



# TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS FOR SELECT CORRIDORS

September 2009



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

The symbol in our logo is adapted from the official DVRPC seal, and is designed as a stylized image of the Delaware Valley. The circular shape symbolizes the region as a whole. The diagonal line represents the Delaware River and the two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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# Introduction

## Background

Throughout the nation, there has been a cultural shift in transportation from building new roads and highways to focusing on management and operations of the existing system. Therefore, there is a fundamental need to link planning and operations. The Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) legislation emphasizes this new metropolitan planning perspective by requiring state and regional plans to "promote efficient system management and operations."

Both the New Jersey Department of Transportation (NJDOT) and the Pennsylvania Department of Transportation (PennDOT) are currently migrating from design-build organizations to management and operations organizations by becoming more involved with traffic management, incident management, and traffic signal operations.

As part of this process, there is a need to redefine the DOT's relationships with local municipalities, counties, transit agencies, and other regional organizations. To encourage and promote safe and efficient management and operation of the region's transportation network, and to fulfill the region's need to link planning and operations, the Delaware Valley Regional Planning Commission (DVRPC) has initiated a project that examines Transportation Systems Management and Operations (TSM&O) in selected corridors. DVRPC's role in this process is to assist the DOT's and locals in jointly identifying and prioritizing needs, and recommending actions that they can implement to improve cooperation and coordination. Since congestion and the need for mobility do not obey jurisdictional boundaries, and regional transportation investments affect local issues, decisions regarding management and operations at the corridor level affect performance of the regional transportation system.

## What is Transportation Systems Management and Operations?

The term "transportation systems management and operations" is defined as an integrated program to optimize the performance of existing infrastructure through the implementation of multimodal and intermodal, cross-jurisdictional systems, services, and projects. The goal is to identify management and operations deficiencies in the corridor and develop possible mitigation strategies designed to preserve capacity and improve security, safety, and reliability of the transportation system in the chosen corridors.

Typical TSM&O improvements to the transportation system may include traffic signal and arterial management, traffic detection and surveillance, traffic incident management, transportation demand management, transit management systems, and traveler information services.

## Project Scope and Objectives

The purpose of this project is to provide stakeholders with tools to define the framework for implementing improvement strategies and tackling institutional issues in the selected corridors. One corridor was selected from the New Jersey side of DVRPC's region: NJ Turnpike/I-295 between NJ 73 and NJ 168; and one corridor from the Pennsylvania side: I-95 in Delaware County. Since both corridors span multiple municipalities and cover various modes of transportation, there was opportunity to gain consensus on common goals, and identify transportation systems management and operations opportunities.

The project involved extensive stakeholder outreach. Meetings focused on explaining different transportation systems management strategies and engaging open discussion with participants to identify high-level corridor challenges regarding operational issues. Background data such as locations of Intelligent Transportation Systems (ITS) equipment (closed circuit TV (CCTV) cameras, variable message signs (VMS)), traffic signals, and existing diversion routes was collected, analyzed, and presented to the stakeholders. Potential short and long-term improvement scenarios were then formulated and prioritized.

This report includes an improvement strategy matrix for each corridor. The matrices outline TSM&O strategies, establish corridor priorities, and define lead agencies and assisting roles for recommended implementation.

## Transportation Systems Management and Operations Strategies

The following is an overview of ITS applications and TSM&O strategies that were used throughout this project to guide the stakeholders.

### Traffic Signal and Arterial Management

Closed loop traffic signal systems fall under the category of Traffic Signal and Arterial Management. By installing a closed loop traffic signal system, and other types of traffic detectors, traffic flow can be more effectively managed along arterial corridors. Closed loop signal systems work by dynamically adjusting signal timings and progression to reflect traffic conditions. Additionally, advanced signal systems help manage coordinated signal systems across municipal boundaries. Transit signal priority and emergency signal preemption are also included in this category.

## Traffic Detection and Surveillance

A variety of traffic detection and surveillance technologies can help identify incidents quickly, including roadway detectors, CCTV camera systems, and vehicle probe tracking systems (using E-ZPass readers, for example). These tools provide continuous monitoring of traffic volumes on highways and arterials, and at intersections.

## Traffic Incident Management

Incident Management Task Forces (IMTF) are included in this category. An IMTF can positively and directly affect incident responses on selected corridors by engaging a wide range of emergency response stakeholders to address incident management issues. IMTF partners include DOT's, State Police, municipal fire and police, and towing and recovery operators. In this region, DVRPC is a member of six IMTF's and currently manages four of them. An IMTF usually meets quarterly, develops an action plan, and routinely performs incident debriefings. By meeting informally and away from the scene of an incident, issues with incident management can be addressed effectively.

The use of Emergency Service Patrols (ESP) is a critical component to traffic incident management. ESP vehicles are equipped to not only assist stranded motorists, but to help clear minor incidents and assist emergency responders at the scene. The ESP program is designed to improve the efficiency of the highway system through the expedited removal of minor incidents that impact traffic flow and help reduce the risk of secondary accidents by deploying warning devices, such as arrow boards.

## Transit Management Systems

Overall system and station surveillance and communications is included in this category, such as Automated Vehicle Location (AVL) systems, Computer-Aided Dispatch (CAD) systems, and utilization of remote vehicle and facility surveillance cameras. Transit signal priority systems are also included in this category. By using sensors to detect approaching transit vehicles and then giving priority by extending green time for them to clear an intersection, transit performance can be improved. This method could lead travelers to make a modal shift and choose transit over their own personal vehicles.

## Traveler Information

Strategies included in the category of traveler information utilize technologies such as Internet websites, 511 services, media, and other ITS technologies. These technologies allow travelers to make more informed decisions regarding trip departures, routes, and mode of travel. Along the roadways, travel conditions may be disseminated to travelers via ITS technologies such as VMS or Highway Advisory Radio (HAR).

## Work Zone Management

Work zone management strategies include temporary implementation of traffic management or incident management strategies. These temporary systems can be stand-alone implementations or may supplement existing systems in the area during construction. Examples are queue detectors, speed detectors, intrusion warning systems, and VMS/HAR devices. The Federal Highway Administration (FHWA) estimates that more than 20 percent of the National Highway System (NHS) is under construction during its peak season. These work zones can cause delays, often on already congested roads. Just after this TSM&O effort began, a Federal requirement to include travel times on VMS in construction work zones was implemented.

## Maintenance and Construction Coordination

Coordination of maintenance and construction activities among different agencies, and between agencies and municipalities are recognized as crucial strategies for efficient movement of traffic and transit vehicles on the roadway.

## Study Process

The study process consisted of developing a list of stakeholders involved in traffic, transit, and/or incident management, and meeting with them in a workshop setting where challenges, visions, goals, and possible solutions were identified for the selected corridors. As a result of the working meetings, improvement strategy matrices for each corridor were developed.

DVRPC collected data and developed maps to support discussion, including looking at previous relevant studies, Congestion Management Plan (CMP) strategies, existing ITS inventory, official DOT diversion routes, traffic signal locations, and transit alternatives.

## Corridor Selection

In deciding which corridors to study, DVRPC coordinated with traffic operation center staff from both PennDOT and NJDOT and examined several corridors from a TSM&O perspective. Based on their day-to-day experiences in traffic operations and management, the I-95 Corridor in Delaware County, Pennsylvania and the NJ Turnpike/I-295 Corridor (between NJ 73 and NJ 168) in New Jersey were short-listed. DVRPC's Congestion Management Process (CMP) and ITS Master Plan, described below, were then consulted to determine that these two corridors would be appropriate choices.

In choosing locations for study, it was important to coordinate with existing CMP corridors. The CMP is a systematic process to identify congestion and its causes, propose mitigation strategies, and evaluate the effectiveness of implemented strategies. The most recent CMP (Publication #09028B), adopted by the DVRPC Board in December 2008, identifies congested corridors and multimodal strategies to mitigate congestion. The CMP is an integral part of the planning process that influences decision-making, and also feeds projects and strategies into DVRPC's Long-Range Plan and



Transportation Improvement Program. The two corridors chosen for this study have direct correlations with identified CMP corridors. In Pennsylvania, the entire I-95 corridor is identified as PA CMP Corridor 4: I-95; with the Delaware County segment further identified as Subcorridor D. In New Jersey, the I-295 and NJ Turnpike corridors are identified as NJ CMP Corridors 1 and 2, respectively; with CMP Corridor 2 corresponding to the NJ Turnpike in Camden and Burlington Counties.

*DVRPC's Transportation Operations Master Plan, July 2009 (Publication #09049)*, identifies several roadway networks in both Pennsylvania and New Jersey as Integrated Corridor Management (ICM) Corridors. The concept of ICM is for agencies to improve the movement of people and goods along metropolitan corridors through a multimodal, integrated transportation management approach. The basic premise behind the ICM initiative is that independent, individual networks and their parallel linkages, can be operated in a more coordinated and integrated manner, thereby increasing overall corridor throughput and enhancing mobility. Both I-95 in Delaware County and the NJ Turnpike/I-295 Corridor are identified as future ICM corridors.



# Delaware County I-95 Corridor

## Overview

### Boundaries

The Delaware County I-95 Corridor extends from the border of Philadelphia, Pennsylvania, south to the Delaware State Line. The study area is depicted in [Figure 1](#).

### Transportation Networks

#### Freeways

The freeway network in the study area provides good connectivity between major employment and housing areas of the western Philadelphia metropolitan area, as well as access to Delaware. In addition to the I-95 freeway, there are two other freeways in the study area: I-476 and US 322, which both provide connections to I-95. US 322 also provides a direct connection to New Jersey via the Commodore Barry Bridge. I-95 is a six-lane facility, with a lane drop and addition at I-476. US 322 merges left onto I-95 and continues across to the bridge, which creates a heavy weave area. Average Annual Daily Traffic (AADT) volumes on I-95 vary from 120,000 vehicles per day near the Delaware State line to over 140,000 vehicles per day north of I-476.

#### Arterial Roadways

The following is a listing of the arterial network in the study area:

- ▶ US 322 traverses east-west, provides access to western Delaware and Chester County, crosses I-95 at Interchange 3, and continues to New Jersey via the Commodore Barry Bridge;
- ▶ PA 291 is mostly a four lane highway running north-south and parallel to I-95 and the Delaware River, connecting many major industrial sites along the river, as well as providing access to Harrah's Casino in Chester;
- ▶ US 13 also runs parallel to I-95 and the Delaware River in the City of Chester, then crosses I-95 into Ridley Township;

- ▶ PA 252 and PA 320 are east-west roadways, closely parallel to I-476 and intersect I-95 in the study area at Interchange 6;
- ▶ PA 352 intersects I-95 also at Interchange 6 and is a north-south roadway; and
- ▶ PA 452 runs east-west near US 322 and crosses I-95 at Interchange 2.

## Transit

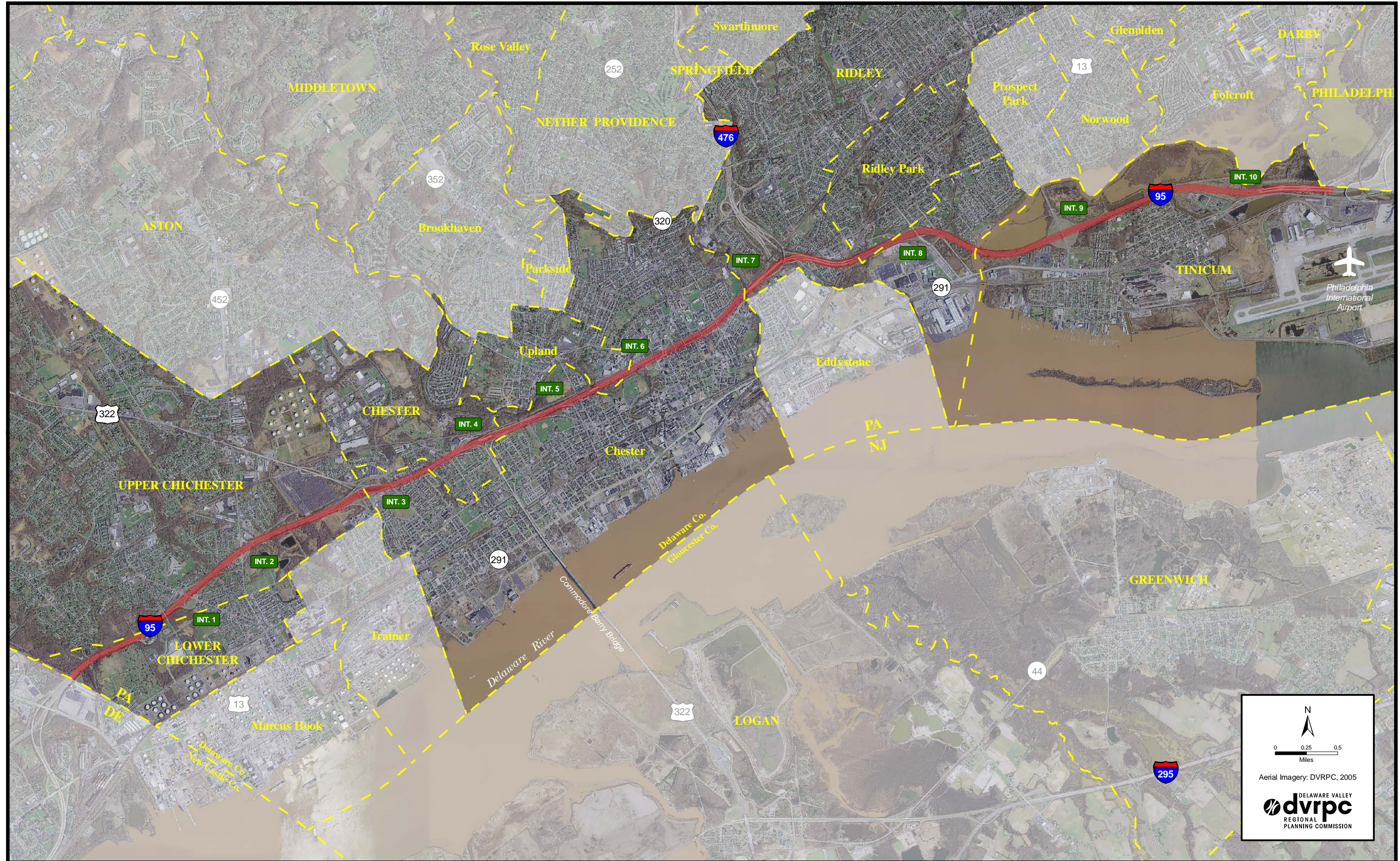
The Chester Transportation Center is a SEPTA bus and train station located at Sixth and Welsh Streets in the City of Chester. The station is served by the R2 Line (described below) and the following bus routes in the study area (also shown in [Figure 2](#)):

- ▶ Route 37: South Philadelphia to Eastwick and Chester Transportation Center, runs along PA 291 and provides service to the Philadelphia International Airport, Harrah’s Casino in Chester, and major employment centers (Owl service (24 hours a day) to casino and airport);
- ▶ Route 109: 69th Street Terminal to Chester Transportation Center, runs along PA 352 and PA 320 (Owl service);
- ▶ Route 113: 69th Street Terminal to Marcus Hook via Chester Transportation Center, runs along PA 291 in the vicinity of the study area;
- ▶ Route 114: Darby Transportation Center to Granite Run Mall via Chester, runs along US 13;
- ▶ Route 117: Feltonville to Penn State via Chester Transportation Center, runs along PA 352 and local roads in Chester;
- ▶ Route 118: Chester Transportation Center to Newtown Square, runs along PA 352 and PA 320; and
- ▶ Route 119: Chester Transportation Center to Cheyney University, runs along US 322 and local Chester roads.

SEPTA’s Regional Rail Line R2 between Philadelphia and Wilmington provides service in the study area via the Marcus Hook, Highland Avenue, Chester Transportation Center, Eddystone, Crum Lynne, Ridley Park, and Prospect Park Stations. AMTRAK’s passenger train line also passes through the study area, but does not stop for service.

## Stakeholders

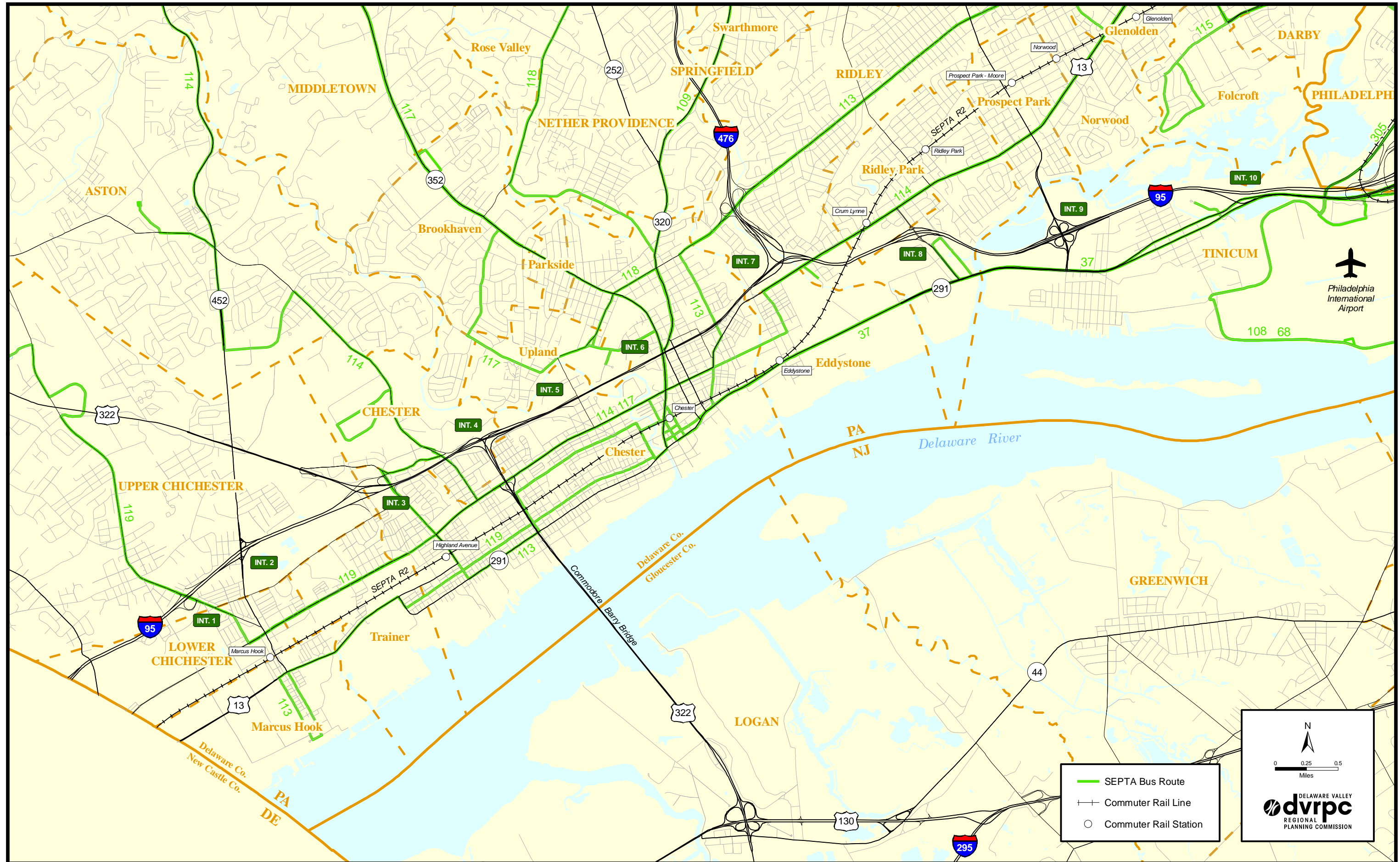
It was important to engage a wide variety of stakeholders in this process since the corridor covers multiple modes of transportation and spans eight municipalities: the City of Chester, Chester Township, Lower Chichester Township, Ridley Park Borough, Ridley Township, Tinicum Township, Upland Borough, and Upper Chichester Township. Invited stakeholders for this corridor are listed in [Table 1](#) and have been involved to some extent in the development of this project.





Delaware County I-95 Corridor: Transit Network

Figure 2







In general, operational and management responsibilities of I-95 are performed by PennDOT. Enforcement, security, and crash investigation are the responsibility of the PA State Police (I-95), and the local law enforcement agencies (local roads). Emergency services are typically dispatched by Delaware County Emergency 9-1-1 Center, and are the responsibility of local fire departments.

Table 1: Delaware County I-95 Corridor Stakeholders

Municipalities	Police and Fire Departments	Regional Agencies
City of Chester	Pennsylvania State Police	Delaware County 9-1-1 Center
Chester Township	<ul style="list-style-type: none"> <li>■ Troop K - Media</li> </ul>	Delaware County Planning Dept
Lower Chichester Township	Chester City Police Department	Delaware County TMA
Ridley Park Borough	Chester Township Police Department	Delaware River Port Authority
Ridley Township	Crozer-Chester Medical Center	Federal Highway Administration
Tinicum Township	<ul style="list-style-type: none"> <li>■ Emergency Medical Services</li> </ul>	<ul style="list-style-type: none"> <li>■ Philadelphia</li> </ul>
Upland Borough	Eddystone Police Department	PennDOT District 6-0
Upper Chichester Township	Essington Fire Company	<ul style="list-style-type: none"> <li>■ Traffic Control Center</li> <li>■ Delaware County Maintenance Office</li> <li>■ Construction Office</li> </ul>
	Lower Chichester Fire Department	SEPTA
	Reliance Hook and Ladder Co. #1	
	Ridley Park Fire Company #1	
	Ridley Park Police Department	
	Ridley Township Police Department	
	Tinicum Township Police Department	
	Upland Police Department	
	Upper Chichester Township Police Dept	

Source: DVRPC

### Existing Operational Inventory

ITS technologies in this corridor include CCTV cameras and VMS. Both DRPA and the PennDOT District 6-0 Traffic Management Center (TMC), located in King of Prussia and serving the five southeastern counties in Pennsylvania, utilize these technologies to monitor traffic conditions, assist in incident management, and disseminate information to the public. It is important to note that PennDOT is currently developing a statewide 511 travel information service to cover all expressways in Pennsylvania, including I-95 in Delaware County. PennDOT’s TMC staff also manages ESP.

**Figure 3** displays ITS elements in this corridor.

There are three CCTV cameras on I-95 in the corridor that the TMC monitors, which are located at the I-95/I-476 Interchange and the I-476/MacDade Boulevard Interchange. There are several CCTV cameras in the corridor that DRPA monitors, and most of them are located on the Commodore Barry Bridge.

In the vicinity of the project limits, there is a four-signal closed loop traffic signal system installed on MacDade Boulevard between Milmont Avenue and Edgewood Avenue in Ridley Township.

DVRPC, in partnership with PennDOT District 6-0 and NJDOT, developed the web-based Interactive Detour Route Mapping (IDRuM) application that organizes all existing PennDOT and NJDOT

Emergency Detour Routes within the region into a manageable, easy-to-use interface. IDRUM is available in both an online ([www.idrum.us](http://www.idrum.us)) and offline version, with the offline version designed to give emergency responders access to the detour routes where internet access is limited or non-existent. IDRUM houses official detour routes for the Delaware County I-95 Corridor.

## Corridor Issues and Needs

Through working meetings with the stakeholders, a list of transportation management and operational issues were identified in the corridor. Some of the issues discussed were lack of coordination at times, lack of extensive ITS equipment along the corridor, difficulty in locating incidents, lack of diversion routes, and various incident management issues. A summary of the issues identified by meeting participants is listed below.

- ▶ I-95 is never “quiet”, does not have off-hours and there is always heavy traffic.
- ▶ Bottlenecks at the US 322 and I-476 Interchanges cause congestion.
- ▶ There is a lack of coordination with municipalities with regard to notification of incidents. Often, municipalities are only aware of an incident on I-95 when traffic begins to spill-over onto the local roadway network. Communication is often inadequate between PennDOT’s TMC and the municipal police who handle the influx of traffic.
- ▶ There is a lack of coordination with SEPTA when an incident occurs on any of the affected routes in the study area. Incident information is not communicated with respect to roadways that may disrupt their bus service, and SEPTA is not prepared ahead of time to handle late arrivals or re-route buses as necessary.
- ▶ Sometimes there is a lack of communication and coordination with tow companies that respond to incidents. They need to be able to respond to an incident scene faster for quick clearance.
- ▶ Larger employers in the study area such as Boeing, Crozer-Chester Medical Center, and the Philadelphia International Airport lack direct access to incident information to pass along to their employees. Such information would not only help employees choose a less congested route home, but would help employers know if their employees would be delayed, or if deliveries and ambulance routes would be affected (if there was an emergency situation).
- ▶ The Delaware Department of Transportation and the Delaware State Police are not always notified about incidents which may affect their operations.
- ▶ There is a lack of complete ITS equipment along the I-95 corridor in the study area.

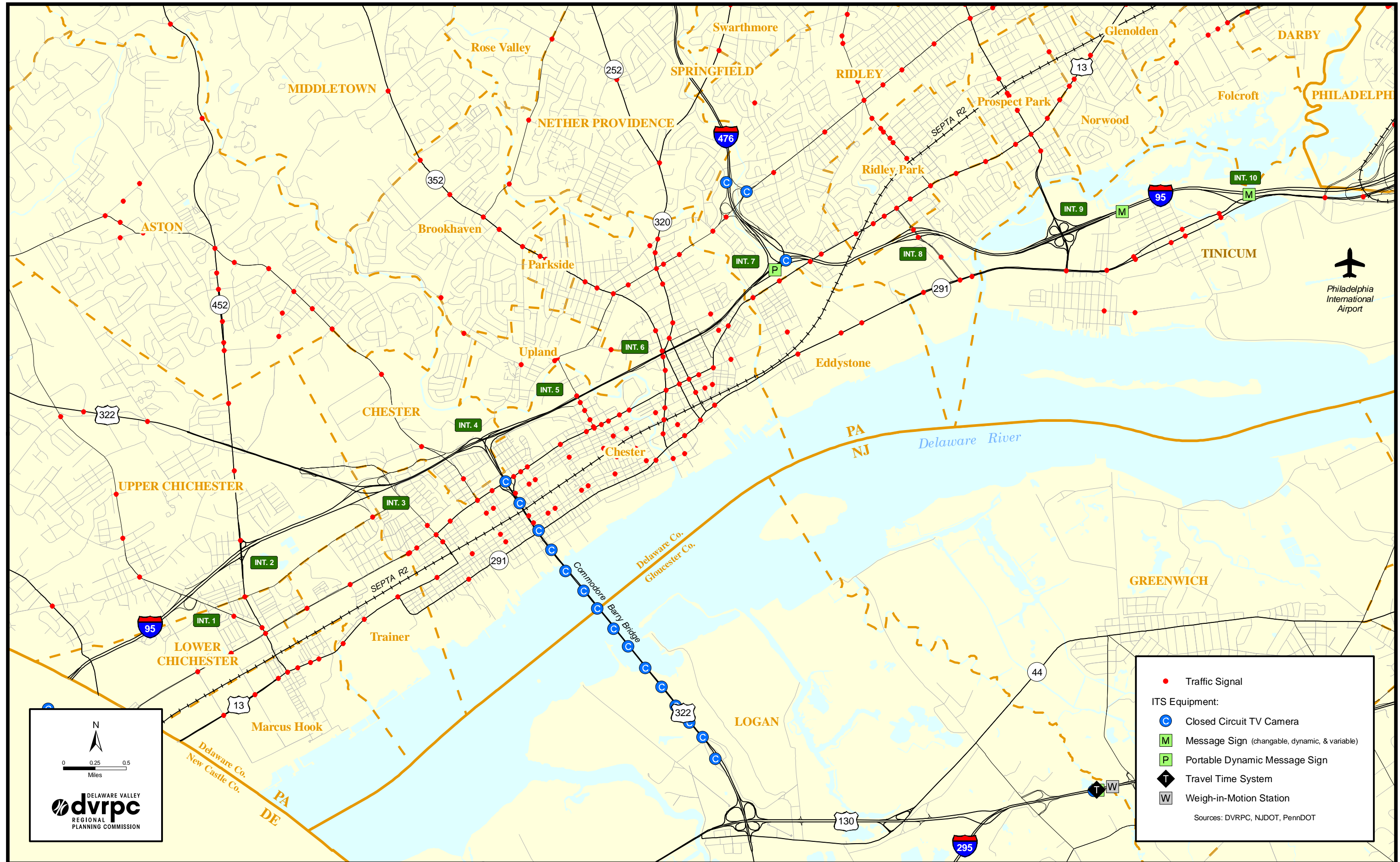
*NOTE: A \$17.5M Project from American Recovery and Reinvestment Act of 2009 will complete ITS deployment along this corridor.*

- ▶ There is a lack of “official” detour routes for I-95. Many of the local roads are already congested. Official detour routes may help concentrate congestion along only a few routes in the corridor.

*NOTE: Since this project ended, “official” detour routes have been designated in this study area.*

Delaware County I-95 Corridor: ITS Equipment & Traffic Signals

Figure 3





- ▶ There is a need to identify locations of incidents quickly and accurately. Installation of ramp and milemarker designation signs placed along I-95 could help incident identification issues, as has been used in other corridors in the region.
- ▶ Response boxes (zones) are needed to designate which fire company should respond to specific areas on I-95 during an incident. Usually, the closest fire company to an interchange should respond to an incident regardless of whether they are located in the municipality where the incident occurs.
- ▶ There is a need to enhance relationships between PennDOT, PA State Police, and fire departments regarding operations at the scene of an incident. Training is needed regarding equipment placement at the scene of an incident. All parties should work to position equipment or vehicles from blocking travel lanes, where possible.
- ▶ There is a need for additional funding to state and municipal responders for additional equipment resources and manpower due to increased responses on the highway over the years.
- ▶ There is a need for park and ride lots to help alleviate commuter traffic and transfer those drivers and passengers to rail or bus service.

## Goals, Objectives and High Priority Strategies

As a result of the working meetings, and with respect to needs identified by the stakeholders, an Improvement Strategy Matrix (**Table 2**) was developed. The Improvement Strategy Matrix classifies corridor operational issues into five goals: Improve Coordination, Enhance Corridor Management, Enhance Incident Management, Develop Parking Management, and Enhance Traveler Information.

For each operational goal, strategies were identified to meet their objectives. The stakeholders prioritized each strategy during the final meeting. High priority projects are those that are short-term in nature and/or rank most important by the stakeholders. Medium priority projects are those that are near-term in nature and/or rank moderately important. Low priority projects are those that are long-term in nature and/or rank least important. For each strategy, stakeholders that will need to play a role in accomplishing them were identified. Lead agencies were also identified to coordinate the effort.

The following descriptions highlight each goal, explain objective(s) associated with them, and summarize only high priority strategies and their corresponding lead agency(s).

### Improve Coordination

The objective of improving coordination includes better communication among stakeholders. They expressed many issues related to this category, which revolved around a need to establish an IMTF in the corridor. Instituting an IMTF would satisfy the need to establish better communication among all stakeholders, not only PennDOT and PA State Police, but other partners such as local municipalities, the Delaware County Transportation Management Association (DCTMA), and SEPTA.

DVRPC agreed to establish and manage the task force, and will eventually turn over management responsibilities to the DCTMA.

Establishing CCTV video sharing between PennDOT's TMC and Delaware County 9-1-1 Center is another high priority, with PennDOT taking the lead. By sharing video directly, resources can be more efficiently dispersed to an incident.

## Enhance Corridor Management

Objectives to enhance corridor management include establishing official PennDOT Diversion Routes, deploying ITS equipment, improving signal operations, and mitigating capacity constraints.

Stakeholders prioritized ITS as a tool for management of the corridor, especially during construction projects. Examples of ITS technologies included in this category are VMS and speed detectors for travel time dissemination. CCTV cameras could be very effective tools for early incident detection and incident verification by PA State Police, as well as the Delaware County Emergency Operation Center, PennDOT Delaware County Maintenance office, DRPA, DELDOT, NJDOT, and local police, etc. Adding this ITS equipment on I-95 and parallel routes as necessary would address their need for better corridor management.

PennDOT is designing improvements to I-95 in the vicinity of US 322 to eliminate the weaving issues and improve capacity constraints. The project will replace the northbound left lane merge with a right merge, thus eliminating the weave between US 322 and the Commodore Barry Bridge, and upgrade the southbound US 322 Interchange. Also part of this project, VMS with travel times will be constructed on I-95 as per new federal requirements. PennDOT was identified as the lead agency for implementation of a traffic management plan, additional ITS devices in the corridor, and ensuring that a rail alternative is included in the project.

Identifying detour routes and installing trailblazing signs along them were a priority as well, with PennDOT chosen as the lead agency. Since this TSM&O effort ended, PennDOT has established "official" detour routes for I-95 in this corridor, and they are housed in DVRPC's IDRUM application.

Improving signal timings, including emergency preemption on select corridors (including detour routes) would help in the event of an emergency detour from I-95. This may require implementing more closed loop signal systems, improving communication between the municipalities and PennDOT so the TMC can manage signals in the event of an emergency, and instituting a Memorandum of Understanding between the municipalities and PennDOT to relinquish signal control in those circumstances. PennDOT will be the lead agency.

## Enhance Incident Management

Objectives to enhance incident management include improving fire response, improving incident location identification, clearing incidents quicker, and enhancing incident management operations.

Strategies in this category include establishing response boxes, to determine which fire company responds to which segment of the highway, since the municipality where the incident takes place is not always the closest responder. Delaware County 9-1-1 Center and local municipal response agencies will share the lead, while also working with PA State Police, to establish response areas.

Installing ramp designation signs and highway markers are a priority strategy to the stakeholders as well. By installing these signs, travelers are better able to communicate to 9-1-1 dispatchers the location of an incident. PennDOT will be the lead agency for this effort to manufacture and install the signs.

Increasing ESP coverage hours are also a high priority strategy, with PennDOT taking the lead to increase funding for the program.

The last high priority strategy in the Incident Management category is performing Post Incident Response Evaluations (PIRE). A PIRE is an informal debriefing to discuss all aspects of a particular incident. No formal notes are taken, and participants are able to communicate what went right or wrong during the incident, and what can be improved upon for future incident management. All agencies involved in the incident should be involved in the exercise, with PA State Police and PennDOT taking the lead with regard to organizing the meeting and leading the discussions.

## **Develop Parking Management**

The objective of parking management in this corridor is to provide park and ride opportunities. The stakeholders identified strategies associated with parking management as medium priority.

## **Enhance Traveler Information**

The objective of traveler information in this corridor is to simply provide more information about traffic conditions and travel options to the public. High priority strategies include enhancing stakeholder websites, enhancing DCTMA's coordination with larger employers, installing wayfinding signage to indicate destinations and attractions, and installing trailblazers for detour routes and transit stations (PennDOT and the City of Chester are co-leading a current project for this strategy). By including SEPTA transit information on PennDOT's website and vice-versa, there will be opportunities for travelers to make choices on their mode of transportation. DCTMA is envisioned as the lead agency to coordinate with large employers such as Boeing and the Crozer-Chester Medical Center to give them traveler information directly.

Table 2: Delaware County I-95 Corridor Improvement Strategy Matrix

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<p><b>Improve Coordination</b></p> <p>Improve communication among stakeholders.</p>		<p>Institute an Incident Management Task Force for the corridor.</p>	<ul style="list-style-type: none"> <li>■ <b>DCTMA</b></li> <li>■ DE Co. 9-1-1</li> <li>■ DE State Police</li> <li>■ DelDOT</li> <li>■ DRPA</li> <li>■ <b>DVRPC</b></li> <li>■ FHWA</li> <li>■ PA State Police</li> <li>■ PennDOT</li> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ Local Municipip's</li> <li>■ SEPTA</li> <li>■ Towing Co.'s</li> </ul>	<p>High</p>
		<p>Develop a contact list for distribution among the stakeholders.</p>	<ul style="list-style-type: none"> <li>■ PA State Police</li> <li>■ PennDOT</li> <li>■ Local Fire, Police, &amp; EMS Responders</li> </ul>	<p>High</p>
		<p>Institute a cross-agency training program.</p>	<ul style="list-style-type: none"> <li>■ Local Municipip's</li> <li>■ SEPTA</li> <li>■ Towing Co.'s</li> </ul>	<p>Medium</p>
		<p>Develop incident notification protocol to non-traditional partners.</p>	<ul style="list-style-type: none"> <li>■ <b>DCTMA</b></li> <li>■ DE Co. 9-1-1</li> <li>■ DelDOT</li> <li>■ DRBA</li> <li>■ DRPA</li> <li>■ PA State Police</li> <li>■ <b>PennDOT</b></li> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ Local Municipip's</li> <li>■ NJDOT</li> <li>■ SEPTA</li> <li>■ Towing Co.'s</li> </ul>	<p>Medium</p>
		<p>Establish CCTV video sharing between PennDOT TMC and Delaware County 9-1-1 Center.</p>	<ul style="list-style-type: none"> <li>■ DE Co. 9-1-1</li> <li>■ <b>PennDOT</b></li> </ul>	<p>High</p>

Source: DVRPC

\* Participating agencies listed in **bold** are envisioned as the lead agency.

\*\* High Priority projects are those that are short-term in nature and/or rank most important by the steering committee.

Medium Priority projects are those that are near-term in nature.

Low Priority projects are those that are long-term in nature and/or rank least important by the steering committee.



Table 2: Delaware County I-95 Corridor Improvement Strategy Matrix (Continued)

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<b>Enhance Corridor Management</b>	Establish PennDOT Diversion Routes	Identify detour routes to close gaps for I-95 detour routes in Delaware County.	<ul style="list-style-type: none"> <li>■ DVRPC</li> <li>■ PA State Police</li> <li>■ <b>PennDOT</b></li> <li>■ Local Municip.'s</li> </ul>	High
		Install trailblazing signs for detour routes.	<ul style="list-style-type: none"> <li>■ <b>PennDOT</b></li> <li>■ Local Municip.'s</li> </ul>	High
	Deploy ITS Equipment	Deploy CCTV cameras, VMS, and vehicle detection on I-95 from the Delaware State Line to the Philadelphia International Airport. This project would fill in the gaps in coverage on I-95 up to the airport. The Interstate Completion Plan calls for deployment of 19 CCTV cameras, 5 VMS, 40 vehicle detectors, and a stockpile of portable VMS's for this segment of I-95.	<ul style="list-style-type: none"> <li>■ FHWA</li> <li>■ <b>PennDOT</b></li> </ul>	High
	Improve Signal Operations	Improve signal timings, including emergency preemption, on select roadways through closed loop traffic signals, traffic signal optimization and incident management signal preemption. Possible roadways include PA 452, PA 291, US 13, and US 322 between I-95 and US 1.	<ul style="list-style-type: none"> <li>■ <b>PennDOT</b></li> <li>■ Local Municip.'s</li> <li>■ Local Fire, Police, &amp; EMS Responders</li> </ul>	High
	Improve Capacity Constraints	Advance the US 322 / I-95 Interchange Reconstruction Project. Ensure that a rail alternative is included in the project, and a traffic management plan is instituted.	<ul style="list-style-type: none"> <li>■ DE County Planning</li> <li>■ FHWA</li> <li>■ <b>PennDOT</b></li> <li>■ Local Municip.'s</li> </ul>	High
		Initiate the I-476 / I-95 Interchange Study to eliminate the I-95 lane drop.	<ul style="list-style-type: none"> <li>■ DE County Planning</li> <li>■ FHWA</li> <li>■ <b>PennDOT</b></li> <li>■ Local Municip.'s</li> </ul>	Medium

Source: DVRPC

\* Participating agencies listed in **bold** are envisioned as the lead agency.

\*\* High Priority projects are those that are short-term in nature and/or rank most important by the steering committee.

Medium Priority projects are those that are near-term in nature.

Low Priority projects are those that are long-term in nature and/or rank least important by the steering committee.

Table 2: Delaware County I-95 Corridor Improvement Strategy Matrix (Continued)

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**	
Enhance Incident Management	Improve Fire Company Responses	Establish fire response boxes based on quickest access.	<ul style="list-style-type: none"> <li>■ DE Co. 9-1-1</li> <li>■ Local Fire Co.'s</li> <li>■ PA State Police</li> </ul>	High	
		Draft an MOU for fire companies to commit to response box policy.		High	
	Improve Identification of Incident Locations	Install ramp designation and milemarkers along I-95 and I-476 and the interchanges at every tenth mile.	<ul style="list-style-type: none"> <li>■ PennDOT</li> </ul>	High	
		Institute a public education campaign on quick clearance policies and procedures.	<ul style="list-style-type: none"> <li>■ PA State Police</li> <li>■ PennDOT</li> </ul>	Medium	
	Clear Incidents Quicker	Increase emergency service patrol coverage hours.	<ul style="list-style-type: none"> <li>■ PennDOT</li> </ul>	High	
		Develop incident management policy and procedures guidelines with the IMTF, distribute the document to all involved stakeholders, and train recipients.	<ul style="list-style-type: none"> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ PA State Police</li> <li>■ PennDOT</li> </ul>	Medium	
	Enhance Incident Management Operations	Perform post incident debriefings.		<ul style="list-style-type: none"> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ PA State Police</li> <li>■ PennDOT</li> </ul>	High

Source: DVRPC

\* Participating agencies listed in **bold** are envisioned as the lead agency.

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Low Priority projects are those that are long-term in nature and/or rank least important by the steering committee.

Table 2: Delaware County I-95 Corridor Improvement Strategy Matrix (Continued)

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<b>Develop Parking Management</b>	Provide Park and Ride Opportunities	<p>Establish park and ride lots. Use VMS signs on I-95 to indicate available parking.</p> <p>Explore potential park and ride locations including the Boeing Plant.</p> <p>Explore opportunities to provide for parking expansion near the R2 stations with existing community facilities. For example, SEPTA has worked with a local church in Marcus Hook to provide parking for permit holders, and there are plans to expand the number of leased spaces.</p> <p>Explore other opportunities for parking expansion in Marcus Hook during the rebuilding of the PA 452 bridge over Amtrak tracks.</p>	<ul style="list-style-type: none"> <li>■ DCTMA</li> <li>■ PennDOT</li> <li>■ SEPTA</li> <li>■ Local Municipip's</li> </ul>	Medium
<b>Enhance Traveler Information</b>	Provide Traveler Information	<p>Install wayfinding signage to indicate destinations and attractions, and trailblazers for transit stations and detour routes.</p> <p>Distribute literature on road construction activity and detours.</p> <p>Enhance stakeholder websites to provide traveler information. For example, SEPTA's R2 Regional Rail line trip status can be viewed using "Train View" on DCTMA's website.</p> <p>Enhance DCTMA's coordination with larger employers (Boeing, Philadelphia International Airport, Crozer-Chester Medical Center, Harrah's Casino, car rental agencies, etc.) to provide real time travel information, which is then relayed to employees via intra-office websites, fax servers, or emails.</p>	<ul style="list-style-type: none"> <li>■ PennDOT</li> <li>■ City of Chester</li> <li>■ Local Municipip's</li> <li>■ SEPTA</li> <li>■ DCTMA</li> <li>■ PennDOT</li> <li>■ DCTMA</li> <li>■ PennDOT</li> <li>■ Local Municipip's</li> <li>■ Major Employers</li> <li>■ SEPTA</li> <li>■ DCTMA</li> <li>■ Major Employers</li> <li>■ PennDOT</li> </ul>	High

Source: DVRPC

\* Participating agencies listed in **bold** are envisioned as the lead agency.

\*\* High Priority projects are those that are short-term in nature and/or rank most important by the steering committee.

Medium Priority projects are those that are near-term in nature.

Low Priority projects are those that are long-term in nature and/or rank least important by the steering committee.

## Recommendations

It is important to note that all high priority strategies in the previous section are considered recommendations. Once projects were prioritized, the stakeholders placed initial emphasis on the following key high priority strategies:

- ▶ **Establish an Incident Management Task Force** - DCTMA has volunteered to lead the Incident Management Task Force effort for this corridor with initial help from DVRPC. Just after this project ended, DVRPC established the task force and held a kick-off meeting.
- ▶ **Plan Diversion Routes** - PennDOT has identified detour routes and is currently in the process of implementing color-coded trailblazers for the routes.
- ▶ **Install Mile Marker Signage**

## Coordinating with the Regional Operations Plan

PennDOT has developed a District-6-0 Regional Operations Plan (ROP). The ROP is an outgrowth of PennDOT's approved Transportation Systems Operations Plan (TSOP) which sets the statewide direction for projects in intelligent transportation systems and operations. The Regional Operations Plan extends TSOP to the regional level, defines the strategic transportation operations program for the region, expands cooperative relationships between regional transportation operators and planning partners, and achieves uniformity across regions.

Short-term ROP projects applicable to the corridor include (listed by priority):

- ▶ ROP Priority 1: I-95 ITS Deployment (Delaware State Line to the Philadelphia International Airport)
- ▶ ROP Priority 8: Establish Incident Management Task Forces
- ▶ ROP Priority 9: Install a fiber connection to the Delaware Department of Transportation
- ▶ ROP Priority 10: Implement IDRuM

# New Jersey Turnpike and I-295 Corridor

## Overview

### Boundaries

The study corridor runs in a northeast direction through Camden and Burlington Counties. The focus is the New Jersey Turnpike and I-295, which are parallel routes, from NJ 168 in the south to NJ 73 in the north. The study area is shown in [Figure 4](#).

### Transportation Networks

Several highways of varying functional classification ranging from local roads to interstate highways serve the corridor.

### Freeways

The focal points of this study are the New Jersey Turnpike and I-295, which run parallel to each other through the entire corridor. At each end of the study corridor, I-295 and Turnpike interchanges are located approximately one mile apart, allowing for easy access between the two highways.

The New Jersey Turnpike is a major toll road, which extends the length of the state and is a vital artery for interstate commerce. The Turnpike is a four-lane, toll highway providing high levels of mobility for long distance trips in the Northeast Corridor. The study corridor is bookended by Interchange 3 – NJ 168, Camden/Philadelphia at the south and Interchange 4 – NJ 73, Camden/Philadelphia to the north.

I-295 is also a major commercial artery, and is a six-lane highway that parallels the New Jersey Turnpike. It also serves the local traffic needs of Salem, Gloucester, Camden, Burlington, and Mercer counties. The I-295 Bellmawr/Runnemede/Mount Ephraim Interchange (Interchange 28) is situated at the southern end of the study corridor provides direct access to NJ 168. At the north, Interchange 36 provides access to NJ 73 and the Tacony Bridge. As well as the two interchanges at the corridor limits, I-295 has four additional ones that access US 30 (White Horse Pike), PATCO's Woodcrest Station, CR 561 Haddonfield-Berlin Road, and NJ 70 (Marlton Pike).

Just south of the corridor is NJ 42, which is a north-south controlled access facility that runs between the Atlantic City Expressway and Philadelphia. There is direct access to NJ 42 from the I-295/I-76 Interchange in Bellmawr via NJ 168. This interchange also provides access to I-76 that in conjunction with I-676, provides a direct express link from I-295 in Camden County to the Walt Whitman Bridge, Ben Franklin Bridge, and the cities of Camden and Philadelphia.

## Arterial Roadways

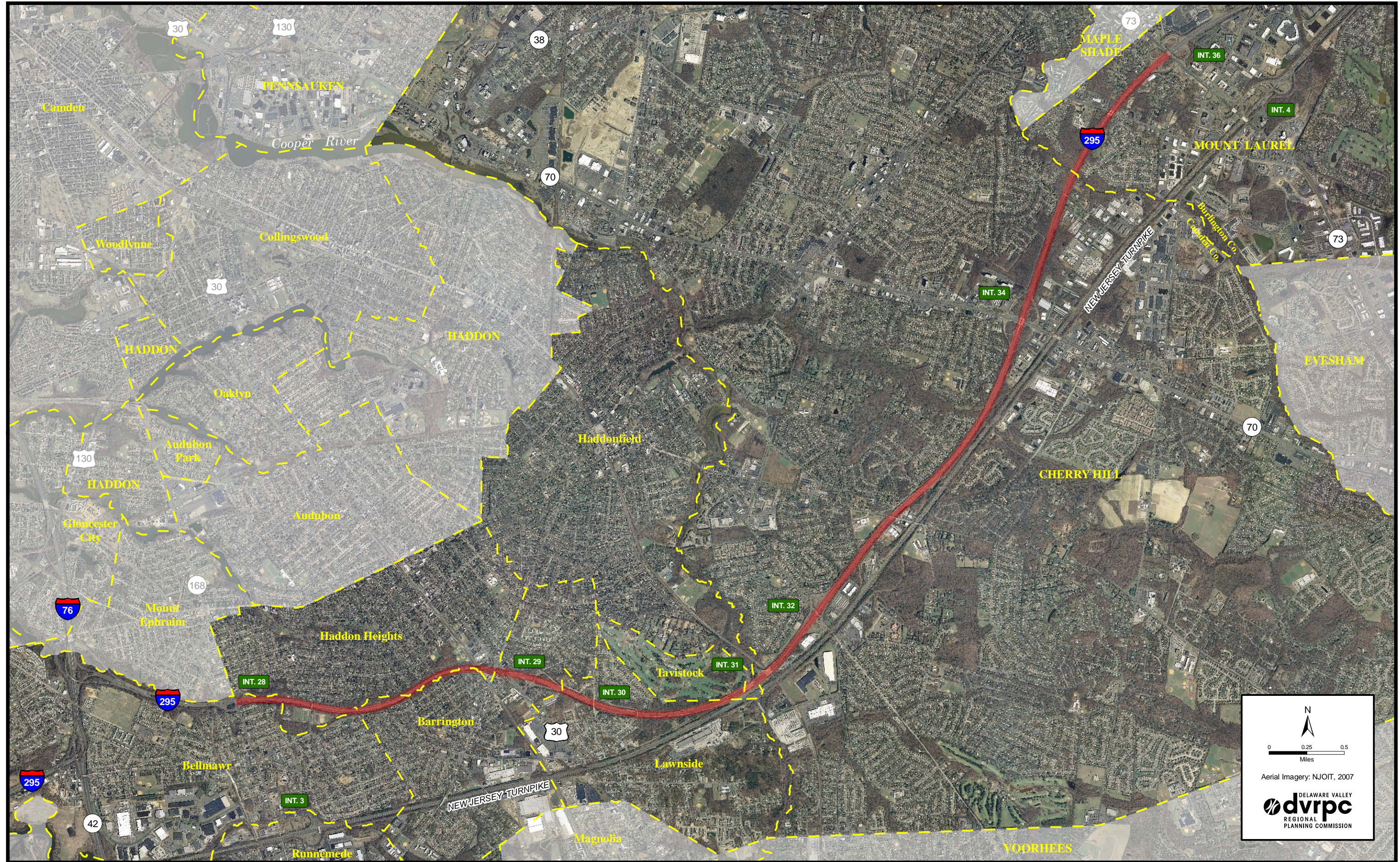
The study area is served by several state, county, and local routes that run parallel to or intersect with both I-295 and the NJ Turnpike. Together they form a network that provides land access and enables traffic circulation within the corridor (Figure 4).

The following is a listing of the arterial network in the study area that has direct access to either the NJ Turnpike and/or I-295:

- ▶ NJ 73 is located at the northern limit of the corridor and provides access to both I-295 and the NJ Turnpike. It intersects I-295 at Interchange 36, and the NJ Turnpike at Interchange 4. It is composed of three lanes in each direction, with lane drops to two at the turnpike. It is classified as an urban principal highway serving retail, employment, and residential destinations in both Camden and Burlington County.
- ▶ NJ 70 is an east-west facility that bisects the corridor. It is an urban principal highway and utilized as a major thoroughfare running through Cherry Hill. It generally has four to six travel lanes and provides direct access to I-295 via Interchange 34.
- ▶ CR 561, Haddonfield-Berlin Road, is a four-lane north-south facility in Camden County. It intersects with I-295 via Interchange 32.
- ▶ Interchange 31 of I-295 directly serves PATCO's Woodcrest Station. This is a major park and ride facility in the region. Commuters drive to the station and take PATCO into Philadelphia.
- ▶ US 30, the White Horse Pike, bisects the corridor in the southern section and is generally a four-lane east-west facility, with additional lanes near I-295. US 30 intersects with I-295 via Interchange 29.
- ▶ NJ 168 is an east-west, three-lane facility at the southern end of the corridor running northwest from Washington Township, Gloucester County, to Camden City, Camden County, serving regional and local traffic in southern New Jersey. There is direct access to I-295 and the NJ Turnpike whose interchanges, 28 and 3, respectively, are less than one mile apart.

The following is a listing of the arterial network in the study that act as collector roads and connect to many of the roads listed above.

- ▶ NJ 41, Kings Highway, is a north-south facility that parallels I-295/NJ Turnpike serving retail and residential destinations in both Camden and Burlington Counties.







- ▶ NJ 154, Brace Road, is a north-south road that traverses through a mainly residential neighborhood, but is often used as a connector between NJ 70 and CR 561.
- ▶ Kresson Road (CR 671) is an east-west county road serving retail and residential destinations in the vicinity of NJ 70 in Cherry Hill.
- ▶ Greentree Road (CR 683) is an east-west facility serving retail and residential destinations in the NJ 70 corridor area. Greentree Road is a heavily utilized connector between NJ 70 and NJ 73.
- ▶ Springdale Road (CR 673) is the main access facility into the Cherry Hill Industrial Park, located east of I-295 on the north side of NJ 70.
- ▶ Cropwell Road (CR 675) carries both regional and local traffic between Old Marlton Pike and Voorhees Township. Cropwell Road is a north-south facility.

## Transit

### Bus

NJ Transit is the primary scheduled transit provider in this corridor. There are seven bus routes, as shown in [Figure 5](#), within the study area: Routes 400, 403, 406, 451, 455, 457, and 318. Only the Route 318 operates on I-295 while the other six either cross or parallel I-295 or the NJ Turnpike. Routes 455 and 457 also run north south to the west of I-295 and the Turnpike. The other routes generally run east west bisecting the corridor. Philadelphia and/or Camden are the primary origins for these services, and their destinations are typically outside the study area in suburban South New Jersey. Many of the routes converge in Camden at the Walter Rand Transportation Center.

The following is a list of NJ Transit bus routes in the study area:

- ▶ Route 400: Sicklerville to Philadelphia passing through the study area along NJ 168 (Black Horse Pike);
- ▶ Route 403: Philadelphia to Turnersville, running along US 30 (White Horse Pike) connecting with both the Echelon Mall and Lindenwold PATCO Station, which are outside of the study area;
- ▶ Route 406: Philadelphia to Marlton, with variations outside the study area to Berlin and Medford Lakes. The bus runs along Marlton Pike (NJ 70) from the intersection of Marlton Pike and Roosevelt Avenue to Marlton Circle (NJ 70 and NJ 73);
- ▶ Route 451: Camden to Echelon Mall, operating predominantly on Haddon Avenue and Haddonfield-Berlin Road;
- ▶ Route 457: Camden to Moorestown Mall, traveling north on Kings Highway (CR 551), looping around the Haddonfield Train Station (PATCO) and continuing on to Kings Highway (NJ 41), turning east on Church Road (CR 616), north again on Fellowship Road ( CR 673), finally looping back at Harper Drive into the Moorestown Mall;
- ▶ Route 455: Paulsboro to the Cherry Hill Mall, traveling north on Kings Highway (NJ 41) and connecting with the Haddonfield Train Station (PATCO), and circling into Cherry Hill Mall; and

- ▶ Route 318: Philadelphia to Six Flags Great Adventure, operating between July and Labor Day, leaving Philadelphia in the morning and departing Six Flags Great Adventure in the evening. This bus route runs closed-door through the study area.

## Rail

The study area and surrounding region is served by regional train service oriented to Center City Philadelphia (Figure 5). Port Authority Transit Corporation (PATCO) is a regional rail line providing service between Lindenwold and Center City Philadelphia via Camden City. PATCO stations, within the study area, are at Woodcrest, Haddonfield, and Westmont. Commuter bus service is available to these stations. On I-295, there is direct access to the Woodcrest Station via Interchange 31.

The New Jersey Transit Atlantic City Line stops in Cherry Hill. The station is located near the Garden State Park behind The Pavilions Shopping Center, with connecting bus service. It is possible to transfer between PATCO and the Atlantic City Line at Lindenwold Station.

## Stakeholders

It was important to engage a wide variety of stakeholders in this process since the corridor covers multiple modes of transportation and spans seven municipalities: the boroughs of Barrington, Bellmawr, Haddon Heights, Lawnside, Runnemede, and the townships of Cherry Hill and Mount Laurel. **Table 3** lists stakeholders that have been involved in the development of this project.

In general, the operational and management responsibilities of I-295 are performed by NJDOT, while the operations of the New Jersey Turnpike are performed by the New Jersey Turnpike Authority. Enforcement, security, and crash investigation are the responsibility of the New Jersey State Police and local law enforcement agencies. Emergency services are dispatched by county communication centers, and are the responsibility of local fire departments.

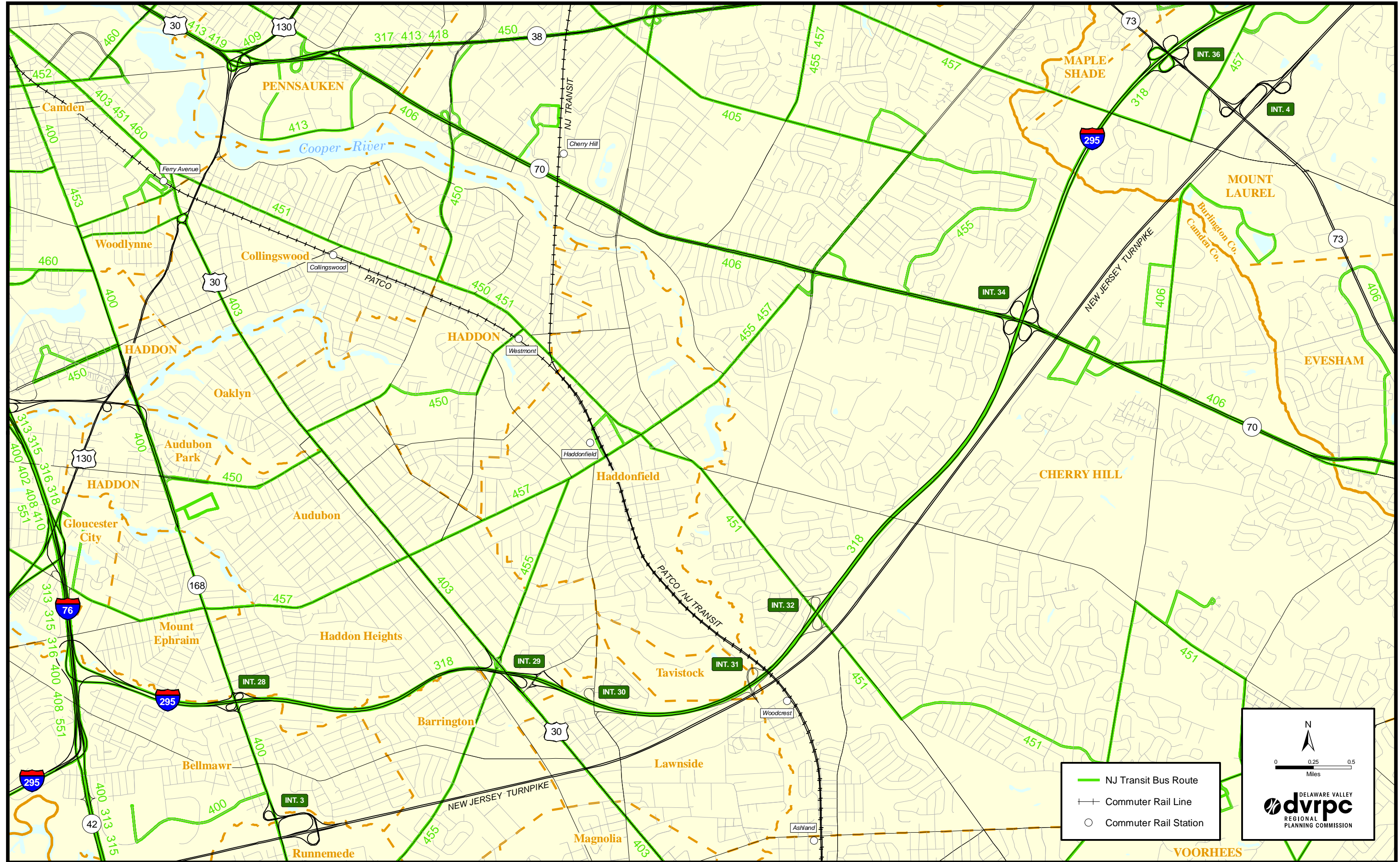




Table 3: NJ Turnpike/I-295 Corridor Stakeholders

Municipalities	Police and Fire Departments	Regional Agencies
Borough of Barrington	Barrington Emergency Management	Burlington County Engineering
Borough of Bellmawr	Barrington Fire Department	Burlington County Communications
Cherry Hill Township	Barrington Police Department	Camden County Engineering
Borough of Haddon Heights	Bellmawr Fire Department	Camden County Communications
Borough of Lawnside	Bellmawr Police Department	Cross County Connection TMA
Mount Laurel Township	Cherry Hill Fire Department	DVRPC
Runnemede Borough	Cherry Hill Police Department	Federal Highway Administration
	Haddon Heights Fire Department	<ul style="list-style-type: none"> <li>■ New Jersey Division</li> </ul>
	Haddon Heights Police Department	NJDOT
	Mount Laurel Fire Department	<ul style="list-style-type: none"> <li>■ Traffic Operations South</li> <li>■ STMC</li> <li>■ Maintenance South</li> <li>■ Project Management</li> <li>■ Traffic Engineering and Safety</li> </ul>
	Mount Laurel Police Department	NJ Transit
	New Jersey State Police	NJ Turnpike Authority
	Runnemede Fire Department	<ul style="list-style-type: none"> <li>■ STMC</li> </ul>
	Runnemede Police Department	Port Authority Transit Corporation (PATCO)

Source: DVRPC

## Existing Operational Inventory

A significant investment in ITS technologies has already taken place in this corridor, such as the installation of CCTV cameras, VMS, and HAR. These technologies assist NJDOT staff in their Traffic Operation Center (TOC South), in Cherry Hill Township, monitors traffic conditions, assists in incident management, and disseminates information to the public. **Figure 6** displays ITS elements in the corridor. NJDOT-TOC South serves the 10 southernmost counties in New Jersey. All new ITS systems now include fiber optic communication to the TOC that allow staff to monitor and operate the ITS equipment.

NJDOT-TOC South also assists in incident management by dispatching ESP on major highways; coordinating Incident Management Response Teams (IMRT); and disseminating information to the public. The IMRT project was instituted by NJ State Police, where members respond to major highway incidents or planned events and direct the proper response and use of NJDOT resources in the most efficient way.

A closed loop traffic signal system has been installed on US 30, NJ 38, NJ 70, and NJ 73, which allows NJDOT's staff to operate the traffic signals along the corridor remotely from the TOC. Traffic signals on these systems are interconnected through a fiber optic network to allow communications with the TOC. In Camden County, the municipalities operate traffic signals on county roads.

The New Jersey Statewide Transportation Management Center (STMC) is another major operational improvement that has been recently implemented. It is a 24 hour, 7 day a week center jointly

operated and staffed by the New Jersey Turnpike Authority, NJDOT, and NJ State Police. Co-location of these agencies affords simple and effective coordination of traffic incidents and emergencies. Each of the agencies manages its own roadways from the STMC, but is supported by a technology base that shares information and video across agency boundaries. This new center became operational in April 2008. The NJDOT Traffic Operation Center in Cherry Hill has become a satellite center and is open five days a week. It closes during the overnight hours and on weekends, at which point all control is performed by the STMC.

The same database that supports the STMC also provides accurate and timely information to the motorists via NJ 511 Travel Information. NJ 511 provides motorists with real time traffic and travel information about accidents, incidents, and unusual delays on Interstate and state highways, the New Jersey Turnpike and the Garden State Parkway. By using NJ 511, motorists can make informed decisions about planning trips, alternate routes, and departure times. This improves individual drivers' trips and helps reduce congestion and improve safety on state highways.

Building upon existing procedures and relationships, the New Jersey Turnpike Authority developed a Traffic Incident Management Diversion Route Plan. The plan is the result of a combined effort of the NJ Turnpike Authority, NJDOT, and NJ State Police. The plan is intended to improve traffic incident management through better communications and more efficient use of available resources when incidents on the NJ Turnpike necessitate a diversion. The initial portion of the plan deals with interchanges 1 to 9. The protocol for incident-based closures is determined by the incident duration. The plan includes appropriate northbound and southbound detour plans. For each diversion segment, primary and secondary routes have been developed that dictate the official detour route for directing motorists to their destinations. Included are key contact phone numbers for notifications to affected agencies, law enforcement, and/or local municipalities.

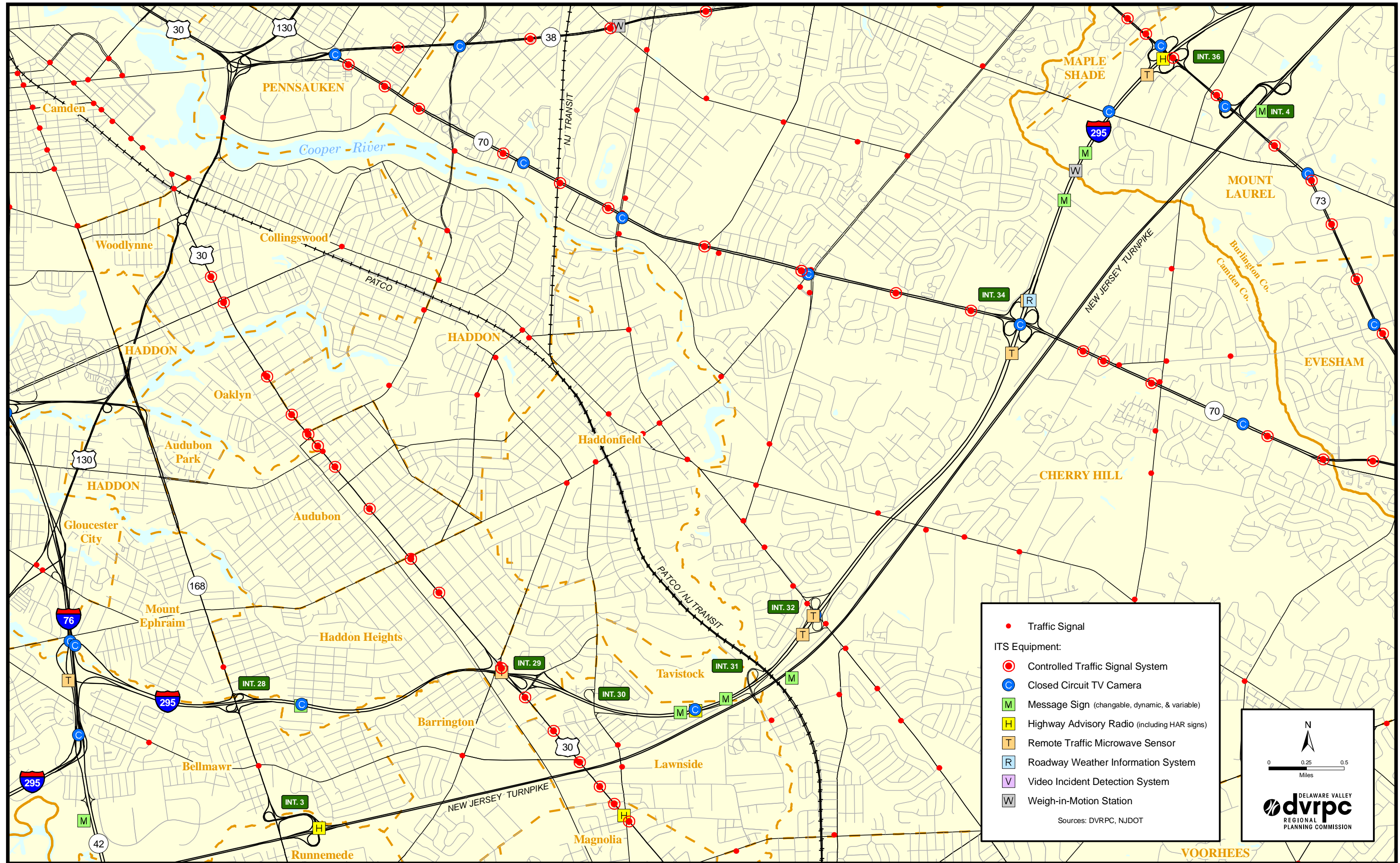
Currently, NJDOT's detour route maps for Burlington and Camden Counties have been incorporated into DVRPC's IDRuM application. The ultimate goal is to integrate NJDOT's detour route maps for all New Jersey counties, with IDRuM being utilized statewide.

In coordination with NJDOT and NJ State Police, DVRPC has helped to establish the NJ 42/55, I-76/676/295 Incident Management Task Force. The purpose of an incident management task force is to foster communication and cooperation among organizations that are involved in responding to traffic incidents in these complex and congested interchange areas, to identify the incident management needs of those organizations, and to address those needs through funding, training or other programs. IMTF members represent municipal police, fire and EMS, county communications, NJ State Police, NJDOT, NJ Department of Environmental Protection (DEP), Delaware River Port Authority (DRPA) Police, the towing industry, and other appropriate emergency responders, as well as applicable regional agencies. The IMTF has also developed a Policy and Procedures Manual that provides responders uniform operational guidelines for safe operations at the scene of an incident.

The Cross County Connection TMA (CCCTMA) has unveiled "Traffic Connection," a dynamic electronic service that provides registered users with up-to-the-minute accident alerts and announcements to help in avoiding traffic congestion and delays in the Southern New Jersey area. Utilizing SMS (simple messaging service) technology, this free service delivers plain text alerts (with no attachments), to mobile electronic devices such as: cell phones, PDAs, Blackberrys and other e-mail enabled mobile devices.

NJ Turnpike/I-295 Corridor: ITS Equipment & Traffic Signals

Figure 6







## Corridor Issues and Needs

Workshop meetings were held and attended by a large group of stakeholders throughout the corridor. They each brought a different organizational perspective and experience that helped to guide this effort. The stakeholders have similar interests in improving the efficiency of the corridor. The purpose of the workshop meetings was to identify and prioritize the needs of the corridor.

### Issues

The following is a list of issues and topics raised at the workshop meetings.

- ▶ Better communications are needed between the NJDOT and NJ Turnpike.
- ▶ There is a lack of communications between NJDOT, NJ Turnpike, and the municipalities. Currently, this communication rarely exists and municipalities are frequently unaware of the diversion route information that NJDOT or NJ Turnpike is instructing to motorists.
- ▶ There is no policy for NJDOT to coordinate with the Camden County Communication Center when an incident occurs.
- ▶ There is a lack of coordination with NJ Transit when an incident occurs. Overflow traffic from the NJ Turnpike and I-295 impacts transit operations on the arterials.
- ▶ There is a need for more ramp designation signs north on I-295. Currently, these signs are only installed along NJ 42, I-676, I-76 and I-295 in the vicinity of the I-295/I-76/NJ 42 Interchange. The signs would help emergency responders locate incidents quicker and avoid congestion.
- ▶ There is a need for trailblazing signs along diversion routes, so when an incident happens, motorists can make better choices once off I-295 or the NJ Turnpike.
- ▶ There is a need for more variable message signs along the corridor to help motorists make better en route decisions during incidents.
- ▶ There is a need for the NJ Turnpike to use its HAR to not only broadcast information on their facility, but other routes for short-term incidents and on VMS for long term incidents.
- ▶ NJDOT, NJ Turnpike, municipalities, NJ Transit, and the county communications center do not currently directly share CCTV camera images and other traffic data.
- ▶ ITS needs to be a priority during construction projects.
- ▶ There is a need to construct a new NJ Turnpike interchange at US 30. Since the Turnpike is widening south from Interchange 6, it may be a good time to make recommendations now for a new interchange.
- ▶ Operational information from NJ Transit, NJ Turnpike, and NJ DOT is wanted from local municipalities in a bundled package via email or text messaging.

## Goals, Objectives and High Priority Strategies

As a result of the working meetings, and with respect to needs identified by the stakeholders, an Improvement Strategy Matrix (**Table 4**) was developed. The Improvement Strategy Matrix classifies corridor operational issues into four goals: Improve Coordination, Enhance Corridor Management, Enhance Incident Management, and Enhance Traveler Information.

For each operational goal, strategies were identified to meet their objectives. The following highlights each goal, explains the objective(s) associated with it, and summarizes high priority strategies and their corresponding lead agency(s).

### Improve Coordination

Under the category of Improve Coordination, stakeholders expressed many concerns which revolved around a lack of coordination with NJDOT and NJ Turnpike. Since NJDOT and NJ Turnpike have co-located at the STMC, coordination between them has improved. But there appears to be a lack of communication between them and the local municipalities and NJ Transit, especially during incidents. Often, NJ Turnpike or NJDOT will detour traffic off of their facilities and the local municipalities will not be aware of it until they see the influx of traffic on their roads. Also, NJ Transit is not usually aware of detours until their bus drivers report that one has been deployed.

One objective to address these issues is to establish better communication among all stakeholders, including partners such as local municipalities, the TMA, towing companies, and NJ Transit.

The first strategy is to establish a new IMTF while continuing to support the NJ 42/55, I-76/676/295 IMTF. This corridor has already committed a lot of time and effort into establishing one of the premier IMTF's in New Jersey. To build upon this effort, a second IMTF could be implemented in the northern part of the corridor in Mt Laurel, Burlington County. Initially, the lead agencies will be either NJDOT or NJ State Police. To further improve coordination, the two task forces should periodically hold joint meetings because they each face many of the same issues.

A second strategy in this category is to institute a cross-agency training program, with NJDOT and NJ State Police identified as lead agencies. The benefit of this type of training is that stakeholders will begin to interact and work together before they arrive at an incident scene. The relationships built during training will help to improve response for all emergency responders (police, fire, EMS, NJDOT, NJ State Police, and the towing and recovery community).

The third strategy in this category is to develop incident notification protocols and institute procedures for the NJDOT and NJ Turnpike to share information with municipalities, NJ Transit, and the county during an incident. Enacting procedures will help enhance coordination between the NJDOT, NJ Turnpike, and all stakeholders.

## Enhance Corridor Management

Under the category of Enhance Corridor Management, stakeholders discussed the need for ITS to be a priority for management of the corridor. Objectives include deploying additional ITS equipment, establishing diversion routes, improving signal operations, and fixing capacity constraints.

A high priority improvement that was identified is to establish local diversion routes. As described earlier, NJDOT and NJ Turnpike have a Traffic Incident Management Diversion Route Plan for the NJ Turnpike. It is important to note, however, that since this project ended, official detour routes have been established and can be found on the IDRUM website for I-295 through the corridor, and it is no longer a high priority improvement.

Also identified in this category is the need for ITS to be a priority for management of the corridor. More specifically, additional VMS and travel information detectors, such as speed detectors should be installed for travel time dissemination, as per Federal guidelines. Both NJDOT and NJ Turnpike are identified as the lead agencies for implementation of additional ITS devices in the corridor.

## Enhance Incident Management

There has already been significant work regarding incident management in the corridor. However, the stakeholders understand that this needs to be an ongoing effort and possibly expand north, into Burlington County and the Mt Laurel area. Other objectives in this category include the need to improve fire company response, improve identification of accident locations, clear incidents quicker, and enhance incident management operations.

One of the high priority improvement strategies is to be able to enact statewide quick clearance legislation. There are many different facets of quick clearance that could be enacted. One is to give authority to emergency responders to quickly remove debris from the highway and reducing their liability, if the clearance is done in a manner that is not reckless or negligent. There are also "Move It" laws that require motorists involved in minor crashes to move their vehicles out of the traffic lanes to a safer location. Another strategy is enacting tow-away policies that remove disabled vehicles from roadway shoulders to reduce the potential for moving traffic to collide with parked vehicles. It also helps to clear the way for any emergency vehicles that may be using the shoulder to get to an incident scene. All of these quick clearance policies are aimed at clearing the highway of hazards that cause both congestion and increase the possibility of secondary crashes. The lead agencies for this strategy are NJ State Police and NJDOT.

A second high priority improvement is to institute widespread training on quick clearance policies and procedures, and incorporate public education into this process. The benefit of multidisciplinary training is that emergency responders can build relationships among each other prior to meeting at the scene of an incident.

## Enhance Traveler Information

The objective of enhancing traveler information in this corridor is to provide more travel options to the public. A high priority strategy is installing trailblazer signs for diversion routes. Another component is to utilize stakeholder websites and ITS equipment to broadcast traveler information.

Both NJDOT and the Cross County Connection TMA have conducted recent upgrades to their traveler information systems. NJDOT has implemented the NJ 511 Travel Information. This system includes phone, website, and personalized traveler information services. *My NJ511* is a free subscription based service that sends up-to-the-minute information about traffic accidents, incidents, congestion, and active construction directly to subscribers' cell phones and email accounts. Municipalities may be able to use this service to get instant notification about incidents on I-295 or the NJ Turnpike that will affect their communities. The Cross County TMA has also instituted a text messaging service for travel and incident information distribution

Table 4: NJ Turnpike/I-295 Corridor Improvement Strategy Matrix

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<b>Improve Coordination</b>	Better communication among stakeholders.	Continue to support the NJ 42/55, I-76/676/295 IMTF. Implement an IMTF for the northern part of the corridor (Mt Laurel, Burlington County). Periodically hold joint meetings of the two IMTF's.	<ul style="list-style-type: none"> <li>■ Burlington Co. Communication Center</li> <li>■ Burlington Co. Engineering</li> <li>■ Camden Co. Communication Center</li> </ul>	High
		Develop a contact list for distribution among the stakeholders.	<ul style="list-style-type: none"> <li>■ CCTMA</li> <li>■ DVRPC</li> <li>■ FHWA</li> <li>■ <b>NJDOT</b></li> <li>■ <b>NJ State Police</b></li> </ul>	Medium
	Institute a cross-agency training program.	<ul style="list-style-type: none"> <li>■ NJ Turnpike</li> <li>■ NJ Transit</li> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ Local Municipip's</li> <li>■ Towing Co.'s</li> </ul>	High	

Source: DVRPC

\* Participating agencies listed in **bold** are envisioned as the lead agency.

\*\* High Priority projects are those that are short-term in nature and/or rank most important by the steering committee.

Medium Priority projects are those that are near-term in nature.

Low Priority projects are those that are long-term in nature and/or rank least important by the steering committee.

Table 4: NJ Turnpike/I-295 Corridor Improvement Strategy Matrix (Continued)

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<p><b>Improve Coordination (continued)</b></p> <p>Better communication among stakeholders.</p>		<p>Institute incident notification procedures for NJDOT &amp; NJ Turnpike to share information with municipalities during an incident.</p>	<ul style="list-style-type: none"> <li>■ Burlington Co. Communication Center</li> <li>■ Camden Co. Communication Center</li> <li>■ CCCTMA</li> <li>■ <b>NJDOT</b></li> <li>■ <b>NJ State Police</b></li> <li>■ <b>NJ Turnpike</b></li> <li>■ <b>NJ Transit</b></li> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ Local Municipip's</li> </ul>	<p>High</p>
		<p>Institute a policy for NJDOT &amp; NJ Turnpike to coordinate with the County Communication Centers.</p>		
		<p>Develop notification protocol by NJDOT to NJ Transit when an incident occurs.</p>		
		<p>Continue to enhance coordination between NJDOT and NJ Turnpike.</p>		
		<p>Establish CCTV video sharing between stakeholders.</p>	<ul style="list-style-type: none"> <li>■ Burlington Co. Communication Center</li> <li>■ Burlington Co. Engineering</li> <li>■ Camden Co. Communication Center</li> <li>■ <b>NJDOT</b></li> <li>■ NJ Turnpike</li> <li>■ NJ Transit</li> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ Local Municipip's</li> </ul>	

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Table 4: NJ Turnpike/I-295 Corridor Improvement Strategy Matrix (Continued)

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<b>Enhance Corridor Management</b>	Deploy ITS Equipment	Add more VMS along the corridor.	<ul style="list-style-type: none"> <li>■ FHWA</li> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> </ul>	High
		Install travel information detectors, such as speed detectors for travel time dissemination.		
		Make ITS needs a priority during construction projects		
	Improve Signal Operation	Improve signal timings on select corridors through closed loop traffic signals, traffic signal optimization, and incident management signal preemption.	<ul style="list-style-type: none"> <li>■ Burlington Co. Engineering</li> <li>■ NJDOT</li> <li>■ NJ Transit</li> <li>■ Local Municipip's</li> </ul>	Medium
Improve Transit Vehicle Priority on NJ 168, NJ 70 and select corridors. Transit signal priority systems use sensors to detect approaching transit vehicles and alter signal timings to improve transit performance.				
Improve Capacity Constraints	Investigate possibility of a new NJ Turnpike interchange near US 30.	<ul style="list-style-type: none"> <li>■ NJ Turnpike</li> </ul>	Low	

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Table 4: NJ Turnpike/I-295 Corridor Improvement Strategy Matrix (Continued)

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<b>Enhance Incident Management</b>	Improve Fire Company Responses	Establish fire response boxes based on quickest access, and have fire companies sign an MOU to commit to response box policy.	<ul style="list-style-type: none"> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> <li>■ <b>NJ State Police</b></li> <li>■ Local Fire, EMS</li> </ul>	Low
	Improve Identification of Accident Locations	Expand mile markers and ramp designation signs. Coordinate designs between NJDOT and NJ Turnpike.	<ul style="list-style-type: none"> <li>■ <b>NJDOT</b></li> <li>■ <b>NJ Turnpike</b></li> </ul>	Medium
	Clear Incidents Quicker	Enact statewide Quick Clearance legislation.	<ul style="list-style-type: none"> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> <li>■ <b>NJ State Police</b></li> </ul>	High
		Institute widespread training on quick clearance policies and procedures. Incorporate public education into this process.	<ul style="list-style-type: none"> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> <li>■ <b>NJ State Police</b></li> </ul>	High
		Develop an incident management policy and procedures guidelines with the incident management task force in the Mount Laurel area, distribute the document to all involved stakeholders, and train recipients.	<ul style="list-style-type: none"> <li>■ Burlington Co. Communication Center</li> <li>■ DVRPC</li> <li>■ FHWA</li> <li>■ <b>NJDOT</b></li> <li>■ <b>NJ State Police</b></li> <li>■ NJ Turnpike</li> <li>■ Local Fire, Police, &amp; EMS Responders</li> <li>■ Local Municipip's</li> <li>■ Towing Co.'s</li> </ul>	Medium
	Enhance Incident Management Operations	Perform post incident debriefings.	<ul style="list-style-type: none"> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> <li>■ <b>NJ State Police</b></li> <li>■ Local Fire, Police, &amp; EMS Responders</li> </ul>	Low

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Table 4: NJ Turnpike/I-295 Corridor Improvement Strategy Matrix (Continued)

Goal	Objective	Improvement Strategy	Participating Agencies*	Priority**
<b>Enhance Traveler Information</b>	Provide Traveler Information	Install trailblazing signs for diversion routes.	<ul style="list-style-type: none"> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> </ul>	High
		Distribute literature on construction and detours.	<ul style="list-style-type: none"> <li>■ CCCTMA</li> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> </ul>	Low
		Utilize stakeholder websites to provide traveler information: Cross County Transportation Management Association: <a href="http://www.driveless.com">www.driveless.com</a> , NJDOT's website (including 511): <a href="http://www.NJcommuter.com">www.NJcommuter.com</a> , and NJ Transit website: <a href="http://www.njtransit.com">www.njtransit.com</a>	<ul style="list-style-type: none"> <li>■ CCCTMA</li> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> <li>■ NJ Transit</li> </ul>	High
		Distribute travel and incident information from NJ Transit, NJ Turnpike and NJDOT to locals in a bundled package via email or text messaging.	<ul style="list-style-type: none"> <li>■ CCCTMA</li> <li>■ NJDOT</li> <li>■ NJ Turnpike</li> <li>■ Local Municipip's</li> </ul>	High
		Allow NJ Turnpike's HAR to broadcast information about other routes for short-term incidents and on VMS for long-term incidents	<ul style="list-style-type: none"> <li>■ NJ Turnpike</li> </ul>	Low

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## Recommendations

It is important to note that all high priority strategies described in the previous section are considered recommendations. Once projects were prioritized, the stakeholders placed emphasis on the following key high priority strategies:

- ▶ **Establish an incident management task force in Burlington County**
- ▶ **Develop incident notification protocols**
- ▶ **Enact statewide Quick Clearance legislation**
- ▶ **Install trailblazing signs for diversion routes**

It is recommended that agencies step forward to lead individual operations projects based on their level of interest and need. Each strategy has a defined lead agency, and these lead agencies will need to take the initiative to move operations projects forward.

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Geographic Area Covered: Delaware County I-95 Corridor in Pennsylvania extending from the border of Philadelphia to the Delaware State Line. The NJ Turnpike and I-295 Corridors through Camden and Burlington Counties from NJ 168 to NJ 73.

Key Words: Transportation systems management and operations, TSM&O, transportation operations, transportation management, Intelligent Transportation Systems (ITS), traffic management, transit management, corridor management, incident management

Abstract: This document examines Transportation Systems Management and Operations (TSM&O) in two corridors. The purpose of this project is to provide stakeholders with tools to define the framework for implementing improvement strategies and tackling institutional issues in the selected corridors. The corridor selected from the New Jersey side of DVRPC's region is NJ Turnpike/I-295 between NJ 73 and NJ 168; and the corridor from the Pennsylvania side is I-95 in Delaware County. Since both corridors span multiple municipalities and cover various modes of transportation, there was opportunity to gain consensus on common goals, and identify transportation systems management and operations opportunities.

Staff Contacts:

Christopher W. King  
Senior Transportation Planner  
✉ cking@dvrpc.org

Laurie Matkowski  
Senior Transportation Engineer  
✉ lmatkowski@dvrpc.org

Delaware Valley Regional Planning Commission  
190 N. Independence Mall West, 8th Floor  
Philadelphia PA 19106  
Phone: (215) 592-1800  
Fax: (215) 592-9125  
Internet: [www.dvrpc.org](http://www.dvrpc.org)

