%
Salem County	16,900	21,600	+ 4,700	28.2%
DVRPC				
Camden County	343,300	341,400	– 1,900	-0.6%
Gloucester County	228,900	290,900	+ 62,000	27.1%
Philadelphia County	404,600	388,100	– 16,500	-4.1%
TOTAL	**1,133,100**	**1,211,200**	**+ 78,100**	**6.9%**

* - Figures reflect only the portions of each county that lies within the study area.

** - Figures for SJTPO portions of the study area are 2000 estimates; figures for DVRPC portions of the study area are 1997 estimates.

In the year 2025 Center City Philadelphia will continue to be the largest population center and job market in the region, but the general trend is for population to move out of the cities and into suburban areas like Southern New Jersey. Employment in Center City will continue to increase, but employment will also increase in the outlying areas of Southern New Jersey, somewhat decentralizing regional businesses.

The increase in population and employment will add more trips to already busy roadways and increase congestion in peak periods. This will be intensified by the increase of automobile ownership in study area households. A comparison of DVRPC data from 1997 and projections for 2025 show that the number of automobiles in the DVRPC portion of the study area (Camden, Gloucester and Philadelphia Counties) are expected to rise by roughly 15 percent, or 67,900 vehicles. In contrast, between the year 2000 and 2025 the number of households in the study area are expected to increase by only 21,600, thus the average number of cars per household should increase from 1.24 to 1.34 per household between 2000 and 2025. This has the potential to result in more vehicle miles traveled per person, and therefore a greater level of roadway congestion for a given population.

Table ES-3: Employment Estimates

Section of Study Area*	'97 or '00**	2025	# Change	% Change
SJTPO				
Atlantic County	13,000	17,800	+ 4,800	37.7%
Cumberland County	55,500	73,200	+ 17,700	31.9%
Salem County	4,500	5,300	+ 800	16.7%
DVRPC				
Camden County	131,600	145,500	+ 13,900	10.6%
Gloucester County	86,400	104,900	+ 18,500	21.4%
Philadelphia County	480,300	529,000	+ 48,700	10.1%
TOTAL	**771,200**	**875,600**	**+ 104,400**	**13.5%**

* - Figures reflect only the portions of each county that lies within the study area.

** - Figures for SJTPO portions of the study area are 2000 estimates; figures for DVRPC portions are 1997 estimates.

An analysis of study area travel patterns showed that in 1997 approximately 1.2 million one-way trips were made daily from the portions of Camden and Gloucester Counties within the study area. Eighty-five percent of those trips had origins and destinations in Camden or Gloucester Counties, roughly 28,200 traveled to Center City or University City Philadelphia and roughly 28,500 traveled to downtown Camden. On trips to Center City Philadelphia more than 50 percent of trips from Camden County used transit, while in contrast only 5 percent of trips from Gloucester County used transit. Of the total 1.2 million trips made from Camden and Gloucester Counties, less than two percent used transit.

The study area's road network includes four major north-south routes (I-676, NJ Route 55, NJ Route 42 and the Atlantic City Expressway) that merge together before reaching the two Delaware River bridges within the study area: the Ben Franklin Bridge and the Walt Whitman Bridge. Both the Ben Franklin and the Walt Whitman Bridges lead into the City of Philadelphia. A third bridge, the Commodore Barry Bridge, is located just outside of the study area boundary near the Delaware-Pennsylvania border, and is easily accessible from I-295, one of the two major northeast-southwest highways in the study area. The New Jersey Turnpike and I-295 parallel each other through the northern portion of the study area. They do not lead directly to the Ben Franklin or Walt Whitman Bridge, but an interchange exists between I-295 and I-676 for travel to the City of Philadelphia. Other important roadways in the study area are U.S. Routes 130, 322 and 40, plus NJ Routes 38, 45, 47, 77 and 49. Most other roads are small local routes with limited capacity and speed.

Transit options in the study area are abundant within Philadelphia, but are much more limited in Southern New Jersey. The main transit line in Southern New Jersey is the PATCO Speedline from Lindenwold, NJ to Center City Philadelphia (see **Figure ES-4**). The newly opened NJ TRANSIT River LINE also provides transit service from Camden to Trenton, NJ, and offers transfer opportunities to PATCO and NJ TRANSIT buses at the Walter Rand Transportation Center on Broadway in Camden. Thirteen NJ TRANSIT bus lines also travel through the study area, but with limited service and lengthy travel times due to delays from roadway congestion. In Philadelphia the extensive transit system includes two heavy rail lines (the Market-Frankford Line and the Broad Street Subway), Five trolley lines with an underground tunnel in Center City (the Subway-Surface Lines), a Regional Rail system with 14 lines to the Philadelphia suburbs and numerous bus lines, plus a light rail line, a heritage trolley and two modern trolleys outside of the study area (see **Figure ES-5**).

Figure ES-4: PATCO Speedline

Figure ES-5: SEPTA Light, Heavy and Regional Rail Service

STATEMENT OF NEEDS

An evaluation of existing conditions along with a review of previous studies and the comments received from the first round of public outreach led to the Statement of Needs for the Southern New Jersey to Philadelphia Transit Study:

1. Improve Transit Choices in the Study Area

- Increase rapid transit choices, allowing timely accessibility to jobs and recreational activities
- Provide access to the growing areas of Gloucester and Cumberland Counties
- Increase service levels on the existing public transportation system
- Improve access from the PATCO Speedline to job centers in Center City Philadelphia
- Enhance service and connections to the Philadelphia Waterfront

2. Reduce Congestion with Effective Transit Investments

- Provide alternative to severe congestion levels along roadway corridors such as NJ Route 42 and NJ Route 55
- Coordinate with the I-295/I-76/NJ Route 42 interchange improvement project
- Diminish reliance on the automobile with fast and effective transit alternatives

3. Utilize Existing Transportation Resources

- Maximize use of existing transportation assets such as highway medians or existing railroad right-of-ways
- Provide a direct connection into Philadelphia via existing PATCO Speedline
- Incorporate sufficient space for a transit guideway in the I-295/I-76/NJ Route 42 interchange project improvement
- Minimize impacts to the environment through use of existing physical resources

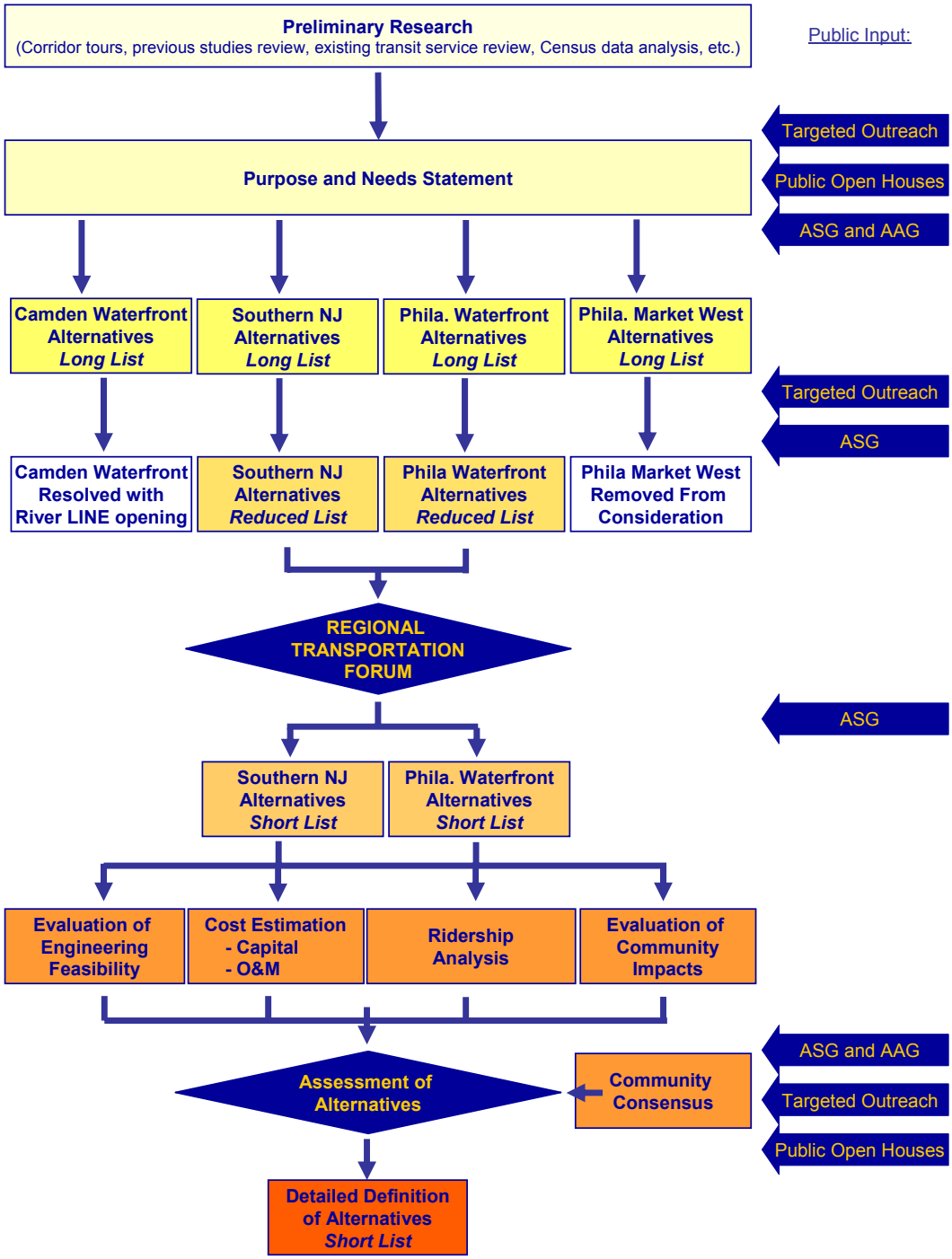
4. Develop a Transit Network that Conveniently Links People and Activity Centers

- Improve access to core areas of employment and redevelopment
- Provide better information about existing public transportation facilities
- Connect and serve commercial, institutional and medical activity centers
- Develop a common method to pay fares between transit systems

ALTERNATIVES DEVELOPMENT

Development of alternatives for the four portions of the study area followed the process depicted in **Figure ES-6**. For each area a long list of alternatives was created that included a variety of modes and alignments designed to satisfy the needs of the study area. The combined long lists for all four areas included a total of 34 alternatives.

Figure ES-6: Alternatives Development Process



*ASG denotes the Assessment Steering Group; AAG denotes the Assessment Advisory Group

Following compilation of the long lists, through discussions with the ASG it was determined that the Camden Waterfront alternatives would be unnecessary once the River LINE began operation. The Camden Waterfront alternatives were therefore removed from consideration. In the Philadelphia Market West area it was decided that the existing transit system adequately serves Market West, and the greatest need was not a new transit service, but improvements to

the existing system including a joint fare-agreement between PATCO and SEPTA and enhancements to the underground pedestrian concourse. Therefore the Market West alternatives were not carried forward for further evaluation.

Internal discussions also reduced the long lists for Southern New Jersey and the Philadelphia Waterfront from a total of 20 alternatives to nine (5 in Southern New Jersey and 4 for the Philadelphia Waterfront). Those nine alternatives comprised the reduced list of alternatives.

Alternatives in the reduced list were evaluated in greater detail than those in the long list, including order of magnitude capital costs and travel time estimates. In October of 2003 a Regional Transportation Forum convened elected officials, members of the ASG and the AAG. The reduced list of alternatives was presented to forum attendees, who were then invited to vote on the alternatives they believed would be the most beneficial to the study area. The results of the voting plus some modifications by the ASG yielded the short list of alternatives, composed of three Southern New Jersey alternatives (one of which was newly created at this point) and two Philadelphia Waterfront alternatives.

The short list alternatives underwent further analysis including a qualitative analysis of feasibility and potential community impacts, market potential and estimation of capital and operation and maintenance costs (O&M costs). The short list alternatives (summarized in **Table ES-4 and ES-5**) are:

Southern New Jersey:

Alternative NJ-1: This alternative would be a new PATCO-style service from Williamstown to Center City Philadelphia via the Atlantic City Expressway (in the median), NJ Route 42 (in the median or alongside), I-676 and the existing PATCO tunnel from Camden, NJ to Philadelphia, PA. Service would be provided every 7.5 minutes in the peak and every 15-20 minutes in the off-peak, with an end-to-end travel time of 40 – 44 minutes. Due to the late addition of this alternative, no estimate was made for ridership potential; however, ridership is expected to be similar to that of phase I in Alternatives NJ-2 and NJ-3. This will be verified in future studies. The estimated capital cost for this alternative is $1.5 billion ($80 million per mile) and the cost to operate and maintain the service is estimated at $32.3 million annually.

Alternative NJ-2: This alternative includes two phases, one from Glassboro, NJ to Center City Philadelphia and a second from Millville, NJ to Glassboro.

Phase I: This would be a new PATCO-style service from Glassboro to Center City Philadelphia via NJ Route 55 (in the median), NJ Route 42 (alongside), I-676 (alongside) and the existing PATCO tunnel from Camden, NJ to Philadelphia, PA. Service would be provided every 7.5 minutes in the peak and every 15-20 minutes in the off-peak, with an end-to-end travel time of 36 – 40 minutes. Ridership potential is roughly 17,600 – 26,600 daily boardings. The estimated capital cost for phase I is $1.4 billion ($90 million per mile) and the cost to operate and maintain the service is estimated at $28.3 million annually.

Phase II: This would be a separate, commuter-oriented service from Millville to Glassboro in the median of NJ Route 55. Passengers would transfer to the Phase I service in Glassboro for travel to Center City Philadelphia. Service would be provided every 30 minutes in the peak and

every 60 minutes in the off-peak, with an end-to-end travel time of 44 – 48 minutes. Ridership potential was not analyzed. The estimated capital cost for phase II is $300 – 450 million ($14 – 21 million per mile) and the cost to operate and maintain the service is estimated at $6.9 million annually.

Alternative NJ-3: This alternative includes two phases, one from Glassboro, NJ to Center City Philadelphia and a second from Millville, NJ to Glassboro.

Phase I: This would be a new PATCO-style service from Glassboro to Center City Philadelphia via an existing Conrail railroad right-of-way and the existing PATCO tunnel from Camden, NJ to Philadelphia, PA. The alignment could be either fully separated or partially grade separated – allowing street crossings only at major intersections. Service would be provided every 7.5 minutes in the peak and every 15-20 minutes in the off-peak, with an end-to-end travel time of 40 - 44 minutes. Ridership potential is roughly 20,700 – 31,100 daily boardings. The estimated capital cost for phase I is $1.8 billion ($100 million per mile) fully grade-separated or $1.5 billion ($80 million per mile) partially grade-separated. The cost to operate and maintain the service is estimated at $30 million annually.

Phase II: This would be a separate, commuter-oriented service from Millville to Glassboro in the existing Conrail railroad right-of-way. Passengers would transfer to the Phase I service in Glassboro for travel to Center City Philadelphia. Service would be provided every 30 minutes in the peak and every 60 minutes in the off-peak, with an end-to-end travel time of 41 - 45 minutes. Ridership potential was not analyzed. The estimated capital cost for phase II will be analyzed in future studies and the cost to operate and maintain the service is estimated at $6.8 million annually.

Philadelphia Waterfront:

Alternative PA-1: This alternative includes two phases, one from Franklin Square to Spring Garden and Pier 70 and a second from Pier 70 to the Navy Yard.

Phase I: This new streetcar/trolley service would begin at the existing Franklin Square Station on the PATCO Speedline and travel east under the Ben Franklin Bridge to Columbus Boulevard. Trolleys would serve the waterfront area from the median of Columbus Boulevard, where tracks already exist. This service would travel north along the waterfront to a terminus at the Market-Frankford Line's (MFL's) Spring Garden Station and south along Columbus Boulevard to a terminus at the Pier 70 Shopping Plaza. A north/south shuttle would provide service from Pier 70 to Spring Garden Station. Franklin Square Station would be reopened to allow transfers between the PATCO Speedline and the new service to the waterfront.

Service would be provided every 5 minutes in the peak and every 12 minutes in the off-peak, with travel times of 5 minutes from Franklin Square to Spring Garden and 15 minutes from Franklin Square to Pier 70. Ridership potential is roughly 4,900 daily boardings. The estimated capital cost for phase I is $700 million ($160 million per mile) and the cost to operate and maintain the service is estimated at $7.3 million annually.

Phase II: This alternative could eventually be extended south along Columbus Boulevard to the Navy Yard and sports stadiums. Phase II was not evaluated in depth.

Table ES-4: Southern New Jersey Alternatives – Short List Summary

		Alternative NJ-1	Alternative NJ-2	Alternative NJ-3
Feasibility	**Constructability**	Alignment through I-76/I-676 and I-76/I-295/NJ Rt 42 interchanges. Width of NJ Rt 42 and Atlantic City Expressway medians may be limited. Construction along busy highways.	Alignment through I-76/I-676 and I-76/I-295/NJ Rt 42 interchanges. Construction along busy highways.	Disruptions to towns/communities along railroad. Possible depressed construction below water table in Gloucester City.
	Existing Right-of-Way	More detailed analysis will be required in subsequent studies	More detailed analysis will be required in subsequent studies	Available, pending discussions with Conrail
Community Impacts	**Mobility**	Improved mobility in Southern New Jersey, including to Camden County College. May draw some riders away from PATCO Speedline	Improved mobility in Southern New Jersey, including to Gloucester County College.	Improved mobility in Southern New Jersey, including to Rowan University. Decreased reliance on automobiles in local communities
	Smart Growth	More likely to encourage sprawl as opposed to smart growth or transit villages	More likely to encourage sprawl as opposed to smart growth or transit villages	More likely to discourage sprawl and build upon existing communities
	Traffic Congestion	Could reduce regional VMT, but would still require automobile access to most stations. Traffic increase on roadways near stations.	Could reduce regional VMT, but would still require automobile access to most stations. Traffic increase on roadways near stations	Possible regional reduction in regional VMT with less dependency on auto trips. Traffic increase in communities near stations.
	Land Use	Would need 6 miles of right-of-way and land for park-and-ride lots. Would use highway median	Would need 6 miles of right-of-way and land for park-and-ride lots. Would use highway median	Minimal new land required. Would use/upgrade existing railroad right-of-way.
Cost Effectiveness	**Ridership Potential** (daily boardings)	Not estimated	*Phase I:* 17,600 – 26,600 *Phase II:* Not estimated	*Phase I:* 20,700 – 31,100 *Phase II:* Not estimated
	O&M Cost (Approx.)	$32.3 million annually	*Phase I:* $28.3 million annually *Phase II:* $ 6.9 million annually	*Phase I:* $30.0 million annually *Phase II:* $ 6.8 million annually
	Order of Magnitude Capital Cost	$1.5 billion / $80 million per mile	*Phase I:* $1.4 billion / $90 million per mile *Phase II:* $300 – 450 million	*Phase I - Full Grade Sep.:* $1.8 billion / $100 million per mile *Phase I - Partial Grade Sep.:* $1.5 billion / $80 million per mile

Table ES-5: Philadelphia Waterfront Alternatives – Short List Summary

		Alternative PA-1	Alternative PA-2
Feasibility	**Constructability**	Tunnel through Ben Franklin Bridge abutment, connection to Columbus Boulevard, construction near active roadway	Tunnel under Market Street, flyover above I-95 and connection to at-grade Columbus Boulevard, construction near active roadway
	Existing Right-of-Way	Pending negotiations with Railroad on Columbus Boulevard, right-of-way is available	Pending negotiations with Railroad on Columbus Boulevard, right-of-way is available
Community Impacts	**Mobility**	Improved mobility between Southern New Jersey and Philadelphia Waterfront	Improved mobility between Southern New Jersey, Philadelphia Waterfront, Market West, Old City Philadelphia, and West Philadelphia
	Smart Growth	Potential to encourage development of Philadelphia Waterfront. Little potential to encourage revitalization of Franklin Square.	Potential to encourage development of Philadelphia Waterfront and strengthen Center City as an employment center.
	Traffic Congestion	Some potential to reduce traffic to and along Philadelphia Waterfront, but more influential as a mobility improvement in and catalyst for smart growth.	Some potential to reduce traffic to and along Philadelphia Waterfront, but more influential as a mobility improvement in and catalyst for smart growth.
	Land Use	Would require little new land, primarily some for second track on Columbus Boulevard, north of Reed Street and for station platforms	Would require little new land, primarily some for second track on Columbus Boulevard, north of Reed Street and for station platforms
Cost Effectiveness	**Ridership Potential** (daily boardings)	*Phase I:* 4,900 *Phase II:* Not estimated	*Phase I:* 7,900 *Phase II:* Not estimated
	O&M Cost (Approx.)	*Phase I:* $7.3 million annually *Phase II:* not estimated	*Phase I:* $8.6 million annually *Phase II:* not estimated
	Order of Magnitude Capital Cost	*Phase I:* $700.0 million $160 million per mile *Phase II:* not estimated	*Phase I:* $1,000.0 million $200 million per mile *Phase II:* not estimated

Alternative PA-2: *Phase I:* This alternative would be an extension of SEPTA's Subway-Surface Lines that currently end at 13th/Juniper and Market Streets in Philadelphia. The extension would allow SSL vehicles to continue eastward to Columbus Boulevard in a tunnel under Market Street and a flyover above I-95. At Columbus Boulevard, SSL vehicles would travel north to the MFL's Spring Garden Station and south to Pier 70 with a combined north/south shuttle service.

The extension would create a direct transfer between the PATCO Speedline and the SSL at 8th and Market Streets for travel from Southern New Jersey to Market Street West with one transfer. Through-service would be possible from the Waterfront to West Philadelphia. Additionally, this alternative would provide an opportunity for the MFL to assume the role of an express service through Center City Philadelphia, while the SSL provides more frequent, local stops similar to those on the MFL today.

Service would be provided every 5 minutes in the peak and every 12 minutes in the off-peak, with travel times of 7 minutes from 13th/Juniper & Market Street Station to Spring Garden and 16 minutes from 13th/Juniper & Market Street Station to Pier 70. Ridership potential is roughly 7,900 daily boardings. The estimated capital cost for phase I is $1,000 million ($200 million per mile) and the cost to operate and maintain the service is estimated at $8.6 million annually.

Phase II: This alternative could eventually be extended south along Columbus Boulevard to the redeveloping navy yard and new sports complex. Phase II was not evaluated in depth.

CONCLUSIONS

The short list of alternatives was presented to the public in round 2 of public outreach. Comments were solicited from participants at the round 2 open houses and 221 comment forms were received. 87 percent of those who responded to the questionnaire were in favor of a transit investment in the study area, nine percent were not in favor and the remaining four percent did not show support or opposition to a transit investment.

The questionnaire asked participants to rank from 1 to 5 (1 being the most important 5 being the least important) five characteristics of a new transit service. The results showed the following preferences:

(most important) 1 - Avoid automobile congestion – relax during commute or trip
2 - Access to stations by walking – located within existing communities
3 - Fastest possible travel time
4 - Easy station access by automobile – located at remote park-and-ride sites
(least important) 5 - No at-grade crossings of local streets

Results of round 2 public outreach clearly indicated public support for new transit investments in the study area, particularly in Southern New Jersey and along the Philadelphia Waterfront. The wide variety of comments received on the short list alternatives is an indication that the full development of preferred alternatives will require working closely with residents and stakeholders to develop a transit services that will ultimately be supported by the communities they serve.

NEXT STEPS

As part of the FTA Planning Process (shown previously on **Figure ES-2**), the next step toward a major transit investment would be to complete a full Alternatives Analysis (AA) for the study area.

An AA is a corridor study that, with the input of areas residents, elected officials and other stakeholders, investigates several alternatives for transit investments including various alignments and modes. An AA would include a full definition of alternatives, complete travel demand forecasting, detailed capital costs and operation and maintenance costs and a financial analysis. The AA would compare costs, benefits and community support for each alternative to determine a Locally Preferred Alternative (LPA). An application would then be submitted to FTA for a contribution of federal funds for the design and construction of the LPA. With permission from the FTA, the LPA would then advance through Preliminary Engineering, Draft and Final Environmental Impact Statement, Final Design and construction before operation of the new service could begin.

1 INTRODUCTION

The Southern New Jersey to Philadelphia Transit Study is sponsored by the Delaware River Port Authority (DRPA) and the Port Authority Transit Corporation (PATCO). DRPA manages and provides transportation services and facilities across the Delaware River and invests in the economic growth of Southeastern Pennsylvania and Southern New Jersey. PATCO operates a 14.2-mile heavy rail line between Lindenwold, New Jersey and Center City Philadelphia (see **Figure 1-1**). This feasibility study is being conducted to assess the need for transit improvements along both water fronts of the Delaware River and between Southern New Jersey and central Philadelphia's major business and transit centers.

Figure 1-1: PATCO Speedline

1.1 STUDY DESCRIPTION

The Southern New Jersey to Philadelphia Transit Study assesses the need and a consensus for expanded rapid transit service for a growing congested corridor between Philadelphia, Pennsylvania and the outlying communities of Southern New Jersey. The study also analyzes the general feasibility of several potential transit investments.

Potential transit opportunities were developed to meet the transportation needs of this diverse study area. The study area was divided into the following four sub-areas:

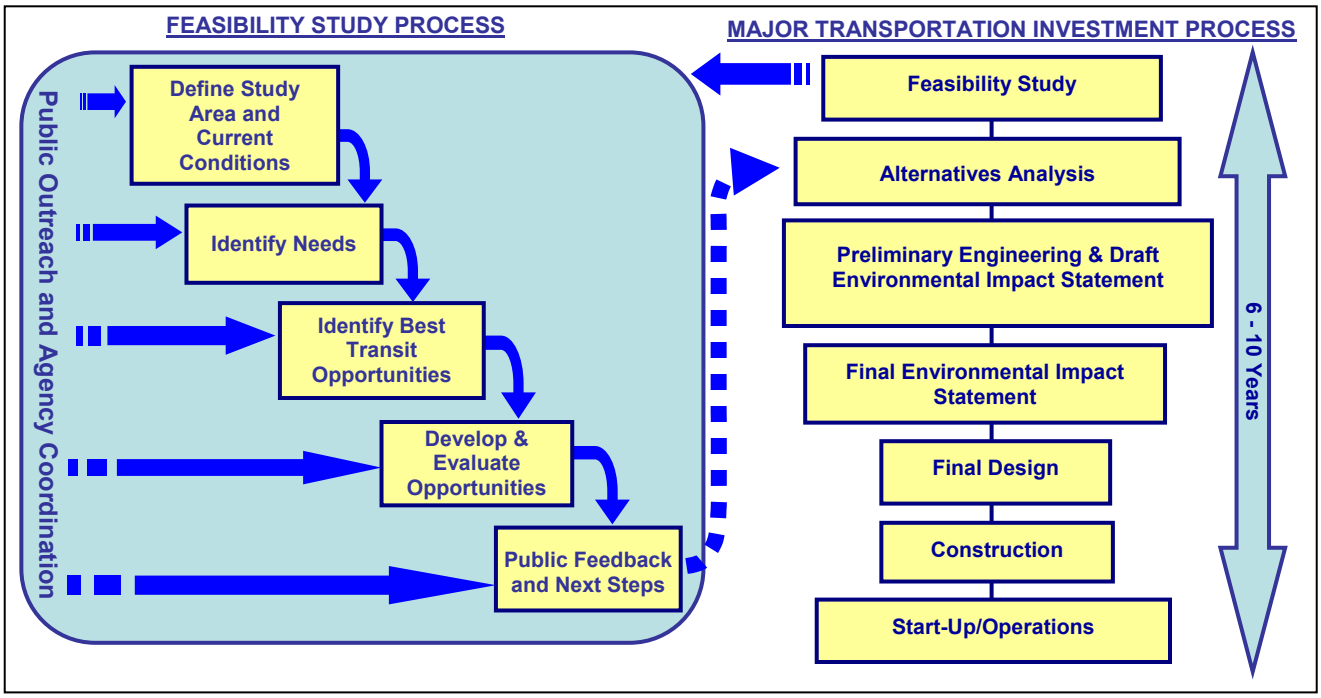
- The commuter-based market in Southern New Jersey (i.e. Northern Cumberland County, a majority of Gloucester County and portions of Atlantic, Camden and Salem Counties)
- The job center in the Market West area of Center City Philadelphia
- The employment and entertainment centers on the Camden Waterfront
- The employment and entertainment centers on the Philadelphia Waterfront

Throughout the study opinions of stakeholders and study area residents were sought to help guide the development of alternatives and gauge the public's support for additional analysis and advancement to a more detailed level of study. Public participation in this study was vital to successfully determine the transit needs of the study area and identify community issues that could result from the introduction of a new transit service.

This study represents the initial phase of the planning development process shown in **Figure 1-2**, for major transit investments that intend to seek federal funds for design and construction. The entire process, from the beginning planning stages to start-up and operation of a new system, can require 6-10 years depending on overall project complexity, environmental impacts and funding availability. This study represents an initial step in the process of identifying, evaluating, designing, and constructing a major transportation investment in the study area.

Next steps include a formal Alternatives Analysis, Draft Environmental Impact Study, Preliminary Engineering, Final Design and ultimately construction.

Figure 1-2: Planning Development Process



1.1.1 STUDY AREA

The study area encompasses an approximately 700-square-mile area, extending from Millville, New Jersey, to Center City, Philadelphia (see **Figure 1-3**). It is approximately 46 miles long and 20 miles wide, and includes Northern Cumberland County, a majority of Gloucester County and portions of Salem, Atlantic and Camden Counties in New Jersey and Philadelphia County in Pennsylvania. The Pennsylvania portion of the study area focuses on the primary employment center of the region, namely Center City Philadelphia or the Central Business District, which is bounded by Spring Garden Street to the north, South Street to the south, the Schuylkill River to the west and the Delaware River to the east (see **Figure 1-4**). It is important to note that the study area was expanded early in the study to Millville at the request of the Regional Transportation Forum.

The purpose of defining a study area is to determine not only where a physical improvement might be constructed, but also to recognize that potential riders and economic benefits of a new transit facility would extend beyond the immediate area surrounding a particular transit alignment.

1.2 PURPOSE OF THIS REPORT

The purpose of this report is to present and document the development of transportation needs and alternatives through a public outreach process, review of previous studies and new opportunities developed by the study team. As the foundation for further study, this report

outlines important components in the public involvement process, establishes a statement of needs for the project and through an iterative process takes an initial "long list" of alternatives in four distinct market areas and reduces it to a "short list" of five alternatives that are conceptually defined in greater detail. Finally, the report provides a comparison of these alternatives, with the purpose of guiding local decisions and subsequent phases of the project development toward the implementation of a transit system.

The report is organized into the following chapters:

Chapter 1 – Introduction
Chapter 2 – Public Outreach and Agency Coordination
Chapter 3 – Existing Conditions
Chapter 4 – Alternatives Development
Chapter 5 – Alternatives Evaluation

This report is ultimately intended to provide a solid framework for embarking upon a formal Alternatives Analysis as per the guidelines of the Federal Transit Administration (FTA).

Figure 1-3: Study Area

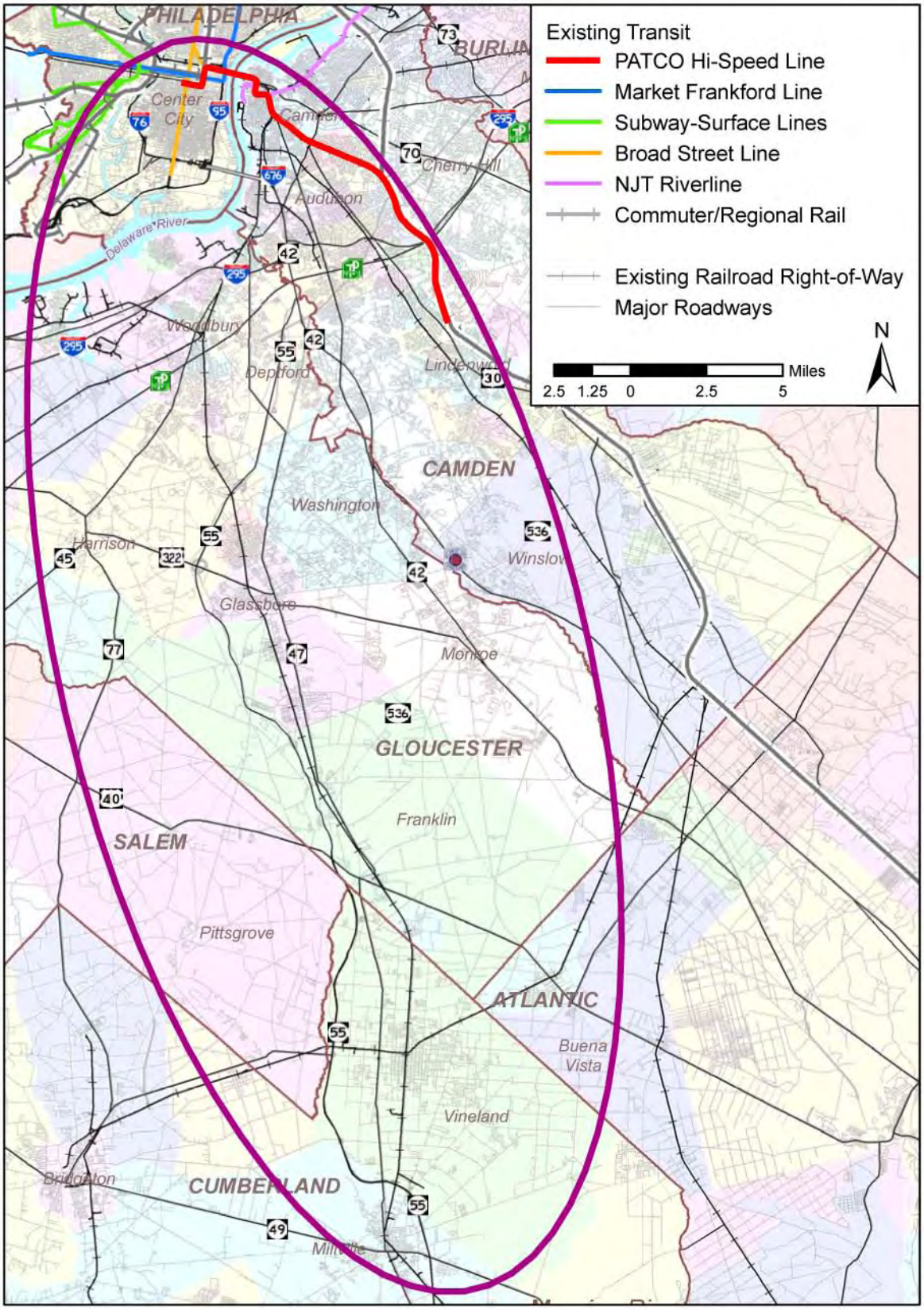


Figure 1-4: Study Area Philadelphia

2 PUBLIC OUTREACH AND AGENCY COORDINATION

An extensive public involvement process was an integral part of the Southern New Jersey to Philadelphia Transit Study. Since one of the study's primary objectives was to assess the local consensus on the need for improved transit service, an attempt was made to reach out to a wide range of interested parties. Two rounds of outreach efforts were held, the first of which helped develop the statement of needs for the study area (presented in **Section 3.7**), and the second of which assessed the consensus in the corridor as to whether additional steps should be undertaken towards implementing a transit investment (see **Section 5.5**). The second round also presented several possible transit investments, their costs and characteristics in order to stimulate discussion and feed future studies.

Public outreach efforts included five main components: open houses, targeted outreach/stakeholder interviews meetings, elected official briefings, regional transportation forum and assessment steering group/assessment advisory group. At the eleven open house meetings area residents and employees were given opportunities to learn about the study, to ask questions and to give feedback. Similarly, elected officials were invited to an additional seven study briefings to keep them apprised of recent study activities and to allow them to raise particular concerns or interests of their constituents related to the transit study. Key stakeholders were invited to small targeted outreach meetings, with anywhere from one to fifteen attendees, where they could speak candidly with members of the study team. Additionally, members of the study team worked closely with an Assessment Steering Group (ASG) and an Assessment Advisory Group (ASG), comprising members of local planning and transportation agencies and the FTA. After the first round of public outreach a Regional Transportation Forum was also held to gather elected officials and members of the ASG and AAG for a collaborative session. Throughout the study information was also available on the DRPA website. The public outreach efforts undertaken as part of this study are summarized in **Table 2-1**, and are discussed in the following sections.

Table 2-1: Public Outreach Meetings

Type of Meeting	Number of Meetings
Public Open Houses	11
Targeted Outreach	35
Elected Officials Briefings	7
Regional Transportation Forum	1
Assessment Steering Group (ASG)	11
Assessment Advisory Group (AAG)	2
Total Meetings	*67*

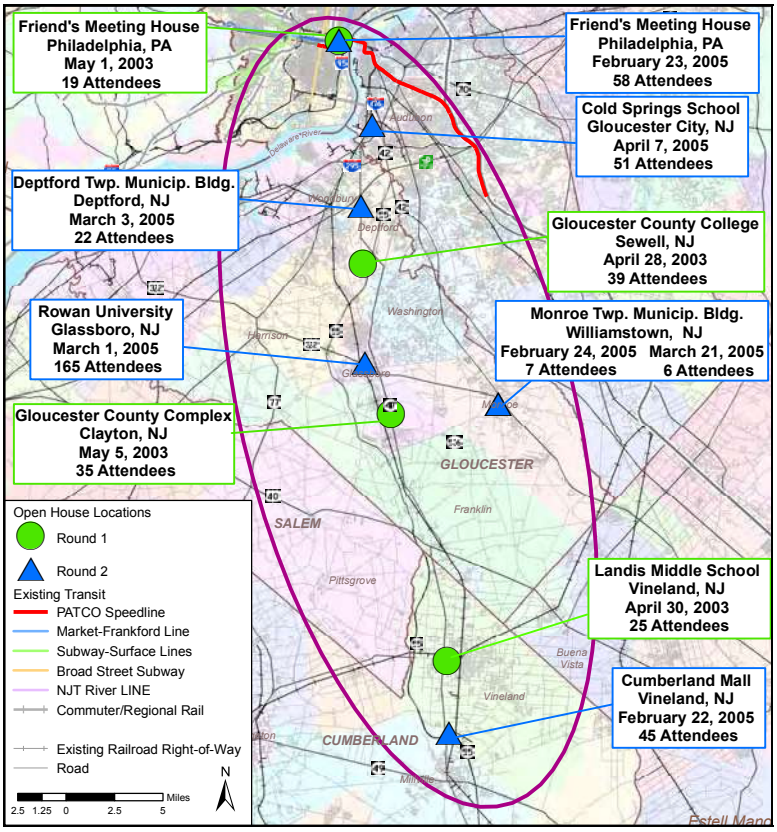
2.1 PUBLIC OPEN HOUSES

Two rounds of open house-format community outreach meetings were conducted at key milestones in the study process. These meetings were hosted in order to reach out to local residents, to gain an understanding of the area from those who live and work there and to gain an understanding of local transit preferences. At the meetings presentation boards were displayed with information about the study process, study area, potential transit investments,

and potential alignments. Study team members were available to guide attendees through the information individually or in small groups. After viewing the presentation boards and speaking with study team personnel, participants were invited to fill out and submit formal comment sheets. This ensured that their reaction to the materials presented and other comments or concerns would be documented for guidance of this and any future studies. Comment sheets were also made available on the DRPA website and were accepted at the meetings, via email or via fax. A summary of comments received will be presented in **Section 2.6**.

Notice of open house meetings was provided in the local press and on the DRPA website. Meeting locations were spread through the corridor (see **Figure 2-1**) in order to reach as many community members as possible. Attendance at open houses for both phases of outreach totaled 472.

Figure 2-1: Public Open House Locations



The first round of open house meetings were used to gather information on the identification of needs, study process, public outreach and opportunities in the study area.

Three open houses were held in Southern New Jersey and one was held in Center City Philadelphia, drawing a total attendance of 118.

The second round of open house outreach meetings presented residents with potential transit investments and potential alignments developed through the study. Six meetings were held in Southern New Jersey and one in Center City Philadelphia. Total attendance reached 354.

The eleven open house meetings that were held and the number of attendees are listed in **Table 2-2**.

Table 2-2: Public Open House Meetings

Date	Location	Attendees
ROUND 1		
April 28, 2003	Gloucester County College Sewell, NJ	39
April 30, 2003	Landis Middle School Vineland, NJ	25
May 1, 2003	Friends Meeting House Philadelphia, PA	19
May 5, 2003	Gloucester County Complex Clayton, NJ	35
	Total Round 1 Attendance:	*118*
ROUND 2		
February 22, 2005	Cumberland Mall Vineland, NJ	45
February 23, 2005	Friends Meeting House Philadelphia, PA	58
February 24, 2005	Monroe Township Municipal Building Williamstown, NJ	7
March 1, 2005	Rowan University Glassboro, NJ	165
March 3, 2005	Deptford Township Municipal Building Deptford, NJ	22
March 21, 2005	Monroe Township Municipal Building Williamstown, NJ (rescheduled from February 24th due to snow)	6
April 7, 2005	Cold Springs School Gloucester City, NJ	51
	Total Round 2 Attendance:	354

2.2 TARGETED OUTREACH AND STAKEHOLDER INTERVIEWS

Numerous organizations and individuals having an interest in the development of transit opportunities in the study area were contacted for one-on-one input or group feedback. A total of fourteen stakeholder group sessions were held, including a diverse selection of area businesses, government entities, labor concerns, and community/civic associations. Additionally, several individuals were contacted for one-on-one interviews to gather input on the project. Outreach to stakeholders was extensive and inclusive, and participation in these events does not reflect the full range of organizations invited to contribute. See **Table 2-3** for a summary outline of the various stakeholder interview events during the course of this study.

Table 2-3: Stakeholder Group Sessions

Date	Organizations Represented		Attendees
April 21, 2003	▪ L3 - Communications	▪ SJPC	2
April 22, 2003 (two interviews)	▪ City of Woodbury ▪ Raritan Engineering ▪ RFC Container	▪ Rossi Motors ▪ Woodbury Main Street Inc. ▪ Woodbury Merchants Association	8
April 23,2003 (two interviews)	▪ AAA South Jersey ▪ DVRPC ▪ NJDOT ▪ SJPC	▪ SJTPO ▪ SNJDC ▪ South Jersey Transportation Auth. ▪ Wingate Inn	18
April 25, 2003 (three interviews)	▪ Au Premiere Limousine ▪ BACC ▪ CCC-FPAC ▪ Coriell Institute ▪ Cumberland County ▪ Cumberland Empowerment Zone ▪ Cumberland Mall	▪ DVARP ▪ Lockheed Martin ▪ Mental Health Associates ▪ Millville Chamber of Commerce ▪ New Jersey Environmental Lobby ▪ South Jersey Healthcare ▪ Vineland Chamber of Commerce	19
May 1, 2003	▪ Local 322 - Plumbing & Pipe Fitting ▪ Local 825 - Operating Engineers ▪ NJ State Senate Labor Committee	▪ Union No. 59 – Cement Masons ▪ United Building Trades	5
May 2, 2003 (two interviews)	▪ DVRPC	▪ SEPTA	2
May 20, 2003	▪ FTA		2
May 27, 2003	▪ Center City District		1

2.3 ELECTED OFFICIALS BRIEFINGS

To address the concerns and comments of elected officials in relation to this study, several elected official briefings were held as part of each round of public outreach. State legislators and local officials from Philadelphia and Southern New Jersey were invited to one-hour sessions including a presentation and question and answer period. Elected officials were also invited to attend a Regional Transportation Forum, which will be discussed in **Section 2.4**. Total attendance at these events totaled 99 in Round 1 and 53 in Round 2. A summary of the events held for elected officials is presented in **Table 2-4**.

Table 2-4: Elected Official Briefings

Date	Location	Attendees
ROUND 1		
March 20, 2003	Rowan University (two sessions) Glassboro, NJ	47
March 21, 2003	DRPA Offices Camden, NJ	12
October 8, 2003	Regional Transportation Forum DRPA Offices Camden, NJ	35
December 5, 2003	Sheraton Society Hill, Philadelphia, PA	5
	Total Round 1 Attendance:	*99*
ROUND 2		
October 26, 2004	Philadelphia City Hall Philadelphia, PA	10
December 3, 2004	Greater Philadelphia Chamber of Commerce Philadelphia, PA	14
December 15, 2004	Washington Township Municipal Building Sewell, NJ	29
	Total Round 2 Attendance:	*53*

2.4 REGIONAL TRANSPORTATION FORUM

Following the first round of public outreach a Regional Transportation Forum was hosted on October 8, 2003 at the DRPA offices in Camden, NJ. The forum convened members of the ASG and AAG and elected officials from Southern New Jersey and Philadelphia to discuss some of the transit opportunities for the study area. Invitations were extended to more than 560 elected officials throughout the study area; attendance totaled 34.

The purpose of the Regional Transportation Forum was to re-emphasize the goals of the study and to get feedback from local decision-makers on the future direction of the study. The forum also provided a chance for elected officials to understand how input from the community outreach meetings and other events was incorporated into the development of the statement of needs and potential transit opportunities.

Attendees at the forum were briefed on the study and its recent efforts, and were then introduced to nine potential transit investments for the study area – five in Southern New Jersey and four on the Philadelphia Waterfront. Comments were solicited from the attendees and questions were answered. Attendees were then provided with an opportunity to vote on what they believed to be the most beneficial of the nine alternatives presented. Their votes helped guide the study team in its selection of alternatives for further analysis (see **Section 4.2** for more details).

2.5 ASSESSMENT STEERING GROUP AND ASSESSMENT ADVISORY GROUP

The study team worked closely with both the Assessment Steering Group and the Assessment Advisory Group. The ASG, comprising representatives of DRPA and PATCO and had the task of "steering" the study to ensure the study remained on task. The ASG also reviewed study progress and specified the next steps for the study.

The AAG provided technical advice to the study team on transportation related issues relating to the study. The AAG also provided information on concurrent studies or projects that could affect this study or should be coordinated with the study. The AAG consisted of the ASG, NJ TRANSIT, SEPTA, SJTA, SJTPO, CCIA, NJDOT, DVRPC, county planning organizations, Rowan University, Center City District, PCPC, FTA and CCCTMA. The AAG met two times throughout the study, as shown in **Table 2-5**.

Table 2-5: AAG Meetings

Date	Location	Attendees
January 29, 2003	DRPA Offices Camden, NJ	31
June 25, 2003	DRPA Offices Camden, NJ	20

2.6 SUMMARY OF COMMENTS

2.6.1 COMMENTS RECEIVED

The comments received in round one of public outreach guided the study team in its composition of a statement of needs for the study area. Round one comments are summarized below. The second round of outreach presented several transit alternatives that were developed through this study to demonstrate the feasibility of public transit in the study area and to spur discussion of the public interest in public transportation and its disposition toward certain types or locations of new transit services. This information helped decide whether there is consensus to move forward to a more detailed transit study, and could help feed the statement of needs and alternatives development in future studies. Since many of the comments received in round two captured the public reaction to the specific alternatives developed and fueled the final conclusions of this study, they will be discussed in **Section 5.5** (Conclusions) after the discussion of the alternatives developed for this study.

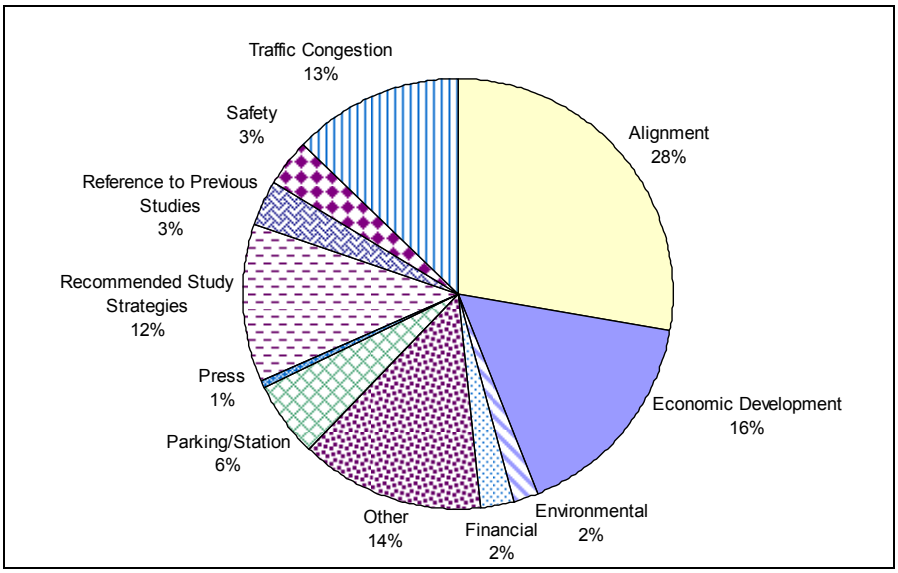
Round 1:
The first round of public outreach received 441 comments. This included comments from residents of the study area as well as elected officials and stakeholders. As shown on **Figure 2-2**, over half of the comments dealt with where a new service should be located (28%), economic development needs (16%) and traffic congestion (13%). The remaining comments dealt with recommended strategies for the study, parking and transit stations, safety, environmental concerns, financing of a transit investment, references to previous studies and other topics.

Many of the comments received expressed a need for better transit to Gloucester and Cumberland Counties. Although it is not within the study area, a few comments also expressed

a desire for transit service to the Jersey Shore. Other comments mentioned that a new transit service should serve population centers, both existing and under developed. Residents were interested in developing a transit service that eases the transportation problems in the study area by serving the main population centers, but does not promote sprawl. They also want to preserve the environment and character of the existing communities.

Several comments remarked that existing bus service has inadequate service area coverage, service frequency, hours of operation and reliability. Comments noted that a new transit service must be separated from road congestion and must have a travel time competitive with a personal automobile. Any new service should also provide convenient transfers to New Jersey Transit (River LINE), SEPTA, and if possible, the Northeast Corridor.

Figure 2-2: Type of Comments Received – Round 1



Many comments praised the economic benefits a new transit service could have on the Philadelphia Waterfront and Southern New Jersey communities. Many of these comments focused on revitalization of the Philadelphia Waterfront and older Southern New Jersey towns which as a result would increase the tax bases due to increases in property values related to a new transit service. Improved transportation options to and from Southern New Jersey, they believed, would make it a more attractive place to live since access to jobs would be greatly increased. Transit service would also improve access to cultural events that take place both in Southern New Jersey and along the Philadelphia Waterfront, thus producing an increase in revenue.

It was noted that many areas of Southern New Jersey are developing rapidly, but the transportation infrastructure is not being developed along with it, creating significant congestion on the roadways. Those who commute from Southern New Jersey noted the following roadways with the worst traffic congestion: Route 38, Route 42 – particularly at the interchange with I-295 and I-676, Route 55, Route 70, Route 73, Route 130. Concerns about traffic congestion included: long travel times, drivers safety and pollution.

3 EXISTING CONDITIONS

The assessment of existing conditions assists transportation planners and the general public in understanding the characteristics of the study area, in terms of where people live and work, where transportation facilities and services exist and where new facilities are planned. This type of information is important for developing an accurate "statement of needs" to guide the study. This task builds upon previous studies in the region, incorporates observations on current conditions and future trends, and reflects the input from stakeholders and individuals on visions for future transportation facilities and the relationship to the communities served.

3.1 LAND USE

The Southern New Jersey to Philadelphia Transit Study area varies greatly in its land use patterns from dense and entirely urban cities to small towns with largely suburban landscapes, areas of almost entirely post-war development, rural areas dotted by dense older towns and low-density commercial development.

Center City Philadelphia and downtown Camden, New Jersey anchor the study area in the north. These urban centers comprise row homes, urban parks, apartment buildings mixed with small shops, office buildings, downtown malls, entertainment venues and office towers. Dense neighborhoods, some thriving and others facing long-term disinvestment, stretch for miles in all directions. Major industrial districts line both waterfronts.

In New Jersey, southeast of Camden, are older, densely inhabited suburbs that extend for several miles along Haddon Avenue (and the PATCO Speedline), White Horse Pike (Route 30), Black Horse Pike (Route 168) and Glassboro Road (Route 47). These suburban areas generally contain small town centers, some of which were built in the 1600's and which were the focal points of railroads built later in the 1800's. A Highway network connects these town centers to one another.

Development densities drop approximately eight miles south of Camden, just beyond the division of NJ Routes 42 and 55 and the I-295 beltway. Residences in this area more commonly reflect post-war styles, with detached single-family homes, easy highway access and limited transit access. The best transit access, provided by the PATCO Speedline, functions largely as a park-and-ride commuter system, with considerable kiss-and-ride traffic and some bicycle and walk-on traffic at certain stations. Much land in this area remains undeveloped, with some rural sections between major roadway corridors. Several regional, small and medium-sized malls anchor the suburban landscape.

Fifteen miles south of Camden most of the land use is rural in nature with most towns and developments consisting of single-family homes with small town centers. This type of rural development continues as far south as Vineland and Millville. Roadways commonly consist of two-lane connectors between old towns.

3.2 MAJOR ACTIVITY CENTERS

Major activity centers represent areas with high levels of employment, commercial, or recreational opportunities. The study area has many major activity centers in Philadelphia and Southern New Jersey as illustrated in **Table 3-1** and **Table 3-2**. While many of the activity centers in Philadelphia are served by some form of rapid transit service, notable exceptions include the Navy Yard and the waterfront. None of the activity centers listed in **Table 3-2** for Southern New Jersey are served by rapid transit.

Table 3-1: Philadelphia Activity Centers

Activity Center	Description
Center City	The largest concentration of employment in Philadelphia is located west of City Hall along Market Street, also known as Market West, that includes major employers such as Bell Atlantic and Independence Blue Cross. The largest shopping district is located east of City Hall along Market Street, also known as Market East, that includes the Gallery, a 3-block long, multi-level indoor mall that includes three large anchor stores and 170 smaller stores. This area also includes the Reading Terminal Market and Pennsylvania Convention Center.
University City	Contains The University of Pennsylvania and Drexel University. Penn employs 25,300 people (including the hospital complex) and has an enrollment of 20,000 graduate and undergraduate students and Drexel employs 1,300 people and has an enrollment of 17,700 graduate and undergraduate students.
Old City	Historic section of Philadelphia with entertainment and tourist destinations, including Independence Park and numerous restaurants and nightclubs.
Philadelphia Waterfront	Located along Columbus Boulevard, the waterfront contains residential, retail and recreational uses with special events held at Penn's Landing near the base of the Ben Franklin Bridge. New big-box retail development is featured on former industrial land further south toward Pier 70.
Navy Yard	1,200 acre site that ceased operations on September 27, 1996. Small scale redevelopment has occurred creating approximately 6,000 jobs. A master plan revealed in 2004 identifies the potential for 30,000 jobs through a mixed-use development.
Stadium Complex	Includes four major sporting and entertainment venues located in South Philadelphia including the Lincoln Financial Field, Citizens Bank Park, the Wachovia Center and the Spectrum. All major professional sporting events are held at this location, including concerts and other events that may occur simultaneously.

Table 3-2: Southern New Jersey Activity Centers

Activity Center	Description
Camden Waterfront	Camden's Waterfront has recently experienced significant public reinvestment. Recent projects include the New Jersey State Aquarium (currently being expanded); the Tweeter Center, an open-air amphitheater with indoor performance area; Campbell's Field, 6,000-seat minor league baseball stadium; and the permanent docking of the U.S.S. Battleship New Jersey museum.
Deptford Mall	The largest in Southern New Jersey located near the intersection of NJ Routes 55 and 42 with140 stores including four large anchor stores and approximately 1.4 million square feet of gross leasable floor area.
Echelon Mall	Located near I-295 and within a half mile from the Ashland PATCO station, made up of three large anchor stores and centered in a planned residential and office complex. Employment is expected to double by the year 2025.
Cumberland Mall	Located at Exit 27 of Route 55, provides 800,000 square feet of gross leasable floor area including more than 80 retail shops and several anchors. Hosts roughly 800 to 1,000 jobs.
Gloucester County College	Gloucester County College, located off Route 55 outside Wenonah, hosts a 5,500-person student body.
Rowan University Camden County College	Formerly Glassboro State College is located near the center of Glassboro and enrolls more than 9,500 students, many of whom live on-campus and employs 2,500 faculty and staff. Camden County College, located off Route 42 in Blackwood, hosts a 15,000-person student body.

3.3 DEMOGRAPHIC AND SOCIOECONOMIC CHARACTERISTICS

Demographic estimates and projections were obtained from the Delaware Valley Regional Planning Commission (DVRPC) and the South Jersey Transportation Planning Organization (SJTPO), the two metropolitan planning organizations (MPOs) for the study area. Current-year estimates are based on the most recent U.S. Census, with adjustments made periodically to reflect more recent trends in school enrollment levels, building permits and office occupancy levels, which all serve as indicators of growth. Projected population and employment is then allocated to particular neighborhoods and undeveloped areas based on the availability of land, the density of development and recent trends in growth or decline.

3.3.1 POPULATION

Currently (according to 1997 and 2000 data), about 1.13 million people live within the study area and the population is expected to grow by about 6.9% by 2025, to 1.21 million people (See **Table 3-3**). About one-third of this population is concentrated in the relatively small, urbanized Pennsylvania portion of the study area. By 2025, overall population in the study area is expected to grow at a moderate rate in suburban portions and decline slowly in urban portions as shown in **Figure 3-1**. The most rapid growth is expected to occur in Gloucester and Cumberland Counties, whose combined growth will exceed the net growth projected for the study area as a whole. Elsewhere in New Jersey, the City of Camden and the communities along the existing PATCO Speedline are expected to experience population decline. In Philadelphia Center City, University City and neighboring communities are expected to continue growing, with high concentrations of new residents. However, other areas are expected to decline, such as South and Southwest Philadelphia, resulting in a net decrease in overall population in 2025 for Philadelphia County, Pennsylvania.

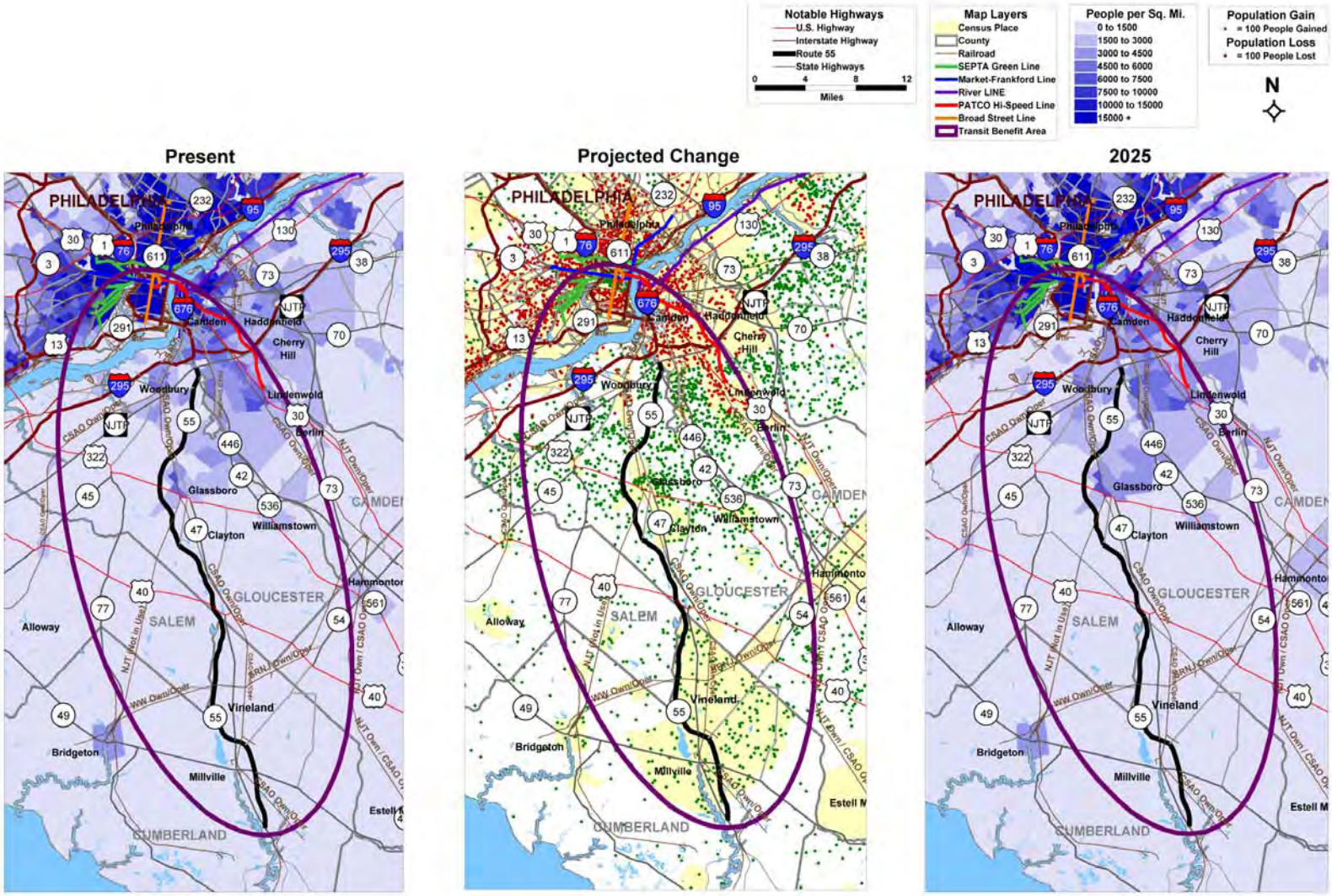
Table 3-3: Population Estimates

Section of Study Area*	'97 or '00**	2025	# Change	% Change
SJTPO				
Atlantic County	18,400	21,200	+ 2,800	15.1%
Cumberland County	120,900	148,000	+ 27,100	22.4%
Salem County	16,900	21,600	+ 4,700	28.2%
DVRPC				
Camden County	343,300	341,400	– 1,900	-0.6%
Gloucester County	228,900	290,900	+ 62,000	27.1%
Philadelphia County	404,600	388,100	– 16,500	-4.1%
TOTAL	**1,133,100**	**1,211,200**	**+ 78,100**	**6.9%**

* - Figures reflect only the portions of each county that lies within the study area.

** - Figures for SJTPO portions of the study area are 2000 estimates; figures for DVRPC portions of the study area are 1997 estimates.

Figure 3-1: Population Change



3.3.2 HOUSEHOLD SIZES

Households and household sizes are important in the context of transportation because vehicle-miles-traveled (the total miles driven by all cars on the roads) are closely related to the number of households in an area. All else being equal, smaller household sizes usually result in more vehicle-miles-traveled. Larger households economize on vehicle-trips, making single trips to accommodate the needs of the entire family. Also, larger households generally have more children, who tend to drive much less than adult residents. Households in which children are present also tend to make shorter trips, since one parent commonly stays at home to work and/or care for the children or else chooses to work close to home. The stay-near-home parent also tends to choose closer destinations for non-work trips.

As household sizes increase, vehicle-miles-traveled increase more modestly; however, as household sizes decrease, the traffic impact of any simultaneous growth in population can be magnified dramatically. In recent decades, household sizes nation-wide have decreased significantly, from about 3.5 persons per household in the 1960s to just 2.6 people per household by 2000.

Data on number of households and household sizes were available only for DVRPC portions of the region. **Table 3-4** shows household sizes near the national average, at 2.64 persons per household, though urban Pennsylvania shows portions of the study area with smaller household sizes than in Camden or suburban Gloucester County. Household sizes are expected to remain constant through 2025 in these suburban counties, though household size in Philadelphia County is expected to continue shrinking, by about 5% over the 25-year period.

Overall, the stability in household sizes indicates that changes in traffic levels should reflect expected changes in population. The effect of suburban population growth on traffic levels should be relatively modest compared to years past. While the growing suburban population inevitably will drive more than the urban population, the effect of suburbanization will not be exacerbated by decreasing household sizes. This conclusion contrasts with national experience of the 1980s and 1990s, when traffic levels grew considerably faster than population, an effect that resulted in rapid increases in congestion and delay.

Table 3-4: Households and Household Sizes

	Households		Average Household Size	
Section of Study Area*	**2000**	**2025**	**2000**	**2025**
DVRPC				
Camden County	124,600	123,900	2.75	2.75
Gloucester County	78,900	100,570	2.90	2.89
Philadelphia County	166,200	166,800	2.44	2.33
TOTAL	**369,700**	**391,300**	**2.64**	**2.61**

* - Figures reflect only the portions of each county that lies within the study area.

3.3.3 EMPLOYMENT

Currently, about 770,000 jobs are located within the study area and employment is expected to grow by about 13.5% by 2025, to 875,600 jobs. **Table 3-5** shows the highest concentration of employment exists in central Philadelphia, which accounts for nearly one-half of the study area's overall employment with 320,000 jobs. The City of Camden is a minor job center, but does manage to achieve a significant employment density. The lowest concentrations of jobs exist in the largely rural southern portions of the study area in Southern New Jersey.

Employment in the study area is expected to grow slowly in both suburban and urban areas. The most rapid growth is expected to occur in Center City Philadelphia with an additional 35,000 jobs by the year 2025 as shown in **Figure 3-2**. University City is projected to add another 7,000 jobs. Overall, central Philadelphia is expected to maintain its share of the study area's employment.

Table 3-5: Employment Estimates

Section of Study Area*	'97 or '00**	2025	# Change	% Change
SJTPO				
Atlantic County	13,000	17,800	+ 4,800	37.7%
Cumberland County	55,500	73,200	+ 17,700	31.9%
Salem County	4,500	5,300	+ 800	16.7%
DVRPC				
Camden County	131,600	145,500	+ 13,900	10.6%
Gloucester County	86,400	104,900	+ 18,500	21.4%
Philadelphia County	480,300	529,000	+ 48,700	10.1%
TOTAL	**771,200**	**875,600**	**+ 104,400**	**13.5%**

* - Figures reflect only the portions of each county that lies within the study area.

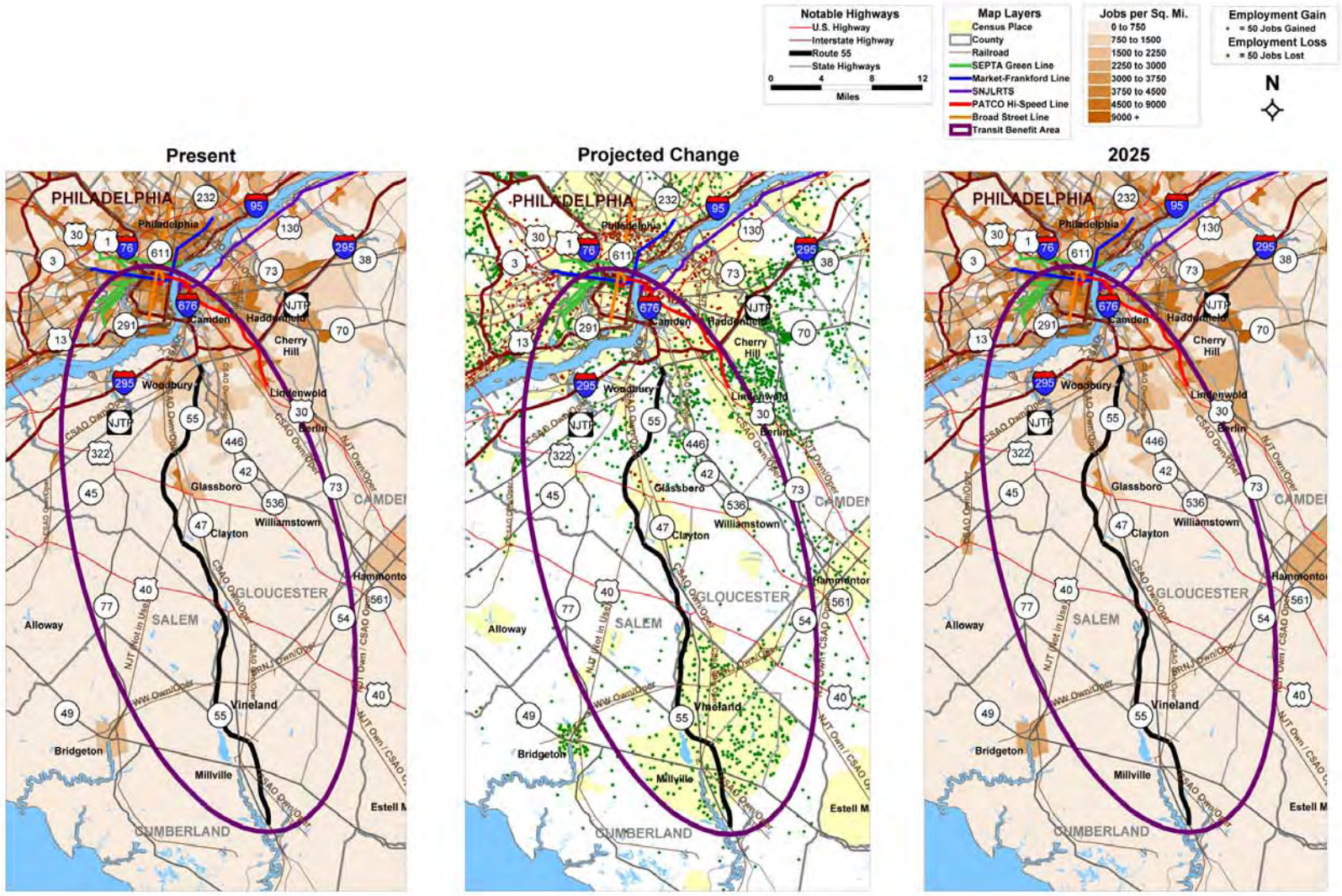
** - Figures for SJTPO portions of the study area are 2000 estimates; figures for DVRPC portions are 1997 estimates.

3.4 AUTOMOBILE OWNERSHIP

Auto ownership data were available only for the DVRPC region. **Table 3-6** shows estimates for the proportion of households in each section that own zero, one, two or at least three cars. From 1997 to 2025, the total number of automobiles in the DVRPC portion of the study area will rise by about 15%, from 457,700 cars to 525,600 cars, about twice the rate of growth in households.

In 1997, urban Pennsylvania portions of the study area exhibited the highest proportion of zero-car households (46%) and the lowest proportion of households with two or more cars (just 16%). In contrast, suburban Gloucester County exhibited the lowest proportion of zero-car households (7%) and highest proportion of households with two or more cars (64%). Camden County's auto ownership rates closely reflected Gloucester County than portions of Pennsylvania. The older communities along the PATCO Speedline exhibit relatively low auto ownership rates compared to the rest of suburban New Jersey.

Figure 3-2: Employment Change



From 1997 to 2025, car ownership rates within the two New Jersey counties are expected to rise slightly, while rates in Pennsylvania portions of the study area are expected to remain stable. As the suburban New Jersey counties grow faster than the urban Pennsylvania portions of the study area, the study area's overall car ownership rates will rise by about 8%, from 1.24 to 1.34 cars per household. By 2025, cars will outnumber households in Gloucester County by nearly two-to-one.

Table 3-6: Automobile Ownership

Section of Study Area	1997					2025				
	0 Cars	1 Car	2 Cars	3+ Cars	Avg. Cars**	0 Cars	1 Car	2 Cars	3+ Cars	Avg. Cars**
Camden County	15%	37%	35%	13%	1.51	13%	33%	38%	16%	1.65
Gloucester County	7%	29%	45%	19%	1.86	5%	24%	50%	21%	1.96
Philadelphia County	46%	39%	13%	3%	0.74	46%	38%	13%	3%	0.74
WEIGHTED AVG.	**27%**	**36%**	**27%**	**9%**	**1.24**	**25%**	**33%**	**30%**	**12%**	**1.34**

* - Figures reflect only the portions of each county that lies within the study area.
** - The estimates for "Avg. Cars" assume that households with 3+ cars have 3.5 cars on average. All other data are based strictly on data provided by DVRPC.

3.4.1 TRANSPORTATION NETWORK

3.4.1.1 Highway Facilities

Numerous agencies maintain the highway system in the study area, including regional, state and local bodies. The most notable agencies are the Pennsylvania Department of Transportation (PENNDOT), the New Jersey Department of Transportation (NJDOT), the South Jersey Transportation Authority (SJTA) and DRPA. PENNDOT oversees highways in Pennsylvania; NJDOT oversees highways in New Jersey other than the Atlantic City Expressway; SJTA oversees the Atlantic City Expressway; and DRPA operates and maintains the highways that cross the Delaware River. **Table 3-7** summarizes the major roadways and bridges in the study area.

Three major bridges provide access across the Delaware River in the study area (from north to south): the Ben Franklin Bridge (I-676), the Walt Whitman Bridge (I-76) and the Commodore Barry Bridge (U.S. 322), all of which charge $3 tolls to westbound passenger vehicles and significantly higher tolls to freight traffic.

Ben Franklin Bridge (I-676 / US 30) – The Ben Franklin Bridge provides access to several major urban highways along its approach in New Jersey, must notably I-676, a southerly freeway providing access to downtown Camden. The Admiral Wilson Boulevard (US 30) is also a major arterial that approaches the Ben Franklin Bridge along the Cooper River in Camden. In Philadelphia, the bridge ramps provide access to city near 5th and Race Streets, with nearby connections to I-95 and I-676.

Walt Whitman Bridge (I-76) – The Walt Whitman Bridge provides access to several regional freeways along its approach in New Jersey, including I-676 to the north, NJ Routes 42 and 55 to the south, and I-295 and the New Jersey Turnpike to the west. In Philadelphia, the bridge provides access to I-95, the Sports Complex, and the Schuylkill Expressway serving University City and western suburbs.

Table 3-7: Major Highway Facilities

Route	Operator	Approx. Study Area Mileage	Access Control	Car Toll	Alignment	AADT at peak section
Freeways						
Atlantic City (ACE) Expressway	SJTA	11.2	Full	$2.50 each way	Northwest-Southeast: Connects Route 42 in Turnersville to Atlantic City	50,000
I-295	NJDOT	17.7	Full	Free	Northeast-Southwest: Parallel to and roughly 2 to 5 miles from Delaware River	65,000
I-676	PENNDOT, DRPA, NJDOT	5.5	Full*	Free**	East-West (PA) & North-South (NJ): Connects all other study area freeways from Center City through Camden	60,000
I-76	PENNDOT, DRPA, NJDOT	10.5	Full	Free**	Northwest-Southeast: Follows Schuylkill River, cuts across S. Philadelphia to New Jersey	135,000
I-95	PENNDOT	12.8	Full	Free	Northeast-Southwest: Parallel and adjacent to Delaware River	150,000
New Jersey Turnpike	NJDOT	18.4	Full	Toll varies: $6.45 full	Northeast-Southwest: Parallel to and about 5 miles from Delaware River	800,000
Route 42	NJDOT	8.1	Full	Free	Northwest-Southeast: Connects Route 55/I-295/I-676 with AC Expressway	85,000
Route 55	NJDOT	40.5	Full	Free	North-South: Connects Route 42/I-295/I-676 with Glassboro, Vineland	50,000
Major Bridges						
Ben Franklin Bridge (I-676)	DRPA	0.65	Full	$3 westbound	Center City to Downtown Camden	100,000
Commodore Barry Bridge (U.S. 322)	DRPA	0.62	Full	$3 westbound	Chester, PA to Bridgeport, NJ	35,000
Walt Whitman Bridge (I-76)	DRPA	0.67	Full	$3 westbound	South Philadelphia to Camden	100,000
Urban Highways/Super Arterials						
U.S. 130	NJDOT	0.4	Partial	Free	Northeast-Southwest: Downtown Camden to Trenton	45,000
Route 38	NJDOT	0.6	Partial	Free	East-West: Downtown Camden to the east	45,000
Route 70	NJDOT	0.6	Partial	Free	East-West: Downtown Camden to the east	50,000
U.S. 30	NJDOT	7.4	Partial	Free	Northwest-Southeast: Center City to Camden to Atlantic City	30,000

* – I-676 has two intersections between the Ben Franklin Bridge and the Vine Street Expressway.
* – I-76 and I-676 charge westbound-only tolls to cross the Walt Whitman and Ben Franklin Bridges, respectively.

Commodore Barry Bridge (US 322) – The Commodore Barry Bridge connects I-95 with I-295. The approaches of US 322 on either side of the bridge are multi-lane for brief distances, but US 322 is predominately a two lane road within Gloucester County as it crosses from east to west.

Major freeways in the study area include:

I-676 – Northerly freeway providing access to downtown Camden and several major highways, via its connection to US 30.

I-295 – Northeast-southwest freeway that provides access to and among inner-ring suburbs between Trenton, New Jersey and Wilmington, Delaware.

New Jersey Turnpike – Northeast-southwest freeway, parallel to I-295 though with more distantly spaced interchanges, providing inter-regional access between northern Delaware and the New York metropolitan area.

NJ Route 42 – Southeasterly freeway that provides access to Williamstown and the Atlantic City Expressway (Route 446), with continuing access to Atlantic City.

NJ Route 55 – Southerly freeway that provides access to Glassboro, Clayton, Vineland and Millville, with connections to local roadways for continuing access to Cape May. It should be noted that NJ Route 55 was constructed with a wide center median of roughly 140 feet, for the purpose of accommodating a future PATCO rail extension.

In addition to the highways previously listed, several other New Jersey state routes provide local and/or rural access within the study area, including:

North-South Routes

- Route 45 – Mullica Hill to points southwest
- Route 47 – Camden to Millville, via Woodbury, Glassboro, Clayton and Vineland
- Route 77 – Mullica Hill to Bridgeton

East-West Routes

- US 322 – Chester to Hammonton and beyond, via Mullica Hill, Glassboro and Williamstown
- US 40 – Wilmington to Atlantic City, via rural Salem, Gloucester and Atlantic Counties
- Route 49 – Pennsville to Estelle Manor, via Millville

It should also be noted that numerous bike lanes both within highway right-of-way and along dedicated trails are also present in the study area, particularly in urban environments. The network of bike lanes has grown considerably in recent years. In Philadelphia, for example, bike lane mileage has more than tripled in the past decade. Additional bike lanes are a potentially beneficial component to a future public transit system in the study area.

3.4.1.2 Transit

Three agencies operate and maintain public transit systems in the study area. The Southeastern Pennsylvania Transportation Authority (SEPTA) offers multi-modal service in the study area, including bus, light rail, heavy rail and regional rail service. The Port Authority Transit Corporation (PATCO) serves the study area with heavy rail, while New Jersey Transit (NJT) supplies local bus, regional bus, light rail and regional rail service to the study area. **Table 3-8** summarizes the major routes within the existing transit network in the study area and displays their average service headways and weekday ridership.

SEPTA

The City Transit Division, the largest of SEPTA's divisions, provides numerous types of service to the study area including three heavy rail lines, five subway-surface light rail lines and 37 bus routes. SEPTA's Regional Rail Division operates and maintains 264 miles of commuter rail service on 14 lines throughout the region (see **Figure 3-3**).

- **Market-Frankford Line (MFL) –** The downtown portion of this heavy rail system traverses the study area. The line extends from Frankford-Terminal at Bridge and Pratt Streets south to Center City Philadelphia and then west to 69th Street Terminal in Upper Darby Township. The downtown section, on Market Street from 2nd Street to 40th Street, is constructed as a subway, serving nine stations. The 8th Street Station provides a connection to the PATCO Speedline. SEPTA Regional Rail connections are available at 11th, 15th and 30th Street Stations and New Jersey Transit's Atlantic City Line is available at 30th Street Station. 15th Street Station provides free transfers to the Broad Street Subway and all five of SEPTA's light rail Subway-Surface Lines. Interregional connections also available from the MFL include the downtown Bus Terminal; Amtrak intercity passenger service and connections to the Philadelphia International Airport.
- **Broad Street Subway (BSS) –** Extending from the Fern Rock Transportation Center at the northern terminus, under City Hall to Pattison Street Station (Sports Complex) in South Philadelphia. The downtown and southern portions of this system lie within the study area. The system provides access to numerous bus routes at each of its nine stations within the study area. In addition, at City Hall Station, passengers are offered connections to all SEPTA regional rail lines and free transfers to the Market-Frankford Line and Subway-Surface Lines. A direct connection to the PATCO Speedline can be made at the 8th Street Station via the Ridge Avenue Spur. In addition to the Ridge Avenue Spur service, the BSS also features express and special event service.
- **Subway-Surface Lines (SSL) –** Five light rail lines, composing the Subway-Surface Line system, lie within the study area and serve the west portion of Center City, West Philadelphia and Southwest Philadelphia. Routes 10, 11, 13, 34 and 36 run westward from Juniper and Market Streets, just east of City Hall. Within Center City, the SSL run underground in the same tunnel as the MFL, with stations at Juniper Street, 15th Street, 19th Street and 22nd Street.

Figure 3-3: SEPTA Light, Heavy and Regional Rail Service

Fixed-Route Bus Service – The City Transit Division provides fixed-route bus service on seventy-three routes throughout the Philadelphia area with approximately thirty-seven routes servicing the study area. These lines offer mobility within Center City and access to and from neighboring districts and suburbs.

- **Regional Rail –** The Regional Rail Division operates and maintains 264 miles of commuter rail service on 14 lines throughout the region. Since all regional rail lines provide access to Center City, a portion of every line lies within the study area. SEPTA's commuter rail system provides access to roughly one-sixth of Center City's jobs.

Table 3-8: Major Transit Facilities and Service

Route	Operator	Guideway	From	To	Peak (min.)	Off-peak (min.)	Daily Boardings
Heavy Rail							
Market-Frankford Line	SEPTA	Subway-Elevated	69th Street Terminal	Frankford	4	10	170,000
Broad Street Subway	SEPTA	Subway	Fern Rock	Pattison	3.5	8	109,000
Ridge Avenue Spur	SEPTA	Subway	Olney Transp. Ctr.	8th and Market	7	16	3,400
Speedline	PATCO	Subway-Elevated	Lindenwold	Center City	3-12	20	33,234*
Light Rail							
10	SEPTA	Subway & Mixed Traffic	Overbrook	Center City	6	10	9,900
11	SEPTA	Subway & Mixed Traffic	Darby	Center City	5	10	10,800
13	SEPTA	Subway & Mixed Traffic	Yeadon/Darby	Center City	4	10	10,800
34	SEPTA	Subway & Mixed Traffic	Angora	Center City	4	10	9,800
36	SEPTA	Subway & Mixed Traffic	Eastwick/Elmwood	Center City	4	10	11,500
River LINE	NJT	Exclusive, occasional grade crossings, & Mixed Traffic	Trenton	Camden	15	30	5,000
Regional Rail							
SEPTA Regional Rail System – 14 Routes	SEPTA	Exclusive, occasional grade crossings	Suburbs of Philadelphia	Center City	various	various	104,200
Atlantic City Line	NJT	Exclusive, occasional grade crossings	Atlantic City	Center City	75	120	2,600
Regional Bus							
313 & 315	NJT	Freeway – Mixed Traffic	Cape May/Wildwood	Center City	8 trips per day		304
408	NJT	Freeway – Mixed Traffic	Millville	Center City	30	60	1,302
410	NJT	Freeway – Mixed Traffic	Bridgeton	Center City	30	60	1,172
412	NJT	Freeway – Mixed Traffic	Glassboro	Center City	30	60	1,172
Bus							
2	SEPTA	Mixed Traffic	Nicetown	South Philadelphia	8	13	19,000
9	SEPTA	Freeway – Mixed Traffic	Upper Roxborough	Center City	10	15	5,500
12	SEPTA	Mixed Traffic	50th & Woodland	Center City	12	20	2,700
21	SEPTA	Mixed Traffic	69th Street Terminal	Penn's Landing	6	8	8,400
23	SEPTA	Mixed Traffic	Chestnut Hill	South Philadelphia	4	10	19,000
25	SEPTA	Mixed Traffic	Frankford Transp. Ctr.	Columbus Crossing	5	10	3,400
33	SEPTA	Mixed Traffic	Tioga	Penn's Landing	6	8	14,700
42	SEPTA	Mixed Traffic	Wycombe	Penn's Landing	6	8	10,000
47	SEPTA	Mixed Traffic	Olney	South Philadelphia	8	10	19,000
57	SEPTA	Mixed Traffic	Fern Rock	Whitman Plaza	10	12	9,500
C	SEPTA	Mixed Traffic	Center City	South Philadelphia	8	12	19,000

* For much of its history the PATCO Speedline carried roughly 40,000 passengers per average weekday.

3.4.1.3 Port Authority Transit Corporation (PATCO)

This 14.2-mile rail operation between Center City and Lindenwold, New Jersey opened originally as the "Camden Bridge Line" in 1936 between Broadway, Camden and 8th & Market, Philadelphia. It was later extended and operation to its present terminus began in 1969. The line serves the northern and eastern edges of the study area. PATCO maintains 13 stations on its Speedline, including nine in New Jersey and four in Center City. In addition, PATCO passengers are offered a discounted transfer to the Market-Frankford Line, the Broad Street Subway and designated surface routes, allowing access to many of SEPTA's routes. In New Jersey, the PATCO Speedline connects with the River LINE at the Walter Rand Transportation Center and the PATCO Camden and Lindenwold Stations offer connections to various New Jersey Transit Bus Lines. PATCO provides 24-hour rail service. The PATCO Speedline was shown in **Figure 1-1**.

3.4.1.4 New Jersey Transit (NJT)

New Jersey's public transportation corporation, New Jersey Transit (NJT), covers a service area of 5,325 square miles in New Jersey, New York and Philadelphia. As the nation's third largest

provider of bus, rail and light rail transit, NJT operates 236 bus routes and eleven rail lines statewide, serving 223 million passenger trips each year. Approximately thirteen of NJT's bus lines and one light rail line serve the study area. Most of the bus lines in the study area offer access to Philadelphia and Camden from the New Jersey suburbs along the study area. The River LINE provides service from Trenton to Camden, where riders can transfer to the PATCO Speedline.

3.4.1.5 Travel Patterns

The existing travel and traffic characteristics in the study area were analyzed to determine the trip origin/destination preferences that might best be served by a future transit system. The analysis was based on 1997 regional travel demand model data provided by DVRPC. Since comparable data was not available for the portion of the study area under the jurisdiction of the SJTPO, rough estimates for these areas were used, based on employment and population data. The study team obtained from DVRPC the zonal trip tables and zonal travel time tables for highway and transit modes. The DVRPC zonal tables were aggregated into 17 district-level tables for the purposes of analysis in this study. To facilitate broad comparisons further, the districts of greatest interest were sorted into even larger groups:

- Center City Philadelphia (Districts 1, 2, 3)
- University City (District 4)
- Camden CBD (District 6)
- Camden Corridor (Districts 7, 8, 9, 10, 11; excluding Camden CBD District 6)
- Gloucester Corridor (Districts 12, 13, 14, 15)
- Camden/Gloucester Corridor (Districts 7, 8, 9, 10, 11, 12, 13, 14, 15; excluding Camden CBD District 6)

In 1997 there were about 1.2 million daily one-way trips generated from the Camden/Gloucester Corridor. Of these trips, about 24,000 traveled to Center City Philadelphia, about 4,200 to University City and about 28,500 to the Camden CBD area. Of the trips to these markets, two-thirds were generated from the Camden Corridor and the rest from the Gloucester Corridor. **Table 3-9** also reveals that more than 1 million trips generated in the Camden/Gloucester Corridor, or 85%, were "intra-corridor" trips – i.e., with both origins and destinations within the Corridor.

Table 3-9: Daily One-Way Trips

Travel Markets	Auto	Transit	Total	Transit Share
Trips from Camden County to:				
Philadelphia CBD East	883	739	1,622	45.56%
Philadelphia CBD Center	3,614	6,575	10,189	64.53%
Philadelphia CBD West	1,560	2,734	4,294	63.68%
University City	2,225	623	2,848	21.86%
Other Philadelphia	23,001	851	23,851	3.57%
Camden CBD	21,372	1,890	23,262	8.12%
Intra-Camden Corridor	598,445	4,335	602,779	0.72%
Gloucester Corridor	82,269	538	82,806	0.65%
Total from Camden Corridor	**733,367**	**18,283**	**751,650**	**2.43%**
Trips from the Gloucester Corridor to:				
Philadelphia CBD East	732	52	784	6.64%
Philadelphia CBD Center	4,207	685	4,892	14.00%
Philadelphia CBD West	1,907	219	2,126	10.30%
University City	1,365	34	1,399	2.40%
Other Philadelphia	11,372	62	11,434	0.54%
Camden CBD	5,003	182	5,184	3.50%
Camden Corridor	93,534	376	93,910	0.40%
Intra-Gloucester Corridor	309,512	851	310,363	0.27%
Total from Gloucester Corridor	**427,630**	**2,460**	**430,090**	**0.57%**
Trips from the Camden/Gloucester Corridor to:				
Philadelphia CBD East	1,615	791	2,406	32.88%
Philadelphia CBD Center	7,821	7,260	15,081	48.14%
Philadelphia CBD West	3,466	2,953	6,419	46.00%
University City	3,590	656	4,246	15.45%
Other Philadelphia	34,373	912	35,285	2.58%
Camden CBD	26,375	2,072	28,446	7.28%
Intra-Camden/Gloucester Corridor	1,083,759	6,099	1,089,858	0.56%
Total from Camden/Gloucester Corridor	**1,160,997**	**20,743**	**1,181,740**	**1.76%**

In terms of transit travel, **Table 3-9** reveals that less than two percent (about 21,000 trips) of the 1.2 million trips generated in the study area were carried by transit. Most of the transit trips were generated from the Camden Corridor to Center City Philadelphia. For these travel movements, the transit shares are approximately 50% or more. However, the transit shares are much lower among trips destined for Philadelphia points outside Center City, even for trips to University City. Nearly 80% of travelers from the Camden/Gloucester Corridor chose to drive to University City rather than take transit. From Gloucester County, only a very small number

of transit trips were generated. Even to Center City Philadelphia, transit shares from Gloucester County were less than 15%.

3.5 PLANNED AND PROPOSED DEVELOPMENT

3.5.1 TRANSPORTATION IMPROVEMENTS

Table 3-10 provides summaries of roadway and transit improvements that are scheduled for the study area. These projects were obtained from the following sources:

- Delaware Valley Regional Planning Commission (DVRPC): FY 2003-2005 Transportation Improvement Plan (TIP)
- SEPTA's FY 2003 Capital Budget and FY 2003-2014 Capital Program and Comprehensive Plan
- South Jersey Transportation Planning Organization (SJTPO): FY 2003-2005 TIP
- New Jersey Department of Transportation (NJDOT): FY 2003 Transportation Capital Program
- NJDOT: FY 2003-2014 Capital Program and Comprehensive Plan
- NJDOT: FY 2003-2005 Statewide TIP
- NJDOT: FY 2002-2004 Statewide TIP

Table 3-10: Major Planned Highway and Transit Improvements

Project	Sponsor	Municipality	Description
Highway			
I-295/I-76/Rt 42 Direct Connection	NJDOT	Bellmawr Bourough, NJ	Construction of four-lane viaduct to carry I-295 through the interchange with I-76 and Route 42 for $2.8 million.
I-295/Rt 42 Missing Movements	NJDOT	Bellmawr Bourough, NJ	Construction of new ramps between I-295 and Route 42 to address missing traffic movements for $22.6 million.
I-676 MLK Blvd. to Newton Ave.	NJDOT	Camden City, NJ	Widen the existing ramp, from eastbound Martin Luther King Blvd. to southbound I-676, to two lanes for $6.1 million.
Routes 41/42	NJDOT	Deptford Township, NJ	Widening and bridge rehabilitation of Route 41 from south of Deptford Center to Clements Bridge Road. Interchange improvements to Clements Bridge Road and Route 42 and Route 41 and Route 42 for $13.1 million.
Routes 47/40 Intersection Improvements	NJDOT	Franklin Township, NJ	Bridge replacement across the Shared Access railroad tracks. Intersection improvements and roadway widening including bicycle/pedestrian compatibility for $7 million.
Routes 47/322 High St. to Greentree Rd.	NJDOT	Glassboro Bourough, NJ	Construction of left turn lanes and wider through lanes on Route 47. Minimum widening and intersection improvements along Route 322 for $4.1 million.
I-95 at Vine St.	PennDOT	Philadelphia, PA	Rehabilitation of structures and roadway including operational improvements for $8 million.
Naval Base Access Road	PennDOT	Philadelphia, PA	Extension of Delaware Ave. southbound including new bridge into the Navy Yard for $4.2 million.
TRANSIT			
Delaware River Tram	DRPA	Camden, NJ-Philadelphia, PA	Construction of an aerial tramway between Camden and Philadelphia waterfronts for $40.0 million.
Market Street Elevated Reconstruction	SEPTA	Philadelphia, PA	Complete reconstruction of elevated superstructure, sub-structure, foundations, abutments, bearings and five stations for $420.0 million.

Project	Sponsor	Municipality	Description
Schuylkill Valley Metro	SEPTA/BA RTA	Philadelphia, PA-Reading, PA	The planning, design, engineering and construction of transportation improvements from Center City to Reading for $1.83 billion.

3.5.2 REAL ESTATE DEVELOPMENTS

Short and long term development is expected to continue shaping the built environment within the study area. Several existing activity centers are slated for expansion and new large-scale developments for both Center City locations and Southern New Jersey have the potential to further support transit services that provide essential connectivity. Currently, some of the largest proposed developments are summarized in **Table 3-11**.

Table 3-11: Summary of Planned Major Real Estate Developments

Planned Development	Description
Aquarium	Expansion of the New Jersey State Aquarium doubling original size for $40 million.
Radio Lofts	On-going and planned redevelopment of the RCA Victor ("Nipper") building near the Camden Waterfront, with plans for condominiums and retail space in an adjacent 10-story manufacturing building. Approximately 99 units, with 8,000 square feet of retail space for $22 million.
Rowan University	Expansion plans over the next 10 years quadrupling the size of the campus for a technology center, athletic fields and student housing for $530 million.
Millville Retail Center	Construction of a $40 million shopping center near the Millville Town Center on Route 47, providing up to 1,000 jobs.
Columbus Commons	Construction of a new shopping complex along Columbus Boulevard and Snyder Avenue for $55.5 million, providing 1,600 full-time jobs.
Meridian Towers	Rehabilitation of two 50+ story towers with approximately 500 residential luxury condominiums located immediately adjacent to city hall.
Philadelphia Navy Yard	Established master plan for 522 acres of the former Navy Yard including a 70-acre corporate center at the entrance, with future plans for mixed residential and commercial uses with the potential for creating 30,000 jobs. Master plan includes possible extension of the Broad Street Subway into the Navy Yard.
Penn's Landing	Proposals for redevelopment of the 13-acre parcel adjacent to the waterfront into a family–oriented entertainment venue.

3.6 PREVIOUS STUDIES

Over a 74-year period numerous studies have been undertaken and published proposing rail service to Southern New Jersey and improved transit access to Philadelphia. The studies have progressed from an initial mix of railroad and transit proposals to focus on rail rapid transit, generally describing frequent, electrified, high-speed service and around the clock service equivalent to the PATCO Speedline from Camden to Lindenwold. The quantity and frequency of studies indicates a continuing, long-term interest to introduce a new, high quality public transportation service. **Table 3-12** summaries these efforts.

Table 3-12: Previous Studies Summary

Title	Project Description
Report to the Senate and General Assembly, State of New Jersey (1931)	Recommended construction of rapid transit over the Delaware River Bridge (now the Ben Franklin Bridge) and a tunnel under the Delaware River Between NJ and P.A.
Report to the Senate and General Assembly, State of New Jersey (1932)	Recommended giving authority to the DRBJC to construct bridges and tunnels and joint operation of West Jersey Seashore Railroad and the AC Railroad.
Final Report to the Senate and General Assembly, State of New Jersey (1933)	Recommended electrifying the line, increasing train speed and lighter weight cars, without raising fares. Revised the physical consolidation plan.
Proposed SNJ Transit Lines (1938)	Examined four branches for the Bridge High Speed Line. Low cost using existing tracks.
Rapid Transit in SNJ (1946)	Examined multi-branch using existing railroad rights-of-way and alternate river crossings.
Supplementing Previous Reports on the Proposed SNJ Rapid Transit Lines. (1948)	Reviewed previous report including existing facilities, compared Southern New Jersey's growth to other areas with rapid transit and revised cost estimates, ridership and revenue.
SNJ Mass Transportation Survey (1956)	35 mile radius survey for additional transit facilities in Camden.
Plan For High Speed Mass Transit System Between PA and SNJ (1959)	Recommended connection of the Bridge Line to three suburban railroads to improve transportation in the area and save the right-of-ways.
Rapid Transit System for SNJ and PA (1960)	Proposed six rapid transit lines from central PA to NJ across Ben Franklin Bridge.
Proposed SNJ Haddonfield-Kirkwood Line Rapid Transit (1960)	Recommended the feasibility of a high speed line to Haddonfield and Kirkwood based on previous studies.
SNJ Rapid Transit System - Haddonfield-Kirkwood Line (1961)	Proposed Woodcrest Station site and dotted lines. Eventually led to construction of PATCO Speedline.
DRPA Mass Transportation Development Program (1975)	Recommended branches to Moorestown and Glassboro, extension from Lindenwold to Berlin and Atco.
Market Street West Transportation Study Final Report (1978)	Investigated transit access needs in the Market west area. Recommended a new Market-Frankford Station between 19th and 22nd Streets.
Lindenwold Hi-Speed Transit Line (1990)	Examined management and operations issues during the first 20 years of PATCO.
Feasibility Study for the Construction of a New Market-Frankford Line Station (1991)	Examined locations and layouts for new station on the Market-Frankford Line between 19th and 22nd Streets.
PM Oversight on the Camden Waterfront Mass Transportation Complex (1992)	Project Management Oversight for the FTA for ferry boat, pier and operator, parking garage and road improvement project.
Burlington-Gloucester Corridor Assessment Study (1991 - 1993)	Final Draft Report for NJT recommending further study for a proposed three-branch system.
Burlington-Gloucester MIS (1994)	Examined three branch system serving Camden Waterfront.
Camden-Trenton Rail Corridor, Special Study No. 2 (1996)	Investigated the feasibility of transit along the Bordentown Secondary (Riverside Line).
SNJ Light Rail Transit System, Project Definition, Revision 2.2 (1997)	Resulted in construction of Southern New Jersey Light Rail Transit System (River LINE) from Camden to Trenton.
PATCO Speedline Extension Study (1998)	Investigated ways to extend PATCO to serve 30th Street Station and University City.

3.7 STATEMENT OF NEEDS

The development of a statement of needs at the earliest stages of the Southern New Jersey to Philadelphia Transit Study establishes the fundamental framework for project development. It identifies transportation-related issues and problems in the study area and thereby establishes the basic mission to guide all subsequent analyses and investigations of potential improvements.

The transportation and community needs of the study area were developed through the public outreach process, technical analyses and agency coordination efforts. The major component to the development of the statement of needs was the comments received at the elected officials briefing, open houses and targeted outreach presentations/meetings. The primary objective of this effort was to listen to the public and develop needs of the study area prior to the identification of any transit opportunities.

Numerous needs were expressed during these sessions laying the groundwork for the development of the Southern New Jersey to Philadelphia Transit Study statement of needs:

1. Improve Transit Choices in the Study Area

- Increase rapid transit choices, allowing timely accessibility to jobs and recreational activities
- Provide access to the growing areas of Gloucester and Cumberland Counties
- Increase service levels on the existing public transportation system
- Improve access from the PATCO Speedline to job centers in Center City Philadelphia
- Enhance service and connections to the Philadelphia Waterfront

2. Reduce Congestion with Effective Transit Investments

- Provide alternative to severe congestion levels along roadway corridors such as NJ Route 42 and NJ Route 55
- Coordinate with the I-295/I-76/NJ Route 42 interchange improvement project
- Diminish reliance on the automobile with fast and effective transit alternatives

3. Utilize Existing Transportation Resources

- Maximize use of existing transportation assets such as highway medians or existing railroad right-of-ways
- Provide a direct connection into Philadelphia via existing PATCO Speedline
- Incorporate sufficient space for a transit guideway in the I-295/I-76/NJ Route 42 interchange project improvement
- Minimize impacts to the environment through use of existing physical resources

4. Develop a Transit Network that Conveniently Links People and Activity Centers

- Improve access to core areas of employment and redevelopment
- Provide better information about existing public transportation facilities
- Connect and serve commercial, institutional and medical activity centers
- Develop a common method to pay fares between transit systems

4 ALTERNATIVES DEVELOPMENT

The purpose of this chapter is to present and document the definition of alternatives as they were developed through public outreach, review of previous studies, technical analyses and evaluation by the study team. As shown in **Figure 4-1**, a long list of alternatives was developed for each of four sub-areas within the study area:

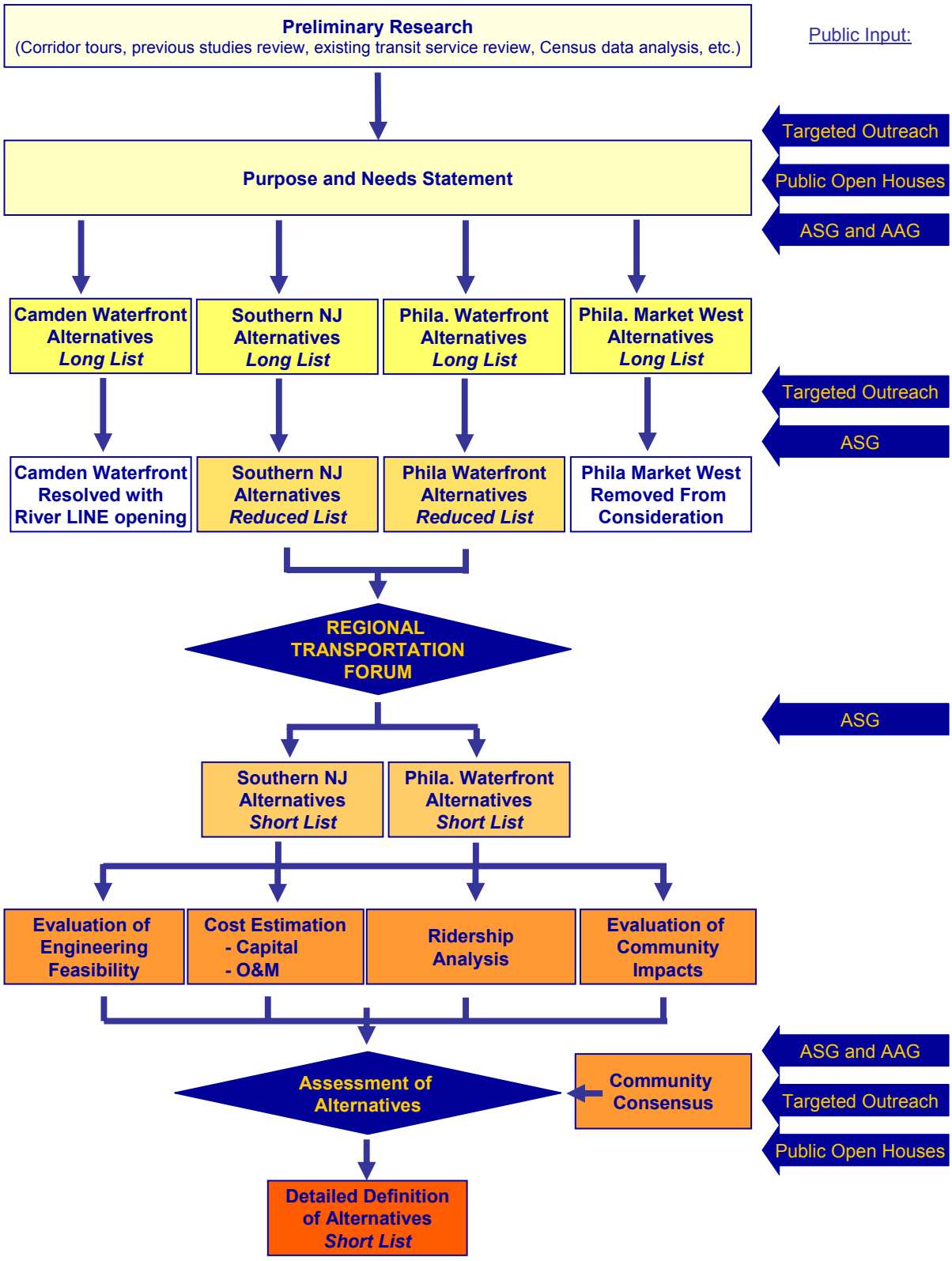
- **Southern New Jersey –** This sub-area encompasses all of Camden and Gloucester Counties and areas of Vineland and Millville proper. Major transportation routes, such as NJ Route 55 and NJ Route 42 as well as the PATCO Speedline are included in this area.
- **Camden Waterfront –** This sub-area is focused on the existing PATCO Speedline stations in downtown Camden and the waterfront attractions along the Delaware River in Camden, including entertainment/recreation venues, employment centers and residential redevelopment.
- **Philadelphia Market West –** This sub-area is focused upon improved connections from the existing PATCO Speedline system to the dense commercial development in Center City Philadelphia along Market Street west of City Hall.
- **Philadelphia Waterfront –** This sub-area is focused on connections from the existing PATCO Speedline and SEPTA bus and rail systems to waterfront destinations along the Delaware River in Philadelphia, including retail establishments and entertainment venues along Columbus Boulevard and Penn's Landing. Extensions to the Sports Complex and Navy Yard in South Philadelphia were also included in coordination with other regional transportation planning efforts being conducted by the Philadelphia Industrial Development Corporation and the Philadelphia City Planning Commission.

Following compilation of the long list, the alternatives were reviewed by the ASG, comprising members of DRPA and PATCO, where they were condensed into a "reduced list of alternatives" that more adequately satisfied the statement of needs of the study and represented the most feasible of the long list alternatives.

The reduced list of alternatives was developed in more detail and presented to the AAG, comprising a wide range of stakeholders, and public officials at the Regional Transportation Forum, held in October of 2003. After a full presentation by the study team and a group discussion, forum members voted for what they considered the most feasible and desirable of reduced list alternatives, resulting in a short list of 5 alternatives for further analysis and evaluation.

The characteristics of the short list of alternatives were further developed and refined including order of magnitude capital and operating cost estimates, market potential, access areas, travel times and public support.

Figure 4-1: Alternative Development Process



*ASG denotes the Assessment Steering Group; AAG denotes the Assessment Advisory Group

4.1 LONG LIST OF ALTERNATIVES

The long list of alternatives represents a broad range of potential opportunities to improve transit in the study area that were not limited by engineering feasibility, operability or other obvious constraints. Note that at the time the long list of alternatives was developed, New Jersey Transit's River LINE was not yet in operation and was referred to as the Southern New Jersey Light Rail Transit System (SNJLRTS). Throughout this report, all references to SNJLRTS have been changed to "River LINE" for overall consistency.

4.1.1 SOUTHERN NEW JERSEY ALTERNATIVES

The long list alternatives developed for the Southern New Jersey area focused on three modes:

- **PATCO –** Heavy rail mode identical to the existing PATCO Speedline with characteristics such as grade separated double-track alignment (unimpeded by automobile, pedestrian and freight train traffic), electric propulsion via a third rail, stainless steel air conditioned vehicles and stations with high platforms for easy access and egress. This technology would be characterized by frequent and rapid service from both park-and-ride and smaller urban area stations with no or minimal park-and-ride access. Stations would be fully automated with fare collection equipment, elevators and escalators.
- **Modified PATCO –** This mode would be similar to the existing PATCO Speedline described above and would be compatible with the existing PATCO Speedline equipment and alignment, however, the vehicles would be capable of receiving power via a pantograph and overhead catenary structure. The ability to switch between third rail and overhead power would allow the vehicles to operate on a partially grade-separated alignment with at-grade crossings at street intersections.
- **Diesel Light Rail –** This mode would be similar to the current technology used on the River LINE from Camden to Trenton. These vehicles generate their own electric power via an on-board diesel engine negating the need for third rail or overhead electric power infrastructure. This technology can operate on exclusive guideway or in-street (as in Camden) but could not merge with the PATCO Speedline to access Center City Philadelphia due to performance inequalities and electric only operation within Camden and Philadelphia tunnel structures. Stations could be low or high platform and fare collection would be based on a proof of payment method.

Six alternatives were developed for the Southern New Jersey portion of the study area. Alternatives 1 through 4 would include two phases of implementation. Phase I would provide service from Glassboro to Camden and Center City Philadelphia while Phase II would provide a limited connecting service from Millville or Williamstown to Glassboro. Alternative 5 would include only one phase of construction from Williamstown to Camden and Center City Philadelphia. Alternative 6 would also include only one phase of construction providing service from Grenloch Lake and Gloucester Township to Camden and Center City Philadelphia.

The long list Southern New Jersey Alternatives are:

Alternative 1: Glassboro/Millville to Philadelphia via NJ Route 55

Phase I - Alternative 1, shown on **Figure 4-2**, would be a PATCO or Modified PATCO style service beginning near Glassboro in the median of NJ Route 55 at Exit 50 and would extend north in the median to the convergence of NJ Routes 55 and 42. At this point the new service would rise above the southbound lanes of NJ Route 55 and continue north along the west side of NJ Route 42 and I-676 to Camden. Near Morgan Boulevard in Camden the alignment would enter the Conrail railroad right-of-way to cross under I-676 to the eastern side, where it would merge with the existing PATCO Speedline to downtown Camden and Philadelphia providing service to Walter Rand Transportation Center and City Hall in Camden, then 8th & Market, 9th/10th & Locust, 12th/13th & Locust and 15th/16th & Locust in Center City Philadelphia.

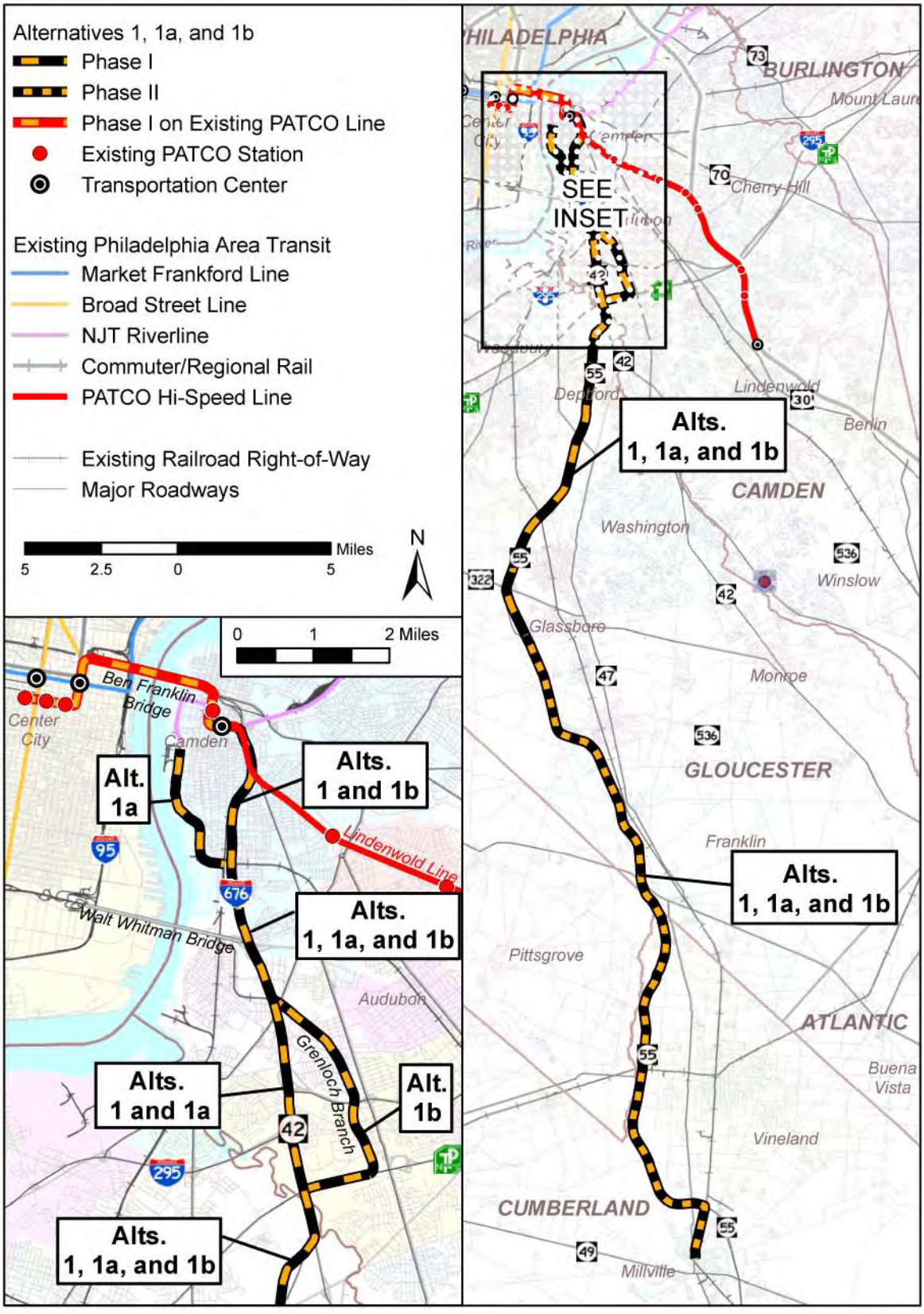
Transfers would be possible to the existing PATCO Speedline and the River LINE at the Walter Rand Transportation Center in Camden, to the Market-Frankford Line and the Broad-Ridge Spur of the Broad Street Subway at 8th & Market in Philadelphia and to the Broad Street Subway at 12th/13th & Locust and 15th/16th & Locust in Philadelphia.

Two variations were also developed for Phase I of Alternative 1:

- **Alternative 1a -** This variation would be operated with diesel light rail vehicles as an extension of the River LINE. The alignment would be identical to that of Alternative 1 from Glassboro to Morgan Boulevard in Camden. At Morgan Boulevard Alternative 1a would diverge from I-676 and enter an industrial branch of the Conrail railroad right-of-way to the Camden Waterfront and the end of the River LINE. Service in this alternative would continue through the Camden Waterfront area along the River LINE tracks and allow riders to transfer to the existing PATCO Speedline at Walter Rand Transportation Center at Broadway in Camden. Alternative 1a could end at Walter Rand or continue north as an extension of service on the current the River LINE.
- **Alternative 1b** – This alternative, operated with a PATCO or Modified PATCO vehicle, would be identical to Alternative 1 from Glassboro north in the median of NJ Route 55 and alongside of NJ Route 42 until it meets the New Jersey Turnpike at the border of Runnemede and Bellmawr. At this point Alternative 1b would leave NJ Route 42 and turn east along one side of the New Jersey Turnpike. Just before reaching the Black Horse Pike (NJ Route 168) it would turn north into the existing Grenloch Branch railroad right-of-way, which parallels the Blackhorse Pike for roughly 1 ½ miles before curving west toward I-76. Alternative 1b would leave the railroad right-of-way at I-76 and continue north alongside of I-76 and I-676 rejoining the alignment of Alternative 1 and continuing north to the railroad right-of-way as it crosses under I-676 and merges with the existing PATCO Speedline to downtown Camden and Center City Philadelphia.

Phase II - A connecting diesel light rail or commuter rail service could be operated from Millville to Glassboro, where riders could transfer to the Phase I service. This service would also travel in the median of NJ Route 55, but would operate less frequently than the Phase I service (likely hourly) due to a lower population density in the service area. Phase II would be the same for Alternatives 1, 1a and 1b.

Figure 4-2: Southern New Jersey Alternatives 1, 1a and 1b - Long List



Alternative 2: Glassboro/Millville to Philadelphia via Conrail Railroad Right-of-Way

Phase I – This alternative shown on **Figure 4-3**, would be a PATCO or Modified PATCO style service. It would begin in Glassboro and extend north on the existing Conrail railroad right-of-way to Camden. In Camden it would travel under I-676 and merge with the existing PATCO Speedline to downtown Camden and Philadelphia. The new service would travel along the existing PATCO Speedline alignment to Walter Rand Transportation Center and City Hall in Camden, then 8th & Market, 9th/10th & Locust, 12th/13th & Locust and 15th/16th & Locust in Center City Philadelphia.

Transfers would be possible to the existing PATCO Speedline and the River LINE at the Walter Rand Transportation Center in Camden, to the Market-Frankford Line and the Broad-Ridge Spur of the Broad Street Subway at 8th & Market in Philadelphia and to the Broad Street Subway at 12th/13th & Locust and 15th/16th & Locust in Philadelphia.

One variation was developed for Phase I of Alternative 2:

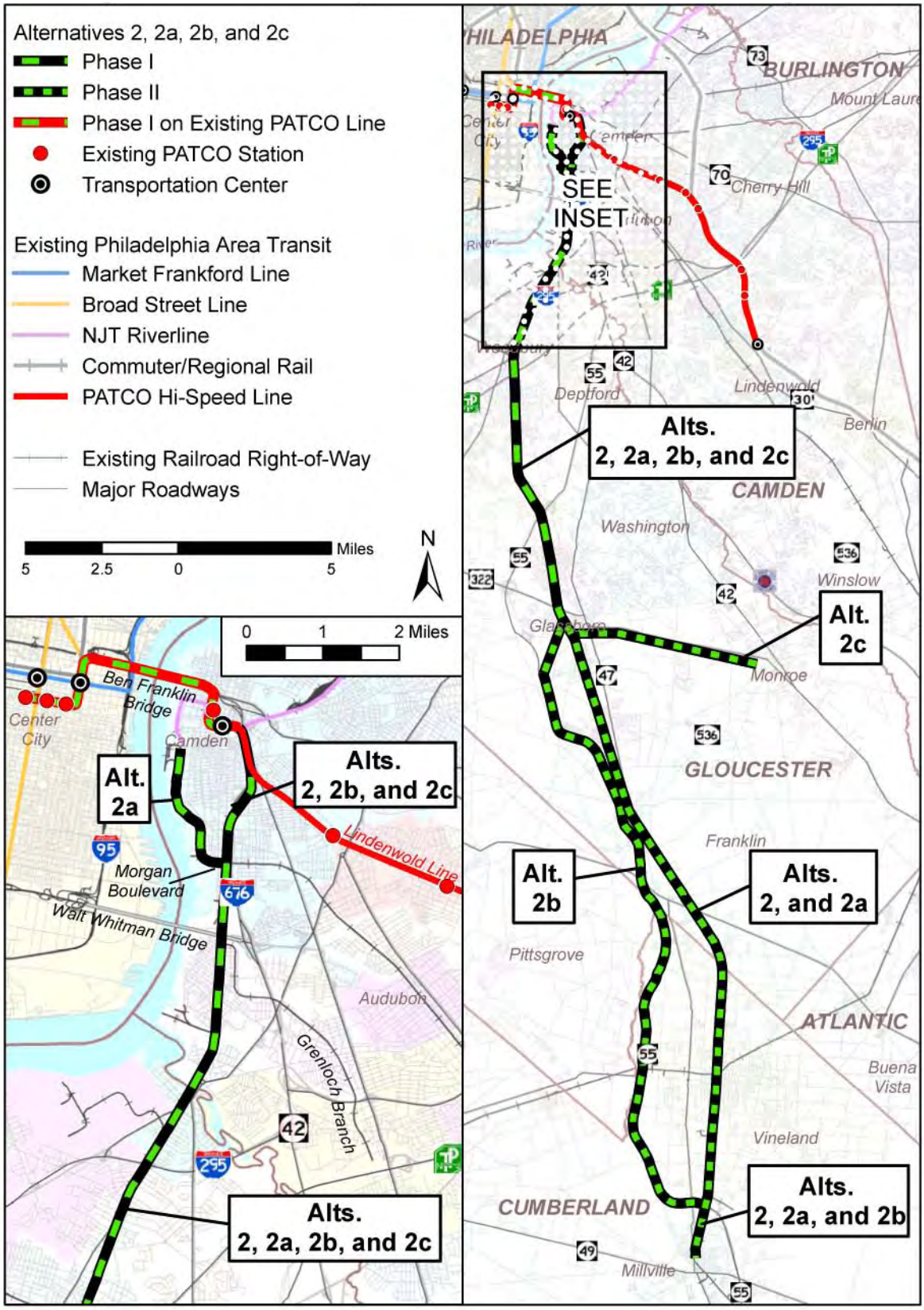
- **Alternative 2a -** This option would be operated with diesel light rail vehicles as an extension of the River LINE. The alignment would be identical to that of Alternative 2 from Glassboro to Morgan Boulevard in Camden. At Morgan Boulevard this alternative would diverge from the main Conrail railroad right-of-way and enter and industrial branch of the right-of-way to the Camden Waterfront and the end of the River LINE. Service in this alternative would continue through the Camden Waterfront area along the River LINE tracks and allow riders to transfer to the existing PATCO Speedline at Walter Rand Transportation Center in Camden. Alternative 2a could end there or continue north as the River LINE.

Phase II – A connecting diesel light rail or commuter rail service would be operated from Millville to Glassboro, where riders could transfer to the Phase I service. This service would also travel in the existing Conrail railroad right-of-way, but would operate less frequently than the Phase I service (likely hourly) due to a lower population density in the service area. Although the right-of-way is currently in use by freight trains, the tracks would require upgrading to accommodate passenger service.

Two variations were developed for Phase II of Alternative 2; both would be hourly diesel services and would connect to Phase I of Alternative 2 in Glassboro:

- **Alternative 2b** – Phase II of Alternative 2b would begin on the Conrail right-of-way in Millville and extend north to Exit 27 of NJ Route 55, where it would leave the railroad right-of-way and enter the median of NJ Route 55. It would continue north in the median of NJ Route 55 to a point between mile markers 46 and 47. It would leave the median and turn northeast into an abandoned railroad right-of-way (formerly of the Pennsylvania-Reading Seashore Lines, or PRSL) to Glassboro, where it would return to the main Conrail railroad right-of-way. In Glassboro transfers would be possible to the Phase I service to Camden and Philadelphia.
- **Alternative 2c** – Phase II of Alternative 2c would begin in Williamstown and extend west along abandoned railroad right-of-way paralleling U.S. Route 322 to Wilmer Street in Glassboro. The abandoned rail right-of-way is not entirely intact and would require additional investigation and analysis in subsequent phases of study. At Wilmer Street

Figure 4-3: Southern New Jersey Alternatives 2, 2a and 2b - Long List



Alternative 2c would turn north onto the Conrail railroad right-of-way and continue to Glassboro where a transfer could be made to Phase I service toward Camden and Center City Philadelphia.

Alternative 3: Glassboro/Millville to Philadelphia via Conrail Railroad Right-of-Way and NJ Route 55

Phase I - This alternative, shown on **Figure 4-4**, would be operated with PATCO or Modified PATCO vehicles. It would begin in Glassboro and extend north on the existing Conrail railroad right-of-way to NJ Route 55, near Exit 53. It would leave the railroad right-of-way at this point and continue north in the median of NJ Route 55, then alongside of NJ Route 42 and I-676 to Camden. Near Morgan Boulevard in Camden the alignment would enter the Conrail railroad right-of-way to cross under I-676 to the eastern side, where it would merge with the existing PATCO Speedline to downtown Camden and Philadelphia. The new service would travel along the existing PATCO Speedline alignment to Walter Rand Transportation Center and City Hall in Camden, then 8th & Market, 9th/10th & Locust, 12th/13th & Locust and 15th/16th & Locust in Center City Philadelphia.

Transfers would be possible to the existing PATCO Speedline and the River LINE at the Walter Rand Transportation Center in Camden, to the Market-Frankford Line and the Broad-Ridge Spur of the Broad Street Subway at 8th & Market in Philadelphia and to the Broad Street Subway at 12th/13th & Locust and 15th/16th & Locust in Philadelphia.

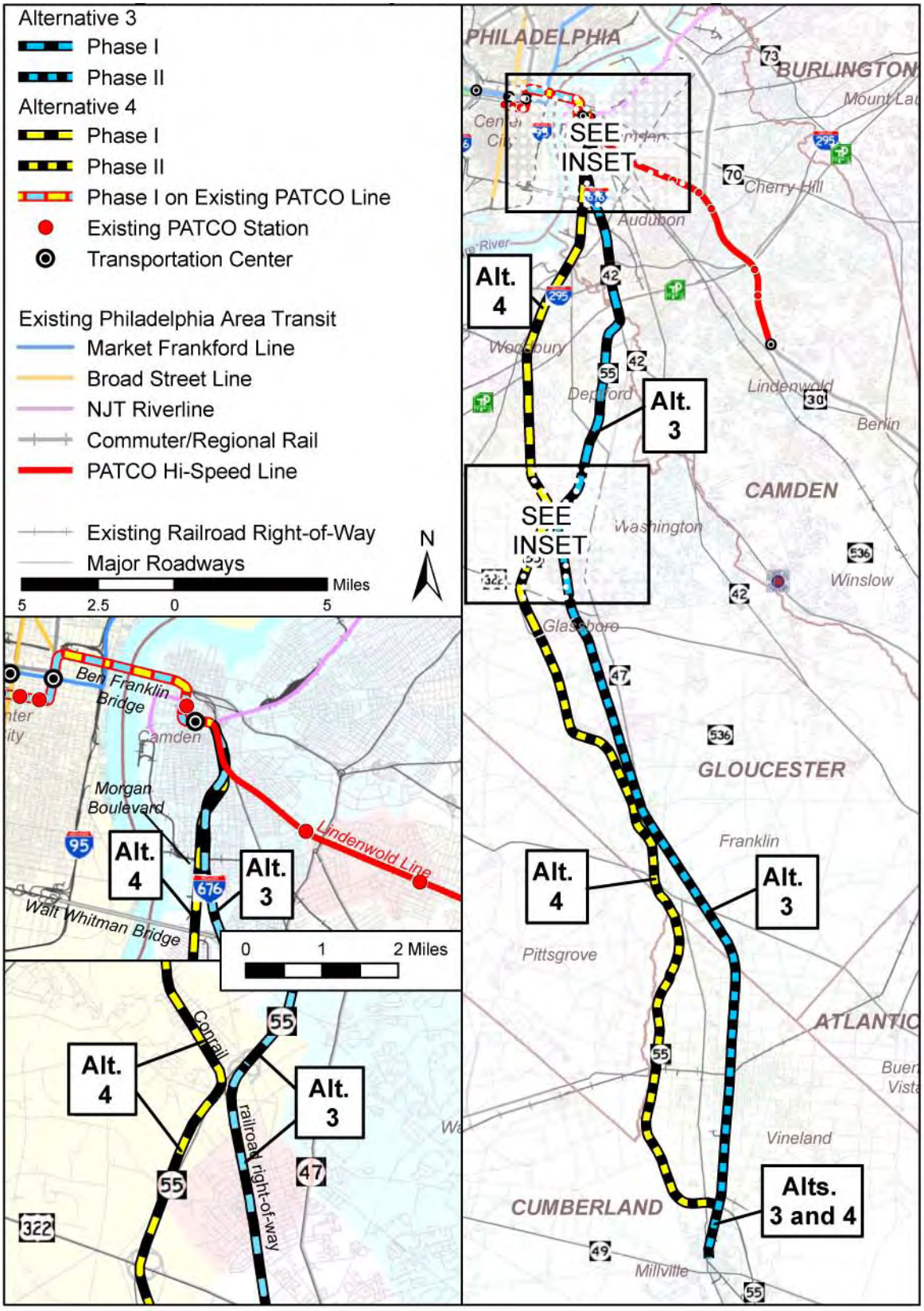
Phase II (identical to Phase II of Alternative 2) - A connecting diesel light rail or commuter rail service would be operated from Millville to Glassboro, where riders could transfer to the Phase I service. This service would also travel in the existing Conrail railroad right-of-way, but would operate less frequently than the Phase I service, likely hourly, due to a lower population density in the service area. Although the right-of-way is currently preserved, the tracks would have to be upgraded to accommodate passenger service.

Alternative 4: Glassboro/Millville to Philadelphia via NJ Route 55 and Conrail Railroad Right-of-Way

Phase I – This alternative, shown on **Figure 4-4**, would be operated with PATCO or Modified PATCO style vehicles. It would begin near Glassboro in the median of NJ Route 55 at Exit 50 and would extend north in the median to roughly Exit 53, where the Conrail railroad right-of-way crosses NJ Route 55 on an overpass. At this point Alternative 4 would leave the median of NJ Route 55 and continue north in the Conrail railroad right-of-way to Camden. In Camden it would travel under I-676 in Camden and merge with the existing PATCO Speedline to downtown Camden and Philadelphia. The new service would travel along the existing PATCO Speedline alignment to Walter Rand Transportation Center and City Hall in Camden, then 8th & Market, 9th/10th & Locust, 12th/13th & Locust and 15th/16th & Locust in Center City Philadelphia.

Transfers would be possible to the existing PATCO Speedline and the River LINE at the Walter Rand Transportation Center in Camden, to the Market-Frankford Line and the Broad-Ridge Spur of the Broad Street Subway at 8th & Market in Philadelphia and to the Broad Street Subway at 12th/13th & Locust and 15th/16th & Locust in Philadelphia.

Figure 4-4: Southern New Jersey Alternatives 3 and 4 - Long List



Phase II (identical to Phase II of Alternative 1) - A connecting diesel light rail or commuter rail service could be operated from Millville to Glassboro, where riders could transfer to the Phase I service. This service would also travel in the median of NJ Route 55, but would operate less frequently than the Phase I service (likely hourly) due to a lower population density in the service area.

Alternative 5: Extension of the PATCO Speedline to Berlin and Williamstown

This alternative, shown on **Figure 4-5**, would be an extension of the current PATCO Speedline from its present terminus at Lindenwold to Williamstown. Alternative 5 would extend southeast from the Lindenwold Station along the Conrail right-of-way that the current PATCO line follows to Lindenwold. It would stretch through the towns of Lindenwold and Berlin, making a stop at or near the current Berlin Station on New Jersey Transit's Atlantic City Line before turning southwest near NJ Spur 536. It would then continue southwest to Williamstown along an abandoned railroad right-of-way paralleling NJ Spur 536 to Williamstown.

Alternative 6: Grenloch Lake to Philadelphia via Grenloch Railroad Right-of-Way

This alternative, shown on **Figure 4-5**, would be operated with PATCO or Modified PATCO style vehicles. It would begin near Grenloch Lake and Camden County College. It would extend north along the abandoned Grenloch Branch railroad right-of-way, which parallels NJ Route 168 for roughly 6.5 miles before curving west toward I-76. Alternative 6 would leave the railroad right-of-way at I-76 and continue north alongside of I-76 and I-676 to Morgan Boulevard in Camden. At Morgan Boulevard it would enter the Conrail railroad right-of-way and follow it under I-676 and merge with the existing PATCO Speedline to downtown Camden and Center City Philadelphia.

Transfers would be possible to the existing PATCO Speedline and the River LINE at the Walter Rand Transportation Center in Camden, to the Market-Frankford Line and the Broad-Ridge Spur of the Broad Street Subway at 8th & Market in Philadelphia and to the Broad Street Subway at 12th/13th & Locust and 15th/16th & Locust in Philadelphia.

Reduction of Long List:

The long list of alternatives for Southern New Jersey is summarized in **Table 4-1**. Following evaluation by the ASG and the study team, six alternatives were removed from consideration and the remaining five alternatives were advanced to the reduced list of alternatives.

The six Southern New Jersey Alternatives that were not advanced are:

- **Alternative 1b:** The indirect routing of this alternative due to the use of the Grenloch Branch would significantly increase the running time compared to other alternatives without providing other benefits to riders and would also have less cost effective operation and maintenance costs as a result. One benefit however, is that this alignment would avoid traveling along the part of I-676, where expensive elevated and retained structure would be required including in the area of the I-295 /I-76/NJ42 Direct Connection Study. However, these cost savings could be negated by the cost for elevated structure along the New Jersey Turnpike (including wetland mitigations) and an overall longer alignment that would increase travel times and operating costs. As a

Figure 4-5: Southern New Jersey Alternatives 5 and 6 - Long List

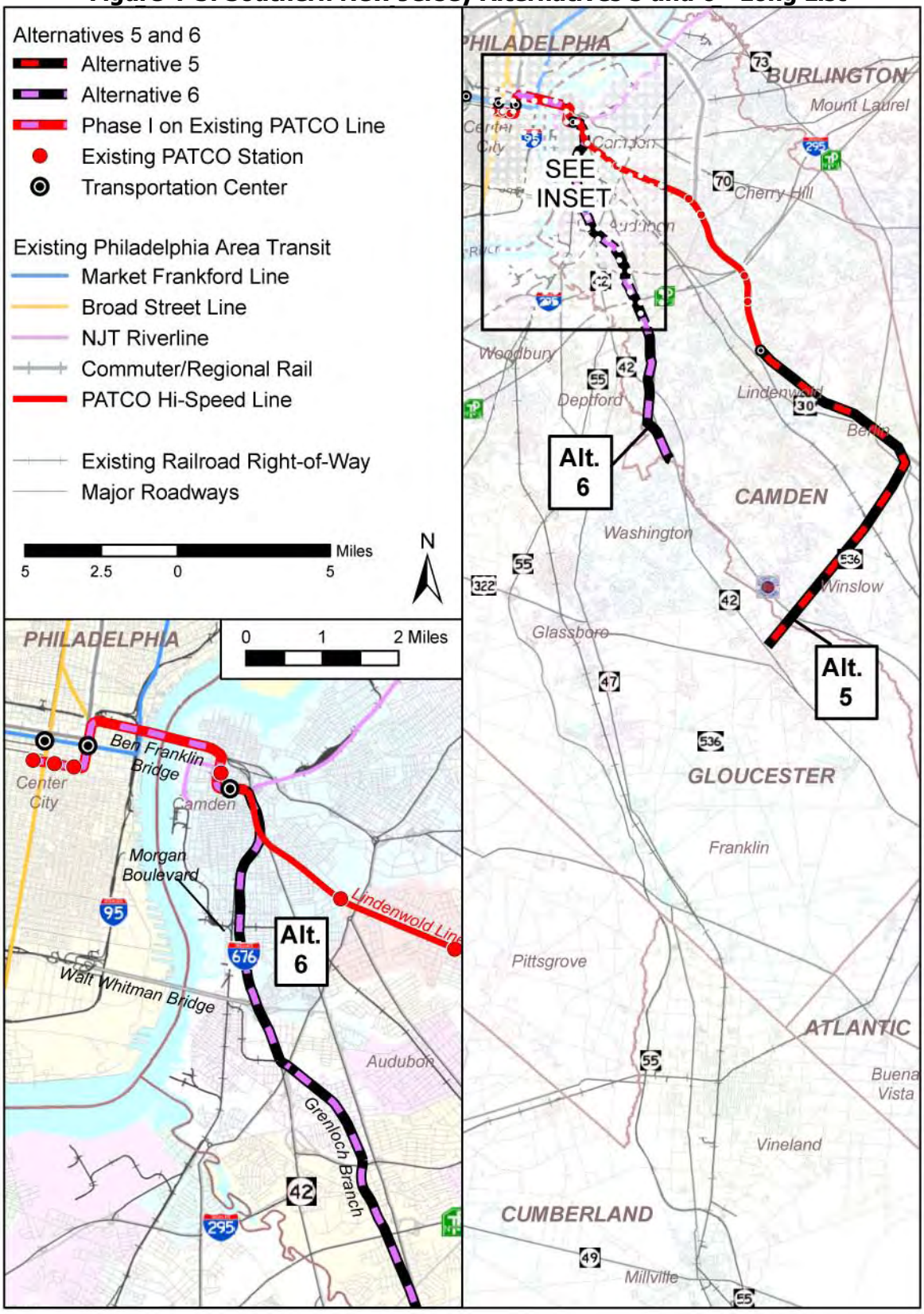


Table 4-1: Southern New Jersey Alternatives - Long List Summary

<table>
<tr><th rowspan="2">Alternative*</th><th colspan="3">Phase I</th><th colspan="3">Phase II</th><th rowspan="2">Capital Cost</th><th rowspan="2">O&M Cost</th></tr>
<tr><th>Termini</th><th>Mode</th><th>Alignment*</th><th>Termini</th><th>Mode</th><th>Alignment*</th></tr>
<tr><td>1
Glassboro/Millville to Philadelphia via NJ Route 55</td><td>Glassboro & Philadelphia</td><td>PATCO or Modified PATCO</td><td>NJ Routes 55 and 42, I-676, PATCO</td><td rowspan="6">Millville & Glassboro</td><td>Diesel Commuter Trains</td><td rowspan="2">Conrail, NJ Route 55</td><td rowspan="2">Medium-High</td><td rowspan="11">Medium</td></tr>
<tr><td>1a
Glassboro/Millville to Camden via NJ Route 55 – Diesel Light Rail</td><td>Glassboro & Camden</td><td>Diesel Light Rail</td><td>NJ Routes 55 and 42, I-676, Conrail industrial</td><td>Diesel Light Rail</td></tr>
<tr><td>1b
Glassboro/Millville to Philadelphia via NJ Route 55, NJ Turnpike and Grenloch RR ROW</td><td rowspan="2">Glassboro & Philadelphia</td><td rowspan="2">PATCO or Modified PATCO</td><td>NJ Routes 55 and 42, NJ Turnpike, Grenloch, I-676, PATCO</td><td rowspan="2">Diesel Commuter Trains</td><td rowspan="3">Conrail, NJ Route 55</td><td rowspan="3">Medium-High</td></tr>
<tr><td>2
Glassboro/Millville to Philadelphia via Conrail RR ROW</td><td>Conrail, PATCO</td></tr>
<tr><td>2a
Glassboro/Millville to Philadelphia via Conrail RR ROW - Diesel Light Rail</td><td>Glassboro & Camden</td><td>Diesel Light Rail</td><td>Conrail, Conrail industrial</td><td>Diesel Light Rail</td><td rowspan="2">Conrail</td></tr>
<tr><td>2b
Glassboro/Millville to Philadelphia via Conrail RR ROW and abandoned PRLS RR ROW</td><td rowspan="4">Glassboro & Philadelphia</td><td rowspan="6">PATCO or Modified PATCO</td><td rowspan="2">Conrail, PATCO</td><td rowspan="4">Diesel Commuter Trains</td><td>Conrail, NJ Route 55, PRSL</td><td rowspan="3">Medium</td></tr>
<tr><td>2c
Glassboro/Williamstown to Philadelphia via Conrail RR ROW</td><td>Williamstown & Glassboro</td><td>Abandoned RR ROW along U.S. Route 322</td></tr>
<tr><td>3
Glassboro/Millville to Philadelphia via Conrail RR ROW and NJ Route 55</td><td>Conrail, NJ Routes 55 and 42, I-676, PATCO</td><td rowspan="2">Millville & Glassboro</td><td>Conrail</td><td rowspan="2">Medium-High</td></tr>
<tr><td>4
Glassboro/Millville to Philadelphia via NJ Route 55 and Conrail RR ROW</td><td>NJ Route 55, Conrail, PATCO</td><td>NJ Route 55</td></tr>
<tr><td>5
Extension of PATCO to Berlin and Williamstown</td><td>Williamstown & Lindenwold</td><td>Abandoned RR ROW parallel to NJ Spur 536, Conrail</td><td colspan="3" rowspan="2">no Phase II</td><td rowspan="2">Low-Medium</td><td rowspan="2">Low-Medium</td></tr>
<tr><td>6
Grenloch Lake to Philadelphia via Grenloch RR ROW</td><td>Grenloch Lake & Philadelphia</td><td>Grenloch, I-676, PATCO</td></tr>
</table>

* PATCO refers to the existing PATCO Speedline; Conrail refers to a Conrail railroad right-of-way; Grenloch refers to the abandoned Grenloch Branch railroad right-of-way; PRSL refers to the abandoned railroad right-of-way in Glassboro formerly owned by the Pennsylvania-Reading Seashore Lines, Abandoned RR ROW refers to an unnamed, abandoned railroad right-of-way.

result this alterative was not deemed as a high level opportunity for rapid transit and was not advanced.

- **Alternative 2b:** It was determined that the former PRSL railroad right-of-way that would be used to connect this alignment from NJ Route 55 northeast to Glassboro is no longer available for use as a rail corridor and as a result was not advanced to the reduced list of alternatives.
- **Alternative 2c:** The railroad right-of-way between Glassboro and Williamstown (parallel to U.S. Route 322) is not entirely intact with parts of the alignment transformed into a bike path and pedestrian walkway. This alternative was not considered as a high-level opportunity for rapid transit and was not advanced.
- **Alternatives 3 and 4:** Although these alternatives would be feasible the study team and ASG determined advancing alternatives 1 and 2 at this stage of study would provide a better means to gauge public opinion of rail service on the Conrail railroad right-of-way or NJ Routes 55 and 42 and I-676 rights-of-way. Since all alternatives could be reinvestigated in future studies, eliminating alternatives 3 and 4 does not preclude their reemergence in future phases of study especially if public opinion supported the analysis.
- **Alternative 6:** The extension of the PATCO Speedline service to the Grenloch Lake area along NJ Route 42 does not provide access to a core area of growth in Southern New Jersey and was considered not as viable or meritorious as the other alternatives in the long list.

These five alternatives were advanced to the reduced list of alternatives:

- **Alternatives 1 and 1a:** Retained for further analysis and evaluation due to their use of existing rights-of-way and directness from end to end.

  Alternatives 2 and 2a: Retained for further analysis and evaluation due to their use of existing railroad right-of-way and directness from end to end. Both alternatives also provide excellent and direct service to local towns in Southern New Jersey and support the state's goal of Smart Growth.
- **Alternative 5:** Retained for further analysis because it would increase the service area of the existing PATCO Speedline and bring it closer to the communities in the NJ Route 55 Corridor. It could also help to increase ridership on an already well-liked system. Additionally it provides a point of comparison for the other alternatives that are all focused along NJ Route 55 and the Conrail rail right-of-way.

4.1.2 CAMDEN WATERFRONT ALTERNATIVES

The Camden waterfront is an area that is steadily being revitalized through deliberate investment from parties such as the State of New Jersey, the Delaware River Port Authority and several private investors. Some of the new attractions include the New Jersey State Aquarium, the Battleship New Jersey Museum, the Tweeter Center indoor/outdoor amphitheatre and Campbell's Field – Home to the Camden Riversharks minor league baseball team. The waterfront also includes Rutgers University, DRPA Administrative Offices, luxury apartments in the newly renovated Nipper Building (original home of the Victor Talking Machine Company, later the RCA Victor Company) with more residential, recreational and commercial development expected in the future.

Downtown Camden is served by two stations on the PATCO Speedline at City Hall (5th and Market Streets) and the Walter Rand Transportation Center (Broadway and Mickle Boulevard) an important transfer point for New Jersey Transit buses and the River LINE. At the time of this analysis, the most obvious shortfall in transit service within downtown Camden was the ability to distribute passengers once they arrived at Walter Rand. With the new influx of development along the riverfront it has become increasingly important to introduce a link between the PATCO Speedline and the waterfront destinations nearby. Six Camden Waterfront alternatives were developed to address this need as shown on **Figure 4-6** and as summarized in **Table 4-2**:

Alternative 1: Bus Shuttle from Walter Rand Transportation Center to Camden Waterfront

This alternative would be a bus shuttle between Walter Rand Transportation Center and the New Jersey State Aquarium that would travel west on Mickle Boulevard, north on Riverside Drive, stop at the New Jersey State Aquarium, then continue east on Federal Street back to Walter Rand Transportation Center. As an option to a new bus route, NJT buses 450, 452 and 457 could be restructured to each travel the same loop through Camden from Walter Rand and be spaced more evenly. This alone would provide a loop at least every 15 minutes during most of the day. NJT could potentially be contracted to add a few more loops when necessary. Conspicuous signage, shelters and appropriate transfer fares from the PATCO Speedline would also be an integral part of this alternative using either method.

Alternative 2: Increased Service on River LINE in Camden

This alternative would increase the proposed service on the River LINE (every 30 minutes) between Walter Rand Transportation Center and the Tweeter Center. It could be operated by the DBOM Operator through renegotiation of their contract, or by PATCO through a negotiation of trackage rights. Two additional vehicles would be required to provide service at 10-minute headways. A fare agreement would be made between the PATCO Speedline and the River LINE/NJT to make the transfer affordable and desirable. Conspicuous signage showing the light rail route, schedule/headways and directions to the River Line from the PATCO Speedline would be an integral part of the alternative.

One variation was developed for this alternative:

- **Alternative 2a** – This alternative would be identical to Alternative 2, but would use electric light rail vehicles. Two additional vehicles would be required to provide service at 10-minute headways in addition to electrification of the right-of-way in Camden

Alternative 3: New PATCO Speedline Branch to Camden Waterfront

This alternative would be a new branch of the PATCO Speedline and would operate with PATCO or Modified PATCO vehicles (as described previously in Section **4.1.1**). The extension would begin under the Ben Franklin Bridge, where the existing line begins its ascent over the Delaware River. At this location there is currently a turnout to reach a storage track under the bridge. The storage track would be extended and utilized as the new branch to the Waterfront. It would stretch west toward the river and turn south just before reaching the bridge anchorage. The extension would curve around the minor league baseball park, Campbell's Field and continue south to the New Jersey State Aquarium. The new branch could be operated with through service to Southern New Jersey or as a shuttle between Walter Rand Transportation Center and the waterfront.

Figure 4-6: Camden Waterfront Alternatives - Long List

Alternative 4: People Mover from Walter Rand Transportation Center to Camden Waterfront

This alternative is a people mover from Walter Rand Transportation Center to the waterfront. From Walter Rand it would travel from west, elevated along the median of Mickle Boulevard, to just west of 3rd Street, where it would diverge from the street and travel alongside Mickle Boulevard to preserve the view of Wiggins Circle. It would terminate next to the parking garage at the New Jersey State Aquarium. The system would run without an operator, similar to people movers in an airport and would have CCTV at the two stations and inside the vehicles. It could be monitored along with the other PATCO Speedline stations at the central office. The route is about ½ mile per direction and would have a passing siding mid-way to allow operation of two trains simultaneously.

Alternative 5: New PATCO Speedline Station on Ben Franklin Bridge

This alternative consists of a new PATCO Speedline station at the eastern anchorage of the Ben Franklin Bridge. When the bridge was built, provision was made for streetcar tracks where the outer vehicular lanes are now located, plus streetcar stations at the anchorages with elevators to transport passengers to ground level. The streetcar tracks and the stations were never completed. Construction of station platforms on the anchorage, at which the PATCO Speedline trains could stop, would allow access to the Camden waterfront from the PATCO Speedline via elevator.

Reduction of Long List:

The long list of Camden Waterfront Alternatives is summarized in **Table 4-2**. It was decided that in light of the impending opening of the River LINE's light rail service through Camden, the only logical investment would be to implement a bus shuttle in the interim. The other alternatives would be cost intensive and unnecessary after service begins on the River LINE. Once the River LINE begins operation, any bus shuttle implemented should be ended, and an information campaign should be implemented to alert riders and potential riders of the convenient link provided by the River LINE to the waterfront area. Information should be made available at the Walter Rand Transportation Center and on the DRPA website as to how and where to transfer onto the River LINE.

Table 4-2: Camden Waterfront Alternatives – Long List Summary

Alternative*	Mode	Alignment/Location	Capital Costs	O&M Costs
1 Bus Shuttle between WRTC and Waterfront Attractions	Bus	Mickle Boulevard, Riverside Boulevard, Federal Street, Broadway	Low	Low
2 Increased Service on River LINE in Camden – Diesel LRT	Diesel Light Rail	Existing River LINE alignment: 3rd Street, Cooper Street, Delaware Avenue	Low-Medium	Low
2a Increased Service on River LINE in Camden – Electric LRT	Electric Light Rail		Medium	Low
3 Extension/New Branch of PATCO to Camden Waterfront	PATCO or Modified PATCO	Under Ben Franklin Bridge, along waterfront	Medium-High	Medium
4 People Mover between WRTC and Waterfront Attractions	Automated People Mover	Mickle Boulevard	High	Medium
5 New PATCO Station on Ben Franklin Bridge	New Station	Eastern Ben Franklin Bridge Abutment	High	Low

*Under Alternative, WRTC refers to the Walter Rand Transportation Center.

The discussion of Camden Waterfront alternatives was considered concluded at this point and no alternatives from this portion of the study area were carried over to the reduced or short lists for further evaluation.

4.1.3 PHILADELPHIA MARKET WEST ALTERNATIVES

Many of the riders on the PATCO Speedline are destined for the portion of the Philadelphia business district located west of City Hall along Market Street, called Market West. This area includes many of the newer high-rise buildings, built after the late 1980's when developers first began to build taller than William Penn, atop City Hall.

While the area is served by the Market-Frankford Line (MFL) and the Subway-Surface Lines (SSL), to reach the area between 15th Street and 30th Street, a PATCO rider must make two transfers, one to the MFL at 8th Street and one to the SSL at 13th or 15th Street. The multiple transfers and the need to purchase two separate fares (one for the PATCO Speedline and one for SEPTA) are deterrents for some potential riders. Many prefer to ride to the 16th and Locust station of the PATCO Speedline and walk to their destination from there – generally five blocks (½ mile) or more – something that can be unpleasant in bad weather.

Alternative 1: PATCO Speedline Extension to 20th & Locust/Walnut Streets

This alternative, shown on Figure 4-7, would be an extension of the existing PATCO Speedline westward from 16th and Locust Streets to 20th Street on either Locust or Walnut Street. This would require tunneling underneath Rittenhouse Square, a popular park, or under Walnut Street, a busy through Street. The extension would bring PATCO riders closer to the Market West area without the need to transfer, but the center of Market West would still be north of the PATCO Speedline end station.

Two variations were developed for this alternative:

- **Alternative 1a** – This alternative would be an additional westward extension of Alternative 1 to 24th/25th Street beneath either Locust or Walnut Street. The alignment would then be at grade along the Schulykill River and travel north along the CSX right-of-way to JFK Boulevard or Arch Street. Passengers could reach Arch Street, JFK Boulevard or 30th Street Station via new walkways or moving walkways included in this alternative. New stations would be located in the vicinity of 20th Street and at the end of the line. An agreement would have to be reached between the City of Philadelphia and CSX to share the railroad right-of-way along the river.
- **Alternative 1b** - This alternative would be an additional westward extension of Alternative 1 to 30th Street Station. The PATCO Speedline would be extended beneath Locust Street and Rittenhouse Square and in a deep tunnel under the Schulykill River, before turning north on the west side of the river and ascending to ground level under 30th Street Station. A new station would be located in the vicinity of 20th Street and at the end of the line at 30th Street Station. The PATCO Speedline would have exclusive use of one of the platforms at 30th Street Station in order to install the same fare collection system used at other PATCO Speedline stations.

Alternative 2: New Station on Market-Frankford Line

This alternative, shown on Figure 4-7, would be the addition of a new side platform station on the Market-Frankford Line between 20th and 21st Streets, as recommended in a previous study of station alternatives to provide a one-transfer connection from the PATCO Speedline to Market West. The Subway-Surface Lines straddling the MFL would be displaced outwards to create space for the

new MFL platforms. Entrances to the MFL station would be at 20th and 21st Streets from stairways on the sidewalks and from lower floors of neighboring commercial buildings. The entrances would lead directly to a mezzanine level under the sidewalk, where passengers would pay their fares. Two sets of stairs would take passengers under the SSL and then back up on the other side to the new MFL platform. Construction of a station with this layout would cause minimal disruption to the MFL and SSL services. The displacement of the SSL would create some service disruptions, but once it is complete, the new station platform could be built with minimal disruption to either rail service.

Alternative 3: Improvements to Pedestrian Concourses

This alternative, shown on Figure 4-7, would consist of improvements to the existing Pedestrian concourse system under Market Street and Broad Street. The concourse would be extended where necessary to make the current system more continuous and navigable. This would allow PATCO riders to access Market West from the PATCO Speedline stations while protected from the elements and without the need for a joint fare. Additional improvements would include installation of surveillance cameras and call buttons for security and/or an increase in the number of police/security personnel present in the concourses.

There would be additional informational improvements including more maps showing the layout of the entire system and directions to key locations. Cosmetic improvements would also be made to make the environment more inviting. In some locations near rail stations noise-mitigating measures could also be implemented.

Moving walkways could also be installed where space permits, but there would be few locations where this would be feasible. Space would have to be left open next to the walkways to allow closing them in the instance of a breakdown. An agreement would have to be reached as to whether the City of Philadelphia or PATCO would install and maintain the moving walkways.

Alternative 4: Extension of Subway-Surface Lines to 8th & Market

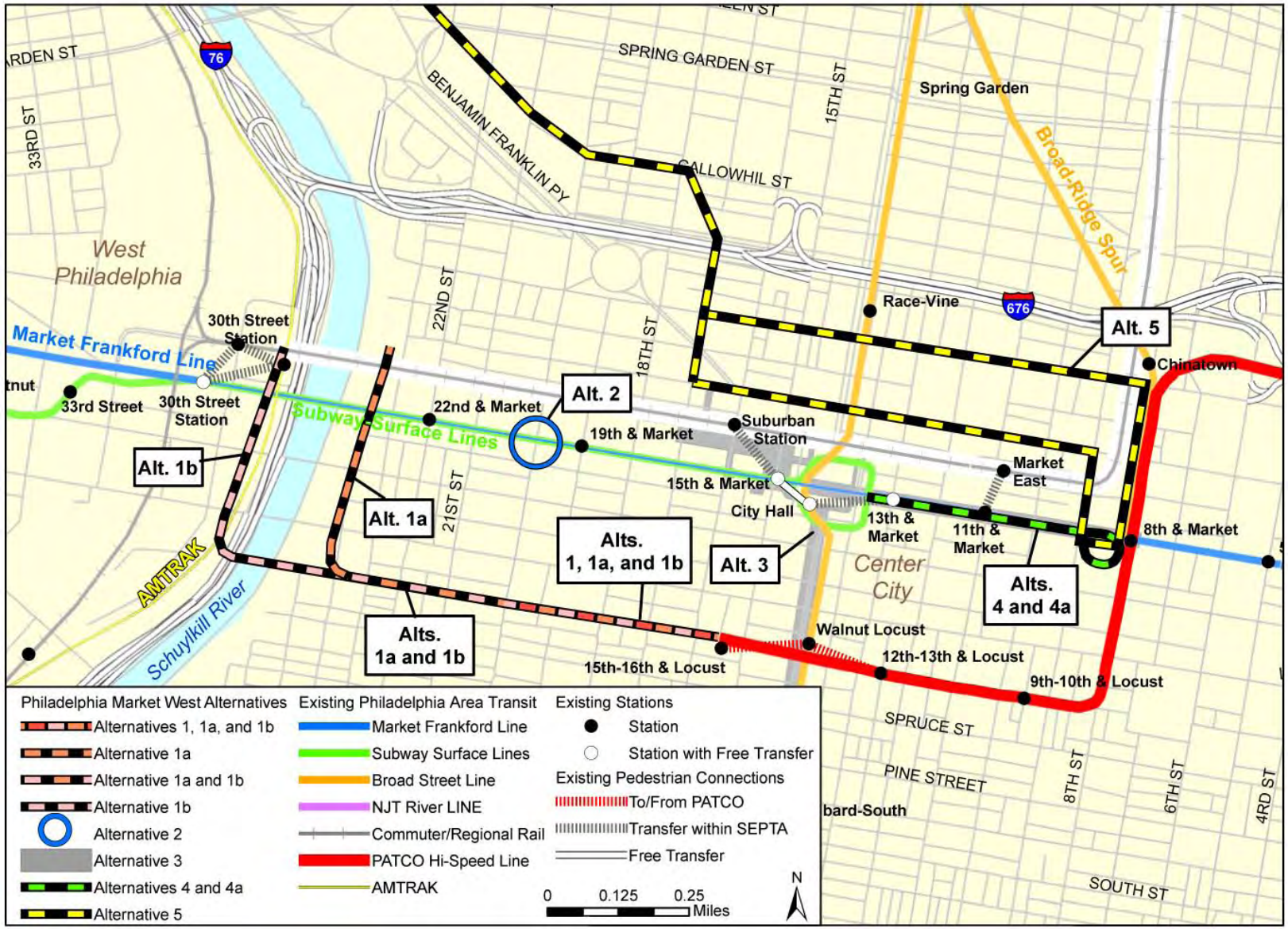
This alternative, shown on Figure 4-7, would be an extension of SEPTA's Subway-Surface Lines from their present terminus at Market and Juniper Streets to 8th and Market, where they would connect with the PATCO Speedline, the Broad-Ridge Spur and the MFL. The extension would be underground, either alongside the MFL as is done between 15th and 30th streets – would require changes to the MFL station platforms at 11th Street, or underneath the MFL – at Juniper Street it is already below the MFL.

Since the Subway-Surface cars are single ended, there would have to be a new turnaround loop installed at 8th Street. The southwest corner of 8th and Market Streets is currently a surface parking lot. This could be a possible location for a turnaround loop. The SSL tracks would have to travel under the existing MFL to pass from the south to the north side when changing directions. This would be less difficult if done on the west side of 8th Street. At 8th Street the SSL would have to be deep enough to be underneath both the MFL and the PATCO Speedline.

One variation was developed for this alternative:

- **Alternative 4a** –This alternative would be similar to Alternative 4, but the alignment on Market Street (between Juniper and 8th Streets) would be at-grade, not underground. The existing Subway-Surface Lines would emerge from the tunnel at portals near 11th Street in the current

Figure 4-7: Philadelphia Market West Alternatives - Long List



bus lanes. From there, the lines would continue east to 8th Street in the outside lanes of Market Street, which they would share with buses.

Alternative 5: Extension of 52nd Street Trolley to 8th & Market

This alternative, shown on Figure 4-7, would be extension of SEPTA's 52nd Street trolley, currently under study, to the existing SEPTA/PATCO Speedline station at 8th and Market.

The 52nd Street Trolley would extend from the vicinity of 52nd Street at the R5/R6 Regional Rail Line to near 12th and Arch/Race Streets via the Philadelphia Zoo and the Philadelphia Museum of Art.

Should the 52nd Street trolley be built, it could be extended at-grade from the proposed station at 12th and Race/Arch Streets to the 8th & Market PATCO Speedline/SEPTA station via Race and 8th Streets. In the reverse direction it could travel west via Market, 9th and Arch Streets.

This extension would provide a transfer possibility for PATCO Speedline passengers at 8th & Market to reach Market West, the Art Museum, Boathouse Row and the Riverpath on the Schuylkill, the Zoo and West Philadelphia.

Reduction of Long List:

The long list of Market West alternatives is summarized in

Table 4-3. Following evaluation by the ASG and the study team, all eight alternatives were removed from further evaluation in the reduced list of alternatives.

These seven Market West Alternatives were not advanced to the reduced list of alternatives:

- **Alternatives 1 and 1a:** These alternatives would have high capital costs and environmental impacts (at Rittenhouse Square), but would only minimally improve service to Market West. The existing infrastructure already serves Market West, but with two transfers. Comments received from the AAG and the general public revealed that given the frequent peak period service on the SSL and MFL, the need to purchase two fares is possibly a greater deterrent to riders than are the two transfers required to reach Market West from PATCO.
- **Alternative 1b:** This alternative would have high capital costs and environmental impacts (at Rittenhouse Square), but would only minimally improve service to Market West. The existing rail transit infrastructure already provides a service to 30th Street Station with one transfer instead of the one-seat ride that Alternative 1b would provide. Comments received from the AAG and the general public revealed that given the frequent peak period service on the SSL and MFL, the need to purchase two fares is possibly a greater deterrent to riders than the two transfers required to reach Market West from PATCO or the one transfer to reach 30th Street Station. Therefore a joint fare structure between PATCO and SEPTA seems to be a more beneficial and cost-effective improvement to the current transit system.

  Alternative 2: While a new station on the MFL seems feasible, it would requie a significant capital investment to remove one transfer on a trip from Southern New Jersey to Market West. As with alternatives 1, 1a and 1b, based on comments received from the AAG and the general public the need to purchase two fares is possibly a greater deterrent to riders than the two transfers required to reach Market West from PATCO. Therefore a joint fare

structure between PATCO and SEPTA seems to be a more beneficial and cost-effective improvement to the current transit system.

Table 4-3: Philadelphia Market West Alternatives - Long List Summary

Alternative	Mode	Alignment/Location	Capital Costs	O&M Costs
1 PATCO Extension to 20th & Locust/Walnut	PATCO	Locust or Walnut Street (underground)	High	Medium
1a PATCO Extension to Schuylkill and JFK/Arch		Locust or Walnut Street (underground) and CSX along Schuylkill River	Very High	Medium
1b PATCO Extension to 30th Street Station		Locust or Walnut Street (underground), under Schuylkill River, Amtrak	Very High	Medium
2 New Station on MFL	New Station	20th/21st Streets and Market Street (underground)	Medium	Low
3 Improvements to Pedestrian Concourse	Pedestrian	Market Street between 8th Street and Market West Area	Medium	Low-Medium
4 Underground Extension of SSL to 8th & Market	SEPTA SSL Trolley	Market Street (underground)	Very High	Medium
4a At-Grade Extension of SSL to 8th & Market		Market Street (at-grade)	High	Medium
5 Extension of 52nd Street Trolley to 8th & Market	Heritage or Modern Trolley	Arch, Race, 8th, and 9th Streets, Columbus Boulevard	High	Medium

*Under Alignment/Location, CSX refers to CSX railroad right-of-way, Amtrak refers to Amtrak railroad right-of-way at 30th Street Station.

- **Alternative 4:** Although an extension of the SSL to 8th Street, would eliminate one transfer between Southern New Jersey and Market West, comments received from the AAG and the general public revealed that given the frequent peak period service on the SSL and MFL, the need to purchase two fares is possibly a greater deterrent to riders than the two transfers required to reach Market West from PATCO. Therefore a joint fare structure between PATCO and SEPTA seems to be a more beneficial and cost-effective improvement to the current transit system.
- **Alternative 4a:** While an extension of the SSL to 8th Street, would eliminate one transfer between Southern New Jersey and Market West, comments received from the AAG and the general public revealed that given the frequent peak period service on the SSL and MFL, the need to purchase two fares is possibly a greater deterrent to riders than the two transfers required to reach Market West from PATCO. It also does not seem logical to reintroduce surface rail transit back into the congestion on Market Street. Therefore a joint fare structure between PATCO and SEPTA seems to be a more beneficial and cost-effective improvement to the current transit system.
- **Alternative 5:** As with alternative 4a, it does not seem logical to reintroduce surface rail transit back onto Market Street. It is also uncertain if and when the 52nd Street trolley

might be constructed, and it does not seem appropriate to plan an alternative as part of another project that might not be built.

Discussions within the ASG determined that the best solution for this area would be to make better use of the existing infrastructure by improving the transfer between the PATCO Speedline and SEPTA. Potential improvements include a joint fare structure between the PATCO Speedline and SEPTA and improvements to the underground pedestrian concourses to make walking a more attractive option in bad weather; therefore one alternative was recommended for implementation:

- **Alternative 3:** Members of the AAG and of the general public supported this alternative, and it would be a relatively low-cost improvement that would improve options for PATCO riders traveling to Market West.

The discussion of Market West alternatives was considered concluded at this point and no alternatives from this portion of the study area were carried over to the reduced list of alternatives for further evaluation.

4.1.4 PHILADELPHIA WATERFRONT ALTERNATIVES

The Philadelphia Waterfront, like the Camden Waterfront, is in the process of redeveloping the remains of an industrial era into an entertainment destination. It is accessible by automobile via Delaware Avenue, also called Columbus Boulevard, and by I-95, which parallels it on the western side and in many places has cut off the City of Philadelphia from its waterfront property. SEPTA's Route 25 bus provides transit service along Columbus Boulevard between Pier 70 in the south, the Spring Garden Station of the Market-Frankford Line and other areas north of the study area.

Entertainment destinations along the waterfront include Festival Pier - a venue for concerts and other events, the Independence Seaport Museum, clubs and bars and retired U.S. navy ships Olympia and Becuna. The buildings at Pier 3 and Pier 5 (just south of the Ben Franklin Bridge) have been renovated to include offices, restaurants, apartments and condominiums. Dockside Apartments is a new residential building on the waterfront near South Street, and farther south, South Philadelphia neighborhoods are just across the street from the waterfront.

Numerous retail properties are located along Columbus Boulevard, as well as the U.S. Coast Guard and a union sheetmetal workers training center. The main area of the waterfront considered in this study stretches from Spring Garden Street, just north of the Ben Franklin Bridge, to Pier 70, a shopping center just north of Snyder Avenue in South Philadelphia. The six Philadelphia waterfront alternatives are:

Alternative 1: Bus Shuttle to Pier 70

This alternative, shown on **Figure 4-8**, would be an extension of SEPTA bus Route 33 to the Philadelphia waterfront, with a terminus at Pier 70 on Columbus Boulevard. From the loop at Penn's Landing, the extension would travel to Columbus Boulevard via the ramp on Chestnut Street (and in the opposite direction via the ramp to Market Street). On Columbus Boulevard the bus would travel south to Pier 70 Shopping Plaza with intermediate stops at other destinations along Columbus Boulevard. Route 33 already operates frequently, approximately every 10 minutes or fewer for most of the day, and every 30 minutes from 8 pm to 5 am, so no additional service would be required.

Figure 4-8: Philadelphia Waterfront Alternatives 1 and 1a - Long List

PATCO riders would be able to transfer onto Route 33 at the 8th & Market PATCO Speedline Station. SEPTA rail passengers would be able to transfer onto Route 33 at the 8th Street and 2nd Street Stations of theMFL.

One variation was developed for this alternative:

- **Alternative 1a** – This would be a bus shuttle separate from SEPTA Route 33. It would begin at a loop around the Pennsylvania Convention Center on 11th, Arch, 12th and Market Streets. It would then travel east on Market Street to the elevated loop at Penn's Landing, including stops at the 8th & Market PATCO Speedline/MFL station and the 2nd Street MFL station. From here it would be identical to Alternative 1, and use the existing ramp to Columbus Boulevard, then travel south to Pier 70 Shopping Plaza with intermediate stops at other destinations along Columbus Boulevard.

Alternative 2: Trolley Shuttle from Philadelphia Convention Center to Pier 70

This alternative, shown on **Figure 4-9**, would be a new shuttle route operated by heritage or modern trolley cars from the Pennsylvania Convention Center to the Philadelphia waterfront, with two branches of service on Columbus Boulevard: one south to Pier 70 and one north to the Spring Garden MFL Station. The service would begin at a loop around the Pennsylvania Convention Center on 11th, Arch, 12th and Market Streets and then travel east on Market Street. At Front and Market Streets it would cross over I-95 on an elevated structure. It would connect to the existing right-of-way on Columbus Boulevard at-grade, where the two waterfront branches would begin. The service would use the existing right-of-way in the median of Columbus Boulevard, but a second track would have to be added north of Reed Street. This alternative could be built with the intention of being incorporated with other possible future investments, including a possible southern extension from Pier 70 to the Sports Complex/Navy Yard.

Service would be structured so that some trips serve each waterfront terminus. Intermediate stops would be made at other destinations along Columbus Boulevard. PATCO riders would be able to transfer onto the new service at the 8th & Market PATCO Speedline Station. SEPTA rail passengers would be able to transfer onto the new service at the 8th Street, 2nd Street and Spring Garden Stations of the MFL.

Alternative 3: Extension of Subway-Surface Lines to Pier 70 and Spring Garden Street

This alternative, shown on **Figure 4-9**, would be an extension of SEPTA's Subway-Surface Lines from their present terminus at Market and Juniper Streets to the Philadelphia waterfront, with two branches of service on Columbus Boulevard: one south to Pier 70 and one north to the Spring Garden MFL Station. The extension would be underground to Front and Market Streets, where it would cross over I-95 on an elevated structure. It would connect to the existing right-of-way on Columbus Boulevard at-grade, where the two waterfront branches would begin. The service would use the existing right-of-way in the median of Columbus Boulevard, but a second track would have to be added north of Reed Street. This alternative could be built with the intention of being incorporated with other possible future investments, including a possible southern extension from Pier 70 to the Sports Complex/Navy Yard. It could also provide an opportunity to make the Market-Frankford Line an express service in Center City and allow the SSL to supply the local service.

Figure 4-9: Philadelphia Waterfront Alternatives 2, 3, 3a and 4 - Long List

Service would be structured so that some trips serve each waterfront terminus. Intermediate stops would be made at other destinations along Columbus Boulevard. There are currently five routes that operate to 13th and Market; they are scheduled to provide an average combined headway of 5 minutes off-peak and less than 1-minute peak. Only two or three of those routes would be extended to the waterfront.

PATCO riders would be able to transfer onto the new service at the 8th & Market PATCO Speedline Station. SEPTA rail passengers would be able to transfer onto the new service at the 8th Street, 2nd Street, and Spring Garden Stations of theMFL, the City Hall Station of the Broad Street Subway (BSS), or ride through from West Philadelphia on the SSL.

One variation was developed for this alternative:

- **Alternative 3a** – This alternative would be similar to alternative 3, but the alignment on Market Street (between Juniper and Front Streets) would be at-grade, not underground. The existing SSL would emerge from the tunnel at portals near 11th Street in the current bus lanes. From there, the lines would continue east to Front Street in the outside lanes of Market Street, which they would share with buses. From Front Street east and south this alternative would be identical to Alternative 3

Alternative 4: Trolley Shuttle from Franklin Square to Pier 70 and Spring Garden Street

This alternative, shown on **Figure 4-9**, would be a new shuttle route operated by heritage or modern trolley cars from the PATCO Speedline's Franklin Square Station (currently closed) to the Philadelphia waterfront, with two branches of service on Columbus Boulevard: one south to Pier 70 and one north to the Spring Garden MFL Station. The original construction of Franklin Square Station included provision for a multi-track streetcar loop, but tracks were never laid and station platforms were never built. The existing facility provides only the space to build them.

The new trolley service in Alternative 4 would begin at the Franklin Square Station and travel underground beneath the existing automobile ramp from the Ben Franklin Bridge. It would require a new streetcar portal to the underside of the Ben Franklin Bridge. The trolley would then continue east at-grade under the Ben Franklin Bridge, with grade crossings at 4th, 3rd and 2nd Streets. Between 2nd Street and I-95, the trolley would travel south around the anchorage of the bridge, cross under I-95 on Race Street and turn onto Columbus Boulevard where the two waterfront branches would begin. Where the trolley leaves the underside of the bridge and travels around the anchorage, the trolley movements would have to be separated from automobile movements. This might require closing the ramp to I-95 N, relocating it, or installing signals at the crossing.

The trolley service would use the existing right-of-way in the median of Columbus Boulevard, but a second track would have to be added north of Reed Street. This alternative could be built with the intention of being incorporated with other possible future investments, including a possible southern extension from Pier 70 to the Sports Complex/Navy Yard.

Service would be structured so that some trips serve each waterfront terminus. Intermediate stops would be made at other destinations along Columbus Boulevard. PATCO riders would be able to transfer onto the new service at the Franklin Square PATCO Speedline Station. SEPTA rail passengers would be able to transfer onto the new service at the Spring Garden Station of the MFL.

Alternative 5: New PATCO Speedline Station on Ben Franklin Bridge

This alternative, shown on **Figure 4-10**, would consist of a new PATCO Speedline station at the western anchorage of the Ben Franklin Bridge. When the bridge was built, provision was made for streetcar tracks where the outer vehicular lanes are now located, plus streetcar stations at the anchorages with elevators to transport passengers to ground level. The streetcar tracks and the stations were never completed. Construction of station platforms on the anchorage, at which the PATCO Speedline trains could stop, would allow access to the Philadelphia waterfront from the PATCO Speedline via elevator.

Alternative 6: Extension of 52nd Street Trolley to Pier 70 and Spring Garden Street

This alternative, shown on **Figure 4-10**, would be an extension of SEPTA's 52nd Street trolley, currently under study. Should the 52nd Street trolley be built, it could be extended east to the Philadelphia waterfront, with two branches of service on Columbus Boulevard: one south to Pier 70, and one north to the Spring Garden MFL Station.

From a proposed station at 12th and Race/Arch Streets, Alternative 6 would extend the trolley east at-grade via Race Street, 8th Street, and Market Street to Front Street, where it would cross over I-95 on an elevated structure (in the reverse direction it would travel west from front street via Market Street, 9th Street and Arch Street). The trolley would connect to the existing right-of-way on Columbus Boulevard at-grade, where the two waterfront branches would begin. The service would use the existing right-of-way in the median of Columbus Boulevard, but a second track would have to be added north of Reed Street. This alternative could be built with the intention of being incorporated with other possible future investments, including a possible southern extension from Pier 70 to the Sports Complex/Navy Yard.

One variation was developed for this alternative:

- **Alternative 6a** – This alternative would be identical to Alternative 6, except that it would travel between Arch/Race Streets and Market Street on 11th and 12th Streets, not 8th and 9th Streets (see **Figure 4-10**).

Figure 4-10: Philadelphia Waterfront Alternatives 5, 6 and 6a - Long List

Reduction of Long List:

The long list of Philadelphia waterfront alternatives is summarized in **Table 4-4**. Following evaluation by the ASG and the study team, six alternatives were removed from consideration and the remaining three alternatives were advanced to the reduced list of alternatives.

Table 4-4: Philadelphia Waterfront Alternatives - Long List Summary

Alternative	Mode	Alignment/ Location	Capital Costs	O&M Costs
1 Extension of SEPTA Bus Route 33 from Penn's Landing to Pier 70	Bus	Columbus Boulevard	Low	Low
1a Bus shuttle from Philadelphia Convention Center to Pier 70		11th, 12th, Arch, and Market Streets, Columbus Boulevard		
2 Trolley Shuttle from Philadelphia Convention Center to Pier 70	Heritage or Modern Trolley		High	Medium
3 Extension of SSL from Juniper/ 13th & Market to Pier 70 and Spring Garden (underground)	SEPTA SSL Trolley	Market Street (underground), Columbus Boulevard	Very High	
3a Extension of SSL from Juniper/ 13th & Market to Pier 70 and Spring Garden (at-grade)		Market Street (at-grade), Columbus Boulevard	High	
4 Trolley Shuttle from Franklin Square to Pier 70 and Spring Garden	Heritage or Modern Trolley	Under Ben Franklin Bridge, Columbus Boulevard		
5 New PATCO Station on Ben Franklin Bridge	New Station	Eastern Ben Franklin Bridge Abutment		Low
6 Extension of Proposed 52nd Street Trolley to Pier 70 and Spring Garden (via 11th and 12th Streets)	Heritage or Modern Trolley	Arch, Race, 11th, and 12th Streets, Columbus Boulevard		Medium
6a Extension of Proposed 52nd Street Trolley to Pier 70 and Spring Garden (via 8th and 9th Streets)		Arch, Race, 8th, and 9th Streets, Columbus Boulevard		

These alternatives were not advanced to the reduced list of alternatives:

- **Alternative 1a:** There is no need for additional surface transit on Market Street, and it would be less expensive to extend an existing bus route (as in alternative 1) than it would be to add a new route.
- **Alternative 2:** The Market-Frankford Line already provides rail service underneath the eastern portion of Market Street that is unhindered by surface traffic congestion. It does not seem logical to reintroduce surface rail transit back onto eastern Market Street where traffic conditions would make it much less reliable than the existing underground service.
- **Alternative 3a:** As with Alternative 2, it does not seem logical to reintroduce surface rail transit back onto Market Street. Additionally, the portals needed to bring the Subway-Surface Lines to street level would be disruptive to traffic.

- **Alternative 5:** There are numerous operational and safety issues that make this alternative undesirable. Another reason for not advancing this alternative is that it would not distribute passengers to various locations within the waterfront area, and would therefore provide a lower level of service than the other alternatives.
- **Alternatives 6 and 6a:** As with alternatives 2 and 3a, it does not seem logical to reintroduce surface rail transit back onto Market Street. It is also uncertain if and when the 52nd Street trolley might be constructed, and it does not seem appropriate to plan an alternative as part of another project that might not be built.

These three alternatives were advanced to the reduced list of alternatives:

- **Alternative 1:** This alternative was advanced because of its simplicity and its merits as an inexpensive, easily and quickly implementable solution.
- **Alternative 3:** This alternative was retained because it would improve access to the Philadelphia waterfront for PATCO riders transferring at 8th and Market, would also benefit Philadelphia riders on SEPTA, and would improve connections for PATCO riders to the Market West area. Although it would add more rail service to Market Street rather than another east-west street without rail, it would provide an opportunity to make the Market-Frankford Line an express service in Center City while the Subway-Surface Lines assume the local service role.
- **Alternative 4:** This alternative was retained because it is a service that PATCO could operate. Unlike the other alternatives, this service would not be dependent on an agreement with another operator like SEPTA. It would also provide a more direct connection to the Waterfront for PATCO riders by allowing them to transfer at the PATCO Speedline's Franklin Square Station rather than traveling to 8th and Market before transferring.

4.2 REDUCED LIST OF ALTERNATIVES

The reduced list of alternatives included only the five alternatives advanced from the long list for Southern New Jersey, three alternatives from the long list for the Philadelphia Waterfront, and one new alternative for the Philadelphia Waterfront. The new Philadelphia Waterfront alternative (Alternative 3) is a lower-cost version of the trolley shuttle from Franklin Square Station to Pier 70 and Spring Garden. Instead of the expensive underground connection to Franklin Square Station, this alternative would include facilities for a pedestrian connection to Franklin Square Station from a trolley terminus at 4th Street underneath the Ben Franklin Bridge. Pedestrians could then use the original aboveground entrances to Franklin Square Station.

For further evaluation, the alternatives were re-numbered to be consecutive, as shown in **Table 4-5** and **Table 4-6** and as depicted on **Figure 4-11** and **Figure 4-12**. The results from interviews, public open houses and internal reviews revealed the that there was greatest need for mass transit in these two market service areas and that efforts could be made to utilize existing transit systems (or connections to them) in order to provide service from the PATCO Speedline to the Camden Waterfront and Center City/Market West regions.

Table 4-5: Southern New Jersey Alternatives - Reduced List Summary

Alternative*	Phase I						Phase II				
	Termini	Mode	Alignment*	Length	Travel Time**	Capital Cost	Termini	Mode	Alignment*	Length	Capital Cost
Alternative 1 PATCO from Glassboro/Millville via NJ 55, NJ 42, I-676 (Long List Alt 1)	Glassboro & Philadelphia	PATCO or Modified PATCO	NJ Routes 55 and 42, I-676, PATCO	18 miles	40 minutes	$1.5 – $2.3 billion	Millville & Glassboro	Diesel Commuter Trains	Conrail, NJ Route 55	24 miles	$300 – $450 million
Alternative 2 Light Rail from Glassboro/ Millville via NJ 55, NJ 42, I-676 (Long List Alt 1a)	Glassboro & Camden	Diesel Light Rail	NJ Routes 55 and 42, I-676, Conrail industrial	18.5 miles	55 minutes	$1.0 – $1.5 billion	Millville & Glassboro	Diesel Light Rail	Conrail, NJ Route 55	24 miles	$300 – $450 million
Alternative 3 PATCO from Glassboro/ Millville via Conrail (Long List Alt 2)	Glassboro & Philadelphia	PATCO or Modified PATCO	Conrail, PATCO	16 miles	40 minutes	$1.0 – $2.7 billion	Millville & Glassboro	Diesel Commuter Trains	Conrail	22.5 miles	$300 – $450 million
Alternative 4 Extension of PATCO to Williamstown (Long List Alt 5)	Williamstown & Lindenwold	PATCO or Modified PATCO	Abandoned RR ROW parallel to NJ Spur 536, Conrail	14 miles	43 minutes	$0.5 - $1.5 billion	no Phase II				
Alternative 5 Light Rail from Glassboro/ Millville via Conrail (Long List Alt 2a)	Glassboro & Camden	Diesel Light Rail	Conrail, Conrail industrial	16.5	55 minutes	$1.0 – $2.5 billion	Millville & Glassboro	Diesel Light Rail	Conrail Conrail, NJ Route 55, PRSL		$300 – $450 million

*PATCO refers to the existing PATCO Speedline; Conrail refers to a Conrail railroad right-of-way; Grenloch refers to the abandoned Grenloch Branch railroad right-of-way; PRSL refers to the abandoned railroad right-of-way in Glassboro formerly owned by the Pennsylvania-Reading Seashore Lines, Abandoned RR ROW refers to an unnamed, abandoned railroad right-of-way.

** Travel time is to Center City Philadelphia, not just portion on new alignment. For light rail alternatives this includes transfer time to PATCO.

Table 4-6: Philadelphia Waterfront Alternatives - Reduced List Summary

Reduced List Alternative	Mode	Alignment/ Location	To Pier 70		To Spring Garden		Capital Cost
			Length	Travel Time	Length	Travel Time	
Alternative 1 Extension of SEPTA Bus Route 33 from Penn's Landing to Pier 70 (Long List Alt 1)	Bus	Columbus Boulevard	2.5 miles	16 minutes from 8th & Market	Not applicable		$0.3 – $0.6 million
Alternative 2 Trolley Shuttle from Franklin Square to Pier 70 and Spring Garden (Long List Alt 4)	Heritage or Modern Trolley	Under Ben Franklin Bridge, Columbus Boulevard	3.1 miles	15 minutes	2.0 miles	5 minutes	$250 - $450 million
Alternative 3* Trolley Shuttle from 4th Street and BFB to Pier 70 and Spring Garden (Long List Alt 4)	Heritage or Modern Trolley and Pedestrian Walkway	Under Ben Franklin Bridge, Columbus Boulevard	2.9 miles	14 minutes + walk to Franklin Square	1.8 miles	4 minutes + walk to Franklin Square	$200 - $300 million
Alternative 4 Extension of SSL from Juniper/ 13th & Market to Pier 70 and Spring Garden (underground) (Long List Alt 3)	SEPTA SSL Trolley	Market Street (underground), Columbus Boulevard	3.4 miles	16 minutes	2.9 miles	7 minutes	$500 - $900 million

* Alternative 3 is a new alternative that was based on Long List Alternative 4, but is not identical to it; BFB refers to the Ben Franklin Bridge

Figure 4-11: Transition of Southern New Jersey Long List to Reduced List

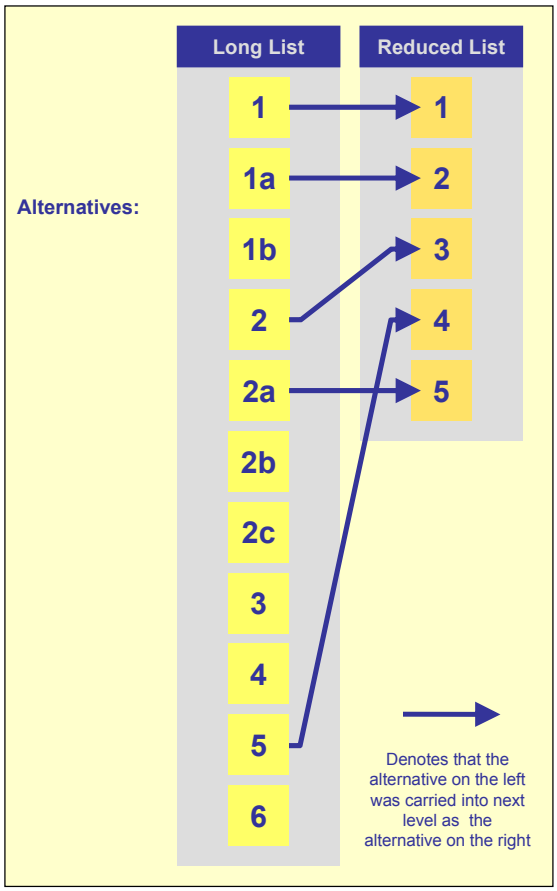
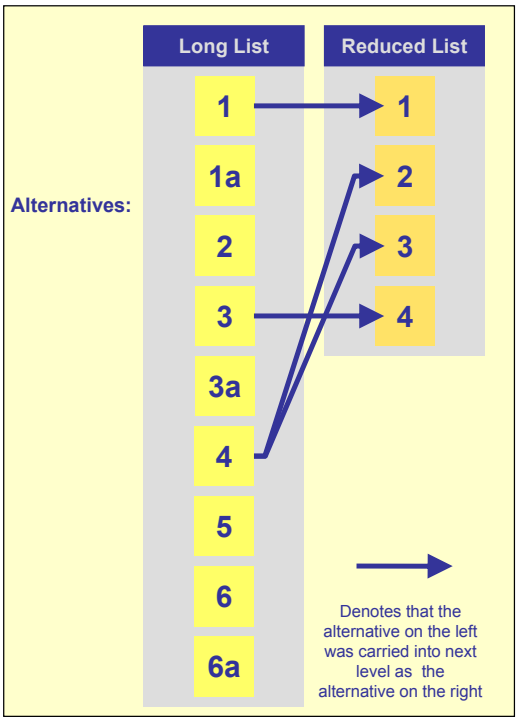


Figure 4-12: Transition of Philadelphia Waterfront Long List to Reduced List



Reduction to Short List of Alternatives:

The strategy for condensing the reduced list of alternatives into a short list of alternatives was first to allow the attendees at the Regional Transportation Forum (discussed in Section 2.4) to vote on which alternatives they believed to be the most practical and beneficial to the region. The results of the voting did not make the final determination of which alternatives were advanced to the short list of alternatives, but were taken into consideration and used as guidance. The final decision was reached through ASG work sessions in the weeks following the Regional Transportation Forum.

Attendees at the Regional Transportation Forum included elected officials from New Jersey and Pennsylvania, representatives of local transit authorities, state departments of transportation, planning organizations, special interest groups and other stakeholders in the Southern New Jersey-Philadelphia area.

At the forum a presentation was given to review the study and the nine alternatives under consideration. Attendees were then shown several display boards describing each alternative, inclusive of order of magnitude capital costs and assumed operating frequencies. Attendees were asked to vote for the two alternatives in Southern New Jersey and the two alternatives in the Philadelphia waterfront area that in their opinion would best suit the needs of each area.

For this purpose each attendee was given two sticker dots for each study corridor area (designated by color) to place on the presentation boards in a designated area.

Attendees were reminded that local public, political, and financial support would be required for any transit investment that wishes to receive federal funding. The alternatives that were advanced to the short list of alternatives should provide economic benefits to the region, build on sound land use strategies and have the region's support. The focus of the meeting was to obtain guidance on which alternatives to advance to the short list of alternatives for further evaluation. The results of the voting are presented in **Table 4-7**, with shaded rows denoting those that the forum attendees chose to advance to the short list.

Table 4-7: Regional Transportation Forum Voting Results

Reduced List of Alternatives	Votes
Southern New Jersey Alternative 1 PATCO from Glassboro/ Millville via NJ 55, NJ42, I-676	**11**
Southern New Jersey Alternative 2 Light Rail from Glassboro/ Millville via NJ 55, NJ 42, I-676	1
Southern New Jersey Alternative 3 PATCO from Glassboro/ Millville via Conrail	**22**
Southern New Jersey Alternative 4 Extension of PATCO to Williamstown	3
Southern New Jersey Alternative 5 Light Rail from Glassboro/ Millville via Conrail	**12**
Philadelphia Waterfront Alternative 1 Bus shuttle from Philadelphia Convention Center to Pier 70	**6**
Philadelphia Waterfront Alternative 2 Trolley Shuttle from Franklin Square to Pier 70 and Spring Garden	4
Philadelphia Waterfront Alternative 3 Trolley Shuttle from 4th Street and BFB to Pier 70 and Spring Garden	3
Philadelphia Waterfront Alternative 4 Extension of SSL from Juniper/ 13th & Market to Pier 70 and Spring Garden (underground)	**16**

Based on the voting results, five alternatives (NJ-1/3/5 and PA-1/4) were advanced to the short list of alternatives. However, subsequent to the Regional Transportation Forum, the ASG made three adjustments to these alternatives:

Southern New Jersey:

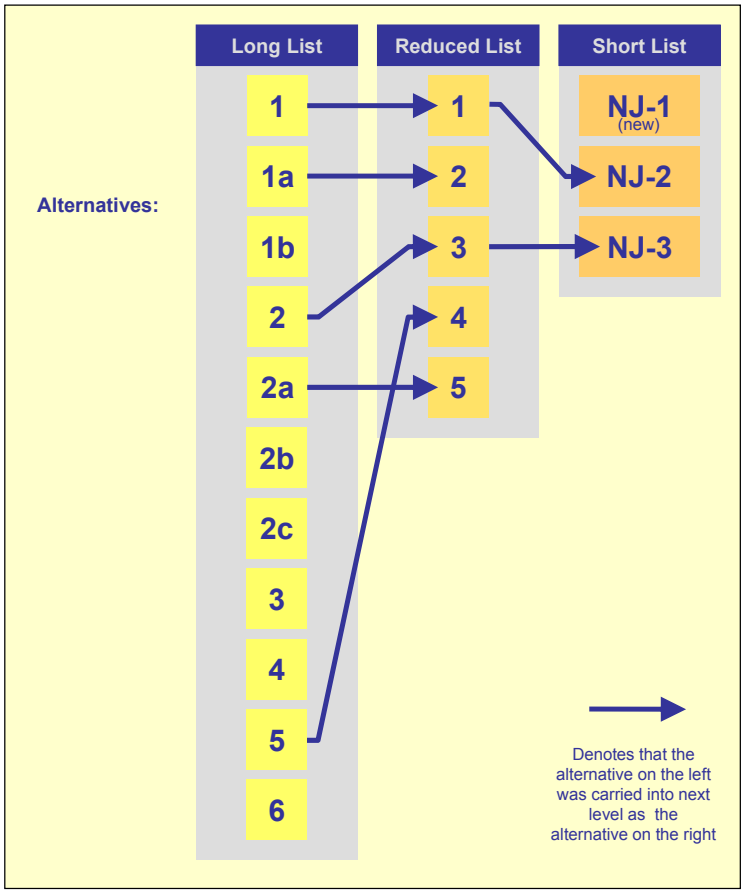
- **Alternative 5** was considered similar to Alternative 3 in that it utilized the Conrail right-of-way, however, public input dictated the need for a system with minimal at-grade crossings and a direct connection to Philadelphia. As a result, the ASG decided that Alternative 3 met these needs and removed Alternative 5 from the short list.
- **Alternative 4** received significant interest from the general public and elected officials but lacked a direct connection to the Williamstown/Winslow area. As a result, the ASG proposed that this alignment would follow NJ Route 42 and then the Atlantic City Expressway for a more direct route. Alternative 4 was therefore added to the short list of alternatives.

Philadelphia Waterfront:

- **Alternative 1** was considered as an alternative that was already partially in place with existing SEPTA routes that could be easily revised to meet the service levels of the proposed alternative. In addition, Alternative 1 was not seen as an effective rapid transit service to meet the needs of the waterfront areas and possibly the activity centers in South Philadelphia. As a result this alternative was removed from further consideration and Alternative 2 was substituted since it had the next highest level of votes.

The final short list includes three alternatives in Southern New Jersey and two alternatives along the Philadelphia waterfront. Alternatives in both sub-areas have been renumbered to be consecutive and include a designation for Southern New Jersey (NJ) or Philadelphia Waterfront (PA). The reduction of the long list of alternatives to the short list is also documented in **Figure 4-13** and **Figure 4-14** for Southern New Jersey and the Philadelphia Waterfront, respectively.

Figure 4-13: Reduction of Southern New Jersey Alternatives to Short List



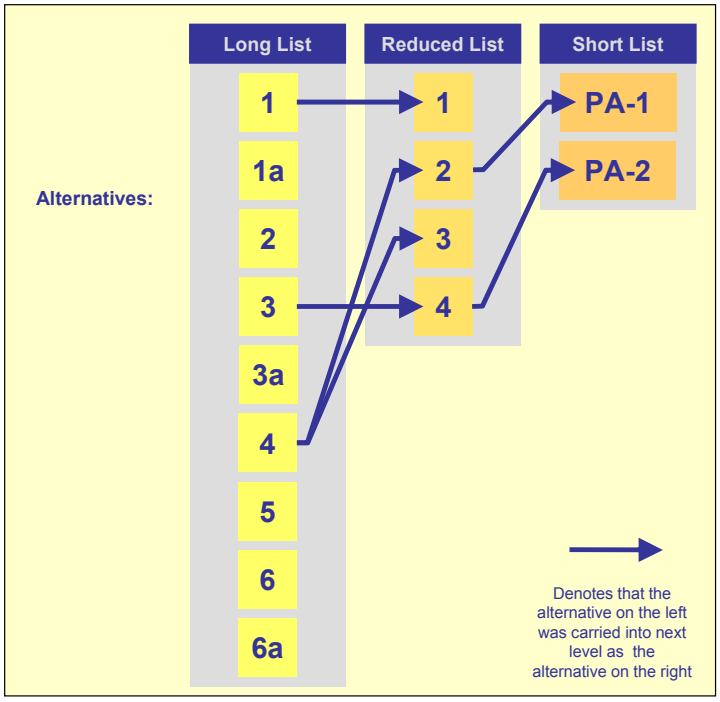
Southern New Jersey Short List

- **Alternative NJ-1**: The PATCO Speedline from Williamstown to Camden and Philadelphia via Atlantic City Expressway, NJ Route 42 and I-676
(new alternative)

- **Alternative NJ-2**: The PATCO Speedline from Glassboro and Millville to Camden and Philadelphia via NJ Route 55, NJ Route 42 and I-676
(Reduced List Alternative 1)

- **Alternative NJ-3**: The PATCO Speedline from Glassboro and Millville to Camden and Philadelphia via Conrail railroad right-of-way
(Reduced List Alternative 3)

Figure 4-14: Reduction of Philadelphia Waterfront Alternatives to Short List



Philadelphia Waterfront Short List

- **Alternative PA-1**: Trolley Shuttle from Franklin Square Station to Pier 70 and Spring Garden (Reduced List Alternative 2)

- **Alternative PA-2:** Extension of the Subway-Surface Lines under Market Street to Pier 70 and Spring Garden (Reduced List Alternative 4)

A detailed definition of the five short list alternatives, including feasibility, community impacts and cost effectiveness will be presented in **Chapter 5**.

5 SHORT LIST ALTERNATIVES AND NEXT STEPS

Additional analyses of the five short list alternatives were performed to assess their feasibility, their affects – both positive and negative – on the surrounding communities and the estimated costs and potential ridership of each. The analysis included nine characteristics in three categories:

Feasibility
- Constructability
- Existing Right-of-Way

Community Impacts
- Mobility
- Smart Growth
- Traffic Congestion
- Land Use

Cost Effectiveness
- Ridership Potential
- Operating and Maintenance Cost
- Order of Magnitude Capital Cost

As is appropriate for a feasibility study, the feasibility of the alternatives and community impacts associated with each were qualitatively assessed. The items assessed in the feasibility analysis will be discussed in **Section 5.1**, and those included in the community impact analysis will be discussed in **Section 5.2**. Cost effectiveness was quantitatively assessed using standard estimation practices, as will be discussed in **Section 5.3**.

The five short list alternatives will be presented with their accompanying characteristics in **Section 5.4.** In **Section 5.5** conclusions of stakeholders and the general public from the second round of public outreach will be presented. Finally, the next steps towards a transit investment in Southern New Jersey and the Philadelphia Waterfront area will be discussed in **Section 5.6**.

5.1 FEASIBILITY OF ALTERNATIVES

The alternatives must advance the goals and objectives of the study as presented in the Purpose and Needs Statement, must be technically and operationally feasible and must be environmentally acceptable. An alternative is considered fatally flawed if it:

- Does not improve transportation service
- Does not focus economic growth in the communities
- Does not preserve the quality of the environment
- Does not invest and deploy resources efficiently and cost-effectively
- Requires technology that is not available presently nor in the foreseeable future
- Requires taking large amounts of brand new right-of-way for the project
- Cannot be reasonably implemented from an engineering or construction perspective, for example, because a grade is too steep or a curve is too sharp for a particular mode
- Significantly decreases existing capacity on the transportation system
- Significantly increases traffic congestion
- Adversely affects existing transit services due to longer running times or less reliable service
- Significantly decreases air quality after implementation

- Presents serious regulatory challenges involving either Federal/State/Local requirements or environmental permit issues
- Excessively or permanently disrupts local communities within the corridor

In development of the short list of alternatives, all alternatives that had an obvious fatal flaw were eliminated from consideration. The five short list alternatives are therefore all believed to be feasible; however, they each present different obstacles based on their individual locations and attributes. This feasibility assessment was intended to identify problem areas that might require additional evaluation and careful design in future phases of development.

- **Constructability -** The assessment of constructability was based on the physical alignment drawings each alternative and identified areas where construction could be difficult due to right-of-way constraints, surrounding structures, neighborhood impacts, construction safety issues and special land uses.

- **Existing Right-of-Way -** The assessment of right-of-way availability considered the use of existing property such as highway/roadway medians and railroad rights-of-way for the proposed alignments of each alternative. In some cases the availability of this property depends on future negotiations with certain institutions, public agencies or communities along the alignments.

5.2 COMMUNITY IMPACTS

Community impacts are those that affect the lives and neighborhoods of residents along the proposed alternatives. This was a qualitative assessment that centered on transportation, land use and environmental impacts.

- **Mobility -** The assessment of an alternative's effect on mobility focused on what new destinations would become accessible through the operation of that alternative. It also identified alternatives that have potential to reduce reliance on automobiles.

- **Smart Growth -** This assessment noted whether an alternative would support the types of land use typically associated with Smart Growth, a growing initiative in New Jersey. As described by the New Jersey Department of Smart Growth, "Smart Growth principles include mixed-use development, walkable town centers and neighborhoods, mass transit accessibility, sustainable economic and social development and preserved green space." The department also notes, "In New Jersey, Smart Growth supports development and redevelopment in recognized Centers—a compact form of development … with existing infrastructure that serves the economy, the community and the environment."

- **Traffic Congestion -** This qualitative assessment identified the likelihood of each alternative to increase or decrease overall vehicle miles traveled in the region including the potential to reduce automobile trips in the region.

- **Land Use -** The assessment of an alternative's effect on land and transportation resources was a review of the right-of-way requirements. It noted which alternatives

would necessitate large amounts of open or developed land and which would re-use land already set aside for transportation.

5.3 COST EFFECTIVENESS

Determining the cost effectiveness of the short list alternatives required calculations of ridership, operating and maintenance (O&M) costs, and capital costs. The methodologies for these calculations are presented in **Sections 5.3.1** through **5.3.3**.

5.3.1 RIDERSHIP POTENTIAL

Ridership potential was estimated based on a general travel demand analysis commensurate with the level of detail required for this early phase of project planning. The main objective was to evaluate the project's potential to provide a viable, attractive travel choice for the target market and understand the potential for ridership on each alternative given existing and projected transit services, trip patterns, population and employment. This information is useful in determining the potential for a proposed alignment to move forward in the project development process since transit ridership is a key factor in FTA's evaluation within the New Start process.

A "pivot point" approach was used to estimate ridership potential for each alternative. This analysis observes the base transportation system and travel patterns, examines proposed changes in travel times by mode, and then estimates travelers' response to those changes based on typical behavior in local or other U.S. settings.

The study team used regionally accepted 2020 trip tables and travel times, provided by the Delaware Valley Regional Planning Commission (DVRPC), to understand base travel patterns and transportation options. Data for travel times and number of trips were available by mode (transit, auto, etc.), by trip purpose (Home-Based Work, Non-Home Based, etc.), and by travel period (Peak and Off-Peak), for hundreds of Traffic Analysis Zones (TAZs) in the study area. Consistent with standard practice and FTA requirements for more detailed New Starts grant applications, travel time data reflected travelers' perception of time, rather than actual minutes, placing greater weight on time spent waiting, accessing, or transferring, than on in-vehicle time.

Estimated changes in transit travel time between every affected pair of TAZs were made within the study area, based on expected run speeds, frequency, and approximate station locations of the proposed rail alternatives. The travel time changes were estimated by TAZ-pair for each permutation of mode, trip purpose, and travel period mentioned above. An assumption was made that travelers originating more than one mile from a station would have auto access via the nearest station with a park-and-ride.

How travelers might change their choice of travel mode was evaluated in response to changes in the transportation system. This relationship, between mode choice and system changes, was characterized by a set of generic Logit functions, each specific to the trip purpose and period of travel being evaluated. (Logit functions are mathematical probability curves, calibrated to reflect behavior of travelers in the study area.) The results by TAZ-pair were summarized across all trips to estimate total daily and/or peak period ridership for each alternative.

The results presented for each alternative serve only as a basis for preliminary comparison among the alternatives. In later phases of study (i.e. Alternative Analysis) alternatives will be defined in greater detail and a full modeling effort will be used to estimate ridership. Given the preliminary nature of this planning effort, this approach was agreed upon as sufficient to determine order of magnitude market potential for each alternative, knowing that results may differ in a future AA project phase.

5.3.2 OPERATING AND MAINTENANCE COSTS

The annual operating and maintenance (O&M) costs for the short list alternatives were calculated on the basis of three variables – vehicle miles, vehicle/train hours, and the number of vehicles deployed in peak service. Unit costs for each variable were multiplied by annual service level quantities calculated for each alternative to determine annual O&M cost.

For the Southern New Jersey Alternatives, unit costs were based on information in the 2002 National Transit Database (NTD) for the PATCO Speedline. Unit costs for the Philadelphia Waterfront Alternatives were based on SEPTA's operating cost as provided in its route-by-route operating ratio report, commonly called the Dallas Report, for the most recent year available (2002). Costs from both sources were inflated at an annual rate of 3.5 percent to represent 2004 dollars. Service level quantities were based on assumed characteristics of the new services, and were generally based on existing services such as the PATCO Speedline and the SEPTA Subway-Surface Lines (SSL). O&M estimates do not include transit system network savings based on changes to existing bus service affected by proposed new service. The following sections present a more detailed description of how service level quantities and unit costs were calculated.

Service Level Quantities:

An initial run time and service frequency was developed for each alternative to estimate service level quantities (vehicle miles, vehicle/train hours, and peak vehicles). Service levels were calculated as follows:

Vehicle Miles:

The calculation of vehicle miles was based on the following formula:

Daily Vehicle Miles = Hours of Operation × Frequency × Cycle Length × Cars per Train
= [Hours/Day] ×[Train Cycles/Hour] ×[Miles/Cycle] ×[Vehicles/Train]

Hours of operation were set consistent with current PATCO service standards for the Southern New Jersey Alternatives and consistent with current SEPTA SSL standards for Philadelphia Waterfront Alternatives; all alternatives were assumed to operate 24 hours-a-day, seven days-a-week. Hours of operation used for Southern New Jersey Alternatives included 3 hours of peak service, 16 hours of off-peak service, and 5 hours of late night service. Weekend and holiday service used levels equivalent to weekday off-peak levels for 17 hours, and late night service for 7 hours. Weekday operation of the Philadelphia Waterfront Alternatives was set to include 7 hours of peak service, 9 hours of off-peak service and 8 hours of late night service. Weekend service for the Philadelphia Waterfront Alternatives was assumed to include 10 hours at levels equivalent to weekday off-peak service, and 14 hours at levels equivalent to weekday late night

service. Assumptions for hours of service, headways, and cars per train are listed in **Table 5-1** (Philadelphia Waterfront Alternatives all operate with single cars).

Table 5-1: Assumed Service Characteristics

	Weekdays			Weekends/ Holidays	
	Peak	Off-Peak	Late Night	Off-Peak	Late Night
Southern New Jersey Alternatives					
Phase I					
Hours of Operation	3	16	5	17	7
Headway (minutes)	7.5	15	40	15	40
Cars Per Train	6	2	2	2	2
Phase II					
Hours of Operation	3	16	5	17	7
Headway (minutes)	30	60	80	60	80
Cars Per Train	3	2	2	2	2
Philadelphia Waterfront Alternatives					
Hours of Operation	7	9	8	10	14
Headway (minutes)	5	12	30	12	30

Calculation of vehicle miles was performed individually for peak and off-peak periods on weekdays. The sum was multiplied by the number of days in a calendar year with normal weekday service (251 for Southern New Jersey Alternatives and 254 for Philadelphia Waterfront Alternatives). Weekend service was calculated based on the service levels listed above and multiplied by the number of weekend days and holidays in a calendar year (114 for Southern New Jersey Alternatives and 110 for Philadelphia Waterfront Alternatives). Annual vehicle miles were calculated by taking the sum of annual weekday and weekend/holiday vehicle miles.

Vehicle and Train Hours:

Calculation of vehicle and train hours followed the general formulas:

Daily Train Hours = Hours of Operation × Frequency × Cycle Time
= [Hours/Day] × [Train Cycles/Hour] × [Hours/Cycle]

Daily Vehicle Hours = Daily Train Hours × Cars per Train
= [Train Hours/Day] × [Vehicles/Train]

Hours of operation, frequencies and number of cars per train were taken from the vehicle mile calculations since the quantities are identical. To obtain the cycle time, the one-way run time for each alternative was multiplied by two, then layover time was added. The layover time is required for the operator to prepare the vehicle for travel in the opposite direction and for a few minutes to rest (minimum of 10-15 percent of the run time depending on the length of the route). The layover time also adds flexibility into the schedule so that one unexpected delay does not cascade, affecting operations all day. Additionally, the layover time was used to adjust cycle time to a quantity divisible by the service headway. This ensures that each vehicle starts exactly one headway period after the preceding vehicle. Once the cycle times were developed, the general formulas shown above were used to calculate daily vehicle hours or train hours for each alternative.

The decision to use either vehicle hours or train hours for the calculation of O&M costs was based on the service characteristics of an alternative. Hourly quantities were used to estimate the hours worked by operators, and when multiplied by the appropriate unit cost, account for salaries of operators and fringe benefits. A multi-car train with personnel in each car would use vehicle hours to approximate operators' working hours. A train with multiple cars and one operator would use train hours. For the Southern New Jersey Alternatives, it was assumed that all alternatives would require only one operator per train, resulting in the use of train hours to estimate O&M costs. Since the Philadelphia Waterfront Alternatives only operate single vehicles, vehicle hours were used.

Peak Vehicles:

Calculation of peak vehicle requirements followed the general formulas:

Peak Vehicles = Peak Trains × Cars per Train
= [Trains] × [Vehicles/Train]

Peak Trains = Cycle Time × Frequency
= [Hours/Cycle] × [Train Cycles/Hour]

Both peak trains and peak vehicles were rounded up to the next highest integer. For example, if peak vehicles were calculated to be 2.1 trains, 3 trains would be the actual requirement since it is impossible to configure 2.1 trains.

Unit Cost Development:

O&M unit costs were calculated for each service level variable from data obtained in the 2002 SEPTA Dallas Report, and the 2002 National Transit Database report. The Dallas Report includes unit costs per vehicle hour, vehicle mile, and peak vehicles for SEPTA's SSL. Costs were inflated to represent 2004 dollars. The NTD provides O&M costs segregated under four cost categories:

- Vehicle Operation Costs – (e.g. operators)
- Vehicle Maintenance Costs – (e.g. mechanics, fuel)
- Non-vehicle Maintenance Costs – (e.g. maintenance of buildings/grounds)
- General and Administrative Costs – (e.g. marketing, accounting, human resources)

The NTD also provided annual service levels that directly relate to these cost categories, including:

- Vehicle Hours – drive vehicle operation costs
- Vehicle Miles – drive vehicle maintenance costs
- Peak Vehicles – drive non-vehicle maintenance costs

Based on this information, unit costs for Southern New Jersey Alternatives were estimated by dividing the specific cost category (i.e. vehicle operation costs) by the related annual service level (i.e. vehicle hours). The resulting unit costs were multiplied by the estimated annual service level quantities for each alternative to estimate annual O&M costs.

5.3.3 ORDER OF MAGNITUDE CAPITAL COSTS

Order of magnitude capital costs for the Southern New Jersey and Philadelphia Waterfront Alternatives were developed based on the following approaches:

Southern New Jersey Alternatives:

Capital cost estimates for the Southern New Jersey Alternatives were based on previous estimates completed in the more detailed 1975 UMTA (Urban Mass Transit Administration, now the Federal Transit Administration) study. The 1975 study included two fully grade-separated alternatives from Glassboro to Camden – one along I-676, I-76, NJ Route 42, NJ Route 55, and Conrail railroad right-of-way (at that time the Pennsylvania-Reading Seashore Lines, or PRSL) and one entirely along the Conrail railroad right-of-way. Both were similar to the alternatives proposed in this study differing primarily in number of stations and type of construction (at-grade, elevated, depressed, and at-grade in highway median). As a feasibility analysis, the current study does not necessitate a cost estimate as detailed as was completed for the 1975 study; therefore, modifying the results of the 1975 study provides an estimate that is adequately detailed for the current study.

The methodology for estimating capital costs for the Southern New Jersey Alternatives was to inflate the 1975 estimates to current year dollars, using per-unit costs, then add or subtract to make the total estimate reflect the slightly different characteristics of the present study's alternatives. An allowance was also added for upgrades to the existing PATCO Speedline, required for two-branch operation.

Inflation of the 1975 estimate to current year dollars assumed a 250 percent increase in costs from 1975 to 1991 (in agreement with another estimate performed in 1991), and a 3.5 percent increase for every year after 1991. In addition to inflating the 1975 costs, the contingency and add-ons used in the original estimate were examined and adjusted as necessary to make them reflect common estimation practices that may have changed in the past 30 years.

To determine the differences between the current alternatives and those proposed in 1975, the length of alignment and number of stations using each type of construction was tabulated. For each alternative, the difference between the current and corresponding 1975 alternative in each category was multiplied by an appropriate unit cost and added or subtracted from the inflated 1975 total to arrive at an estimate. Unit costs were based on those from a previous PATCO extension study. Costs were also added or subtracted for vehicles, parking, and grade crossing treatments.

Philadelphia Waterfront Alternatives:

Since no previous capital cost estimates existed for the Philadelphia Waterfront Alternatives, they were calculated using a order of magnitude build up methodology. Unit costs were developed for elements of the infrastructure based on data from peer systems, the FTA Fixed Guideway Heavy Rail and Light Rail Capital Cost Studies, and RS Means Heavy Construction Cost Data. Costs included infrastructure, vehicles, systems, contingency, special conditions and soft costs.

5.4 CHARACTERISTICS OF ALTERNATIVES

The following sections present the three Southern New Jersey short list alternatives and the two Philadelphia Waterfront short list alternatives. The short list of alternatives includes:

Southern New Jersey Alternatives

- **Alternative NJ-1:** PATCO from Williamstown to Camden and Philadelphia via Atlantic City Expressway, NJ Route 42 and I-676
- **Alternative NJ-2:** PATCO from Glassboro and Millville to Camden and Philadelphia via NJ Route 55, NJ Route 52 and I-676
- **Alternative NJ-3:** PATCO from Glassboro and Millville to Camden and Philadelphia via Conrail railroad right-of-way

Philadelphia Waterfront Alternatives

- **Alternative PA-1:** Trolley Shuttle from Franklin Square to Pier 70 and Spring Garden
- **Alternative PA-2:** Extension of the Subway-Surface Lines under Market Street to Pier 70 and Spring Garden

A side-by-side comparison of the three Southern New Jersey Alternatives is provided in **Table 5-11** and in **Table 5-16** for the two Philadelphia Waterfront Alternatives.

5.4.1 ALTERNATIVE NJ – 1: NJ ROUTE 42 AND ATLANTIC CITY EXPRESSWAY

General Description:

This new service would begin in Williamstown at NJ Route 536 and travel north in the median of the Atlantic City Expressway. The service would continue north in the median of NJ Route 42, then alongside of NJ Route 42 and I-676. In Camden the new service would merge with the existing PATCO Speedline for service to Camden and Center City Philadelphia. The alignment would be entirely grade separated along major roadways with access primarily at park-and-ride lots.

Feasibility:

- **Constructability:** Two main challenges in constructing this alignment would be locating the alignment through the interchanges at I-76/I-676 and at I-76/I-295/NJ Route 42. Both interchanges include numerous highway ramps, and both are closely surrounded by residential areas. The New Jersey Department of Transportation (NJDOT) is in the process of redesigning the I-76/I-295/NJ Route 42 interchange and construction is expected to be complete by 2012.

  Preliminary review of the alignment showed that this alternative could be feasible, however, the median of NJ Route 42 and/or the Atlantic City Expressway must be examined in more detail in the next level of study to determine whether there are areas that may require widening.

  Consideration should also be given to the construction of the alignment alongside of busy highways where separating motorists from construction workers requires additional resources with the potential to increase construction costs.

PATCO-style service from Williamstown to Camden and Philadelphia via Atlantic City Expressway, NJ Route 42, and I-676

Simulation of PATCO in the Median of NJ Route 42

Characteristics:

Transportation Mode:
Heavy Rail - PATCO (Electric)

Alignment Length:
Williamstown-Camden: 18.9 miles
Camden-Philadelphia: 4.4 miles

Peak / Off-Peak Headway:
7.5 minutes / 15 minutes

Estimated Travel Time:
Williamstown-Philadelphia: 40-44 minutes

Communities Directly Served:
Williamstown, Winslow, Turnersville, Blackwood, Gloucester Township, Deptford, Bellmawr, Haddon, Camden, Center City Philadelphia

Ridership Potential:
to be determined in subsequent studies

Order of Magnitude Capital Cost:
$1.5 billion
$80 million per mile

Annual O&M Cost (Approx.):
$32.3 million

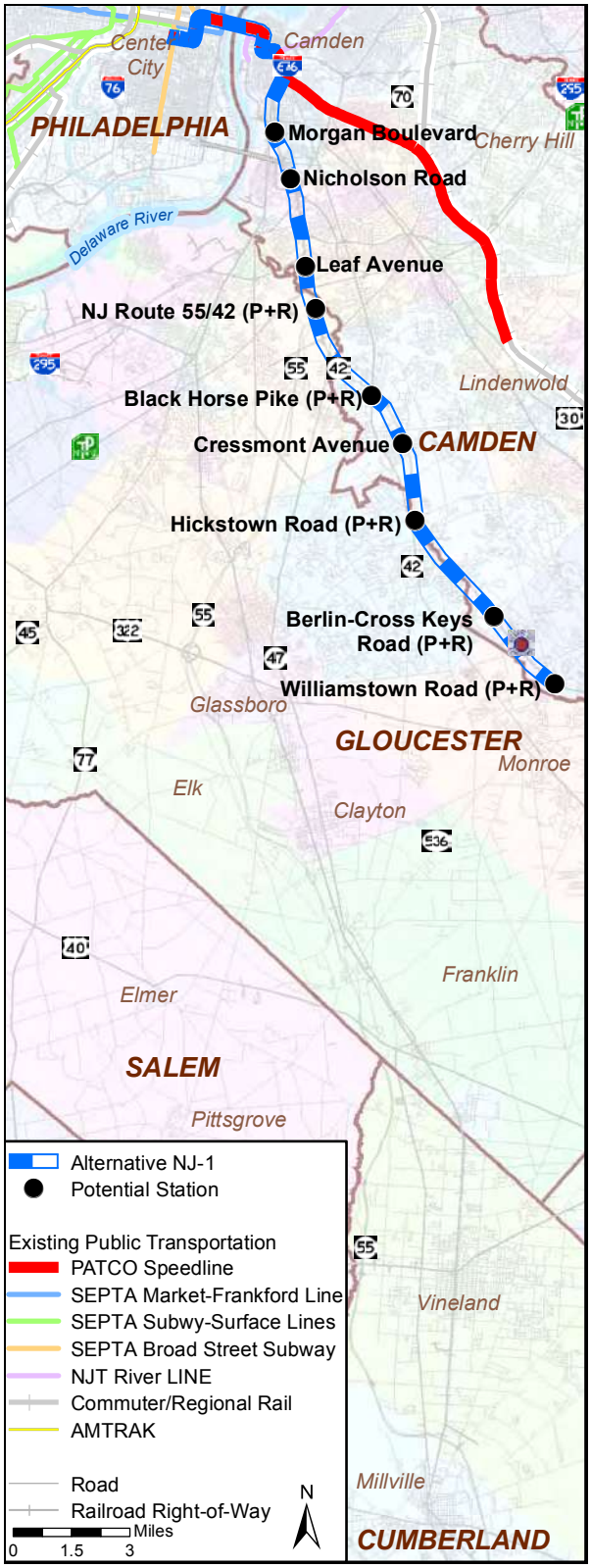
- **Existing Right-of-Way:** South of Camden, Alternative NJ-1 would require land acquisition along I-676 and NJ Route 42 that may require displacements of some homes or businesses. South of the NJ Route 42/55 interchange, adequate land appears to be available in the medians of NJ Route 42 and the Atlantic City Expressway, however, further analysis is necessary to determine exact constraints. Additional property would be required for park-and-ride lots at station areas.

Community Impacts:

- **Mobility:** Alternative NJ-1 would considerably improve and expand transit service in Southern New Jersey. This alternative would serve Camden County College, downtown Camden, Center City Philadelphia, and several communities in Southern New Jersey. This alternative's park-and-ride-oriented design would not significantly reduce reliance on automobiles, since a large portion of travelers would have to drive to stations to access the service. Reverse commute trips typically would require a bus transfer to reach any employment near the rail stations, and therefore would likely not be significant. Alternative NJ-1 also has a greater potential to divert passengers from the existing PATCO Speedline due to its proximity to the existing service.

- **Smart Growth:** Alternative NJ-1 would increase accessibility to and from the study area and therefore has the potential to promote additional development in the region. This alternative is located along existing highways and does not reach many town centers; therefore most travelers would likely access the stations in private automobiles. Bus service could be implemented to circulate riders between the rail stations and nearby neighborhoods or activity centers, but it is

Figure 5-1: Short List Alternative NJ-1



not likely to significantly reduce the number of automobile access trips. Alternative NJ-1 is less likely to support smart growth in Southern New Jersey since it is almost exclusively based on automobile park-and-ride access. The potential for transit villages is also less likely since all access would necessitate crossing a highway to reach the station.

- **Traffic Congestion:** This alternative could reduce vehicle miles traveled (VMT) in the study area by reducing the length of trips that would otherwise extend into Philadelphia or to more distant stations on the PATCO Speedline. However, by relying on automobiles for access to the stations, this alternative would not eliminate a significant number of automobile trips. Additionally, there are few major roadways in this area except those that parallel the alignment, causing the potential for increased traffic on local roads leading to stations.

- **Land Use:** Alternative NJ-1 would require roughly six miles of new right-of-way acquisition and structure adjacent to I-676 and NJ Route 42, as well as land for sizeable park-and-ride lots at stations along the entire alignment. It would make use of an existing right-of-way in the median of NJ Route 42 and the Atlantic City Expressway, and the existing PATCO Speedline tunnel and bridge in Camden and Philadelphia. There is a possibility that additional land may be required if the medians of NJ Route 42 and/or the Atlantic City Expressways are not wide enough to accommodate the proposed alignment.

Cost Effectiveness:

- **Ridership Potential:** In response to significant public interest, this alternative was added to the short list well after completion of the ridership estimation task, and as a result, estimates were not developed for this alternative. However, the characteristics of Alternative NJ-1 are similar to those of NJ-2 and NJ-3, therefore it is somewhat likely that the potential for ridership would be similar. Exact estimations will be completed during the upcoming
  AA phase.

- **O&M Cost (Approx.):** O&M costs were based on the three variables shown in **Table 5-2**: vehicle hours, vehicle miles and peak vehicles. Those quantities were developed with the assumption of a 42-minute one-way run time and a route length of 23.3 miles. Service would include 3 hours of peak service, 16 hours of off-peak service, and 5 hours of late-night service on weekdays, plus 17 hours of off-peak and 7 hours of late-night service on weekends and holidays. As shown in **Table 5-2**, the cost to operate and maintain the Alternative NJ-1 service from Williamstown to Philadelphia was estimated at approximately $32.3 million annually.

Table 5-2: Net Annual O&M Costs - Alternative NJ-1

	Phase I
Annual Vehicle Hours:	155,900
Annual Vehicle Miles:	4,192,800
Daily Peak Vehicles:	84
Total Annual O&M Cost:	***$32.3 m***

- **Order of Magnitude Capital Cost:** The percentage of guideway and the number of stations in Alternative NJ-1 that would be constructed at-grade, at-grade in a highway median and elevated is shown in **Table 5-3**. This alternative would be almost entirely at-grade with some elevated guideway along I-676 and NJ Route 42. Six of the seven stations would be at-grade with four located in the highway median. Stations in the median may require a pedestrian bridge (unless roadway bridge already exists) over the highway for access to the platform in the median, causing construction costs to be higher than standard at-grade stations. One of the seven stations would be elevated.

Table 5-3: Summary of Construction Types - Alternative NJ-1

Type of Construction	Percent of Guideway	Number of Stations
At-Grade	25%	2
At-Grade Median	64%	4
Elevated	11%	1
TOTAL:	*100%*	*7*

The order of magnitude capital costs for Alternative NJ-1 would be approximately $1.5 billion, as shown in **Table 5-4**.

Table 5-4: Capital Costs (2004$s) - Alternative NJ-1

Total Capital Cost	Capital Cost per Mile
$1.5 billion	$80 million

5.4.2 ALTERNATIVE NJ – 2: NJ ROUTE 42 AND NJ ROUTE 55

General Description:

Phase I: This new service would begin in Glassboro at Exit 50 of NJ Route 55 traveling north in the median and then alongside NJ Route 42 and I-676. In Camden, this alternative would merge with the existing PATCO Speedline for service to Camden and Center City Philadelphia. The alignment would be entirely grade separated. Access to this service would be primarily at park-and-ride lots.

Phase II: This extension would be a separate, commuter-oriented service from Millville to Glassboro. Passengers would transfer to the Phase I service in Glassboro for travel to Center City Philadelphia. The Phase II service would operate primarily in the median of NJ Route 55, but south of the Cumberland Mall would be on the existing Conrail railroad right-of-way. Initially Phase II would be operated with a diesel rail vehicle, but could eventually be electrified and converted to a PATCO type service with through trains to Center City Philadelphia.

Feasibility:

- **Constructability:** The main challenges in constructing this alignment would be locating the alignment through the interchanges at I-76/I-676 and at I-76/I-295/NJ Route 42. Both interchanges include several highway ramps, and both are closely surrounded by residential areas. NJDOT is in the process of redesigning the I-76/I-295/NJ Route 42 interchange, and construction is expected to be complete by 2012.

  Consideration should also be given to the construction of the alignment alongside of busy highways where separating motorists from construction workers requires additional resources with the potential to increase construction costs.

PATCO-style service from Glassboro and Millville to Camden and Philadelphia via NJ Route 55, NJ Route 42, and I-676

Simulation of PATCO in the median of NJ Route 55

Characteristics:

Transportation Mode:
Phase I: Heavy Rail - PATCO (Electric)
Phase II: Diesel Rail (light rail or other)

Alignment Length:
Phase I: Glassboro-Camden: 16.2 miles
Camden-Philadelphia: 4.4 miles
Phase II: Millville-Glassboro: 24.8 miles

Peak / Off-Peak Headway:
Phase I: 7.5 minutes / 15 minutes
Phase II: 30 minutes / 60 minutes

Estimated Travel Time:
Phase I: Glassboro-Philadelphia: 36-40 minutes
Phase II: Millville-Glassboro: 44-48 minutes

Communities Directly Served:
Phase I: Harrison/Glassboro, Mantua, Deptford, Bellmawr, Haddon, Camden, Center City Philadelphia

Phase II: Millville, Vineland, Malaga, Franklinville, Clayton

Ridership Potential:
Phase I: 17,600-26,600 daily boardings
Phase II: to be determined in subsequent studies

Order of Magnitude Capital Cost:
Phase I: $1.4 billion
$90 million per mile
Phase II: $300 – 450 million
$14 – 21 million per mile

Annual O&M Cost (Approx.):
Phase I:$28.3 million
Phase II: $6.9 million

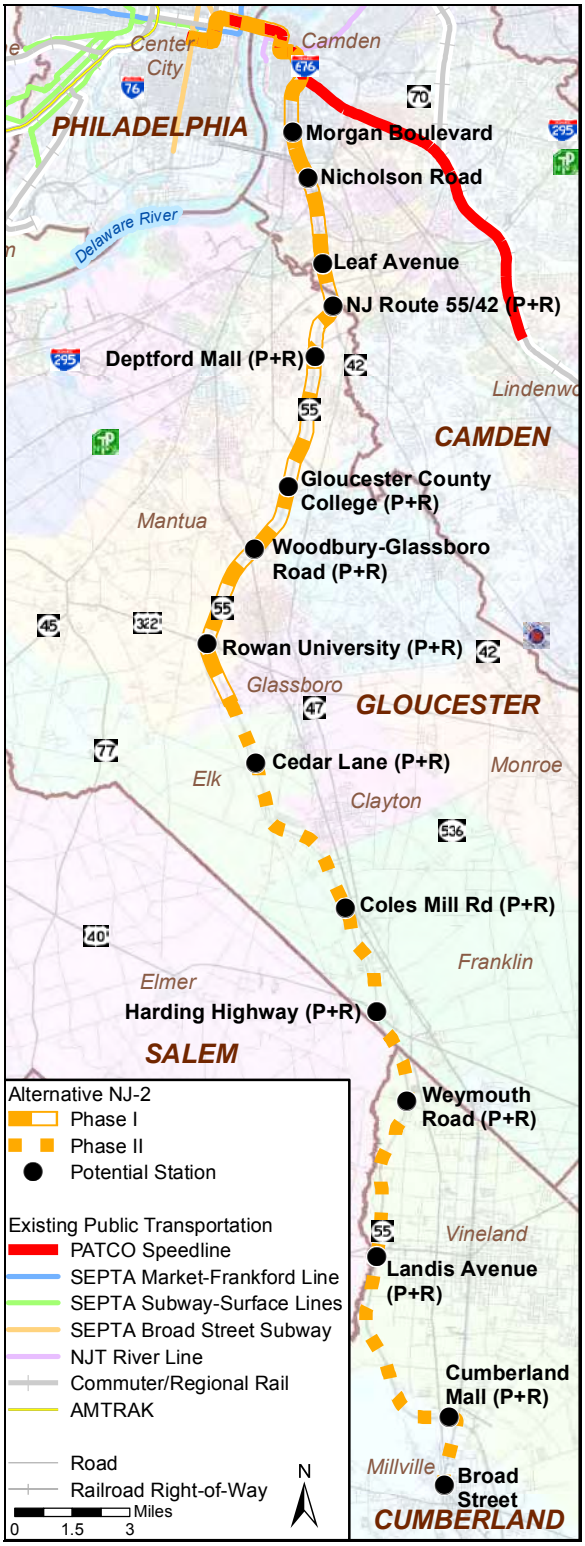
- **Existing Right-of-Way:** South of Camden, Alternative NJ-2 would require land acquisition along I-676 and NJ Route 42 that may require displacements of some homes or businesses. South of the NJ Route 42/55 interchange, the median of NJ Route 55 would be used to locate the rapid transit alignment. Additional land would be required for several park-and-ride lots that would be the primary means of access to this system.

Community Impacts:

- **Mobility:** Alternative NJ-2 would considerably improve and expand transit service in Southern New Jersey. It would serve Gloucester County Community College, downtown Camden, Center City Philadelphia, and via outlying park-and-ride lots, several communities in Southern New Jersey. The park-and-ride-oriented design would likely not significantly reduce reliance on automobiles, since a large portion of travelers would drive to stations. Reverse commute trips typically would require a bus transfer to reach any employment near the rail stations, and therefore would likely not be significant.

- **Smart Growth:** Alternative NJ-2 would increase accessibility to and from the study area and therefore would promote additional development in the region. This alternative is located alongside of highways and sparsely developed land and most travelers would likely access stations in private automobiles. Of the fourteen stations proposed in Phases I and II, eleven would include park-and-ride facilities. This type of rail service would almost exclusively be accessed by automobile access and is less likely to support smart growth initiatives. Minimal opportunity would be created to support transit villages around stations since access would necessitate crossing a highway.

Figure 5-2: Short List Alternative NJ-2



- **Traffic Congestion:** This alternative could significantly reduce VMT in the study area by reducing the length of trips that would otherwise extend into Philadelphia or to more distant stations on the PATCO Speedline. However, by relying on automobiles for access to the stations, this alternative would not eliminate many trips entirely, and it would have potential to increase congestion on many of the roads near station areas. Since there is little development directly adjacent to most of the stations in this alternative, there is not significant potential to increase traffic within communities.

- **Land Use:** Alternative NJ-2 would require roughly six miles of new right-of-way acquisition adjacent to I-676 and NJ Route 42, as well as land for park-and-ride lots at stations along the entire alignment. It would make use of an existing right-of-way in the median of NJ Route 55 and the existing PATCO Speedline tunnel and bridge in Camden and Philadelphia.

Cost Effectiveness:

- **Ridership Potential:** *Phase I:* On the portion between Glassboro and Philadelphia, Alternative NJ-2 is expected to draw approximately 17,600 – 26,600 daily boardings, or 6.2 million boardings annually by the year 2025.

  Phase II: No estimate was made for ridership between Millville and Glassboro due to the complexities of incorporating the DVRPC and SJTPO planning areas. Estimates will be completed in subsequent studies.

- **O&M Cost (Approx.):** O&M costs were based on the three variables shown in **Table 5-5**, vehicle hours, vehicle miles and peak vehicles. Those quantities were developed with the assumption of 38 and 44 minute one-way run times and route lengths of 20.6 and 24.8 miles for Phase I and Phase II services, respectively. Service would include 3 hours of peak service, 16 hours of off-peak service, and 5 hours of late-night service on weekdays, plus 17 hours of off-peak and 7 hours of late-night service on weekends and holidays. As shown in **Table 5-5**, the cost to operate and maintain the Phase I service from Glassboro to Philadelphia was estimated at approximately $28.3 million annually. For the Phase II service from Millville to Glassboro it was estimated to be around $6.9 million annually.

Table 5-5: Net Annual O&M Costs - Alternative NJ-2

	Phase I	Phase II
Annual Vehicle Hours:	138,000	41,100
Annual Vehicle Miles:	3,707,100	967,500
Daily Peak Vehicles:	72	12
Total Annual O&M Cost:	***$28.3 m***	***$6.9 m***

- **Order of Magnitude Capital Cost:** *Phase I:* The percentage of guideway and the number of stations in Phase I of Alternative NJ-2 that would be constructed at-grade, at-grade in a highway median and elevated is shown in **Table 5-6**.

  This alternative would be almost entirely at-grade, with 29 percent at-grade and 58 percent at-grade in a highway median. The remaining 13 percent would be elevated alongside of I-676 and NJ Route 42. Only two of the eight stations would be at-grade. Five of the eight stations would access the alignment in the highway median. These stations would require a

pedestrian bridge over the highway for access to the platform in the median, making the construction cost higher than standard at-grade stations. One station would be elevated.

Table 5-6: Summary of Construction Types - Alternative NJ-2 Phase I

Type of Construction	Percent of Guideway	Number of Stations
At-Grade	29%	2
At-Grade Median	58%	5
Elevated	13%	1
TOTAL:	*100%*	*8*

The capital cost for Alternative NJ-2 would be approximately $1.4 billion, as shown in **Table 5-7**.

Table 5-7: Capital Costs (2004 $s) - Alternative NJ-2 Phase I

Total Capital Cost	Capital Cost per Mile
$1.4 billion	$90 million

Phase II: Capital cost estimates will be completed in subsequent studies.

5.4.3 ALTERNATIVE NJ – 3: CONRAIL RIGHT-OF-WAY

General Description:

Phase I: This service would begin in Glassboro and would travel north in the existing Conrail railroad right-of-way to Camden, where it would merge with the existing PATCO Speedline for service to Center City Philadelphia. The alignment could be fully grade-separated like the existing PATCO Speedline, or partially grade-separated when possible. Partial separation would eliminate grade-crossings at major crossroads, but would maintain grade crossings with crossing gates at smaller crossroads. It would require a Modified PATCO vehicle, capable of operating from an overhead power source when traveling at-grade, and from a third rail on the existing alignment between Camden and Philadelphia.

Small local stations would allow local access to the service on foot, by bicycle or by kiss-and-ride. Outside of towns park-and-ride stations would allow access to this service at an automobile-friendly location with adequate parking facilities. The park-and ride lots would help prevent large increases in traffic and parking in small towns that do not have additional capacity for automobiles.

Phase II: This extension would be a separate, commuter-oriented, limited service from Millville to Glassboro. Passengers would transfer to the Phase I service in Glassboro for travel north to Center City Philadelphia. The Phase II service would be entirely in the Conrail rail right-of-way. It would initially be operated with a diesel vehicle, but could eventually be electrified and converted to a PATCO or Modified PATCO type service with through trains to Philadelphia.

Engineering Feasibility:

- **Constructability:** The most difficult construction for this alternative would likely be in town centers, where the primary concern would be minimizing disruptions to the community and crossroads.

PATCO-style service from Glassboro and Millville to Camden and Philadelphia via Conrail Railroad Right-of-Way

Simulation of PATCO on the Conrail Railroad Right-of-Way

Characteristics:

Transportation Mode:
Phase I: Heavy Rail - PATCO (Electric)
Phase II: Diesel Rail (light rail or other)

Alignment Length:
Phase I: Glassboro-Camden: 18.5 miles
Camden-Philadelphia: 4.4 miles
Phase II: Millville-Glassboro: 21.4 miles

Peak / Off-Peak Headway:
Phase I: 7.5 minutes / 15 minutes
Phase II: 30 minutes / 60 minutes

Estimated Travel Time:
Phase I: Glassboro-Philadelphia: 40-44 minutes
Phase II: Millville-Glassboro: 41-45 minutes

Communities Directly Served:
Phase I: Glassboro, Pitman, Mantua, Wenonah, Woodbury Heights, Woodbury, Deptford, Westville, Gloucester City, Camden, Center City Philadelphia

Phase II: Millville, Vineland, Newfield, Malaga, Franklinville, Clayton,

Ridership Potential:
Phase I: 20,700-31,100 daily boardings
Phase II: to be determined in subsequent studies

Order of Magnitude Capital Cost:
Phase I (Full / Partial Grade Separation):
$1.8 billion / $1.5 billion
$100 million per mile / $80 million per mile
Phase II: to be determined in subsequent studies

Annual O&M Cost (Approx.):
Phase I:$30.0 million
Phase II: $6.8 million

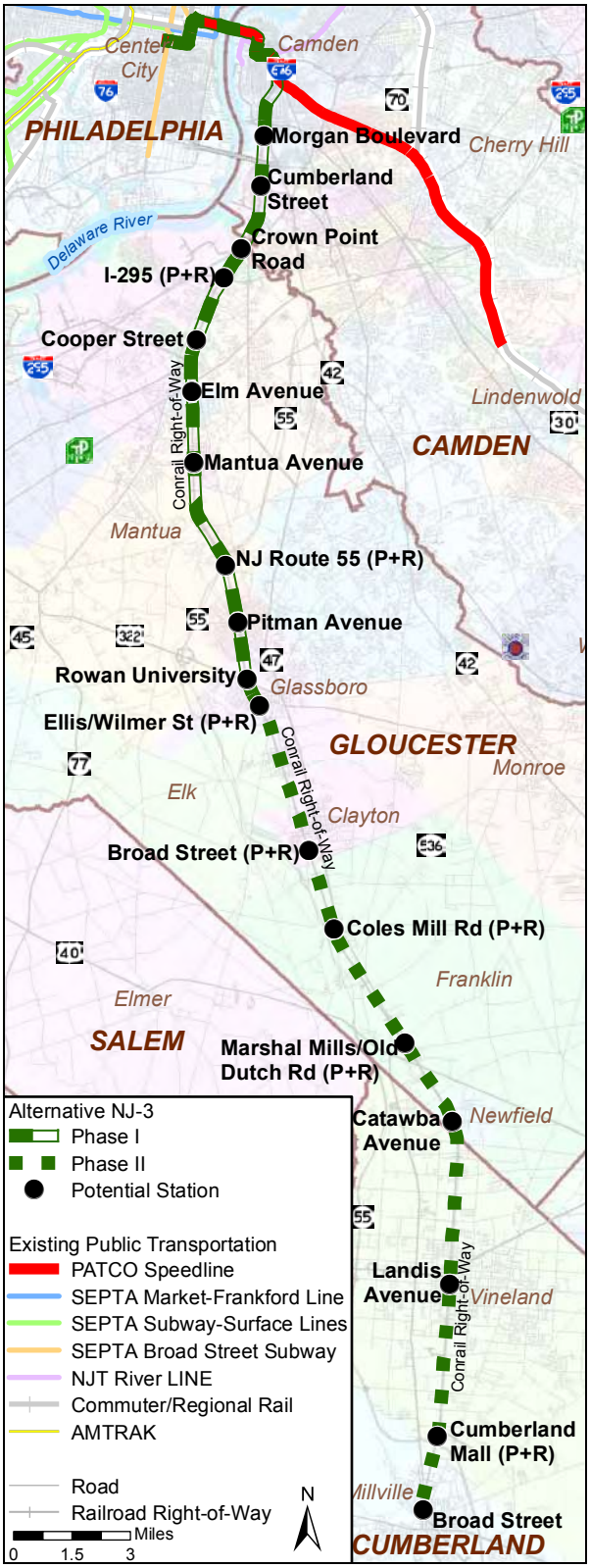
- **Existing Right-of-Way:** Pending negotiations with Conrail, right-of-way for Alternative NJ-3 could be available for passenger service. Availability of land for stations will be investigated in subsequent studies, when final locations are determined.

Community Impacts:

- **Mobility:** Alternative NJ-3 would considerably improve and expand transit service in Southern New Jersey. It would serve a well-established travel market, connecting many Southern New Jersey town centers, Rowan University, the Gloucester County Seat in Woodbury, downtown Camden, Center City Philadelphia and the major activity centers within these areas. The walkable nature of these areas would encourage walk and bike-access trips to and from the new rail service, which would facilitate reverse-commute trips that usually rely on easy walk egress. Rowan University would be a major generator of reverse commute trips, as many students and employees traveling to Rowan would be from the north of the university. This would bring additional revenue to the rail service with little to no additional capacity needs.

  Smart Growth: By providing direct service to existing towns, Alternative NJ-3 has the potential to help strengthen existing communities. Of the eleven stations proposed in Phase I, only three would likely be park-and-rides and only two of those would be in areas with potential for significant levels of new development, thus there would be limited potential for sprawling development to occur near new stations. In the Phase II service, four of the seven stations would likely have park-and-ride facilities. This is strictly due to the limited existing development south of Glassboro.

Figure 5-3: Short List Alternative NJ-3



- **Traffic Congestion:** The effect of this alternative on travel patterns is likely to be significant. By providing stations within existing, walk-able communities, this alternative has the potential to reduce the total number of vehicle miles traveled within the region. Many people would be provided with the option to walk or bike to a transit station rather than drive to their destination or to a station on the more distant PATCO Speedline. For those who still would not be within walking distance of a station, using the new park-and-ride stations would reduce their trip lengths versus driving to Camden, Philadelphia or to a station on the PATCO Speedline. This alternative could also reduce vehicle miles traveled on reverse commutes since travelers could likely reach some employment areas within the Southern New Jersey communities without an automobile.

  There is potential for an increase in traffic through small towns in order to reach the new transit service, but locating well-designed, large park-and-ride stations outside of the towns at intersections with major highways, such as NJ Route 55 and I-295, will help mitigate this issue. Additionally, proper signage and restrictions on parking near the smaller, community stations could make the park-and-ride stations considerably more appealing automobile access points than the community stations. These issues must be examined in more detail during the next phase of study.

- **Land Use:** The land required for Alternative NJ-3 would be minimal for a project of this size. This alternative would take advantage of the existing PATCO Speedline infrastructure through Camden and Philadelphia and would not require much additional right-of-way acquisition south of Camden since it would reuse and upgrade existing rail infrastructure and right-of-way. A small amount of land would be required for eight community stations and three park-and-ride stations in Phase I, and three community stations and four park-and-ride stations in Phase II.

Cost Effectiveness:

- **Ridership Potential:** *Phase I:* On the portion between Glassboro and Philadelphia, Alternative NJ-3 is expected to draw approximately 20,700 – 31,100 daily boardings, or 7.3 million boardings annually by the year 2025.

  Phase II: No estimate was completed for ridership on the portion of Alternative NJ-3 between Millville and Glassboro due to the complexities of incorporating the DVRPC and SJTPO planning areas. Estimates will be completed in subsequent studies.

- **O&M Cost (Approx.):** O&M costs were based on the three variables shown in **Table 5-8**: vehicle hours, vehicle miles and peak vehicles. Those quantities were developed with the assumption of 42 and 43-minute one-way run times and route lengths of 22.9 and 21.4 miles for Phase I and Phase II services, respectively. Service would include 3 hours of peak service, 16 hours of off-peak service, and 5 hours of late-night service on weekdays, plus 17 hours of off-peak and 7 hours of late-night service on weekends and holidays. As shown in **Table 5-8**, the cost to operate and maintain the Phase I service from Glassboro to Philadelphia was estimated at approximately $30.0 million annually. For the Phase II service from Millville to Glassboro it was estimated at approximately $6.8 million annually.

Table 5-8: Net Annual O&M Costs - Alternative NJ-3

	Phase I	Phase II
Annual Vehicle Hours:	140,200	41,100
Annual Vehicle Miles:	4,189,800	834,800
Daily Peak Vehicles:	78	12
Total Annual O&M Cost:	***$30.0 m***	***$6.8 m***

- **Order of Magnitude Capital Cost:** *Phase I:* Phase I of Alternative NJ-3 included two scenarios, one with the alignment fully-grade separated and one with it partially separated – only at major intersections. A cost estimate was prepared for each scenario. The difference between the two scenarios is shown in **Table 5-9**, which shows the percentage of guideway and the number of stations that would be constructed at-grade, elevated and depressed for each scenario.

  The fully grade separated alignment would be only 66 percent at-grade, with the remaining 34 percent either elevated or depressed to avoid grade crossings. Only four of the eleven stations (roughly 36 percent) would be at-grade. In contrast, the partially grade separated scenario would retain 89 percent of the alignment at-grade and seven of the eleven stations (64 percent) would also be at-grade.

Table 5-9: Summary of Construction Types - Alternative NJ-3 Phase I

Type of Construction	Fully Grade Separated		Partially Grade Separated	
	Percent of Guideway	Number of Stations	Percent of Guideway	Number of Stations
Depressed	19%	4	6%	3
At-Grade	66%	4	89%	7
Elevated	15%	3	5%	1
TOTAL:	*100%*	*11*	*100%*	*11*

The capital cost for the fully grade-separated scenario would be roughly $1.8 billion, while the slightly less expensive, partially grade-separated scenario would total approximately $1.5 billion, as shown in **Table 5-10**.

Phase II: Capital cost estimates were not completed for Phase II but will be developed in detail during the next phase of study.

Table 5-10: Capital Costs (2004 $s) - Alternative NJ-3 Phase I

Alternative Segment	Total Capital Cost	Capital Cost per Mile
Fully Grade Separated	$1.8 billion	$100 million
Partially Grade Separated	$1.5 billion	$ 80 million

Table 5-11: Southern New Jersey Alternatives - Short List Summary

		Alternative NJ-1	Alternative NJ-2	Alternative NJ-3
Feasibility	**Constructability**	Alignment through I-76/I-676 and I-76/I-295/NJ Rt 42 interchanges. Width of NJ Rt 42 and Atlantic City Expressway medians may be limited. Construction along busy highways.	Alignment through I-76/I-676 and I-76/I-295/NJ Rt 42 interchanges. Construction along busy highways.	Disruptions to towns/communities along railroad. Possible depressed construction below water table in Gloucester City.
	Existing Right-of-Way	More detailed analysis will be required in subsequent studies	More detailed analysis will be required in subsequent studies	Available, pending discussions with Conrail
Community Impacts	**Mobility**	Improved mobility in Southern New Jersey, including to Camden County College. May draw some riders away from PATCO Speedline	Improved mobility in Southern New Jersey, including to Gloucester County College.	Improved mobility in Southern New Jersey, including to Rowan University. Decreased reliance on automobiles in local communities
	Smart Growth	More likely to encourage sprawl as opposed to smart growth or transit villages	More likely to encourage sprawl as opposed to smart growth or transit villages	More likely to discourage sprawl and build upon existing communities
	Traffic Congestion	Could reduce regional VMT, but would still require automobile access to most stations. Traffic increase on roadways near stations.	Could reduce regional VMT, but would still require automobile access to most stations. Traffic increase on roadways near stations	Possible regional reduction in regional VMT with less dependency on auto trips. Traffic increase in communities near stations.
	Land Use	Would need 6 miles of right-of-way and land for park-and-ride lots. Would use highway median	Would need 6 miles of right-of-way and land for park-and-ride lots. Would use highway median	Minimal new land required. Would use/upgrade existing railroad right-of-way.
Cost Effectiveness	**Ridership Potential** (daily boardings)	Not estimated	*Phase I:* 17,600 – 26,600 *Phase II:* Not estimated	*Phase I:* 20,700 – 31,100 *Phase II:* Not estimated
	O&M Cost (Approx.)	$32.3 million annually	*Phase I:* $28.3 million annually *Phase II:* $ 6.9 million annually	*Phase I:* $30.0 million annually *Phase II:* $ 6.8 million annually
	Order of Magnitude Capital Cost	$1.5 billion / $80 million per mile	*Phase I:* $1.4 billion / $90 million per mile *Phase II:* $300 – 450 million	*Phase I - Full Grade Sep.:* $1.8 billion / $100 million per mile *Phase I - Partial Grade Sep.:* $1.5 billion / $80 million per mile

5.4.4 ALTERNATIVE PA – 1: NEW STREETCAR/TROLLEY TO FRANKLIN SQUARE

General Description:

Phase I: This new streetcar/trolley service would begin at the existing Franklin Square Station on the PATCO Speedline and travel east under the Ben Franklin Bridge to Columbus Boulevard. Trolleys would serve the waterfront area from the median of Columbus Boulevard, where tracks already exist. This service would travel north along the waterfront to a terminus at the Market-Frankford Line's (MFL's) Spring Garden Station and south along Columbus Boulevard to a terminus at the Pier 70 Shopping Plaza. A north/south shuttle would provide service from Pier 70 to Spring Garden Station

Franklin Square Station would be reopened to allow transfers between the PATCO Speedline and the new service to the waterfront.

Phase II: This alternative could eventually be extended south along Columbus Boulevard to the Navy Yard and sports stadiums.

Feasibility:

- **Constructability:** The most difficult construction for this alternative would likely be the connection from the underground trolley terminal at Franklin Square to the at-grade alignment under the Ben Franklin Bridge. This will require tunneling through the abutment at 4th Street and relocating the DRPA storage facilities currently located there, or tunneling to allow the trolley line to emerge east of 4th Street, underneath the bridge. Either method would require careful planning and implementation to avoid compromising the integrity of the bridge.

  Construction of the alignment from underneath the Ben Franklin Bridge to Columbus Boulevard would also be somewhat complex, as there are overpasses to negotiate through, as well as an on-ramp to I-95 north that might need to be closed or re-routed.

New Streetcar service from Franklin Square Station to Pier 70 and Spring Garden Street via Ben Franklin Bridge and Columbus Boulevard

Simulation of Heritage Trolley on Columbus Boulevard

Characteristics:

Transportation Mode:
Phase I: Electric Streetcar or Trolley
Phase II: Electric Streetcar or Trolley

Alignment Length:
Phase I: Franklin Sq.-Columbus Blvd.: 0.6 miles
Ben Franklin Bridge-Spring Garden St.: 1.4 miles
Ben Franklin Bridge-Pier 70: 2.5 miles
Phase II:Pier 70-Navy Yard/Stadiums: not determined

Peak / Off-Peak Headway:
Phase I: 5 minutes / 12 minutes
Phase II: undetermined

Estimated Travel Time:
Franklin Square to Spring Garden: 5 minutes
Franklin Square to Pier 70: 15 minutes

Areas Directly Served:
Phase I: Festival Pier, Spring Garden Station (transfers to SEPTA), Old City Philadelphia, Penn's Landing, South Street Philadelphia, South Philadelphia, Pier 70, Franklin Square (transfers to PATCO)

Phase II: Packer Avenue Marine Terminal, Navy Yard, Lincoln Financial Field, Wachovia Center, Wachovia Spectrum, Citizen's Bank Park

Ridership Potential:
Phase I: 4,900 daily boardings
Phase II: to be determined in subsequent studies

Order of Magnitude Capital Cost:
Phase I: $700 million / $160 million per mile
Phase II: to be determined in subsequent studies

Annual O&M Cost (Approx.):
Phase I: $7.3 million
Phase II: to be determined in subsequent studies

Construction on Columbus Boulevard would be relatively straight-forward, but north of Reed Street the existing railroad right-of-way would have to be widened to allow two tracks. This could increase the complexity of the project since it could require restructuring the roadway lanes or widening the road. The proximity of this construction to an active roadway would also increase the potential for safety issues during construction.

- **Existing Right-of-Way:** Pending negotiations for the railroad right-of-way on Columbus Boulevard, right-of-way for Alternative PA-1 seems to be available.

Community Impacts:

- **Mobility:** Alternative PA-1 would improve service to the numerous entertainment and employment destinations along the Philadelphia Waterfront. PATCO riders in particular would enjoy easier access to those locations via a transfer at Franklin Square Station. SEPTA riders would be able to transfer to the new waterfront trolley at Spring Garden Street or at Penn's Landing via a pedestrian connection from the many bus routes that terminate there.

- **Smart Growth:** Alternative PA-1 has potential to encourage development of the Philadelphia Waterfront. It would provide frequent, easy access to the waterfront from Southern New Jersey (via PATCO), and Northeast Philadelphia (via MFL). Trips from Center City Philadelphia and West Philadelphia would also be possible, but would be much less direct than from other areas since Alternative PA-1 would only have a connection to the MFL at Spring Garden Street.

  Due to its relatively small market and the nature of the area at Franklin Square, limited to no redevelopment would be expected in the vicinity of Franklin Square.

Figure 5-4: Short List Alternative PA-1

- **Traffic Congestion:** This alternative has potential to reduce the number of automobile trips slightly between Southern New Jersey and the Philadelphia Waterfront, but its effect on congestion would be limited. On Columbus Boulevard the restrictions it would place on automobile turning movements might negate the benefits of any possible reductions in automobile traffic.

- **Land Use:** Alternative PA-1 has low requirements for land acquisition. It would travel on land beneath the Ben Franklin Bridge and in existing railroad right-of-way in the median of Columbus Boulevard. The area beneath the Ben Franklin Bridge may be utilized for storage, but is largely empty. The median of Columbus Boulevard is currently unused for most of its length, except for the southern end, near Pier 70, where it is sometimes used for switching freight trains. An agreement would have to be reached with the railroad for use of this track. Some land may be required on Columbus Boulevard for station platforms and expansion of the median to accommodate two tracks north of Reed Street.

Cost Effectiveness :

- **Ridership Potential:** *Phase I:* On the portion between Franklin Square, Pier 70 and Spring Garden Street Alternative PA-1 is expected to draw 4,900 daily boardings, or 1.4 million boardings annually by the year 2025.

  Phase II: No estimate was made for ridership on the portion of Alternative PA-1 between Pier 70 and the Navy Yard/Stadiums. Estimates may be completed in the next phase of study depending on the extent of the study area.

- **O&M Cost (Approx.):** O&M costs were based on the three variables shown in **Table 5-12**: vehicle hours, vehicle miles and peak vehicles. Those quantities were developed with the assumption of 5 and 15 minute one-way run times and route lengths of 2.0 and 3.1 miles for the services to Spring Garden and Pier 70, respectively. Service would include 7 hours of peak service, 9 hours of off-peak service, and 8 hours of late-night service on weekdays, plus 10 hours of off-peak and 14 hours of late-night service on weekends and holidays. As shown in **Table 5-12**, the cost to operate and maintain Phase I of Alternative PA-1 would be $7.3 million annually. Costs were not estimated for Phase II to the navy yard and stadiums.

Table 5-12: Net Annual O&M Costs - Alternative PA-1

	Franklin Square to Spring Garden	Franklin Square to Pier 70
Annual Vehicle Hours:	15,700	29,800
Annual Vehicle Miles:	178,600	280,600
Daily Peak Vehicles:	3	7
Annual O&M Cost:	*$2.5 m*	*$4.8 m*
Total Annual O&M Cost:	***$7.3 m***	

- **Order of Magnitude Capital Cost:** *Phase I:* The capital cost estimate for Alternative PA-1 includes the tunnel through the abutment of the Ben Franklin Bridge, an upgrade of the track on Columbus Boulevard plus addition of a second track north of Reed Street, installation of a signal system, new station platforms, completion of the

underground trolley terminal at Franklin Square Station, and the purchase of 12 new vehicles (10 plus 2 spares). Percentage add-ons were also included for special conditions, contingency and soft costs. The capital costs are listed by category in **Table 5-13** and total roughly $700 million for the Alternative, or approximately $160 million per mile of new construction.

Table 5-13: Summary of Capital Cost Categories - Alternative PA-1

Category	Cost
Infrastructure	$ 295.3 m
Vehicles and Systems	$ 57.0 m
Contingency and Special Conditions	$ 166.0 m
Soft Costs	$ 179.9 m
Total Cost	***$698.2 m***
Cost per Mile	***$157.6 m***

Phase II: No estimate was completed for Phase II. This will be done in subsequent studies.

5.4.5 ALTERNATIVE PA – 2: EXTENSION OF SUBWAY-SURFACE LINES

General Description:

Phase I: This alternative would be an extension of SEPTA's Subway-Surface Lines that currently end at 13th/Juniper and Market Streets in Philadelphia. The extension would allow SSL vehicles to continue eastward to Columbus Boulevard in a tunnel under Market Street and a flyover above I-95. At Columbus Boulevard, SSL vehicles would travel north to the MFL's Spring Garden Station and south to Pier 70 with a combined north/south shuttle service.

The extension would create a direct transfer between the PATCO Speedline and the SSL at 8th and Market Streets for travel from Southern New Jersey to Market Street West with one transfer. Through-service would be possible from the Waterfront to West Philadelphia. Additionally, this alternative would provide an opportunity for the MFL to assume the role of an express service through Center City Philadelphia, while the SSL provides more frequent, local stops similar to those on the MFL today.

Phase II: This alternative could eventually be extended south along Columbus Boulevard to the redeveloping navy yard and new sports complex.

Feasibility:

- **Constructability:** The most difficult construction for this alternative would likely be tunneling underneath Market Street and making a connection to the current terminus of the SSL. This construction would take place underneath the MFL and several businesses, and would have to ensure continued operation of both the MFL and the SSL.

  A second difficulty would be constructing the flyover across I-95 and the connection between the flyover and the at-grade

Extension of the Subway-Surface Lines from 13th & Market Street Station to Pier 70 and Spring Garden Street via Market Street and Columbus Boulevard

Simulation of Subway-Surface Car on Columbus Boulevard

Characteristics:

Transportation Mode:
Phase I: SEPTA Subway-Surface Trolley
Phase II: SEPTA Subway-Surface Trolley

Alignment Length:
Phase I : 13th & Market.-Columbus Blvd.: 1.2 miles
Market Street-Spring Garden St.: 1.7 miles
Market Street-Pier 70: 2.2 miles
Phase II: Pier 70-Navy Yard/Stadiums: not determined

Peak / Off-Peak Headway:
Phase I: 5 minutes / 12 minutes
Phase II: undetermined

Estimated Travel Time:
13th & Market to Spring Garden: 7 minutes
13th & Market to Pier 70: 16 minutes

Areas Directly Served:

Phase I: Festival Pier, Spring Garden Station(Transfers to SEPTA), Old City Philadelphia, Penn's Landing, South Street Philadelphia, South Philadelphia, Pier 70, Market East Area, 8th & Market Station(transfers to PATCO and SEPTA), Market West Area, Philadelphia City Hall, 30th Street Station (transfers to SEPTA and AMTRAK)and West Philadelphia

Phase II: Packer Avenue Marine Terminal, Navy Yard, Lincoln Financial Field, Wachovia Center, Wachovia Spectrum, Citizen's Bank Park

Ridership Potential:

Phase I: 7,900 daily boardings
Phase II: to be determined in subsequent studies

Order of Magnitude Capital Cost:

Phase I: $1,000 million / $200 million per mile
Phase II: to be determined in subsequent studies

Annual O&M Cost (Approx.):

Phase I: $8.6 million
Phase II: to be determined in subsequent studies

right-of-way in the median of Columbus Boulevard.

Construction on Columbus Boulevard would be relatively straight-forward, but north of Reed Street the existing railroad right-of-way would have to be widened to allow two tracks. This could increase the complexity of the project since it would require either restructuring the roadway lanes or widening the road. The proximity of this construction to an active roadway would also increase the potential for safety issues during construction.

- **Existing Right-of-Way:** Pending negotiations for the railroad right-of-way on Columbus Boulevard, right-of-way for Alternative PA-2 seems to be available.

Community Impacts:

- **Mobility:** Alternative PA-2 would increase service to the many entertainment and employment destinations on the Philadelphia Waterfront. The new station at 8th and Market Streets would provide an easy transfer to the new service from both the PATCO Speedline and SEPTA rail services. SEPTA riders would also have the option to transfer to Alternative PA-2 at Spring Garden Street, at Penn's Landing (via a pedestrian connection from the many bus routes that terminate there), or to have a one-seat ride to the waterfront from West Philadelphia, including University City. An additional advantage of this alternative is that it would provide PATCO riders with a two-seat ride from Southern New Jersey to the Market West area. This presently requires either two transfers or a long walk from the PATCO Speedline 16th and Locust Station.
- **Smart Growth:** Alternative PA-2 has potential to encourage development of the Philadelphia Waterfront and Market

Figure 5-5: Short List Alternative PA-2

West areas. It would provide frequent, easy access to the waterfront from Southern New Jersey (via the PATCO Speedline), Center City Philadelphia, West Philadelphia and Northeast Philadelphia (via MFL).

- **Traffic Congestion:** This alternative has potential to reduce the number of automobile trips slightly between Southern New Jersey, the Philadelphia Waterfront and West Philadelphia. On Columbus Boulevard the restrictions it would place on automobile turning movements might reduce the benefits of possible reductions in automobile traffic.

- **Land Use:** Alternative PA-2 has low requirements for land acquisition. It would travel under Market Street and in existing railroad right-of-way in the median of Columbus Boulevard. The median of Columbus Boulevard is currently unused for most of its length, except for the southern end, near Pier 70, where it is sometimes used for switching freight trains. An agreement would have to be reached with the railroad for use of this track. Some land may be required on Columbus Boulevard for station platforms and expansion of the median to accommodate two tracks north of Reed Street.

Cost Effectiveness:

- **Ridership Potential:** *Phase I:* On the portion between 13th/Juniper Street, Pier 70 and Spring Garden Street, Alternative PA-2 is expected to draw 7,900 daily boardings, or 2.3 million boardings annually by the year 2025.

  Phase II: No estimate has been made for ridership on the portion of Alternative PA-2 between Pier 70 and the navy yard/stadiums. This will be determined in subsequent studies.

- **O&M Cost (Approx.):** O&M costs were based on the three variables shown in **Table 5-14**: vehicle hours, vehicle miles and peak vehicles. Those quantities were developed with the assumption of 7 and 16-minute one-way run times and route lengths of 2.9 and 3.4 miles for the services to Spring Garden and Pier 70, respectively. Service would include 7 hours of peak service, 9 hours of off-peak service, and 8 hours of late-night service on weekdays, plus 10 hours of off-peak and 14 hours of late-night service on weekends and holidays. As shown in **Table 5-14**, the cost to operate and maintain Phase I of Alternative PA-2 would be $8.6 million annually. Costs were not estimated for Phase II to the navy yard and stadiums.

Table 5-14: Net Annual O&M Costs - Alternative PA-2

	13th & Market to Spring Garden	13th & Market to Pier 70
Annual Vehicle Hours:	17,500	31,600
Annual Vehicle Miles:	257,800	300,200
Daily Peak Vehicles:	4	8
Annual O&M Cost:	*$3.2 m*	*$5.4 m*
Total Annual O&M Cost:	***$8.6 m***	

- **Order of Magnitude Capital Cost:** *Phase I:* The capital cost estimate for Alternative PA-2 includes the tunnel underneath Market Street, flyovers to cross I-95, an upgrade of the track on Columbus Boulevard plus addition of a second track north of Reed Street,

installation of a signal system and the purchase of 15 new vehicles (12 plus 3 spares). Percentage add-ons were also included for special conditions, contingency and soft costs. The capital costs are listed by category in **Table 5-15** and total roughly $1.0 billion for the alternative, or approximately $200 million per mile of new construction.

Table 5-15: Summary of Capital Cost Categories - Alternative PA-2

Category	Cost
Infrastructure	$ 464.5 m
Vehicles and Systems	$ 31.5 m
Contingency and Special Conditions	$ 258.1 m
Soft Costs	$ 274.8 m
Total Cost	***$ 1,029.0 m***
Cost per Mile	***$205.8 m***

Phase II: No estimate was completed for Phase II. This will be done in subsequent studies.

Table 5-16: Philadelphia Waterfront Alternatives - Short List Summary

		Alternative PA-1	Alternative PA-2
Feasibility	**Constructability**	Tunnel through BFB abutment, connection to Columbus Boulevard, construction near active roadway	Tunnel under Market Street, flyover above I-95 and connection to at-grade Columbus Boulevard, construction near active roadway
	Existing Right-of-Way	Pending negotiations with Railroad on Columbus Boulevard, right-of-way is available	Pending negotiations with Railroad on Columbus Boulevard, right-of-way is available
Community Impacts	**Mobility**	Improved mobility between Southern New Jersey and Philadelphia Waterfront	Improved mobility between Southern New Jersey, Philadelphia Waterfront, Market West, Old City Philadelphia, and West Philadelphia
	Smart Growth	Potential to encourage development of Philadelphia Waterfront. Little potential to encourage revitalization of Franklin Square.	Potential to encourage development of Philadelphia Waterfront and strengthen Center City as an employment center.
	Traffic Congestion	Some potential to reduce traffic to and along Philadelphia Waterfront, but more influential as a mobility improvement in and catalyst for smart growth.	Some potential to reduce traffic to and along Philadelphia Waterfront, but more influential as a mobility improvement in and catalyst for smart growth.
	Land Use	Would require little new land, primarily some for second track on Columbus Boulevard, north of Reed Street and for station platforms	Would require little new land, primarily some for second track on Columbus Boulevard, north of Reed Street and for station platforms
Cost Effectiveness	**Ridership Potential** (daily boardings)	*Phase I:* 4,900 *Phase II:* Not estimated	*Phase I:* 7,900 *Phase II:* Not estimated
	O&M Cost (Approx.)	*Phase I:* $7.3 million annually *Phase II:* not estimated	*Phase I:* $8.6 million annually *Phase II:* not estimated
	Order of Magnitude Capital Cost	*Phase I:* $700.0 million $160 million per mile *Phase II:* not estimated	*Phase I:* $1,000.0 million $200 million per mile *Phase II:* not estimated

5.5 CONCLUSIONS

At the completion of this study the five short list alternatives were presented in a second round of public outreach, as described in **Section 2.1**. The purpose of the outreach effort was to determine whether, after seeing some representative transit alternatives, study area residents and employees were in favor of a rapid transit investment and what components of the short list alternatives merit further study.

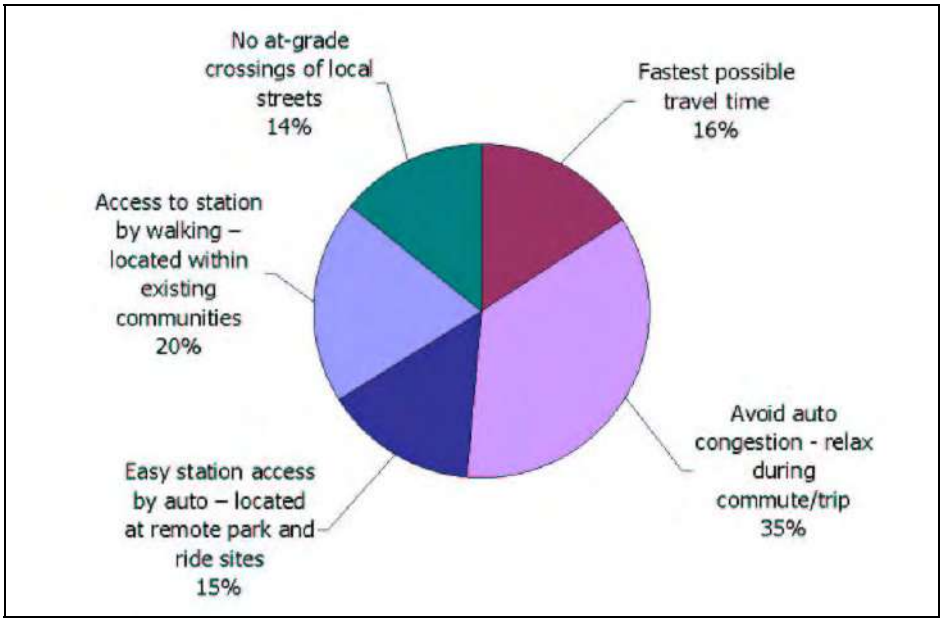
Study area residents and employees were given the opportunity to complete comment forms either at the open houses or online. A total of 221 comments were received, of which 193 (87 percent) expressed support for a transit investment in the study area, 20 (9 percent) expressed opposition to a transit investment in the study area and the remaining 8 did not express an opinion in either direction.

As part of the effort to guide future development of a new transit service, the comment form distributed in round 2 public outreach asked participants to rank from 1 (most important) to 5 (least important) the following items:

- Fastest possible travel time
- Avoid auto congestion - relax during commute/trip
- Easy station access by auto – located at remote park and ride sites
- Access to station by walking – located within existing communities
- No at-grade crossings of local streets

Of the 221 comment forms received, roughly 90 completed the section on ranking priorities for a transit system. The responses are summarized in **Figure 5-6**, which shows for each category the percentage of people who ranked it as a number 1 or 2 priority. The results of the survey show that the primary interest in a new transit investment is related to a desire to avoid automobile congestion (35 percent). Many people also specified an interest in being able to walk to and from stations (20 percent). The remaining three items – fast travel time, easy automobile access to stations and avoiding grade crossings – received roughly equal priority (14 - 16 percent each).

Figure 5-6: Percent of #1 and #2 Rankings for Transit System Priorities



Although there was overwhelming support for a transit investment, it was not exclusively in favor of one alignment in particular. Those who commented on alignment preference were evenly distributed among the alternatives indicating no clear majority for any particular alignment.

Alternative NJ-3 created relatively ardent responses, both positive and negative. Residents were particularly concerned with safety issues related to living near a rail line with frequent service. They were also concerned with the effects of grade crossings and a potential influx of development. Other residents were supportive of the potential benefits of providing rail service to existing communities where residents could potentially access the stations without an automobile; reasons ranged from concerns over gas prices and limits on the gas supply to

providing transportation options to those without cars (including seniors) to reducing the number of vehicles on the roads. They also liked the potential of NJ-3 to stimulate smart growth and to revitalize some of the declining communities along the Conrail railroad right-of-way.

Many other comments were received in favor and in opposition of Alternatives NJ-1 and NJ-2, but the reasons were not as varied or as zealous. Those in favor of these alternatives generally mentioned needing service to Washington Township or Williamstown, reducing traffic congestion, easy automobile access and avoiding population centers. Those opposed to these alternatives mentioned that they do not link towns, difficulties in accessing station platforms in a highway median and that they would not support smart growth.

Many comments focused on the need to reduce traffic congestion on NJ Routes 55 and 42 and increase transportation options, but did not specify an alignment preference. A few comments also suggested alternate routes or other services that they would like considered. Some also commented that a rail line would provide an alternative to driving on congested highways like NJ Route 42 and 55.

From the comments received in round 2 of public outreach, the ASG concluded that there is significant interest in a new transit service to Southern New Jersey and the Philadelphia Waterfront. The group also concluded that additional study and progress toward a transit investment in each of those two areas is warranted.

Many residents had very strong feelings about particular locations for a Southern New Jersey rail service. Future studies will again require close coordination with communities to develop a specific alignment that will be supported through engineering and design. This may include modifications to or combinations of the alternatives discussed in this study or new alternatives that were not evaluated in this study. Additionally, the Philadelphia Waterfront alternatives will require coordination with SEPTA, which currently provides bus service along the waterfront and other connecting services in the remainder of Philadelphia.

5.6 NEXT STEPS

Results of the public outreach performed as part of this study indicate a consensus by the general public to move forward in developing transit alternatives for the defined study area. As part of the FTA Planning Process (shown previously on **Figure 1-2**), the next step toward a major transit investment is to complete a full Alternatives Analysis (AA) for the study area.

An AA is a corridor study that, with the input of areas residents, elected officials and other stakeholders, investigates several alternatives for transit investments including various alignments and modes. An AA would include a full definition of alternatives, detailed ridership forecasting, detailed capital and O&M costs and a financial plan. Alternatives would be compared to each other based on these characteristics to determine a Locally Preferred Alternative (LPA). An application would then be submitted to the FTA to enter into Preliminary Engineering (PE) with Draft Environmental Impact Statement (DEIS). Final Design and Construction would follow depending on the results of PE and DEIS.

In preparation for the next steps toward a transit investment, it will be important to work with and obtain the continued support of local elected officials, stakeholders and the public. Any project that receives Federal New Starts funding, in the form of a grant, is required to obtain a local match. In order to obtain Federal funding for this project the states, counties, cities and municipalities in the study area will have to support the need for transit in Southern New Jersey and Philadelphia Waterfront. Continued involvement of the region will be critical to achieving that this process continues.